INDEPENDENT ORBITER ASSESSMENT

ASSESSMENT
OF THE
ORBITAL MANEUVERING
SUBSYSTEM
VOLUME 1 OF 2

26 FEBRUARY 1988

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

WORKING PAPER NO. 1.0-WP-VA88003-30

INDEPENDENT ORBITER ASSESSMENT
ASSESSMENT OF THE ORBITAL MANEUVERING SYSTEM FMEA/CIL

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This Working Paper is Submitted to NASA under
Task Order No. VA88003, Contract NAS 9-17650

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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 Orbital Maneuvering System (OMS) hardware and electrical power distribution and control (EPD&C), 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 proposed post 51-L NASA FMEA/CIL baseline. This report documents the results of that comparison for the Orbiter OMS hardware and EPD&C systems.

The IOA product for the OMS analysis consisted of two hundred eighty-four (284) hardware and six hundred sixty-seven (667) EPD&C failure mode worksheets that resulted in one hundred sixty (160) hardware and two hundred sixteen (216) EPD&C potential critical items (PCIs) being identified. A comparison was made of the IOA product to the NASA FMEA/CIL baseline as of 23 December 1987 which consisted of one hundred one (101) hardware and one hundred forty-two (142) EPD&C FMEAs, and sixty-eight (68) hardware and forty-nine (49) EPD&C CIL items. In order to facilitate comparison, additional IOA analysis worksheets were generated as required. IOA mapped one hundred thirty-eight (138) hardware and one hundred forty-seven (147) EPD&C FMEAs, and ninety-three (93) hardware and forty-seven (47) EPD&C CILs and PCIs into the NASA FMEAs and CILs. The IOA and NASA FMEA/CIL baselines were compared and discussions were held with the NASA subsystem managers in an effort to resolve the identified issues. A majority of the initial hardware issues were resolved, however, forty-seven (47) hardware issues, twenty-nine (29) of which concern CIL items or PCIs, and seventy (70) EPD&C issues, thirty-one (31) of which concern CIL items or PCIs, remain unresolved.

Many of the unresolved EPD&C issues result because of differences in interpretation of NSTS 22206. The NASA/RI definition of redundancy allowed the selection of specific unrelated failures which were required to cause known problems, e.g., failures required to cause continuous power to a valve. The IOA redundancy string included only items that were capable of performing the specific function of the item being analyzed. IOA considers many NASA/RI redundancy strings to include multiple unrelated failures.

A number of the unresolved hardware and EPD&C issues involve failure modes identified by IOA which are not currently addressed on the NASA FMEA/CIL baseline. IOA considers each of these failure modes to be credible, and recommends that they be added.

The remaining unresolved OMS hardware and EPD&C issues result because of differences between the IOA and NASA/RI analyses of the OMS subsystem which resulted in criticality, redundancy screen, or failure effect differences.

IOA recommends that the unresolved issues presented in this report be considered for incorporation into the NASA FMEA/CIL baseline.

Figures 1 and 2 present comparisons of the proposed post 51-L NASA OMS hardware and EPD&C baselines with the IOA recommended OMS hardware and EPD&C baselines, respectively, and associated issues.

OMS HARDWARE ASSESSMENT OVERVIEW

OMS HARDWARE ASSESSMENT SUMMARY

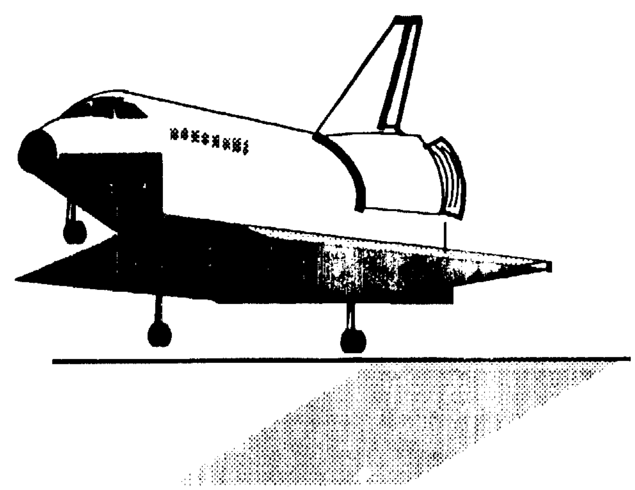
	IOA	NASA[1]	ISSUES
FMEA	138	101	47
CIL	93	68	29

PROPELLANT STORAGE & DISTRIBUTION SUBSYSTEM

	IOA	NASA	ISSUES
FMEA	39	33	6
CIL	23	21	2

HELIUM PRESSURIZATION SUBSYSTEM

	IOA	NASA	ISSUES
FMEA	24	18	9
CIL	18	12	7



OMS ENGINE SUBSYSTEM

	IOA	NASA	ISSUES
FMEA	75	50	32
CIL	52	35	20

[1] *NASA BASELINE AS OF 23 DECEMBER 1987*

IOA AND NASA TOTALS DO NOT INCLUDE INSTRUMENTATION AND THERMAL CONTROL ITEMS. IOA ANALYZED AND ASSESSED THESE ITEMS AS EPD&C ITEMS.

Figure 1 - OMS HARDWARE OVERVIEW

OMS EPD&C ASSESSMENT OVERVIEW

OMS EPD&C ASSESSMENT SUMMARY

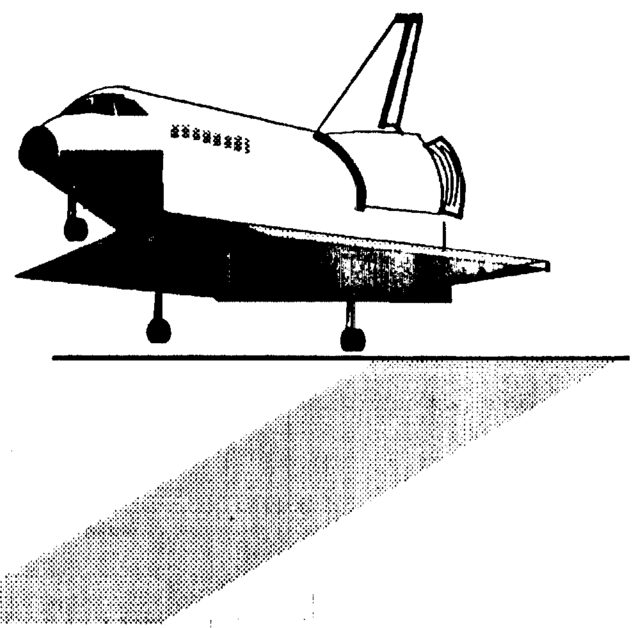
	IOA	NASA[1]	ISSUES
FMEA	147	142	70
CIL	47	49	31

HELIUM PRESSURIZATION SUBSYSTEM

	IOA	NASA	ISSUES
FMEA	18	17	6
CIL	3	2	1

PROPELLANT STORAGE & DISTRIBUTION SUBSYSTEM

	IOA	NASA	ISSUES
FMEA	62	60	43
CIL	15	28	18



OMS ENGINE SUBSYSTEM

	IOA	NASA	ISSUES
FMEA	35	34	9
CIL	17	12	5

THERMAL CONTROL SUBSYTEM

	IOA	NASA	ISSUES
FMEA	32	31	12
CIL	12	7	7

[1] ***NASA BASELINE AS OF 23 DECEMBER 1987***

IOA AND NASA TOTALS INCLUDE INSTRUMENTATION AND THERMAL CONTROL ITEMS.

Figure 2 - OMS EPD&C OVERVIEW

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 re-evaluating the FMEA/CIL for the Space Shuttle design. The MDAC is providing an independent assessment of the Orbiter FMEA/CIL reevaluation results 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, EPD&C, 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 divide the respective subsystem into components and low-level hardware items. Hardware and EPD&C items are evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the NASA and Prime Contractor FMEA/CIL reevaluation results. 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 FMEAs/CILs 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 OMS Ground Rules and Assumptions

The OMS-specific ground rules and assumptions used in the IOA analysis are presented in Appendix B.

3.0 SUBSYSTEM DESCRIPTION

3.1 Design and Function

The Orbital Maneuvering System (Figure 3) provides propulsive thrust for orbit insertion, on-orbit translations, and deorbit. The OMS is housed with the aft RCS in two pods on either side of the tail. The OMS utilizes the hypergolic propellants, monomethyl hydrazine (MMH, fuel) and nitrogen tetroxide (NTO, oxidizer), to provide a total delta V capability of up to 1000 ft/s. The OMS is also used during aborts to dump OMS propellants. Figures 4 and 5 present an overview of the OMS breakdown hierarchy and Figure 6 presents the OMS schematic.

The IOA analysis has defined the OMS as being comprised of the following subsystems.

- o Helium Pressurization
- o Propellant Storage and Distribution
- o Orbital Maneuvering Engine
- o Electrical Power Distribution and Control

3.1.1 Helium Pressurization Subsystem

The helium pressurization subsystem is used to maintain pressure in the propellant tanks to feed propellants to the OMS engines. The subsystem consists of a helium tank, two helium pressurization valves, two dual pressure regulator assemblies, two parallel vapor isolation valves, a dual series-parallel check valve assembly, and couplings. A schematic diagram of the OMS helium pressurization subsystem is shown in Figure 7.

3.1.1.a Helium Tanks

Each pod contains one helium supply tank for the purpose of pressurizing the oxidizer and fuel tanks. The helium supply tank is a spherical pressure vessel consisting of a titanium liner with a Fiberglas structural overwrap. The maximum diameter of the tank is 40.2 inches producing a usable volume of 17.03 cubic feet. The tank operating pressure ranges from a low of 460 psia to a maximum of 4800 psia.

3.1.1.b Helium Isolation Valves

The helium isolation valves (Figure 8) are continuous-duty solenoid-operated valves. The valves are energized open and spring-loaded closed. The OMS HE PRESS/VAPOR ISOL switches on Panel 08 permit automatic or manual control of the valves. With the switches in the General Purpose Computer (GPC) position, the valves are automatically controlled by the GPC during an engine firing sequence. The valves are controlled

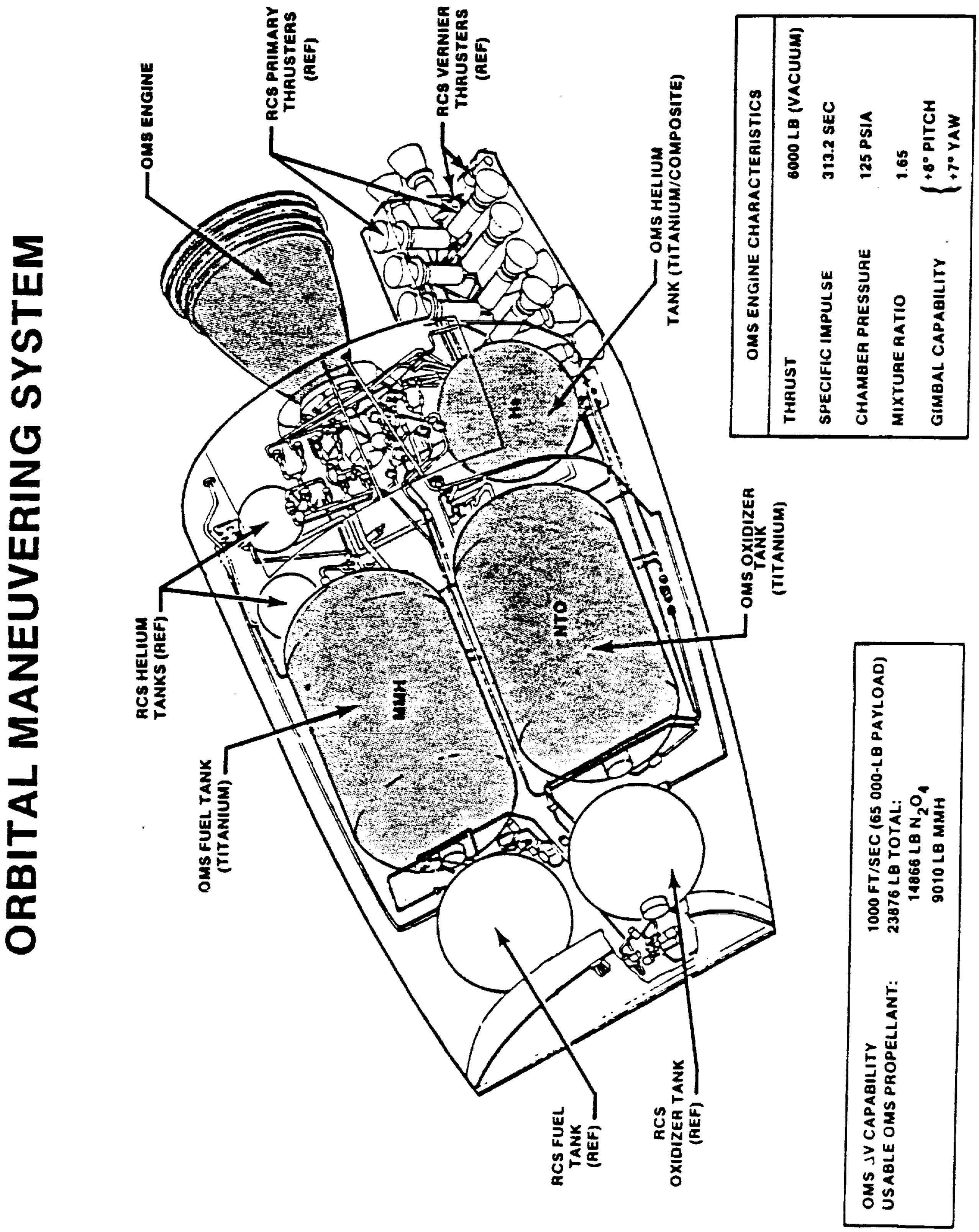


Figure 3 - ORBITAL MANEUVERING SYSTEM OVERVIEW

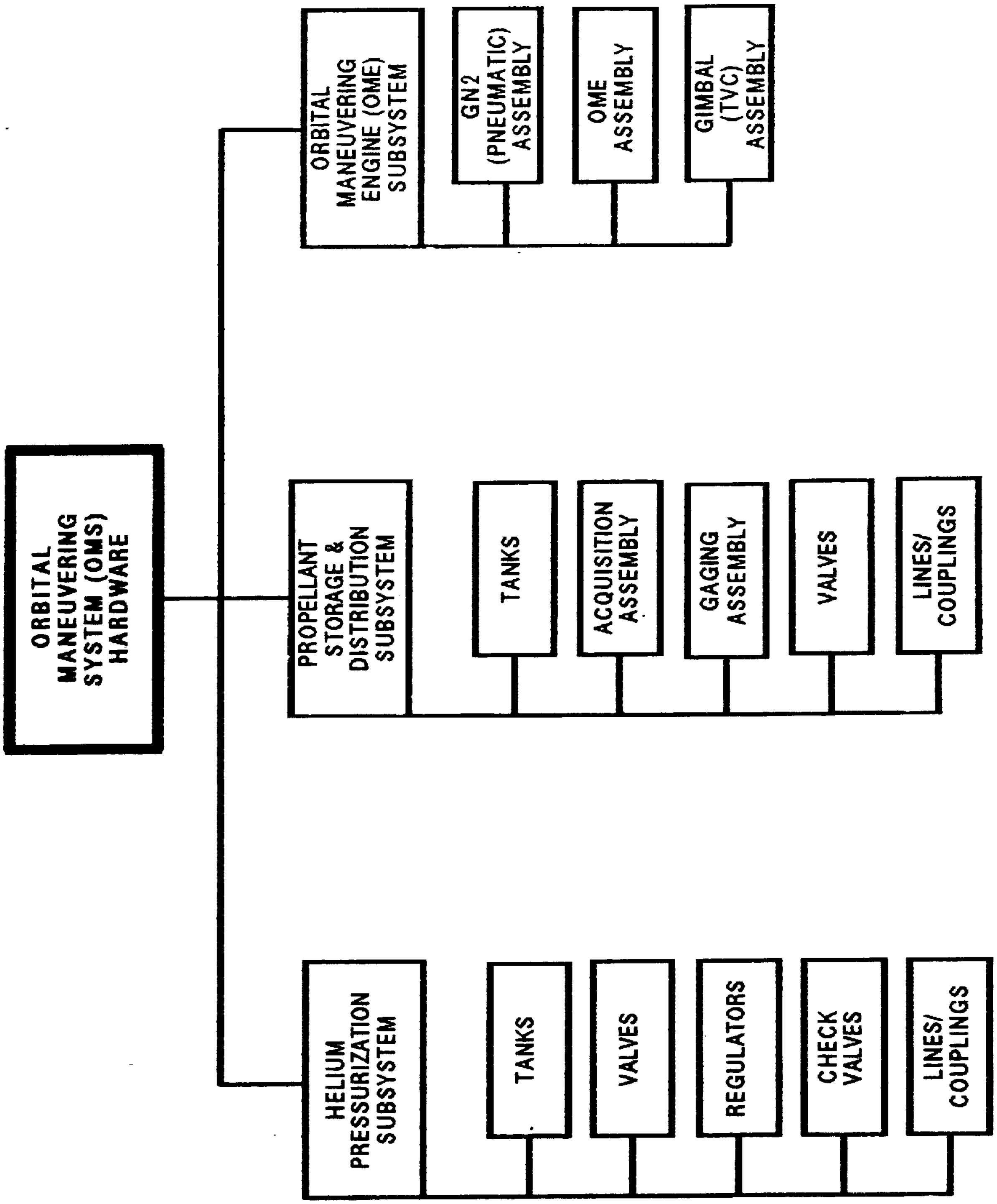


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Figure 4 - OMS HARDWARE BREAKDOWN HIERARCHY

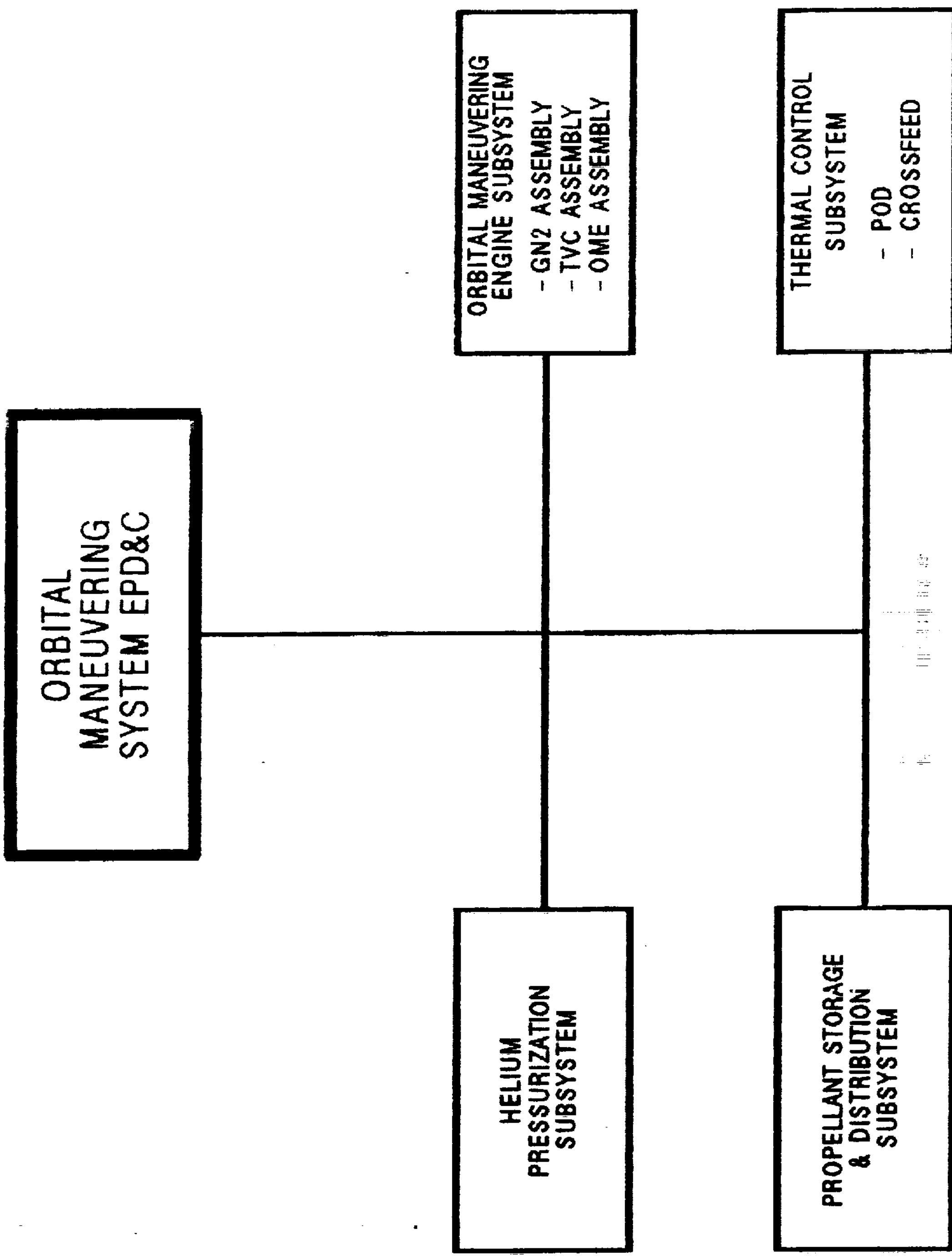

Figure 5 - OMS EPD&C BREAKDOWN HIERARCHY

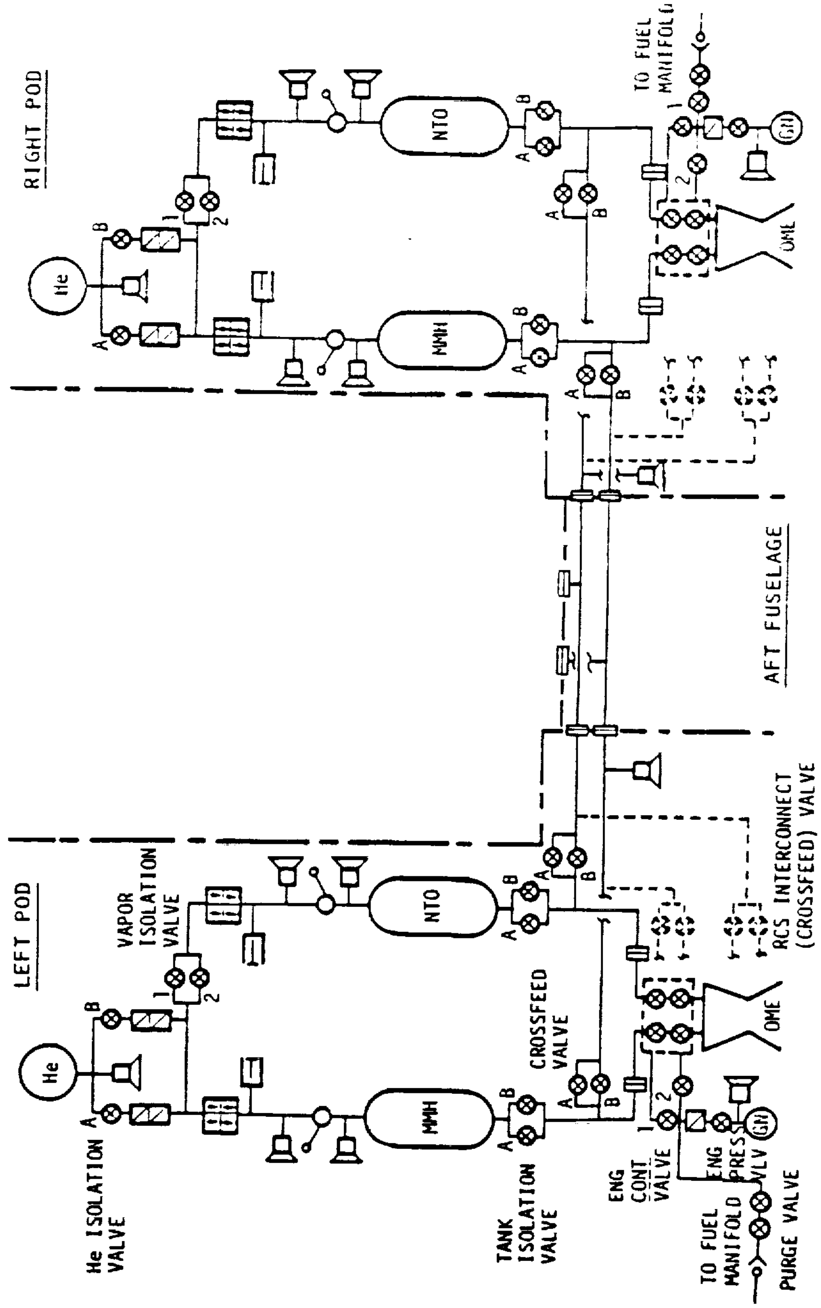

Figure 6 - OMS SCHEMATIC

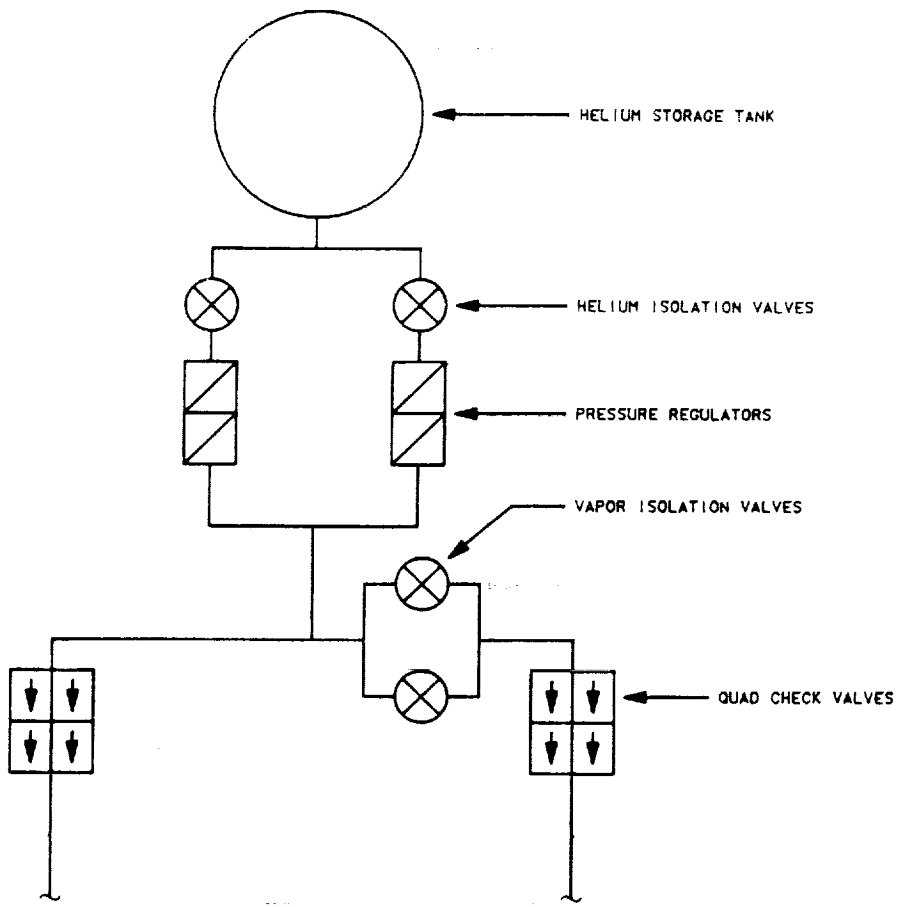

Figure 7 - HELIUM PRESSURIZATION SUBSYSTEM

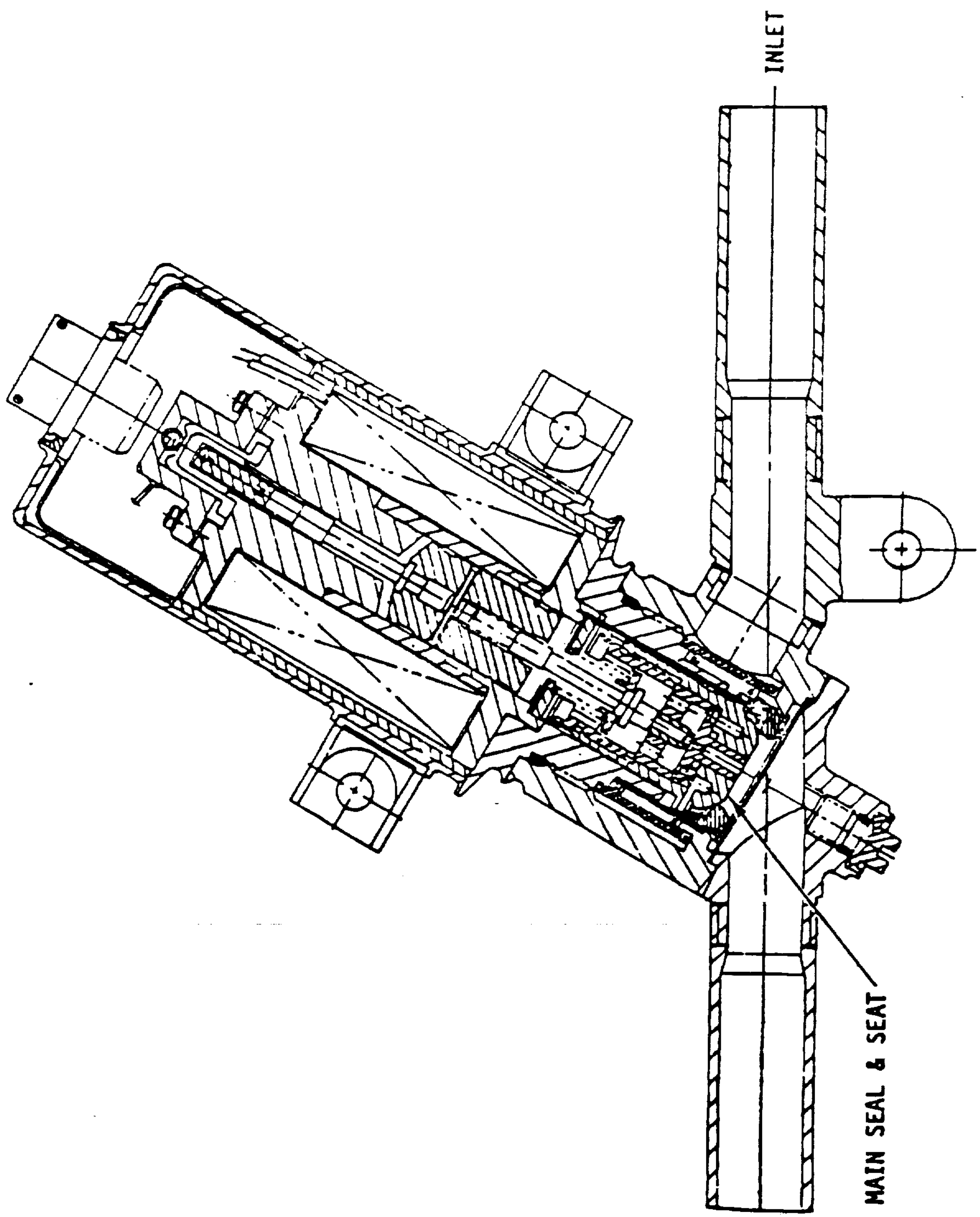

Figure 8 - HELIUM ISOLATION VALVE

manually by placing the switches in the OPEN or CLOSE position. Each valve contains a position feedback that is sent to the GPC for display on the Cathode Ray Tubes (CRTs).

3.1.1.c Helium Pressure Regulator Assemblies

Pressure regulation is accomplished by two pressure-regulating assemblies, one downstream of each helium tank isolation valve. Each assembly contains a primary and secondary regulator in series, and a flow limiter (Figure 9). The primary regulator is normally the controlling regulator. The secondary regulator is normally open and will not become the controlling regulator until the primary regulator allows a higher pressure than normal. The flow limiter allows a minimum of 104 scfm and a maximum of 304 scfm. All regulator pressures are in reference to a bellows assembly that is vented to ambient (Figure 9).

Outlet Press	Primary	Secondary
o Normal flow (0 to 265 scfm)	255+/-4 psig	262+/-4 psig
o High flow (304 scfm)	245 psig min.	252 psig min.
o Lockup	264 psig	271 psig

3.1.1.d Vapor Isolation Valves

These valves are low-pressure, two-position, two-way, solenoid-operated valves (Figure 10). The valves are energized open and spring-loaded closed. These valves are used to isolate the helium system and fuel tank from the oxidizer tank.

These valves can be commanded manually or by the GPC depending on the position of the HE PRESS/VAPOR ISOL switches on Panel 08. Either of the two (A or B) switches in the OPEN position energize both VAPOR ISOL valves to the open position. With the switches in GPC or CLOSE positions the GPC is allowed to open or close the valves automatically.

3.1.1.e Quad Check Valve

The check valve unit is mounted between the regulators and the propellant tank to pass ullage pressure demand flow downstream and to preclude upstream backflow of helium and propellant vapors, or liquids. Each unit consists of four check valve elements arranged as two parallel assemblies of two series check valve elements (Figure 11). External test/checkout ports allow functional checkout without disassembly of the unit. Filter elements are located at unit's inlet and test ports.

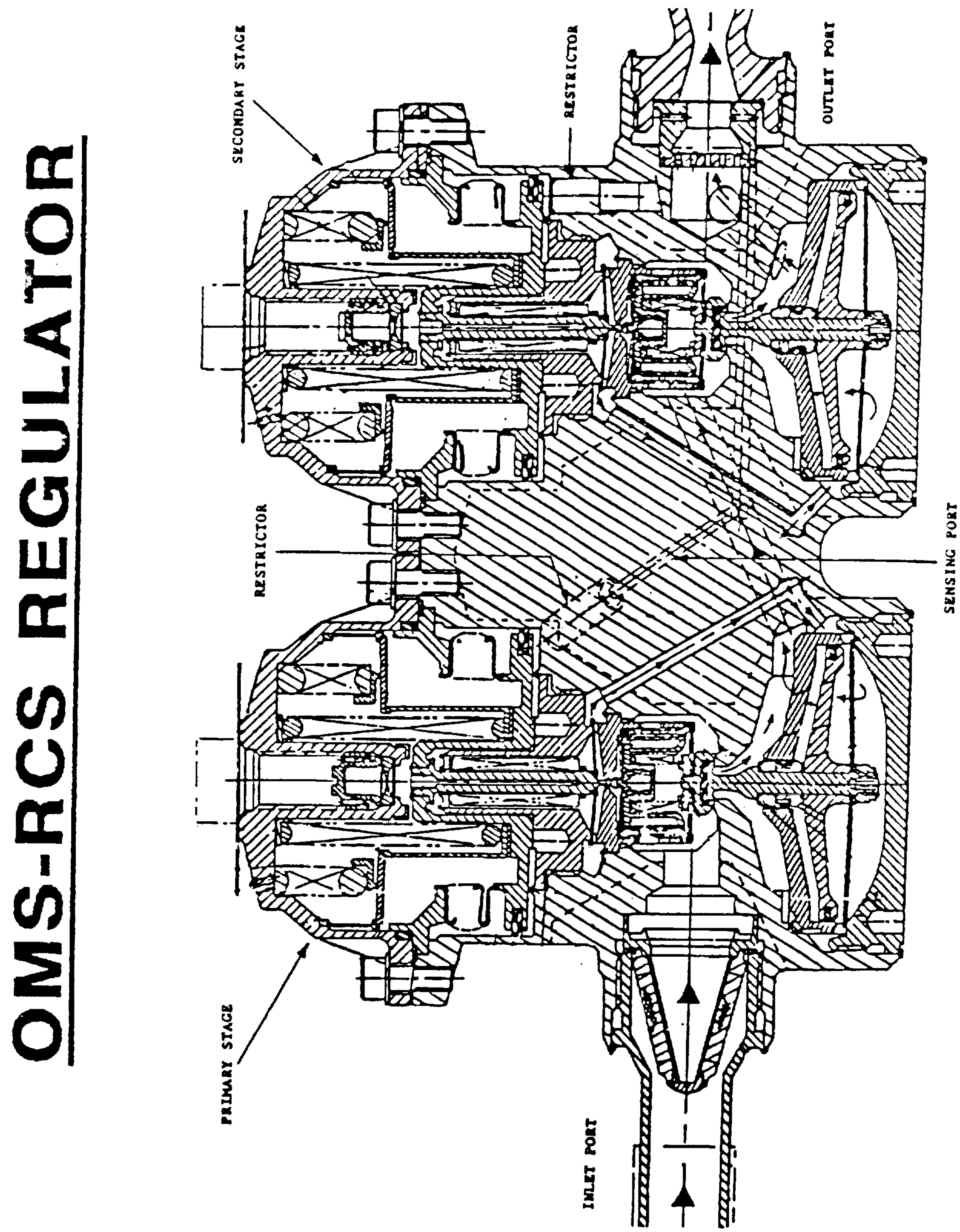

Figure 9 - HELIUM PRESSURE REGULATOR ASSEMBLY

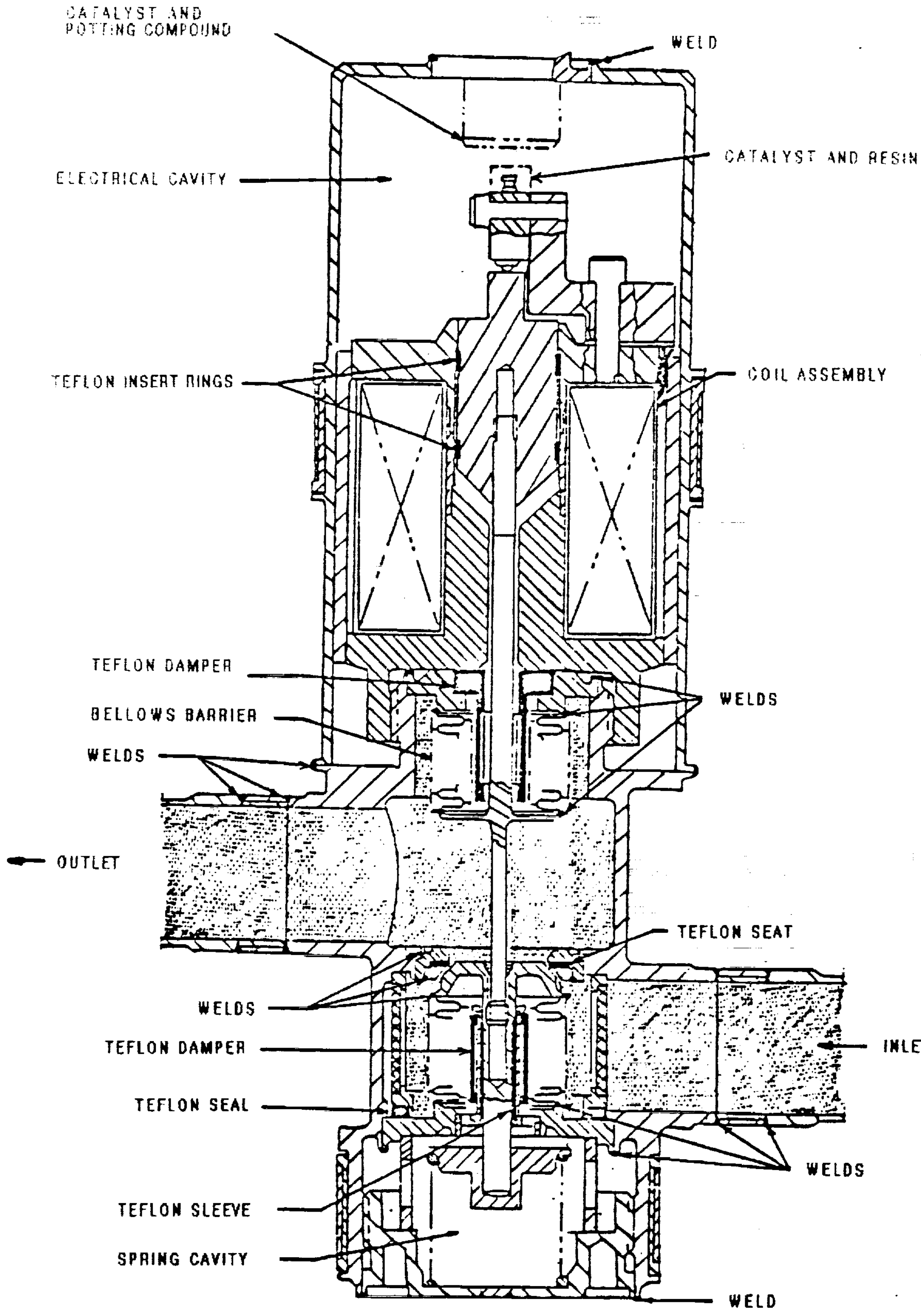

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Figure 10 - VAPOR ISOLATION VALVE

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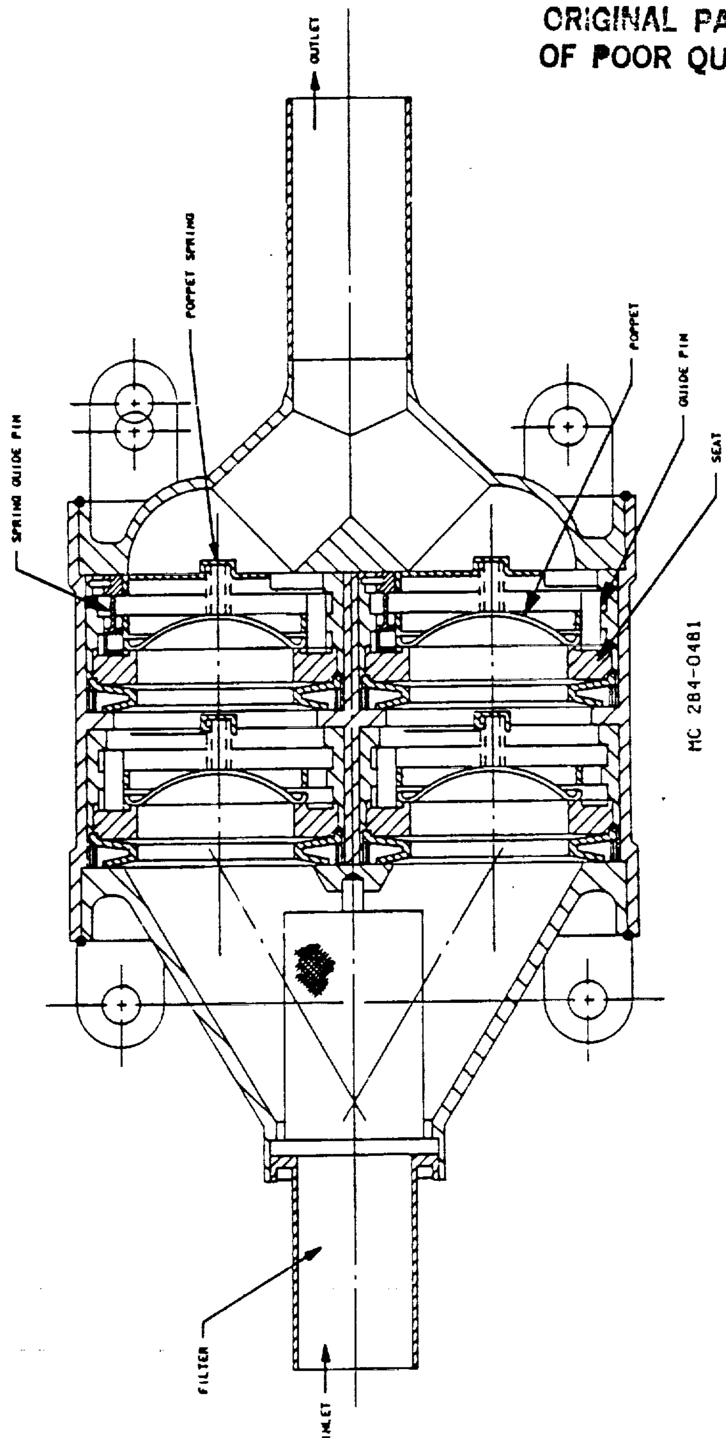

Figure 11 - QUAD CHECK VALVE

3.1.2 Propellant Storage and Distribution Subsystem

This subsystem consists of one fuel and one oxidizer tank, tank and crossfeed isolation valves, pressure relief assembly, manual isolation valve, corresponding feedlines, and couplings. The subsystem is capable of several propellant feed configurations. These include nominal OMS feed, OMS crossfeed, OMS/RCS interconnect and mixed crossfeed. The OMS engines can be operated individually using propellant from either pod. All valves can be controlled manually by switches located in the forward flight deck, with GPC software sequences or GPC memory write procedures. A schematic of the OMS propellant storage and distribution subsystem is shown in Figure 12.

3.1.2.a Propellant Tanks

The propellant supply is contained in domed, cylindrical titanium tanks within the OMS pod. The forward and aft sections of each tank has a fluid volume of 63 and 27 cubic feet, respectively.

The tank operating pressure is 250 psia with a maximum operating pressure of 313 psia. The propellant tanks contain the propellant gaging and the propellant acquisition and retention assemblies.

3.1.2.a.1 Propellant Acquisition and Retention Assembly

Each propellant tank is divided into two compartments: forward and aft. The propellant acquisition and retention assembly (Figure 13) is located in the aft compartment and consists of a communication screen and a trap reservoir.

The communication screen allows propellant flow while preventing helium gas from crossing through the screen, and retains propellant in the aft compartment during zero g.

The trap reservoir contains four stub galleries and a collector manifold. The stub galleries acquire wallbound propellant at OMS startup. The stub galleries also have screens which allow propellant flow while preventing gas ingestion. The collector manifold is connected to the four stub galleries and contains a gas arrester screen to further prevent gas ingestion.

3.1.2.a.2 OMS Gaging

A capacitance system is used to measure the amount of propellant in the OMS tanks. The system consists of forward and aft capacitance probes and an electronic

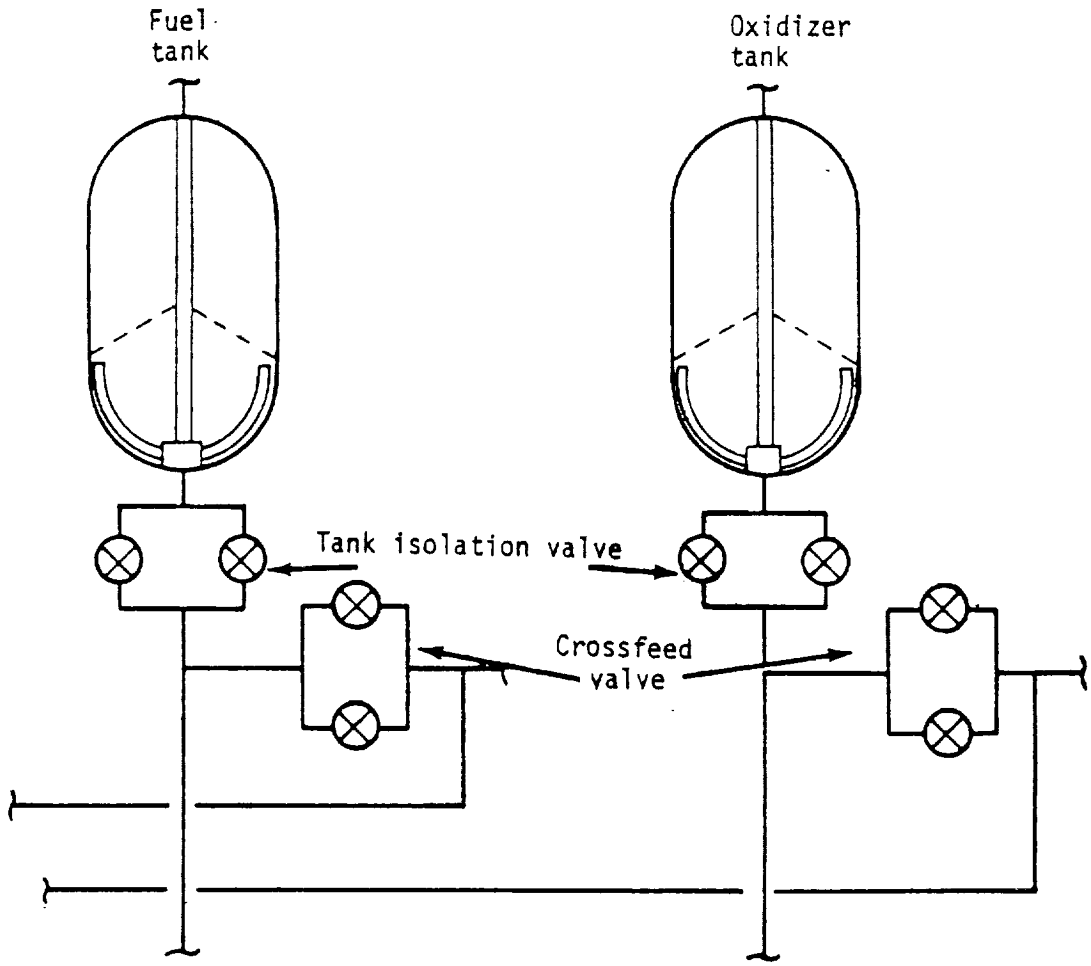

Figure 12 - PROPELLANT STORAGE AND DISTRIBUTION SUBSYSTEM

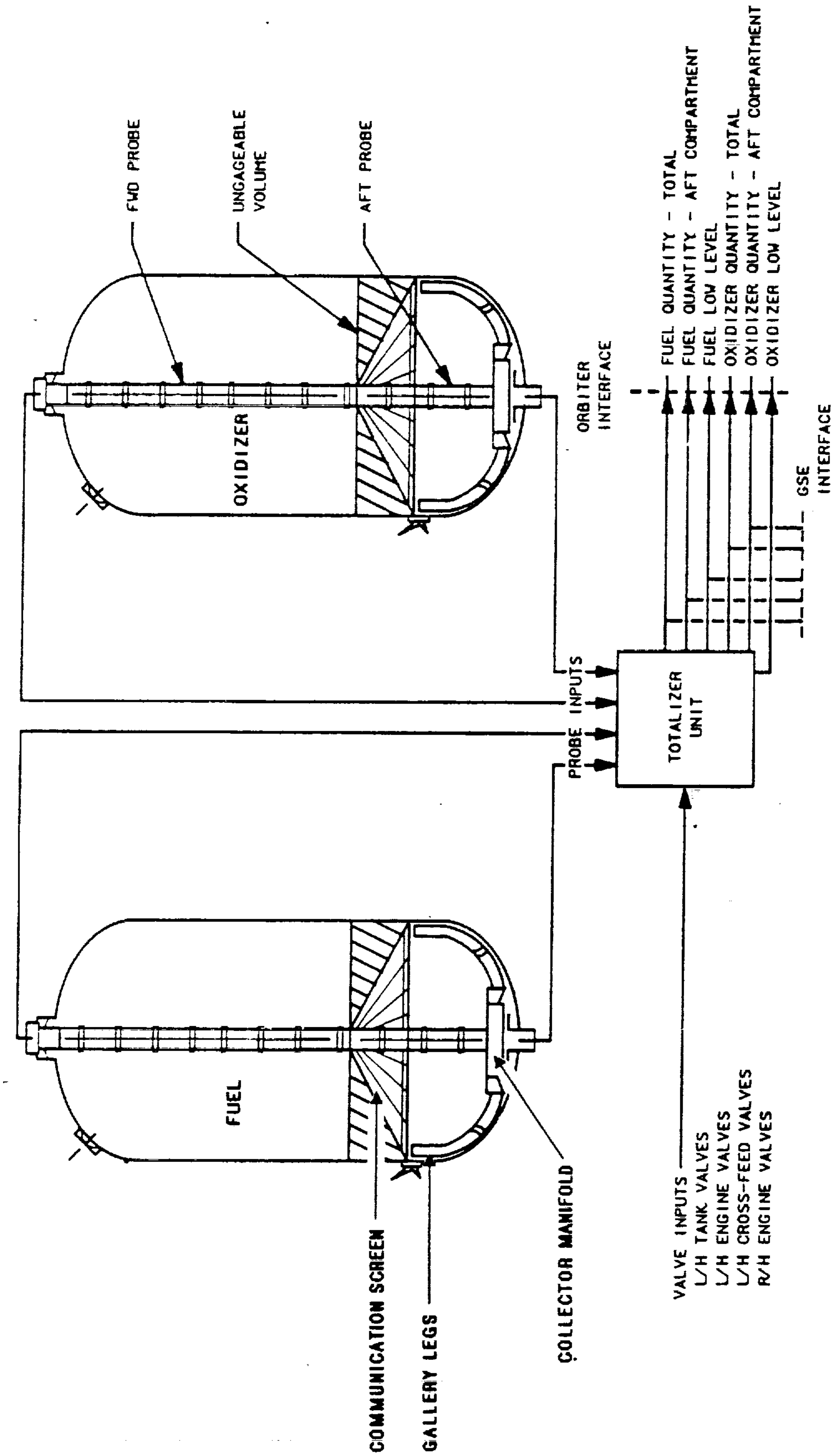

Figure 13 - PROPELLANT TANKS WITH ASSEMBLIES

totalizer. Propellant quantities are updated only during OMS burns. Figure 13 shows an overview of the OMS gaging system.

The design of the probes uses the electrical properties of the propellant to measure the height of propellant between two concentric tubes. Fuel is a conductor and forms one capacitor plate; the other plate is the inner tube of the probe, which is a glass tube with a metalized silver coating on the inside. The oxidizer is dielectric, and the capacitor plates are the outer and inner nickel tubes of the probe.

An ungageable region exists between the top of the bulkhead screen and the bottom of the forward probe. This represents the tank quantity between 30 percent and 44 percent. An integration routine using burn time and a preset flowrate is used by the totalizer to update the quantity of this region.

Forward Probe - The forward probe measures the propellant above the bulkhead screen. The forward probe consists of the concentric capacitance probes, probe electronics, helium pressurization gas inlet, and the gas inlet diffuser screen.

Aft Probe - The aft probe measures the propellant below the bulkhead screen. The aft probe consists of the concentric capacitance probes and the probe electronics.

Totalizer - The totalizer receives inputs from the forward probe, aft probe, tank isolation valves, crossfeed valves, engine control valves and outputs total and aft quantities for each tank. A block diagram of the totalizer logic flow is shown in Figure 13.

An OMS to RCS gaging program calculates the OMS propellant used by the aft RCS from each pod during interconnect operations.

3.1.2.b Pressure Relief Valves

The pressure relief valve is located upstream of the propellant tanks but downstream of the helium quad check valves. The pressure relief valve (Figure 14) consists of a relief valve, burst diaphragm, and a filter.

In the event excessive helium and/or propellant vapor pressure ruptures the burst diaphragm, the relief valve opens and vents the system. The relief valve will close and reseal after the excessive pressure has returned to the operating level.

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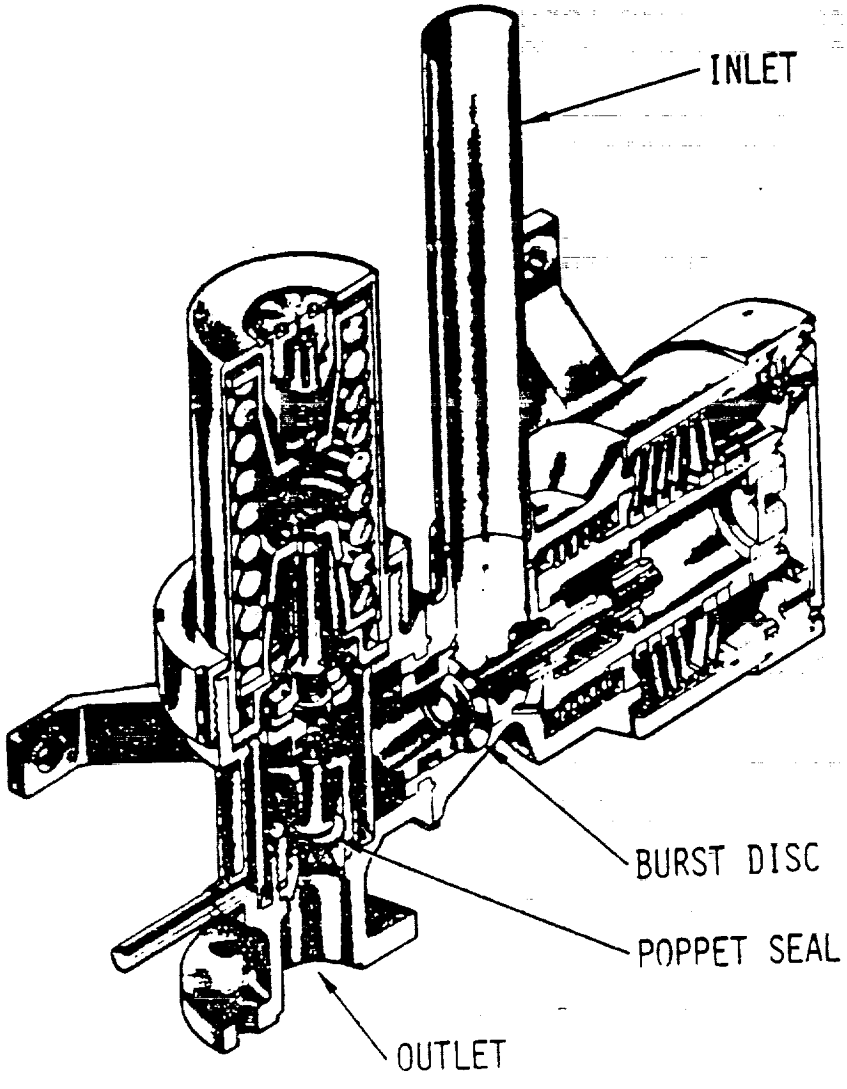

Figure 14 - PRESSURE RELIEF VALVE

The burst diaphragm provides a more positive seal of helium than a relief valve. The filter prevents any fragments from the nonfragmentation type diaphragm from entering the relief valve seat.

The diaphragm rupture pressure is 305+/-8 psig. The relief valve will open at a minimum of 291 psig and a maximum of 307 psig. The minimum reseat pressure is 285 psig.

3.1.2.c Propellant Feed and Interconnect Lines

The propellant feed lines connect each of the left and right pod's propellant tanks to their corresponding engine. The crossfeed lines are connected to the feed lines to allow the crossfeeding of propellant from one pod's propellant tanks to the other pod's engine. Furthermore, the OMS propellant interconnect lines are connected to the RCS crossfeed lines to feed propellant from either OMS pod's tanks to the RCS aft jets.

3.1.2.d Tank Isolation and Crossfeed Valves

These valves are ac motor operated with bistable ball type flow control (Figure 15). They serve to isolate the propellant tank from the feed and crossfeed lines. The TANK ISOLATION and the CROSSFEED switches on Panel O8 permit GPC or manual control of the valves. With the switch in the GPC position, the valves can be automatically controlled by the computers. The valves are controlled manually by placing the switches in the OPEN position allowing an electric signal to provide power to the ac motors to open the valves. With the switches in the CLOSE position a signal is sent to allow power to the ac motor to drive the valves closed.

The ac motor valve operates on 115 volt ac, 400 Hz three-phase power but will operate with only two phases if required. The microswitch position indicators utilize 28 volt dc power to generate the open and close position discretes. The valves are activated by logic circuits in the Orbiter Motor Control Assemblies (MCA). Valves may be moved by manual or GPC command.

A valve will operate when ac power to the motor is turned on by a set of relays in the MCA logic. The high rpm input of the ac motor is stepped down by the planetary gears to turn a semicircular gear sector (not shown). The gear sector in turn drives the brake/clutch (rocker assembly) on the top of the valve assembly. The brake/clutch turns a torsion rod, which is connected to an actuator finger. The actuator finger is the device that moves the valve ball.

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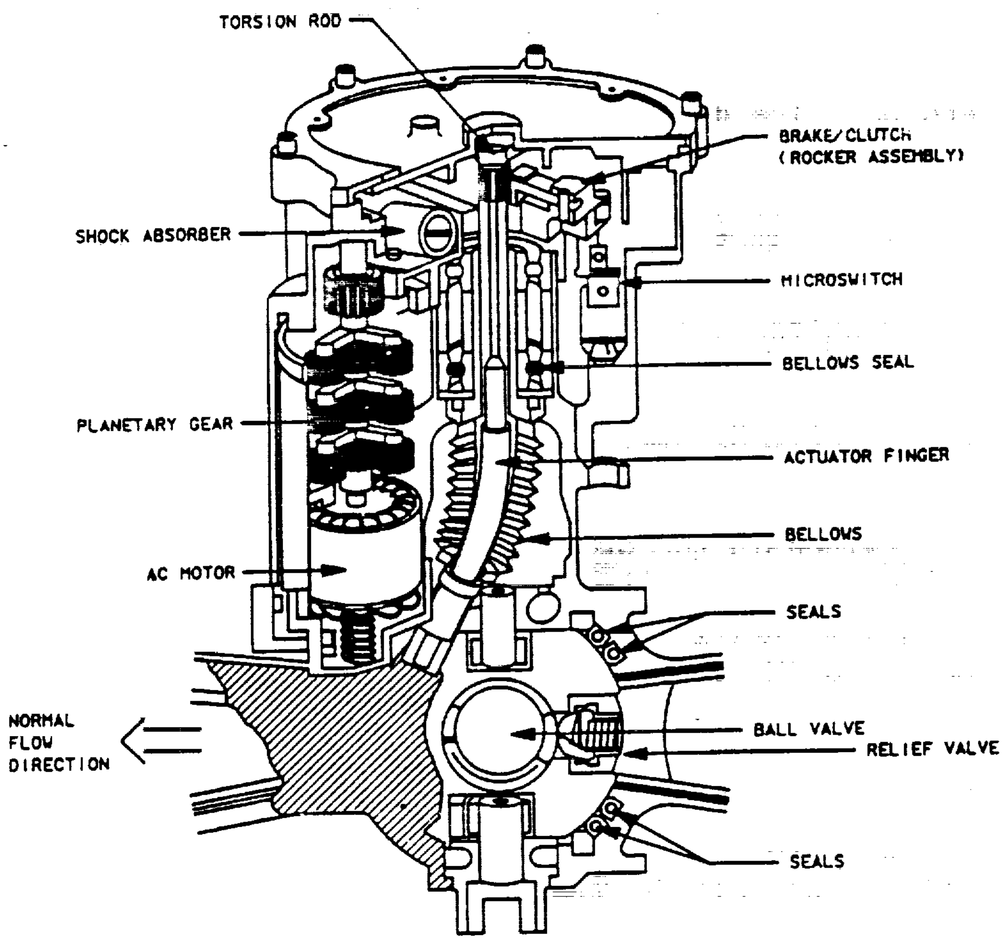

Figure 15 - TANK AND CROSSFEED ISOLATION VALVE

When the valve drives to the command position, cams on the bottom of the semicircular gear sector activate microswitch position indicators. These discretes are fed back to the MCA logic to remove power from the valve within 50 msec after reaching the commanded position.

The actuation time for a valve is from 1.1 to 1.3 seconds for three-phase operation and approximately 1.5 seconds for two-phase operation. Propellant flow through the valve is established within 0.5 seconds of the first valve motion.

3.1.2.e Manual Isolation Valve

The ground manual isolation valve is used to isolate the propellant tank from the helium pressurization subsystem for ground operations. The nonpowered valve can only be opened with a special tool which cannot be detached with the valve in the closed position. Open during all flight phases, the valve has redundant seals to external leak paths (Figure 16).

3.1.3 Orbital Maneuvering Engine Subsystem

The OMS engine is a pressure fed, hypergolic reacting bipropellant, regenerative-cooled, fixed thrust rocket engine. The engine can be gimbaled to provide thrust vector control (TVC). Major assemblies are the GN2 (pneumatic), bipropellant ball valves, injector, combustion chamber, nozzle extension, engine purge valve, fuel/oxidizer lines, couplings, and gimbal system (Figure 17). Two OMS engines are installed on the Orbiter vehicle, one per pod.

Engine operation is controlled via GPC software sequences. Ignition is commanded only after specific crew system configurations (switch positions and CRT inputs) have been completed. However, shutdown can be commanded manually at any time during a burn. Crew/flight controller insight into engine operation is via pressure, temperature, and valve position instrumentation provided with the engine.

3.1.3.a Gaseous Nitrogen (GN2) Assembly

The purpose of the OMS GN2 (pneumatic) assembly is to store pressurized nitrogen gas and supply on command regulated GN2 to actuate the bipropellant ball valves and purge the fuel side of the injector assembly. Also, sufficient regulated GN2 is stored in an accumulator for a minimum of one engine start.

The GN2 assembly consists of a fill and vent valve, storage tank, engine pressurization valve, check valve, pressure regulator, relief valve, accumulator, and associated instrumentation (Figures 18 and 19).

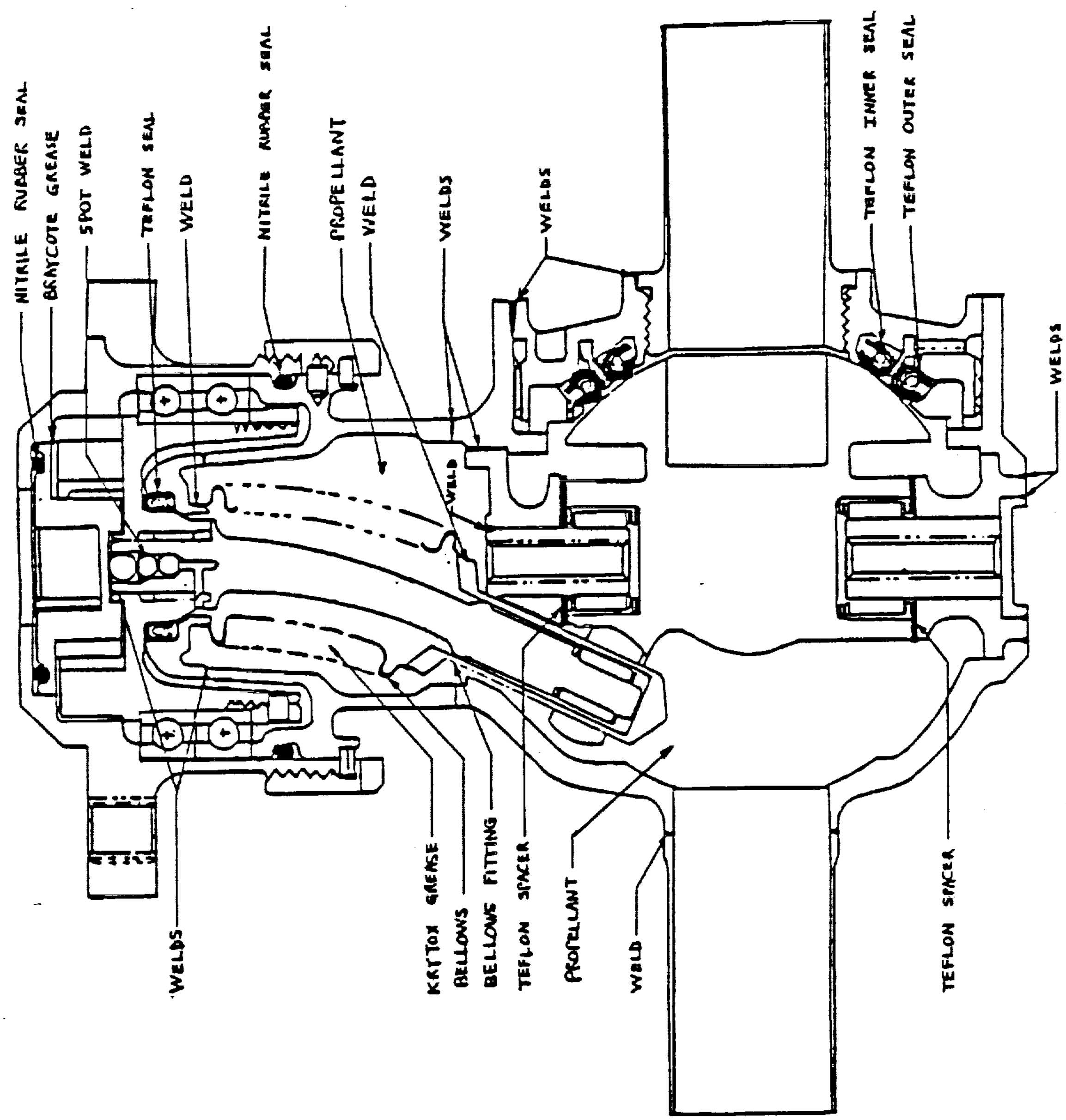

Figure 16 - MANUAL ISOLATION VALVE

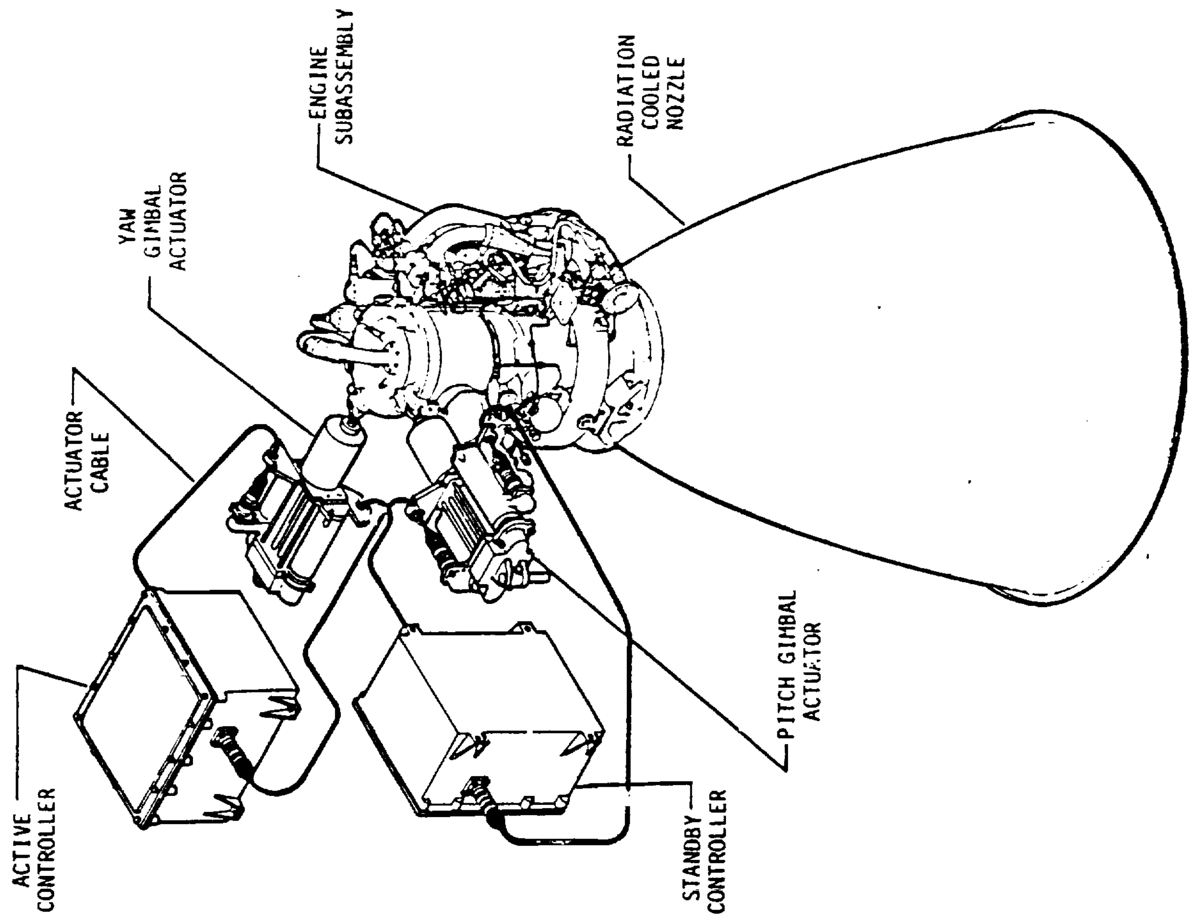

Figure 17 - ORBITAL MANEUVERING ENGINE SUBSYSTEM

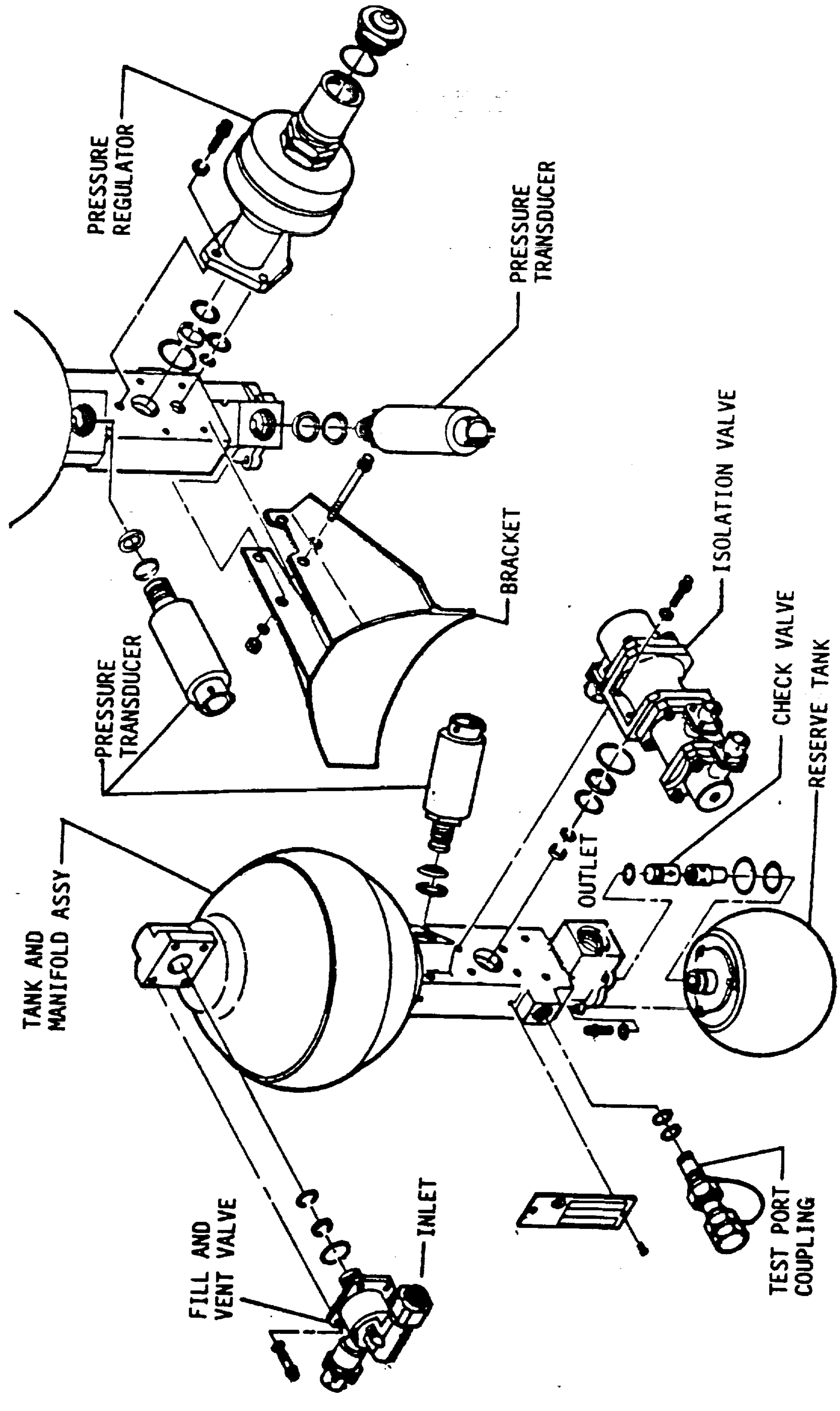

Figure 18 - GN2 PNEUMATIC PACK ASSEMBLY

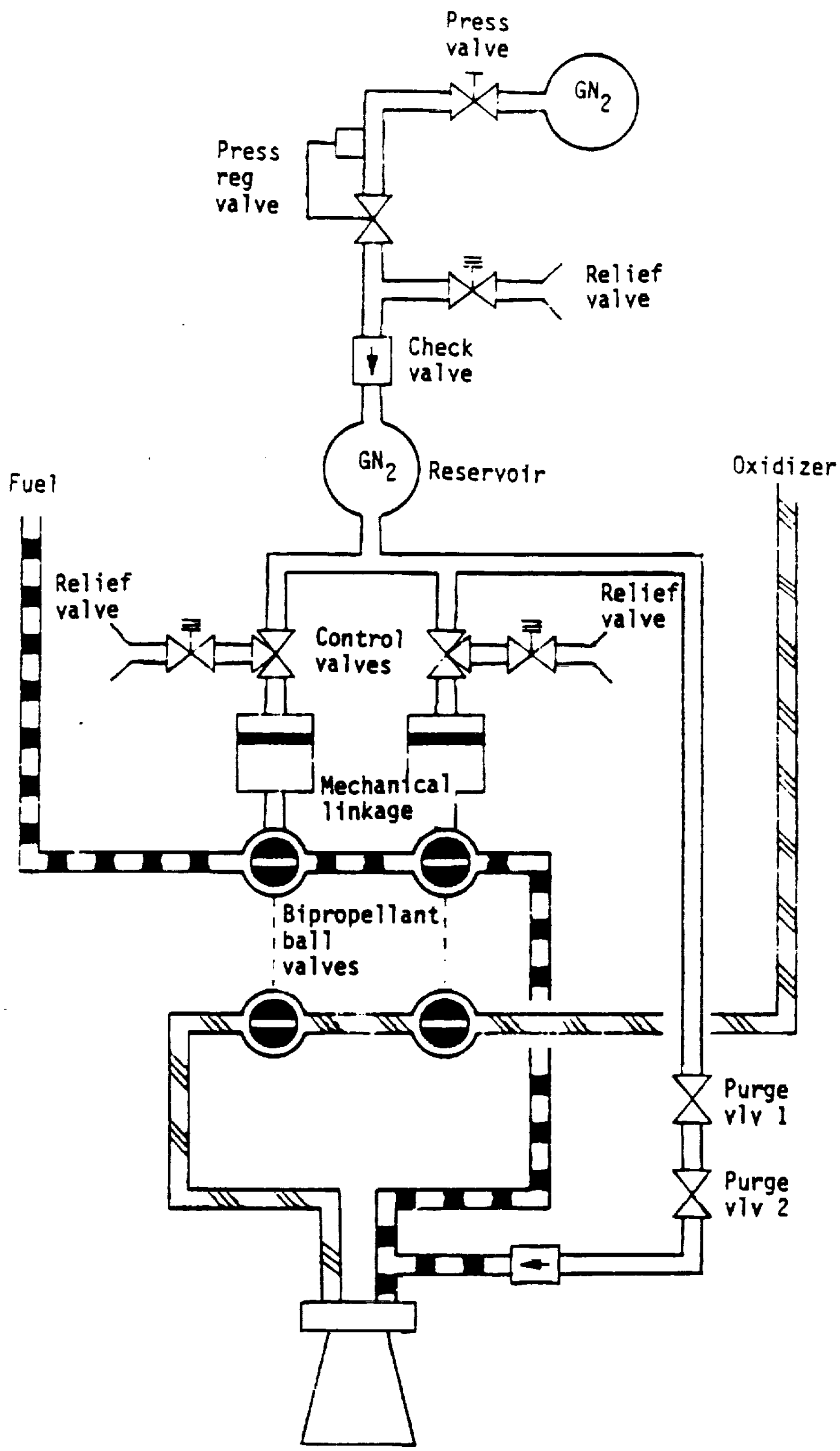

Figure 19 - GN2 PRESSURIZATION ASSEMBLY SCHEMATIC

3.1.3.a.1 Fill and Vent Valve

The fill and vent valve is a two-way, high-pressure coaxial, single solenoid-operated valve (Figure 20). The valve is used only during ground operations to pressurize or vent the GN2 (pneumatic) assembly. There is no electrical power to the solenoid coil during flight. The valve is designed to fail closed via an internal spring. During fill operations the GN2 is filtered through sintered stainless steel wire filters at the inlet and outlet ports. The valve is bolted directly to the GN2 storage tank. There is no instrumentation on this valve.

3.1.3.a.2 Storage Tank

The GN2 storage tank is a fracture-critical component. The tank is manufactured from titanium bar stock in two halves, then welded together. One half incorporates the mounting flange for the fill and vent valve. The second half incorporates the mounting flanges and flow passages for the remaining GN2 components. Initial GN2 loading is 0.43 pounds at 3000 psia and 70 degrees F. Nominally, this loading will supply 17 engine start/purge cycles. Instrumentation consists of two strain gage-type pressure transducers, which can be monitored on CRT display "GNC SYS SUMM 2" and the cockpit dedicated meter "OMS PRESS N2/He" on Panel F7. The tank pressure transducer designated P1 is hardwired to this meter. The transducer outputs are limit sensed in the PASS (OPS 2 and 8) and the BFS (OPS 1, 3, and 6) and will trigger an SM alarm (class 3) if one or both go out of limits. These pressures are included in the Guidance, Navigation, and Control (GNC) downlist for ground monitoring.

3.1.3.a.3 Engine Pressurization Valve

The OMS engine pressurization (PRESS) valve is a two-way, high-pressure, dual solenoid-operated shutoff valve. The purpose of this valve is to start and stop the flow of GN2 in the pneumatic actuation system. The valve will open with the application of electrical power (23-28 V dc) and only one solenoid is required for nominal operation. With the loss of electrical power the valve is designed to fail closed via an internal spring. During GN2 flow conditions, the gas is filtered through a sintered stainless steel wire filter at the inlet port. Instrumentation consists of a leaf spring switch, which is activated by a push rod integral to the valve poppet assembly. Closure of the switch completes an electrical circuit to indicate an open valve. Valve open/closed status can be monitored

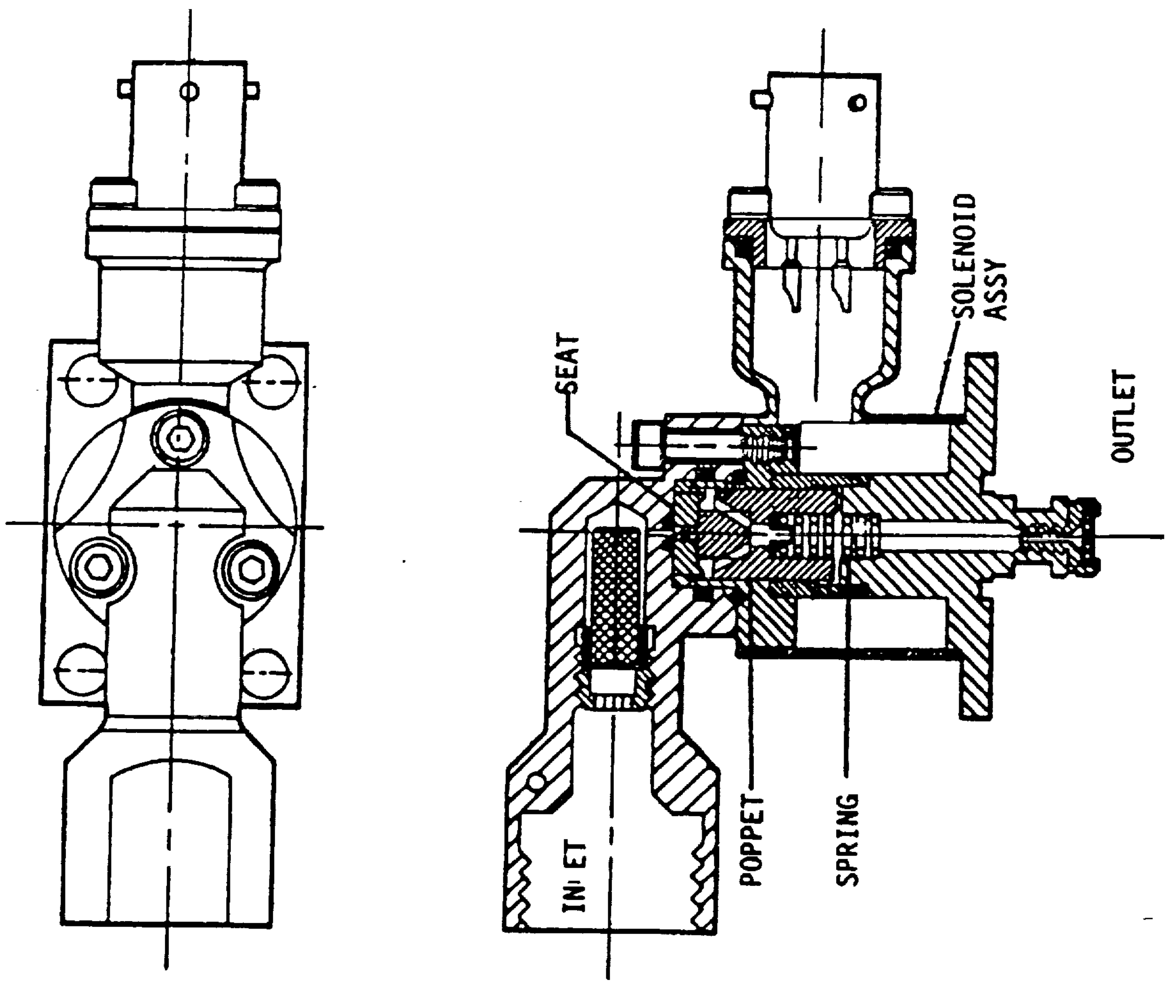

Figure 20 - GN2 FILL AND VENT VALVE

on CRT display "GNC SYS SUMM 2" in the PASS (OPS 2 and 8) and BFS (OPS 1, 3, and 6). The switch's open/closed status is in the GNC downlist and is available for ground monitoring.

The engine pressurization valve is not controlled by the GPC software. Activation of the valve can only be accomplished by manual control of the "OMS ENG" switch on cockpit Panel C3. Placing the "OMS ENG" switch in the "ARM/PRESS" position will open the "ENG PRESS VLV" and allow GPC software to activate the engine control valves for a burn, open the purge valves at burn completion, and repressurize the GN2 accumulator. With the "OMS ENG" switch in the "ARM" position the software will inhibit opening of the purge valves.

3.1.3.a.4 Pressure Regulator/Relief Valve

The GN2 pressure regulator is a modulating, pressure reducing, direct acting pressure-operated mechanical regulator with an integral pressure operated relief valve. The purpose of the regulator is to reduce high upstream GN2 tank pressure (470 to 3000 psig) to the downstream nominal on-orbit ball valve actuator pressure (310 +/- 10 psig). If downstream pressure does increase, (at 360 psig maximum) the regulator will lock up stopping GN2 back-flow. If the regulator fails open or if downstream pressure rises to 450 psig, the integral relief valve will open to vent GN2. At 400 psig the relief valve will reseat to stop venting. During active GN2 flow the gas is filtered through a sintered stainless steel wire filter at the inlet port. There is no instrumentation on this device. However, actual operation can be inferred from the GN2 storage tank and reservoir outlet pressures. The operating pressure levels of the regulator and relief valve may be mechanically reset.

3.1.3.a.5 Check Valve

The GN2 check valve is a one-way flow, cartridge type valve. The purpose of this valve is to prevent GN2 accumulator back flow from occurring if a leak occurs upstream of the check valve. The valve is held close by a mechanical spring and will open with a pressure 6 psig above the downstream level. Reseat pressure is 1 psig delta across the valve. There is no instrumentation associated with this component.

3.1.3.a.6 GN2 Reservoir

The GN2 reservoir (accumulator) is a fracture-critical component manufactured from titanium bar stock. Manufacturing is done in two halves, which are welded together. The assembly is then bolted to a mounting flange, which is part of the GN2 storage tank. The reservoir nominally holds about 0.0008 pounds of GN2 at 320 psia and 70 degrees F. This quantity is enough to guarantee a minimum of one engine start. Instrumentation consists of one strain gage-type pressure transducer located between the check valve and the reservoir inlet/outlet. This measurement is titled "GN2 REG P", and is monitored on the CRT display "GNC SYS SUMM 2" in the PASS (OPS 2 and 8) and BFS (OPS 1, 3, and 6). This pressure is also limit sensed and will trigger an SM alert (class 3) if it goes out of limits. GNC downlist of this pressure, for ground monitoring, is also available.

3.1.3.a.7 Engine Control Valve

The engine control valve is a three-way, two-position, dual solenoid-operated valve (Figure 21). The valve is normally closed to the bipropellant valve pneumatic actuator inlet port. Upon receipt of electrical power (23-32 V dc) redundant solenoids in tandem will open the valve allowing the flow of pressure regulated GN2 into the actuator, deflecting a piston and opening the bipropellant valves. Removal of electric power will close the valve. Closure is accomplished mechanically by an internal spring. Under flow conditions the GN2 is filtered through a sintered stainless steel wire filter located in the inlet port. The valve is bolted to an integral attach flange on the actuator assembly. Purge of pressurized GN2 from the valve and the actuator cylinder is done during the close cycle. Instrumentation for the control valve is a leaf spring switch. Activation is by a push rod, which is an integral part of the valve poppet assembly. Design and operation of the switch is identical to the "ENG PRESS VLV". However, this switch is not monitored in the cockpit but is in the OI downlist for ground monitoring.

3.1.3.a.8 Actuator

The bipropellant ball valve actuator is a pneumatically operated rack for opening the fuel and oxidizer ball valves (Figure 22). The actuator is mechanically closed via internal spring forces. Comprising the assembly are an actuation piston/cylinder, a toothed rack for mating with the ball valve pinion, closure springs, and a Linear Variable Differential Transformer (LVDT). The LVDT is calibrated to show the percentage of ball valve rotation as a function of the rack's linear motion. Output of the LVDT can be monitored on the "GNC SYS SUMM 2" in the PASS (OPS 2 and 8) and BFS (OPS 1, 3, and 6). The output is also in the GNC downlist for ground monitoring.

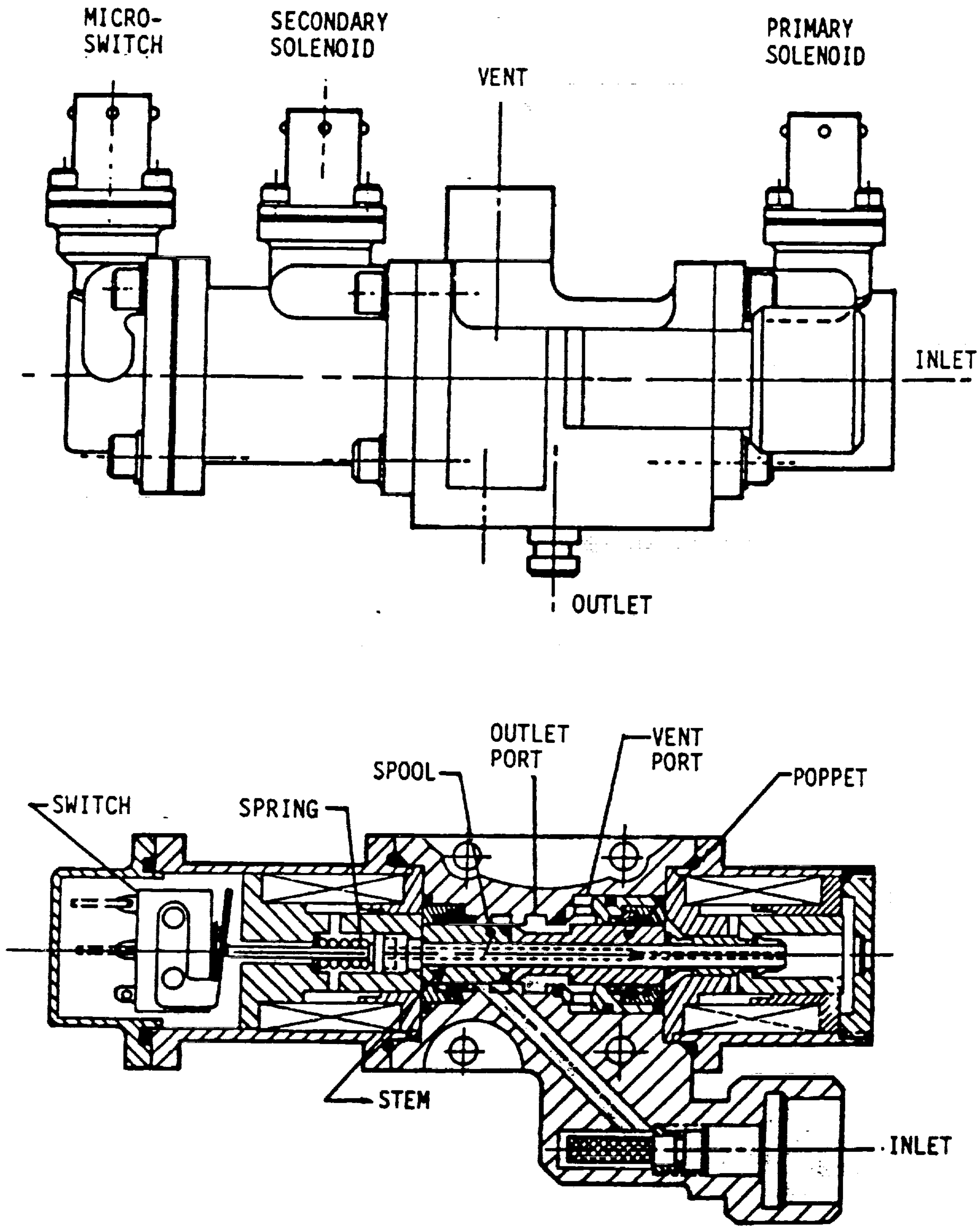

Figure 21 - ENGINE CONTROL VALVE

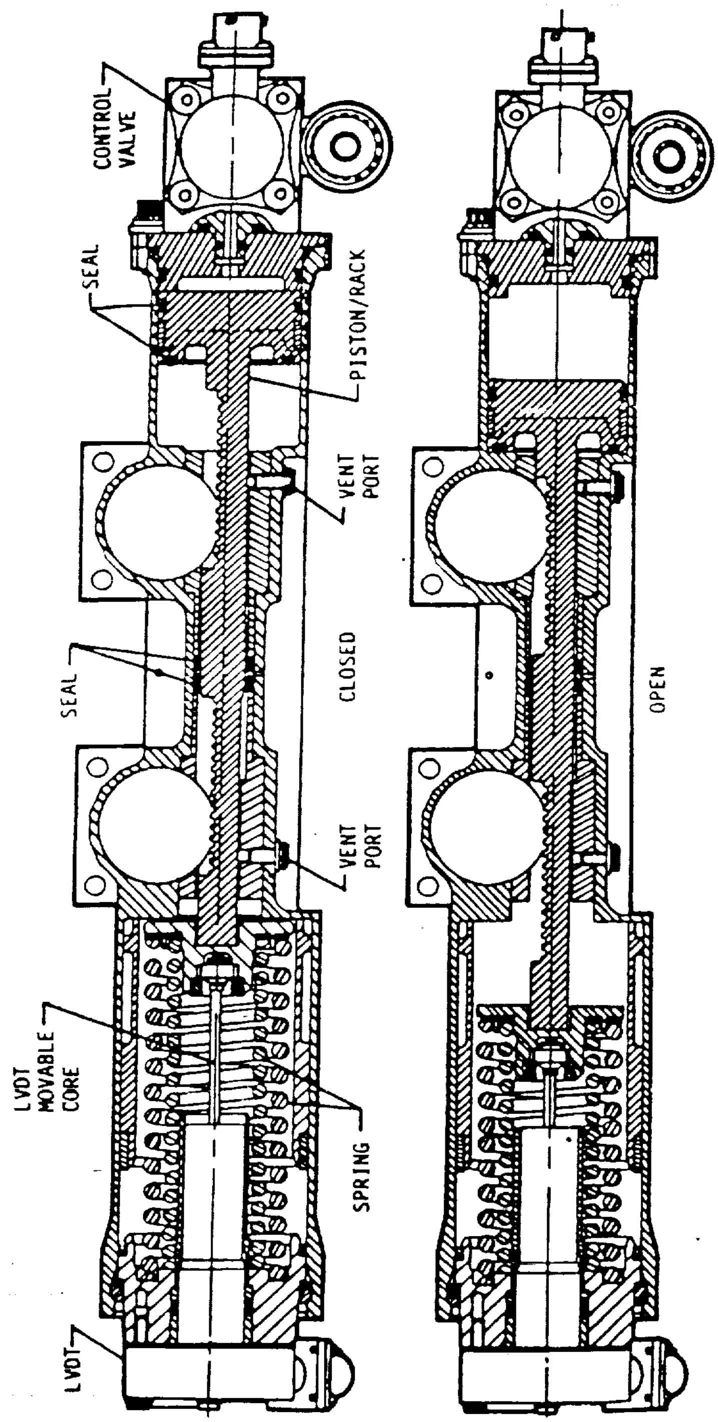

Figure 22 - ACTUATOR ASSEMBLY CROSS SECTION

3.1.3.a.9 Bipropellant Ball Valve Assembly

The bipropellant ball valve was analyzed as part of the OME assembly but is discussed here for continuity. The OMS engine bipropellant ball valve is a rotating open/close flow valve used to control the flow of propellant to the OMS engine. The assembly consists of four valves; pairs of fuel and oxidizer valves in series. Each pair is linked mechanically to its actuator via a pinion that mates with the actuator rack. Valve pairs are rotated simultaneously 90 degrees for 100 percent open. There is no instrumentation on these valves. However, nominal valve operation is inferred by engine start, stop, and performance levels.

3.1.3.a.10 Engine Purge Valve

The purpose of the engine purge valve is to allow, on command, the flow of regulated GN2 into the engine's fuel (MMH) cooling passages. The GN2 purge is done, nominally after every burn, to minimize the possibility of fuel freezing in the internal cooling and injector flow passages. The assembly consists of two valves in series, a check valve, and instrumentation for monitoring the open-closed status of the purge valves.

The purge valve is a two-way solenoid-operated shutoff valve (Figure 23). With the application of electrical power (23-32 V dc), the valve will open to allow GN2 flow. With the removal of power, internal spring forces will close the valve. During the active GN2 flow conditions the gas is filtered through a sintered stainless steel wire filter at the valve inlet port. Instrumentation consists of a leaf spring switch. The switch is activated by a push rod that is an integral part of the poppet assembly. Closure of the switch completes an electrical circuit to indicate an open position. This signal is part of the GNC downlist for monitoring the valve position by the ground. The purge valve operation is not monitored in the cockpit; however, a purge operation can be inferred by monitoring the "GN2 TK P", "GNC REG P" on GNC SYS SUMM 2, Pc, and injector temperature readings. Integral to the second valve is a check valve of identical design to the check valve of 3.1.3.a.5.

Purging of the OMS engine fuel lines, cooling passages, and injector head is accomplished systematically by the OMS GPC firing sequencer software. Nominally the OMS ENG switch is placed in the "ARM/PRESS" position for a burn. This action opens the ENG PRESS VLV, repressurizing the GN2 reservoir and allowing the GPC to issue the open command to the purge valves following the burn.

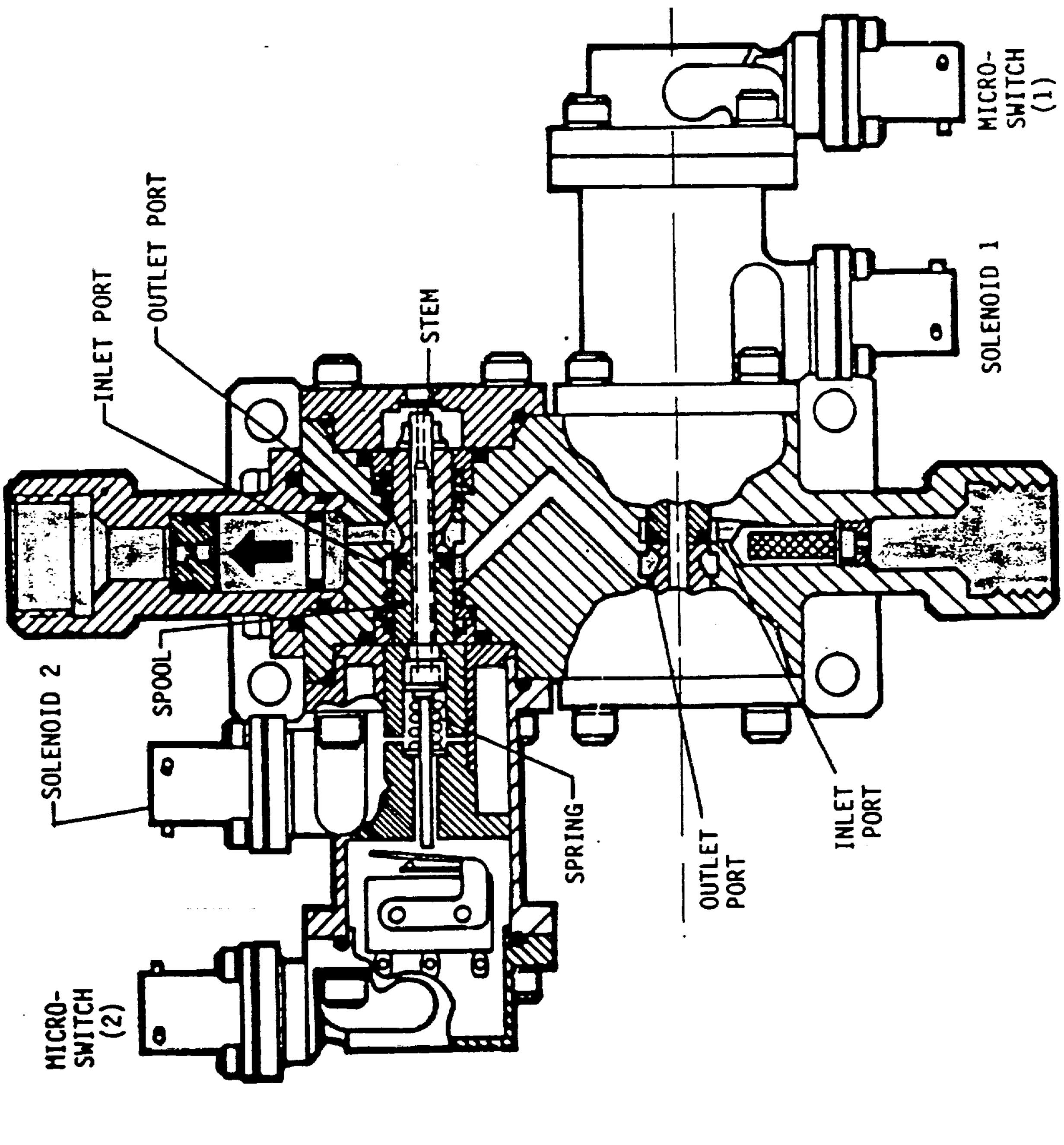

Figure 23 - PURGE VALVE ASSEMBLY CROSS SECTION

If the OMS ENG switch is placed in the "ARM" position, the open commands are inhibited by the GPC.

3.1.3.b OME Assembly

The OME assembly consists of an injector, combustion chamber, nozzle extension, and plumbing. The assembly feeds fuel and oxidizer at the design mixture ratio, confines the combustion of the propellants, and provides for the expansion of the combustion gases to produce thrust. There is one OME assembly in each pod.

3.1.3.b.1 Injector

The OMS engine injector meters, atomizes, and directs fuel and oxidizer into the combustion chamber, at the design mixture ratio. This produces efficient and stable combustion that will provide the required thrust without endangering hardware durability. The injector consists of an oxidizer/fuel manifold, core, fuel distribution ring, platelet injector, and manifold covers (Figure 24). All fuel and oxidizer passages are separated by parent metal or redundant metallurgical joints.

All oxidizer and fuel manifold passages are machined into the stainless steel core billet. The distribution ring mates with the combustion chamber regenerative cooling passages and delivers fuel to the fuel manifold. The injector is made up of six 8-mil thick platelet disks (one external, one face, three metering, and one orifice). Each platelet hole pattern is photographically etched to assure no metal chips or burns remain in the electron beam welded stack. The injector hole pattern consists of 16 concentric alternating rings of oxidizer and fuel orifices. Ring 16 sprays fuel on the combustion chamber wall for film cooling. The manifold covers incorporate attachment bosses for installation of instrumentation (pressure and temperature). All are sealed off except two, one for a combustion chamber pressure transducer and the second for a fuel injector inlet temperature thermocouple. The fuel injector inlet temperature is on "PRPLT THERMAL (DISP 89)" in the PASS (OPS 2) and on "GNC SYS SUMM 2" in the BFS (OPS 1, 3, and 6). The combustion chamber pressure is hardwired to "OMS PRESS PC" meter on panel F7 (output in percent). Both parameters are part of the GNC downlist for ground monitoring. The fuel injector temperature is limit sensed and will trigger an SM alert (class 3) if it exceeds a high limit.

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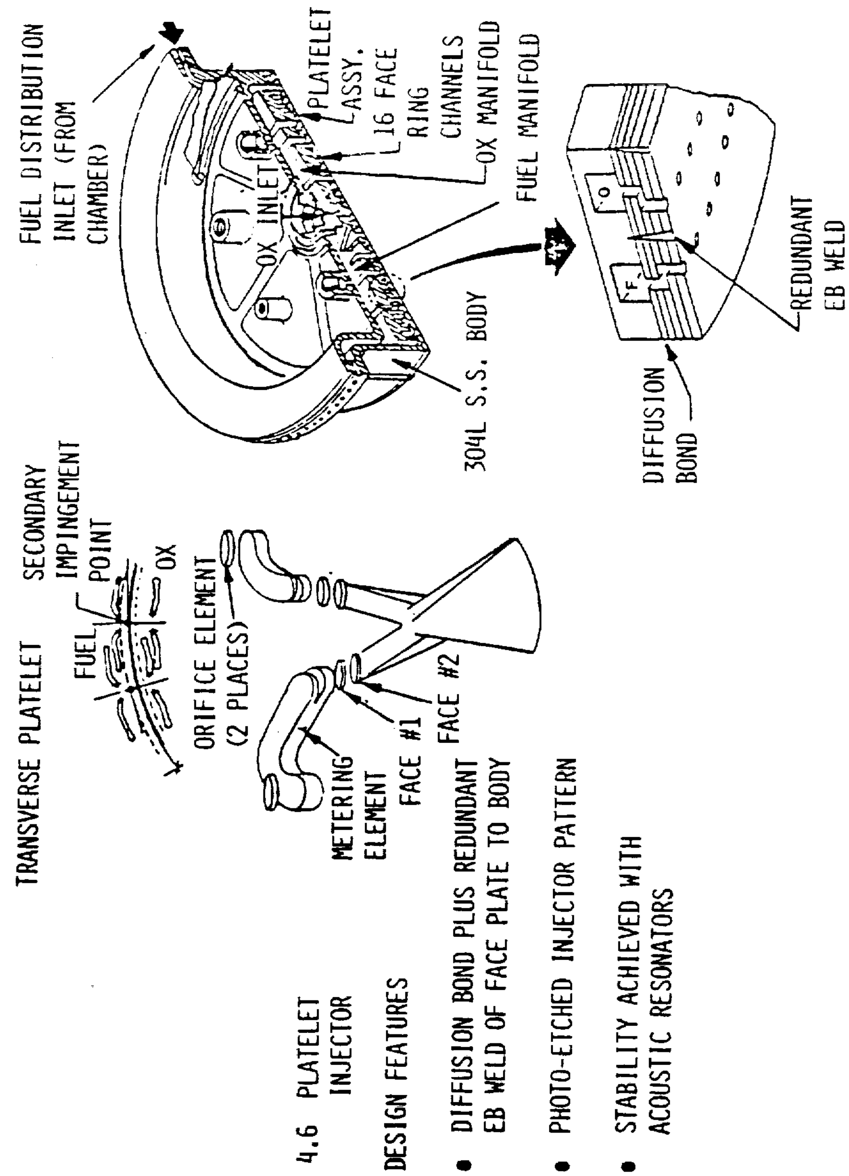

Figure 24 - INJECTOR ASSEMBLY

3.1.3.b.2 Combustion Chamber

The OMS engine combustion chamber confines the hot combustion gases in a fixed volume producing the required pressure and temperature that provides the design thrust. The combustion chamber consists of an acoustic resonator, inner and outer walls, nozzle throat, fuel inlet distribution ring, thrust-gimbal ring mounting pads, clevis mounts for attachment of other assemblies and a nozzle attachment flange (Figure 25). Fuel is used to cool the assembly during engine burns by regenerative and film cooling methods.

One hundred twenty longitudinal grooves are machined into the combustor's stainless steel inner wall. When mated to the outer wall these grooves make up the regenerative cooling passages. These passages are aligned and mated to the injector assemblies' fuel distribution ring during final chamber assembly. The remaining part of the regenerative cooling system is the fuel inlet-distribution ring, which is an integral part welded to the outer wall. The nozzle attachment flange is an integral part of the distribution ring. The thrust-gimbal ring mounting pads are also welded to the distribution ring while the hardware-subsystem clevis mounts are welded to the outer chamber wall.

Integral to the inner wall of the combustion chamber is the converging-throat-diverging (initial) section of the engine's nozzle. The converging section has an area ratio (Ac/At) of 1.934:1, which blends into the throat area (approx. 26.5 square inches). The diverging section is the initial section of the engine's bell-shaped exhaust nozzle. The area ratio of this section is 5.866:1 with a mean divergence angle of about 30.5 degrees.

3.1.3.b.3 Nozzle Extension

The nozzle extension, when bolted to the combustion chamber, completes the engine's bell-shaped exhaust nozzle (Figure 26). It is fabricated from a columbium alloy sheet stock. Nominal thickness is 0.030 inch. However, the attach flange is made from 0.10 inch sheet and the exhaust plane stiffener ring is from 0.0775 inch sheet. These two sections are tapered to match the 0.030 sheet at the girth welds. The final assembly is coated with a silicide compound as a corrosion preventive. Attachment to the combustion chamber is by a split retainer ring with a graphite gasket. Thirty-six bolts hold the extension in place.

The nozzle exit plane area is about 1458 square inches, resulting in an expansion ration (Ae/At) of 55:1. The

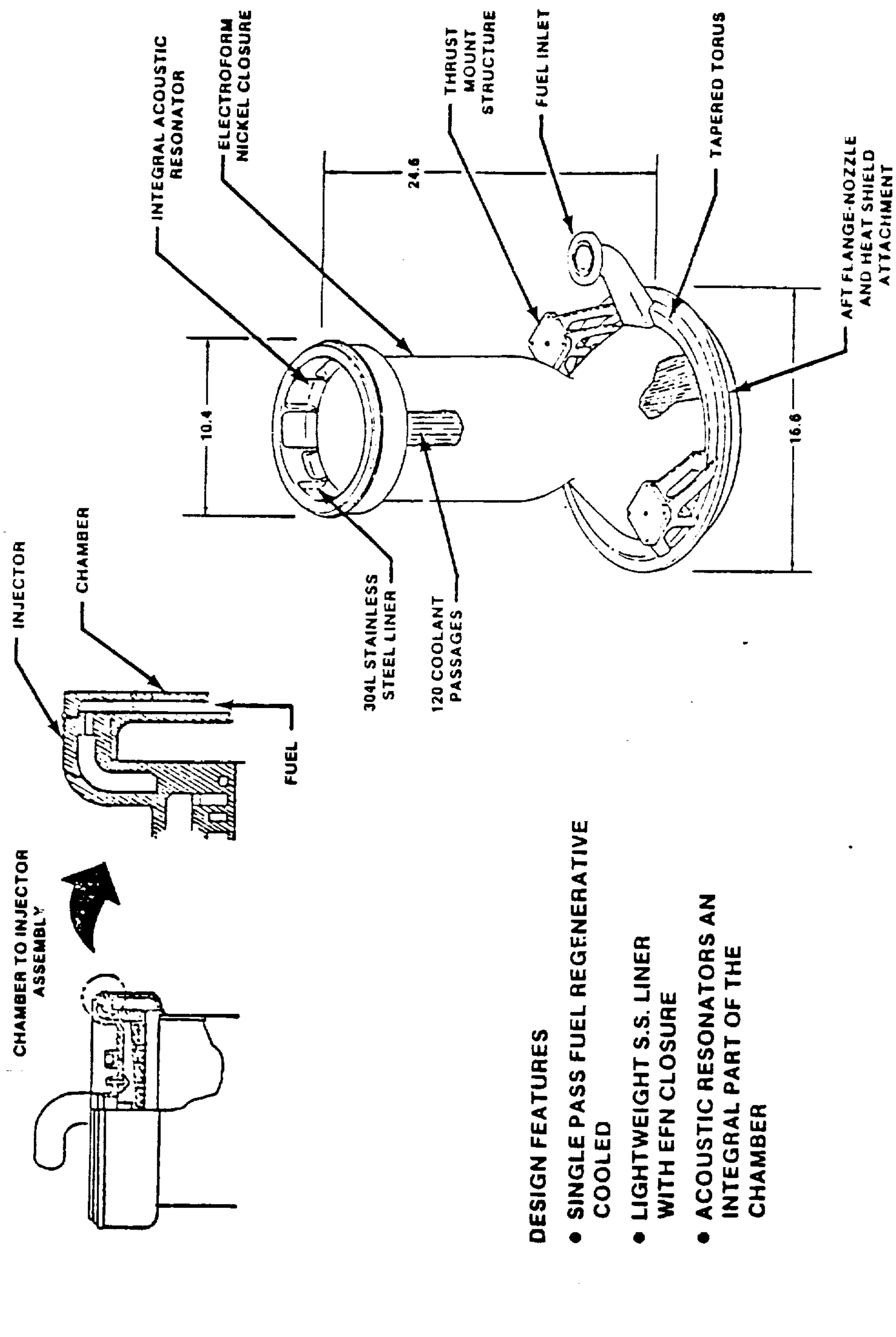

Figure 25 - COMBUSTION CHAMBER ASSEMBLY

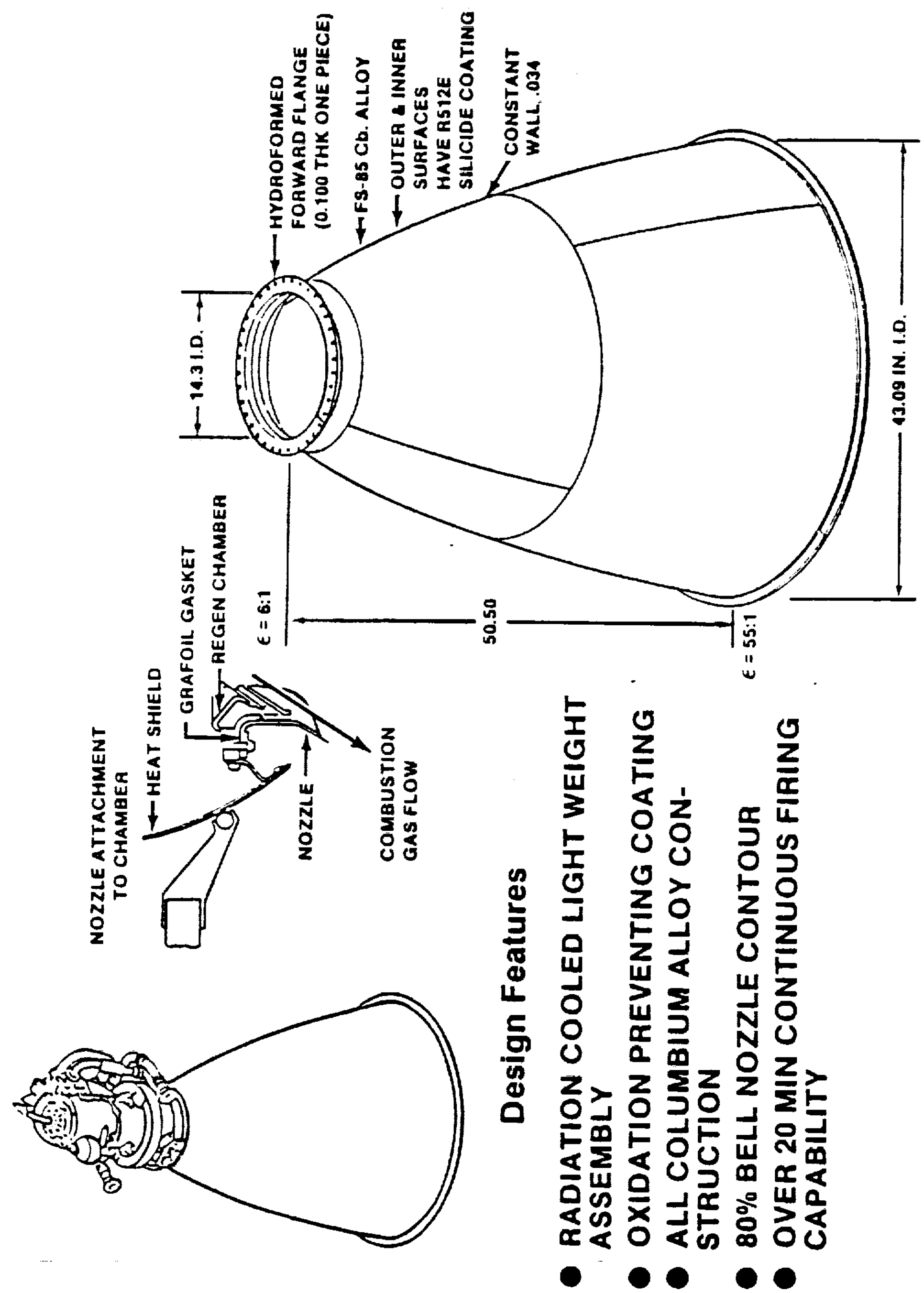

Figure 26 - NOZZLE EXTENSION

exit plane divergent angle is 0.55 degrees, which gives a radial thrust component of about 900 pounds (symmetric). At steady state operation, the exhaust gas exit velocity is approximately 10,100 ft/sec.

3.1.3.b.4 Plumbing

Plumbing for the OMS engine is divided into GN2 (pneumatic), fuel, and oxidizer lines. These lines are fabricated from titanium alloy tubing incorporating integral end fittings.

The fuel and oxidizer inlet lines are fabricated from 1.50-in.-O.D. stainless steel tube. Fittings are welded to the tube for attachment in the propellant feed lines and the inlet side of the bipropellant ball valve assembly. The inlet lines also incorporate bellows to allow for line flexing during gimbal operations and engine assembly. At the attachment to the feed lines, a flow balancing orifice and filter are fitted to each line.

Outlet lines for the fuel and oxidizer are made from 1.250-in. O.D. titanium alloy tubing. End fittings are welded in place for mating to the bipropellant ball valve assembly, the oxidizer inlet manifold, and the fuel's inlet distribution ring. Bellows are incorporated in the lines to allow for engine alignment during vehicle/engine mating.

Instrumentation for the plumbing consists of strain gage type pressure transducers and thermocouples on the fuel and oxidizer inlet lines. The pressure measurements can be monitored in the cockpit on "GNC SYS SUMM 2" in the PASS (OPS 2 and 8) and in the BFS (OPS 1, 3, and 6). The temperatures can be monitored in the cockpit on "PRPLT THERMAL (DISP 89)" in SM OPS 2. The pressures and temperatures are part of the GNC/OI downlist for ground monitoring. The temperatures are also limit sensed and will trigger an SM alert (class 3) if the limits are exceeded.

3.1.3.c TVC (Gimbal) Assembly

Each OMS engine is attached to the Orbiter via a pivoting mount, which can be gimbaled up-and-down (pitch) and side-to-side (yaw) to provide 3-axis thrust vector control (Figure 27). Gimbaling is driven by two electromechanical actuators on each engine (Figure 28). Gimbal travel in the pitch and yaw axes is approximately +/-7 degrees and +/-8 degrees, respectively, about the null. Since the engines are mounted on opposite sides of the Orbiter's centerline (X-axis), pointing one engine up and one down produces a roll

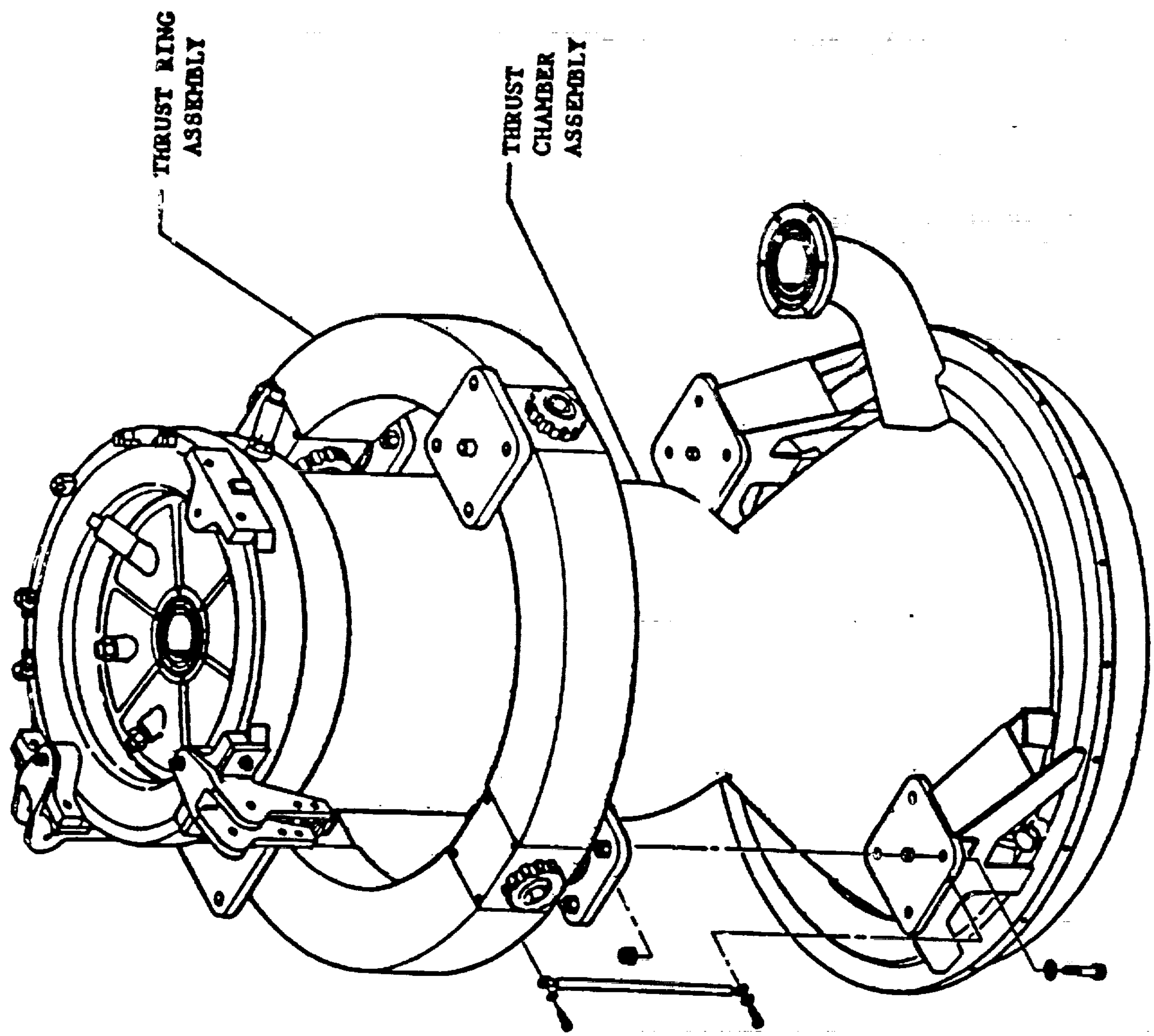

Figure 27 - THRUST RING TO TCA ATTACHMENT

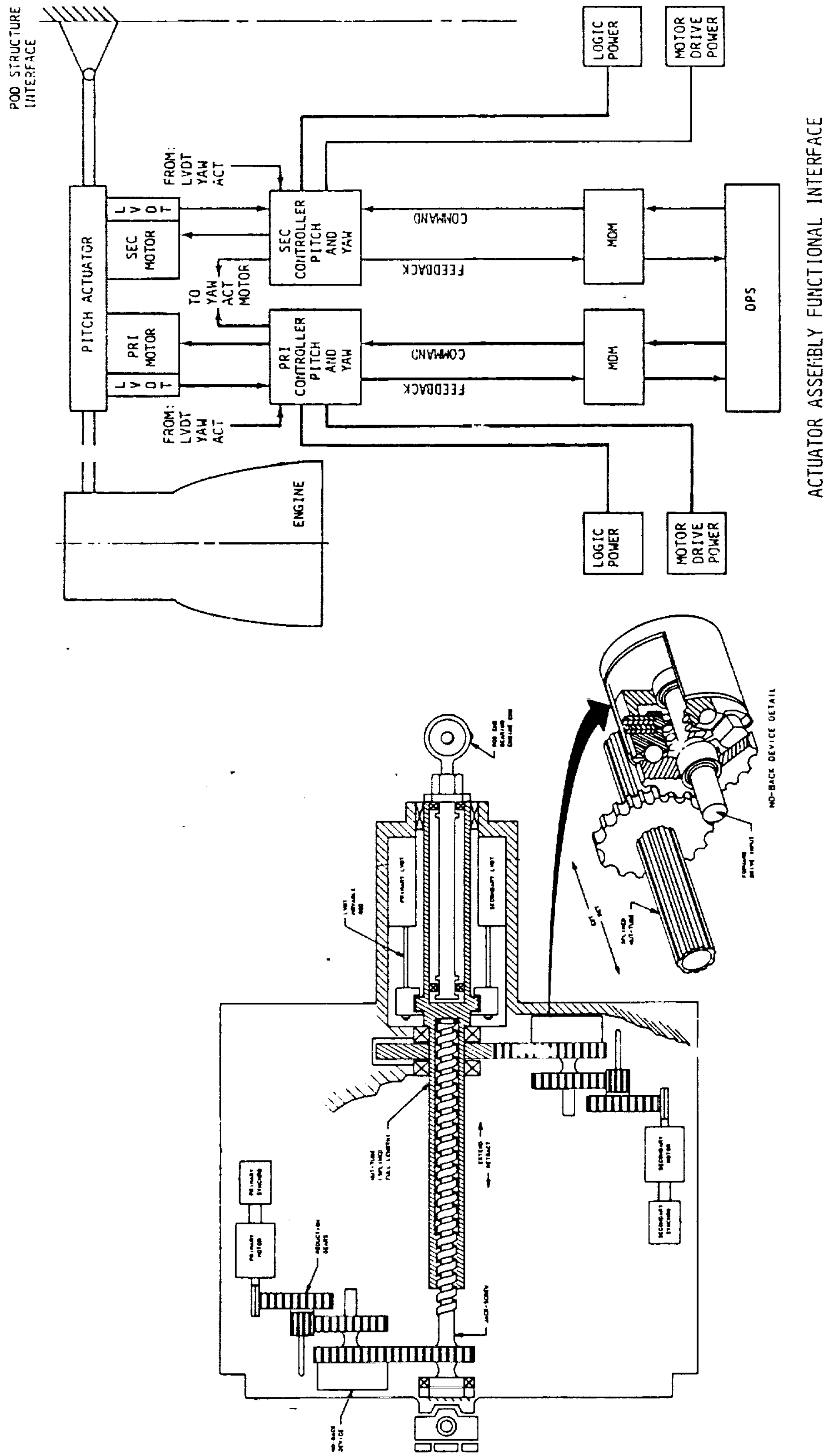

Figure 28 - OMS GIMBAL ACTUATOR

moment. With both engines firing, coordinated 2-axis gimbaling of the two engines produces 3-axis Orbiter flight control. The yaw gimbals control only yaw, whereas the pitch gimbaling produces both a pitch and a roll moment together. 3-axis TVC control is impossible with only one engine. For a one-engine OMS burn, TVC controls pitch and yaw and the RCS is used to control roll. The crew can read the current engine gimbal pitch and yaw angles on the CRT XXXX MNVR YYYY display. The pitch and yaw angles are included in the OI down-list for ground monitoring.

Each gimbal actuator has two channels: primary and secondary. If the active channel stops running, the other can take over. Both channels operate at the same speed, taking four seconds to steer an engine through its entire gimbal range at top speed. The crew can select actuator drive via the CRT XXXX MNVR YYYY display.

3.1.4 Electrical Power Distribution and Control Subsystems

3.1.4.a Thermal Control

Thermal control for the OMS is achieved by insulation of propellant lines and walls that enclose OMS hardware components, and by line-wraparound heaters and blanket-type heaters. The heater system is divided into two areas: the OMS/RCS pods, and the aft fuselage cross-feed and bleed lines. Each of the heater systems has two redundant heater systems, A and B, and are controlled by switches on Panel A14.

3.1.4.a.1 Pod Thermal Control

The OMS/RCS pods use heater patches to provide thermal control. Each heater patch consists of a redundant set of wires, or elements, which have been formed into a flat, tightly spiraled patch. The patch is then mounted on existing hardware, and as electricity flows through the highly resistant wires, the heat generated warms the hardware as well as radiating into the surrounding open areas. Each of the OMS/RCS pods are divided into nine heater areas. Each of the heater patches in the pods contain an A and a B element. Each element has a thermostat which controls the temperature from 55 degrees to 75 degrees, +/-5 degrees F. Temperature sensors are located throughout the pods and supply temperature information to the propellant thermal CRT display and to telemetry. The crew can monitor this display only in SM OPS 2, whereas the ground can monitor the temperature in all OPS.

3.1.4.a.2 Crossfeed and Bleedline Thermal Control

The aft fuselage is divided into eleven heater areas. Each area is heated in parallel by heater systems A and B, and each areas has a control thermostat to maintain temperature at 55 degrees to 75 degrees, +/-5 degrees F. Temperature sensors are located on the control thermostats and on the crossfeed and bleed lines. The temperature sensors supply temperature to the propellant thermal CRT display in SM OPS 2, and to telemetry to all OPS.

3.2 Interfaces and Locations

The OMS engine interfaces with the Shuttle's Data Processing System (DPS), Pulse Code Modulator Master Unit (PCMMU), Caution and Warning System (C&W), Displays and Controls (D/C), and the Electrical Power Distribution and Control System (EPDCS).

Data from the OMS engine consisting of pressures, temperatures, actuator position, and valve position are sent to the DPS via the Flight Critical (FC) Multiplexer/Demultiplexers (MDMs) for processing by the GPCs. Display and annunciation of the health and status of the engine is accomplished by the DPS via CRT displays, cockpit meters, C&W, and telemetry. The DPS system in turn provides the engine with commands for valve configurations, engine ON/OFF, and Thrust Vector Control (TVC).

A subset of the engine data is sent to the PCMMU via the Operational Instrumentation (OI) MDMs to be telemetered. The PCMMU combines these data with other OMS parameters, output from the GPCs as part of the downlist, and routes them to the onboard recorders and to the S-band to be transmitted to the ground as part of the downlink.

A carefully selected subset of OMS engine data is sent to the C&W for fault determination and alarm annunciation. The C&W processes these data against present limits to determine anomalies in engine performance. When anomalies are found, hardware C&W signals are issued that activate indicator lights in the C&W panel and the master alarm pushbuttons and turn on the C&W tone.

Dedicated cockpit meters in the D&C panels are used to display engine data either sent directly from the engine or routed through the GPCs. The D&C panels also have switches and circuit breakers that are used for manual valve configuration and power routing. In the manual TVC mode, crew deflection of the Rotational Hand Controller (RHC) is routed through the GPC for scaling and then to the engine gimbal actuators to provide TVC.

Electrical power is provided to the engine by the EPDCS. Logic power and dc power is provided to valve relays and TVC servo-actuators.

The OMS also interfaces with the aft RCS through propellant interconnect lines. OMS propellant can be fed to RCS jets for attitude holds, maneuvers, and translations on-orbit, and during aborts for more rapid OMS propellant dumping. RCS propellant is not fed to the OMS.

3.3 Hierarchy

Figures 4 and 5 illustrate the hierarchy of the OMS hardware and EPD&C components, respectively. Figures 6 through 28 depict the functional details of the OMS subsystem components.

4.0 ASSESSMENT RESULTS

The IOA analysis of the OMS hardware initially generated two hundred eighty-four (284) failure mode worksheets and identified one hundred sixty (160) potential critical items (PCIs) before starting the assessment process. The EPD&C subsystem analysis initially generated six hundred sixty-seven (667) worksheets with two hundred sixteen (216) PCIs. These analysis results along with additional analysis results generated during the assessment (Appendix E) were compared to the proposed NASA baseline of one hundred one (101) hardware and one hundred forty-two (142) EPD&C FMEAs, and sixty-eight (68) hardware and forty-nine (49) EPD&C CIL items. IOA mapped one hundred thirty-eight (138) hardware and one hundred forty-seven (147) EPD&C FMEAs, and ninety-three (93) hardware and forty-seven (47) EPD&C CILs and PCIs into the NASA FMEAS and CILs. Upon completion of the assessment, and after discussions with the NASA subsystem manager, forty-seven (47) hardware issues, twenty-nine (29) of which concern CIL items or PCIs, and seventy (70) EPD&C issues, thirty-one (31) of which concern CIL items or PCIs, remain unresolved. Each of these unresolved issues are presented in sections 4.1 and 4.2, as well as in the detailed assessment worksheets (Appendix C). Any IOA issues which were resolved with the NASA subsystem managers are documented as such on the detailed assessment worksheets, and are summarized in section 4.3.

Appendix C presents detailed assessment worksheets for each failure mode identified and assessed. These worksheets detail the assessments of each failure mode and document unresolved issues, resolved issues, plus any additional non-issue recommendations and comments. Appendix D highlights the IOA recommended critical items list and corresponding IOA worksheet ID. Appendix E contains IOA analysis worksheets supplementing previous analysis results reported in Space Transportation System Engineering and Operations Support (STSEOS) Working Paper No. 1.0-WP-VA86001-21, Analysis of the Orbital Maneuvering System, January 12, 1987. Appendix F provides a cross reference between the NASA FMEAs and corresponding IOA worksheet(s) along with IOA recommendations and an issues "flag" to denote the FMEAs with which IOA has unresolved issues.

Following the hierarchy breakdown shown in Figures 4 and 5, the OMS assessment results are summarized in the tables below.

Tables I-A and I-B present summaries of the IOA FMEA assessments for the OMS hardware and OMS EPD&C, respectively. The IOA INTL column is the initial number of IOA failure modes for each OMS component. The recommended IOA FMEA baseline (IOA MAP) versus the NASA FMEA baseline, and resulting unresolved issues are presented in the subsequent columns. The unresolved failure mode issues for each OMS component are discussed in the associated section 4 paragraph referenced in the final column.

Tables II-A and II-B present summaries of the IOA CIL assessments for the OMS hardware and OMS EPD&C, respectively. The IOA INTL column is the initial number of IOA PCIs for each OMS component. The recommended IOA CIL baseline (IOA MAP) versus the NASA CIL baseline, and resulting unresolved issues are presented in the subsequent columns. Again, the unresolved failure mode issues for each OMS component are discussed in the associated section 4 paragraph referenced in the final column.

Tables III-A and III-B present summaries of the recommended IOA FMEA baselines for the OMS hardware and OMS EPD&C, respectively.

Tables IV-A and IV-B present summaries of the recommended IOA CIL baselines for the OMS hardware and OMS EPD&C, respectively.

TABLE I-A Summary of IOA FMEA Assessment - OMS Hardware					
Components	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES
HE PRESS SUBSYSTEM					4.2.1.A
STORAGE TANK	2	1	1	0	
TANK ISOLATION VALVE	6	3	2	1	4.2.1.A.1
REGULATOR	5	3	3	1	4.2.1.A.2
VAPOR ISOLATION VALVE	6	2	2	1	4.2.1.A.3
QUAD CHECK VALVE	5	4	3	2	4.2.1.A.4
COUPLINGS (SINGLE SEAL)	3	5	3	2	4.2.1.A.5
COUPLINGS (DOUBLE SEAL)	9	5	3	2	4.2.1.A.5
LINES AND FITTINGS	5	1	1	0	
PROP STOR & DIST SUBSYSTEM					4.2.2.A
PRESSURE RELIEF ASSEMBLY	5	5	5	0	
GROUND MANUAL ISOLATION VALVE	3	1	1	0	
PROPELLANT TANK	2	2	2	0	
GAGING PROBES	10	3	3	0	
TOTALIZER	3	1	1	0	
COMMUNICATION SCREEN	2	1	1	0	
GALLERY LEG SCREEN	1	1	1	0	
COLLECTOR MANIFOLD SCREEN	1	1	1	0	
TANK ISOLATION VALVE	8	4	3	1	4.2.2.A.1
CROSSFEED VALVE	8	4	3	1	4.2.2.A.2
COUPLINGS (SINGLE SEAL)	33	10	6	4	4.2.2.A.3
COUPLINGS (DOUBLE SEAL)	3	0	0	0	
GIMBAL BELLOWS	15	2	2	0	
FLEX LINE ASSEMBLY	2	1	1	0	
ALIGNMENT BELLOWS	3	1	1	0	
LINES AND FITTINGS	8	2	2	0	
OME SUBSYSTEM					4.2.3.A
OME ASSEMBLY					
INLET FILTER & ORIFICE	2	2	2	1	4.2.3.A.1
BIPROPELLANT VALVE ASSEMBLY	27	8	6	2	4.2.3.A.2
BIPROP CAVITY PRESS RLF VALVE	5	4	0	4	4.2.3.A.3
PLATELET INJECTOR	3	2	2	0	
COMBUSTION CHAMBER	2	2	2	0	
NOZZLE EXTENSION	2	1	1	0	
COUPLINGS (SINGLE SEAL)	12	8	3	5	4.2.3.A.4
TVC GIMBAL BELLOWS	3	1	1	0	
ALIGNMENT BELLOWS	3	1	1	0	
LINES AND FITTINGS	1	0	0	0	

TABLE I-A Summary of IOA FMEA Assessment - OMS Hardware (cont'd)					
Criticality:	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES
<u>OME SUBSYSTEM</u>					4.2.3.A
GN2 ASSEMBLY					
TANK FILL/VENT VALVE	3	2	2	1	4.2.3.A.5
STORAGE TANK	2	1	1	0	
GN2 PNEUMATIC PACK HOUSING	2	0	0	0	
PRESSURE ISOLATION VALVE	6	3	2	2	4.2.3.A.6
REGULATOR	5	2	2	0	
PRESSURE RELIEF VALVE	4	3	3	0	
CHECK VALVE	3	2	2	0	
ACCUMULATOR	2	2	1	1	4.2.3.A.7
PURGE VALVE ASSEMBLY	11	2	2	0	
COUPLINGS (SINGLE SEAL)	3	0	0	0	
COUPLINGS (DOUBLE SEAL)	6	10	6	4	4.2.3.A.8
LINES & FITTINGS	7	1	1	0	
<u>OME SUBSYSTEM</u>					4.2.3.A
TVC ASSEMBLY					
GIMBAL RING	1	1	1	0	
GIMBAL RING BEARING	1	2	1	2	4.2.3.A.9
GIMBAL RING MOUNTING PAD	1	1	1	0	
GIMBAL DRIVE MOTOR	2	2	1	1	4.2.3.A.10
GIMBAL DRIVE ASSEMBLY	7	2	2	1	4.2.3.A.11
REDUCTION GEAR	2	2	0	2	4.2.3.A.12
ANTIBACK DEVICE	3	3	1	2	4.2.3.A.13
GIMBAL DRIVE THRUST BEARING	2	3	1	3	4.2.3.A.14
MECHANICAL STOP, SNUBBER	1	1	1	1	4.2.3.A.15
CONTROLLER, GIMBAL ACTUATOR	2	1	1	0	
TOTAL	284	138	101	47	

TABLE I-B Summary Of IOA FMEA Assessment - OMS EPD&C					
Criticality:	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES
<u>HE PRESS SUBSYSTEM</u>					4.2.1.B
CONTROLS					
VALVES					
CONTROLLER	16	2	2	1	4.2.1.B.1
DIODE	20	4	4	0	
DRIVER	4	2	2	0	
FUSE	2	1	1	0	
RESISTOR	12	2	2	0	
SWITCH, TOGGLE	6	3	2	1	4.2.1.B.2
INSTRUMENTATION					
METER	1	1	1	1	4.2.1.B.3
SENSOR, PRESSURE	2	1	1	1	4.2.1.B.4
SENSOR, TEMPERATURE	2	1	1	1	4.2.1.B.5
SWITCH, TOGGLE	1	1	1	1	4.2.1.B.6
<u>PROP STOR & DIST SUBSYSTEM</u>					
CONTROLS					
VALVES					
DIODE	8	25	25	17	4.2.2.B.1
DRIVER	16	3	3	3	4.2.2.B.2
FUSE	8	2	2	1	4.2.2.B.3
RELAY	32	7	7	5	4.2.2.B.4
RESISTOR	72	9	9	6	4.2.2.B.5
SWITCH, TOGGLE	12	6	5	5	4.2.2.B.6
INSTRUMENTATION					
FUSE	2	1	1	0	
INDICATOR, EVENT	4	2	2	2	4.2.2.B.7
METER	4	3	2	2	4.2.2.B.8
SENSOR, PRESSURE	2	1	1	0	
SENSOR, TEMPERATURE	2	1	1	1	4.2.2.B.9
SWITCH, ROTARY	2	2	2	1	4.2.2.B.10

TABLE I-B Summary Of IOA FMEA Assessment - OMS EPD&C (cont'd)					
Criticality:	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES
OME SUBSYSTEM					
CONTROLS					
GN2 ASSEMBLY					
VALVES					
DIODE	8	2	2	0	
DRIVER	22	8	8	1	4.2.3.B.1
FUSE	8	3	3	0	
RESISTOR	20	3	3	0	
SWITCH, TOGGLE	5	4	4	2	4.2.3.B.2
TVC ASSEMBLY					
CONTROLLER	8	2	2	0	
FUSE	2	1	1	1	4.2.3.B.3
INSTRUMENTATION					
GN2 ASSEMBLY					
SENSOR, PRESSURE	3	1	1	1	4.2.3.B.4
OME ASSEMBLY					
FUSE	2	1	1	0	
METER	1	1	1	0	
SENSOR, POSITION	2	1	1	1	4.2.3.B.5
SENSOR, PRESSURE	3	3	2	1	4.2.3.B.6
SENSOR, TEMPERATURE	4	3	3	1	4.2.3.B.7
SIGNAL CONDITIONER	0	1	1	1	4.2.3.B.8
TVC ASSEMBLY					
SENSOR, POSITION	4	1	1	0	
THERMAL CONTROL SUBSYSTEM					
POD					
DRIVER	44	2	2	1	4.2.4.B.1
FUSE	32	3	3	0	
HEATER	64	1	1	1	4.2.4.B.2
RELAY	8	2	2	1	4.2.4.B.3
RESISTOR	28	3	3	0	
SENSOR, TEMPERATURE	12	1	0	1	4.2.4.B.4
SWITCH, THERMAL	32	2	2	1	4.2.4.B.5
SWITCH, TOGGLE	4	2	2	1	4.2.4.B.6
CROSSFEED					
DRIVER	12	2	2	1	4.2.4.B.7
FUSE	10	3	3	0	
HEATER	22	1	1	1	4.2.4.B.8
RELAY	4	2	2	0	
RESISTOR	12	2	2	0	
SENSOR, TEMPERATURE	13	2	2	2	4.2.4.B.9
SWITCH, THERMAL	44	2	2	1	4.2.4.B.10
SWITCH, TOGGLE	4	2	2	1	4.2.4.B.11
TOTAL	667	147	142	70	

TABLE II-A Summary of IOA CIL Assessment - OMS Hardware					
Components	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES
HE PRESS SUBSYSTEM					4.2.1.A
STORAGE TANK	2	1	1	0	
TANK ISOLATION VALVE	5	3	2	1	4.2.1.A.1
REGULATOR	5	3	3	1	4.2.1.A.2
VAPOR ISOLATION VALVE	5	2	1	1	4.2.1.A.3
QUAD CHECK VALVE	5	4	2	2	4.2.1.A.4
COUPLINGS (SINGLE SEAL)	1	2	1	1	4.2.1.A.5
COUPLINGS (DOUBLE SEAL)	0	2	1	1	4.2.1.A.5
LINES AND FITTINGS	4	1	1	0	
PROP STOR & DIST SUBSYSTEM					4.2.2.A
PRESSURE RELIEF ASSEMBLY	5	4	4	0	
GROUND MANUAL ISOLATION VALVE	2	0	0	0	
PROPELLANT TANK	2	2	2	0	
GAGING PROBES	0	0	0	0	
TOTALIZER	0	0	0	0	
COMMUNICATION SCREEN	2	1	1	0	
GALLERY LEG SCREEN	1	1	1	0	
COLLECTOR MANIFOLD SCREEN	1	1	1	0	
TANK ISOLATION VALVE	5	3	3	0	
CROSSFEED VALVE	3	1	1	0	
COUPLINGS (SINGLE SEAL)	11	4	2	2	4.2.2.A.3
COUPLINGS (DOUBLE SEAL)	0	0	0	0	
GIMBAL BELLOWS	15	2	2	0	
FLEX LINE ASSEMBLY	2	1	1	0	
ALIGNMENT BELLOWS	3	1	1	0	
LINES AND FITTINGS	7	2	2	0	
OME SUBSYSTEM					4.2.3.A
OME ASSEMBLY					
INLET FILTER & ORIFICE	2	2	1	1	4.2.3.A.1
BIPROPELLANT VALVE ASSEMBLY	26	8	6	2	4.2.3.A.2
BIPROP CAVITY PRESS RLF VALVE	2	4	0	4	4.2.3.A.3
PLATELET INJECTOR	3	2	2	0	
COMBUSTION CHAMBER	2	2	2	0	
NOZZLE EXTENSION	2	1	1	0	
COUPLINGS (SINGLE SEAL)	4	2	1	1	4.2.3.A.4
TVC GIMBAL BELLOWS	3	1	1	0	
ALIGNMENT BELLOWS	2	1	1	0	
LINES AND FITTINGS	1	0	0	0	

TABLE II-A Summary of IOA CIL Assessment - OMS Hardware (cont'd)					
Criticality:	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES
OME SUBSYSTEM					4.2.3.A
GN2 ASSEMBLY					
TANK FILL/VENT VALVE	0	1	1	1	4.2.3.A.5
STORAGE TANK	1	1	1	0	
GN2 PNEUMATIC PACK HOUSING	1	0	0	0	
PRESSURE ISOLATION VALVE	1	3	2	1	4.2.3.A.6
REGULATOR	3	1	1	0	
PRESSURE RELIEF VALVE	0	2	2	0	
CHECK VALVE	3	2	2	0	
ACCUMULATOR	2	2	1	1	4.2.3.A.7
PURGE VALVE ASSEMBLY	3	2	2	0	
COUPLINGS (SINGLE SEAL)	0	0	0	0	
COUPLINGS (DOUBLE SEAL)	0	4	2	2	4.2.3.A.8
LINES & FITTINGS	3	1	1	0	
OME SUBSYSTEM					4.2.3.A
TVC ASSEMBLY					
GIMBAL RING	1	1	1	0	
GIMBAL RING BEARING	1	2	1	2	4.2.3.A.9
GIMBAL RING MOUNTING PAD	1	1	1	0	
GIMBAL DRIVE MOTOR	0	0	0	0	
GIMBAL DRIVE ASSEMBLY	5	2	2	1	4.2.3.A.11
REDUCTION GEAR	0	0	0	0	
ANTIBACK DEVICE	1	1	0	1	4.2.3.A.13
GIMBAL DRIVE THRUST BEARING	0	2	0	2	4.2.3.A.14
MECHANICAL STOP, SNUBBER	1	1	0	1	4.2.3.A.15
CONTROLLER, GIMBAL ACTUATOR	0	0	0	0	
TOTAL	160	93	68	29	

TABLE II-B Summary of IOA CIL Assessment - OMS EPD&C					
Criticality:	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES
<u>HE PRESS SUBSYSTEM</u>					
CONTROLS					
VALVES					
CONTROLLER	1	1	0	1	4.2.1.B.1
DIODE	6	1	1	0	
DRIVER	0	0	0	0	
FUSE	0	0	0	0	
RESISTOR	0	0	0	0	
SWITCH, TOGGLE	4	1	1	0	
INSTRUMENTATION					
METER	0	0	0	0	
SENSOR, PRESSURE	0	0	0	0	
SENSOR, TEMPERATURE	0	0	0	0	
SWITCH, TOGGLE	0	0	0	0	
<u>PROP STOR & DIST SUBSYSTEM</u>					
CONTROLS					
VALVES					
DIODE	8	5	14	3	4.2.2.B.1
DRIVER	0	0	0	0	
FUSE	0	1	1	1	4.2.2.B.3
RELAY	12	6	6	5	4.2.2.B.4
RESISTOR	28	0	4	4	4.2.2.B.5
SWITCH, TOGGLE	2	2	3	4	4.2.2.B.6
INSTRUMENTATION					
FUSE	0	0	0	0	
INDICATOR, EVENT	0	0	0	0	
METER	0	0	0	0	
SENSOR, PRESSURE	0	0	0	0	
SENSOR, TEMPERATURE	2	1	0	1	4.2.2.B.9
SWITCH, ROTARY	0	0	0	0	

TABLE II-B Summary of IOA CIL Assessment - OMS EPD&C (cont'd)					
Criticality:	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES
OME SUBSYSTEM					
CONTROLS					
GN2 ASSEMBLY					
VALVES					
DIODE	0	2	2	0	
DRIVER	14	6	5	1	4.2.3.B.1
FUSE	8	2	2	0	
RESISTOR	6	1	1	0	
SWITCH, TOGGLE	5	4	2	2	4.2.3.B.2
TVC ASSEMBLY					
CONTROLLER	0	0	0	0	
FUSE	0	0	0	0	
INSTRUMENTATION					
GN2 ASSEMBLY					
SENSOR, PRESSURE	1	0	0	0	
OME ASSEMBLY					
FUSE	0	0	0	0	
METER	0	0	0	0	
SENSOR, POSITION	0	0	0	0	
SENSOR, PRESSURE	0	1	0	1	4.2.3.B.6
SENSOR, TEMPERATURE	1	0	0	0	
SIGNAL CONDITIONER	0	1	0	1	4.2.3.B.8
TVC ASSEMBLY					
SENSOR, POSITION	0	0	0	0	
THERMAL CONTROL SUBSYSTEM					
POD					
DRIVER	22	1	0	1	4.2.4.B.1
FUSE	0	2	2	0	
HEATER	41	0	0	0	
RELAY	4	1	1	1	4.2.4.B.3
RESISTOR	0	2	2	0	
SENSOR, TEMPERATURE	0	0	0	0	
SWITCH, THERMAL	16	1	0	1	4.2.4.B.5
SWITCH, TOGGLE	2	1	1	1	4.2.4.B.6
CROSSFEED					
DRIVER	0	0	0	0	
FUSE	0	0	0	0	
HEATER	10	0	0	0	
RELAY	1	1	1	0	
RESISTOR	0	0	0	0	
SENSOR, TEMPERATURE	5	2	0	2	4.2.4.B.9
SWITCH, THERMAL	17	1	0	1	4.2.4.B.10
SWITCH, TOGGLE	0	0	0	0	
TOTAL	216	47	49	31	

TABLE III-A IOA Recommended Criticalities - OMS Hardware							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
<u>HE PRESS SUBSYSTEM</u>							
STORAGE TANK	1	0	0	0	0	0	1
TANK ISOLATION VALVE	0	2	0	1	0	0	3
REGULATOR	0	1	0	1	1	0	3
VAPOR ISOLATION VALVE	0	1	0	1	0	0	2
QUAD CHECK VALVE	1	2	0	1	0	0	4
COUPLINGS (SINGLE SEAL)	0	2	0	0	0	3	5
COUPLINGS (DOUBLE SEAL)	0	0	0	2	0	3	5
LINES AND FITTINGS	1	0	0	0	0	0	1
<u>PROP STOR & DIST SUBSYSTEM</u>							
PRESSURE RELIEF ASSEMBLY	1	2	0	2	0	0	5
GROUND MANUAL ISOLATION VALVE	0	0	0	0	0	1	1
PROPELLANT TANK	1	1	0	0	0	0	2
GAGING PROBES	0	0	0	0	0	3	3
TOTALIZER	0	0	0	0	0	1	1
COMMUNICATION SCREEN	1	0	0	0	0	0	1
GALLERY LEG SCREEN	0	0	0	0	1	0	1
COLLECTOR MANIFOLD SCREEN	0	0	1	0	0	0	1
TANK ISOLATION VALVE	1	2	0	1	0	0	4
CROSSFEED VALVE	1	0	0	2	1	0	4
COUPLINGS (SINGLE SEAL)	0	4	0	0	0	6	10
COUPLINGS (DOUBLE SEAL)	0	0	0	0	0	0	0
GIMBAL BELLOWS	2	0	0	0	0	0	2
FLEX LINE ASSEMBLY	1	0	0	0	0	0	1
ALIGNMENT BELLOWS	1	0	0	0	0	0	1
LINES AND FITTINGS	2	0	0	0	0	0	2
<u>OME SUBSYSTEM</u>							
OME ASSEMBLY							
INLET FILTER & ORIFICE	1	1	0	0	0	0	2
BIPROPELLANT VALVE ASSEMBLY	0	7	0	1	0	0	8
BIPROP CAVITY PRESS RLF VALVE	3	1	0	0	0	0	4
PLATELET INJECTOR	2	0	0	0	0	0	2
COMBUSTION CHAMBER	2	0	0	0	0	0	2
NOZZLE EXTENSION	1	0	0	0	0	0	1
COUPLINGS (SINGLE SEAL)	0	2	0	0	0	6	8
TVC GIMBAL BELLOWS	1	0	0	0	0	0	1
ALIGNMENT BELLOWS	1	0	0	0	0	0	1
LINES AND FITTINGS	0	0	0	0	0	0	0

TABLE III-A IOA Recommended Criticalities - OMS Hardware (cont'd)							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
<u>OME SUBSYSTEM</u>							
GN2 ASSEMBLY							
TANK FILL/VENT VALVE	0	0	0	1	0	1	2
STORAGE TANK	1	0	0	0	0	0	1
GN2 PNEUMATIC PACK HOUSING	0	0	0	0	0	0	0
PRESSURE ISOLATION VALVE	0	1	0	2	0	0	3
REGULATOR	0	1	0	1	0	0	2
PRESSURE RELIEF VALVE	0	1	0	2	0	0	3
CHECK VALVE	0	1	0	1	0	0	2
ACCUMULATOR	1	1	0	0	0	0	2
PURGE VALVE ASSEMBLY	0	0	0	1	0	1	2
COUPLINGS (SINGLE SEAL)	0	0	0	0	0	0	0
COUPLINGS (DOUBLE SEAL)	0	0	0	4	0	6	10
LINES & FITTINGS	0	1	0	0	0	0	1
<u>OME SUBSYSTEM</u>							
TVC ASSEMBLY							
GIMBAL RING	1	0	0	0	0	0	1
GIMBAL RING BEARING	1	1	0	0	0	0	2
GIMBAL RING MOUNTING PAD	1	0	0	0	0	0	1
GIMBAL DRIVE MOTOR	0	0	0	2	0	0	2
GIMBAL DRIVE ASSEMBLY	1	1	0	0	0	0	2
REDUCTION GEAR	0	0	0	2	0	0	2
ANTIBACK DEVICE	0	1	0	2	0	0	3
GIMBAL DRIVE THRUST BEARING	0	2	0	1	0	0	3
MECHANICAL STOP, SNUBBER	0	1	0	0	0	0	1
CONTROLLER, GIMBAL ACTUATOR	0	0	0	1	0	0	1
TOTAL	31	40	1	32	3	31	138

TABLE III-B IOA Recommended Criticalities - OMS EPD&C							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
HE PRESS SUBSYSTEM							
CONTROLS							
VALVES							
CONTROLLER	0	0	0	2	0	0	2
DIODE	0	0	0	3	0	1	4
DRIVER	0	0	0	2	0	0	2
FUSE	0	0	0	1	0	0	1
RESISTOR	0	0	0	0	0	2	2
SWITCH, TOGGLE	0	1	0	2	0	0	3
INSTRUMENTATION							
METER	0	0	0	0	1	0	1
SENSOR, PRESSURE	0	0	0	0	1	0	1
SENSOR, TEMPERATURE	0	0	0	0	1	0	1
SWITCH, TOGGLE	0	0	0	0	1	0	1
PROP STOR & DIST SUBSYSTEM							
CONTROLS							
VALVES							
DIODE	0	1	0	8	4	12	25
DRIVER	0	0	0	0	3	0	3
FUSE	0	0	0	1	1	0	2
RELAY	0	2	0	3	1	1	7
RESISTOR	0	0	0	0	6	3	9
SWITCH, TOGGLE	0	1	0	3	1	1	6
INSTRUMENTATION							
FUSE	0	0	0	0	0	1	1
INDICATOR, EVENT	0	0	0	0	2	0	2
METER	0	0	0	0	2	1	3
SENSOR, PRESSURE	0	0	0	0	0	1	1
SENSOR, TEMPERATURE	0	0	1	0	0	0	1
SWITCH, ROTARY	0	0	0	0	1	1	2

TABLE III-B IOA Recommended Criticalities - OMS EPD&C (cont'd)							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
OME SUBSYSTEM							
CONTROLS							
GN2 ASSEMBLY							
VALVES							
DIODE	0	0	0	2	0	0	2
DRIVER	0	0	0	6	0	2	8
FUSE	0	0	0	3	0	0	3
RESISTOR	0	0	0	0	0	3	3
SWITCH, TOGGLE	0	2	0	2	0	0	4
TVC ASSEMBLY							
CONTROLLER	0	0	0	1	0	1	2
FUSE	0	0	0	1	0	0	1
INSTRUMENTATION							
GN2 ASSEMBLY							
SENSOR, PRESSURE	0	0	0	0	1	0	1
OME ASSEMBLY							
FUSE	0	0	0	0	0	1	1
METER	0	0	0	0	0	1	1
SENSOR, POSITION	0	0	0	0	1	0	1
SENSOR, PRESSURE	0	0	1	0	2	0	3
SENSOR, TEMPERATURE	0	0	0	0	2	1	3
SIGNAL CONDITIONER	0	0	1	0	0	0	1
TVC ASSEMBLY							
SENSOR, POSITION	0	0	0	1	0	0	1
THERMAL CONTROL SUBSYSTEM							
POD							
DRIVER	0	1	0	0	1	0	2
FUSE	0	0	0	0	3	0	3
HEATER	0	0	0	0	1	0	1
RELAY	0	1	0	0	1	0	2
RESISTOR	0	0	0	0	2	1	3
SENSOR, TEMPERATURE	0	0	0	0	0	1	1
SWITCH, THERMAL	0	1	0	0	1	0	2
SWITCH, TOGGLE	0	1	0	0	1	0	2
CROSSFEED							
DRIVER	0	0	0	0	2	0	2
FUSE	0	0	0	0	3	0	3
HEATER	0	0	0	0	1	0	1
RELAY	0	0	0	0	2	0	2
RESISTOR	0	0	0	0	1	1	2
SENSOR, TEMPERATURE	0	0	2	0	0	0	2
SWITCH, THERMAL	0	0	0	0	2	0	2
SWITCH, TOGGLE	0	0	0	0	2	0	2
TOTAL	0	11	5	41	54	36	147

TABLE IV-A IOA Recommended Critical Items - OMS Hardware							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
<u>HE PRESS SUBSYSTEM</u>							
STORAGE TANK	1	0	0	0	0	0	1
TANK ISOLATION VALVE	0	2	0	1	0	0	3
REGULATOR	0	1	0	1	1	0	3
VAPOR ISOLATION VALVE	0	1	0	1	0	0	2
QUAD CHECK VALVE	1	2	0	1	0	0	4
COUPLINGS (SINGLE SEAL)	0	2	0	0	0	0	2
COUPLINGS (DOUBLE SEAL)	0	0	0	2	0	0	2
LINES AND FITTINGS	1	0	0	0	0	0	1
<u>PROP STOR & DIST SUBSYSTEM</u>							
PRESSURE RELIEF ASSEMBLY	1	2	0	1	0	0	4
GROUND MANUAL ISOLATION VALVE	0	0	0	0	0	0	0
PROPELLANT TANK	1	1	0	0	0	0	2
GAGING PROBES	0	0	0	0	0	0	0
TOTALIZER	0	0	0	0	0	0	0
COMMUNICATION SCREEN	1	0	0	0	0	0	1
GALLERY LEG SCREEN	0	0	0	0	1	0	1
COLLECTOR MANIFOLD SCREEN	0	0	1	0	0	0	1
TANK ISOLATION VALVE	1	2	0	0	0	0	3
CROSSFEED VALVE	1	0	0	0	0	0	1
COUPLINGS (SINGLE SEAL)	0	4	0	0	0	0	4
COUPLINGS (DOUBLE SEAL)	0	0	0	0	0	0	0
GIMBAL BELLOWS	2	0	0	0	0	0	2
FLEX LINE ASSEMBLY	1	0	0	0	0	0	1
ALIGNMENT BELLOWS	1	0	0	0	0	0	1
LINES AND FITTINGS	2	0	0	0	0	0	2
<u>OME SUBSYSTEM</u>							
OME ASSEMBLY							
INLET FILTER & ORIFICE	1	1	0	0	0	0	2
BIPROPELLANT VALVE ASSEMBLY	0	7	0	1	0	0	8
BIPROP CAVITY PRESS RLF VALVE	3	1	0	0	0	0	4
PLATELET INJECTOR	2	0	0	0	0	0	2
COMBUSTION CHAMBER	2	0	0	0	0	0	2
NOZZLE EXTENSION	1	0	0	0	0	0	1
COUPLINGS (SINGLE SEAL)	0	2	0	0	0	0	2
TVC GIMBAL BELLOWS	1	0	0	0	0	0	1
ALIGNMENT BELLOWS	1	0	0	0	0	0	1
LINES AND FITTINGS	0	0	0	0	0	0	0

TABLE IV-A IOA Recommended Critical Items - OMS HDW (cont'd)							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
<u>OME SUBSYSTEM</u>							
GN2 ASSEMBLY							
TANK FILL/VENT VALVE	0	0	0	1	0	0	1
STORAGE TANK	1	0	0	0	0	0	1
GN2 PNEUMATIC PACK HOUSING	0	0	0	0	0	0	0
PRESSURE ISOLATION VALVE	0	1	0	2	0	0	3
REGULATOR	0	1	0	0	0	0	1
PRESSURE RELIEF VALVE	0	1	0	1	0	0	2
CHECK VALVE	0	1	0	1	0	0	2
ACCUMULATOR	1	1	0	0	0	0	2
PURGE VALVE ASSEMBLY	0	0	0	1	0	1	2
COUPLINGS (SINGLE SEAL)	0	0	0	0	0	0	0
COUPLINGS (DOUBLE SEAL)	0	0	0	4	0	0	4
LINES & FITTINGS	0	1	0	0	0	0	1
<u>OME SUBSYSTEM</u>							
TVC ASSEMBLY							
GIMBAL RING	1	0	0	0	0	0	1
GIMBAL RING BEARING	1	1	0	0	0	0	2
GIMBAL RING MOUNTING PAD	1	0	0	0	0	0	1
GIMBAL DRIVE MOTOR	0	0	0	0	0	0	0
GIMBAL DRIVE ASSEMBLY	1	1	0	0	0	0	2
REDUCTION GEAR	0	0	0	0	0	0	0
ANTIBACK DEVICE	0	1	0	0	0	0	1
GIMBAL DRIVE THRUST BEARING	0	2	0	0	0	0	2
MECHANICAL STOP, SNUBBER	0	1	0	0	0	0	1
CONTROLLER, GIMBAL ACTUATOR	0	0	0	0	0	0	0
TOTAL	31	40	1	18	2	1	93

TABLE IV-B IOA Recommended Critical Items - OMS EPD&C							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
<u>HE PRESS SUBSYSTEM</u>							
CONTROLS							
VALVES							
CONTROLLER	0	0	0	1	0	0	1
DIODE	0	0	0	1	0	0	1
DRIVER	0	0	0	0	0	0	0
FUSE	0	0	0	0	0	0	0
RESISTOR	0	0	0	0	0	0	0
SWITCH, TOGGLE	0	1	0	0	0	0	1
INSTRUMENTATION							
METER	0	0	0	0	0	0	0
SENSOR, PRESSURE	0	0	0	0	0	0	0
SENSOR, TEMPERATURE	0	0	0	0	0	0	0
SWITCH, TOGGLE	0	0	0	0	0	0	0
<u>PROP STOR & DIST SUBSYSTEM</u>							
CONTROLS							
VALVES							
DIODE	0	1	0	3	1	0	5
DRIVER	0	0	0	0	0	0	0
FUSE	0	0	0	0	1	0	1
RELAY	0	2	0	3	1	0	6
RESISTOR	0	0	0	0	0	0	0
SWITCH, TOGGLE	0	1	0	1	0	0	2
INSTRUMENTATION							
FUSE	0	0	0	0	0	0	0
INDICATOR, EVENT	0	0	0	0	0	0	0
METER	0	0	0	0	0	0	0
SENSOR, PRESSURE	0	0	0	0	0	0	0
SENSOR, TEMPERATURE	0	0	1	0	0	0	1
SWITCH, ROTARY	0	0	0	0	0	0	0

TABLE IV-B IOA Recommended Critical Items - OMS EPD&C (cont'd)							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
OME SUBSYSTEM							
CONTROLS							
GN2 ASSEMBLY							
VALVES							
DIODE	0	0	0	2	0	0	2
DRIVER	0	0	0	5	0	1	6
FUSE	0	0	0	2	0	0	2
RESISTOR	0	0	0	0	0	1	1
SWITCH, TOGGLE	0	2	0	2	0	0	4
TVC ASSEMBLY							
CONTROLLER	0	0	0	0	0	0	0
FUSE	0	0	0	0	0	0	0
INSTRUMENTATION							
GN2 ASSEMBLY							
SENSOR, PRESSURE	0	0	0	0	0	0	0
OME ASSEMBLY							
FUSE	0	0	0	0	0	0	0
METER	0	0	0	0	0	0	0
SENSOR, POSITION	0	0	0	0	0	0	0
SENSOR, PRESSURE	0	0	1	0	0	0	1
SENSOR, TEMPERATURE	0	0	0	0	0	0	0
SIGNAL CONDITIONER	0	0	1	0	0	0	1
TVC ASSEMBLY							
SENSOR, POSITION	0	0	0	0	0	0	0
THERMAL CONTROL SUBSYSTEM							
POD							
DRIVER	0	1	0	0	0	0	1
FUSE	0	0	0	0	2	0	2
HEATER	0	0	0	0	0	0	0
RELAY	0	1	0	0	0	0	1
RESISTOR	0	0	0	0	2	0	2
SENSOR, TEMPERATURE	0	0	0	0	0	0	0
SWITCH, THERMAL	0	1	0	0	0	0	1
SWITCH, TOGGLE	0	1	0	0	0	0	1
CROSSFEED							
DRIVER	0	0	0	0	0	0	0
FUSE	0	0	0	0	0	0	0
HEATER	0	0	0	0	0	0	0
RELAY	0	0	0	0	1	0	1
RESISTOR	0	0	0	0	0	0	0
SENSOR, TEMPERATURE	0	0	2	0	0	0	2
SWITCH, THERMAL	0	0	0	0	1	0	1
SWITCH, TOGGLE	0	0	0	0	0	0	0
TOTAL	0	11	5	20	9	2	47

4.1 General Unresolved Issues

Many of the unresolved issues which exist on individual FMEAs and CILs are linked to several "general" issues identified by IOA during the OMS FMEA/CIL assessment. These general issues concern either the groundrules used by NASA/RI to perform the FMEA/CIL analysis, or the NASA/RI analysis of the OMS subsystem. Each of the general IOA issues may result in several FMEA and CIL issues.

The general issues identified by IOA in the OMS hardware and EPD&C assessments are discussed in the following sections.

4.1.A Hardware

Because the majority of the original IOA OMS hardware issues have been resolved, only two general hardware issues remain. Most of the remaining specific issues exist independently and cannot, for the most part, be linked to any general groundrule or analysis differences.

4.1.A.1 Loss of TVC During TAL Abort

The OMS activities during a TAL abort include a pre-MECO OMS dump and, beginning with STS-26, a post-MECO 100 fps ET separation burn. For some TAL aborts (late TAL), the post-MECO ET sep burn may need to be lengthened to complete an OMS dump which could not be completed before MECO. During the pre-MECO dump, the OMS engines remain in the ascent stow position and TVC is inactive. For the post-MECO activities, the OMS engines are driven to an I-loaded CG position and TVC is, again, inactive. IOA and NASA/RI agree on a groundrule that two OMS engines are required to ensure the successful completion of all OMS dumps and burns during RTLS and TAL aborts. Thus, single failures which result in the loss of one OMS engine are classified as abort 1/1's.

However, IOA also considers a single TVC failure which results in the inability to move an OMS engine from the pre-MECO stow position to the post-MECO CG position to be a possible 1/1 during a TAL abort. The increased RCS activity required to maintain orbiter control during the post-MECO OMS operations, with one OMS engine out of position, may consume RCS propellant needed to complete the abort. Shutting the affected engine down results in a 1/1 (per above groundrule), and using the engine may consume needed RCS propellant. IOA does not consider RCS control authority to be a problem, but is concerned about RCS propellant over-consumption with this failure scenario.

No RCS consumption data appears to exist for the failure scenario in question: one OMS engine failed out of position; other OMS engine in correct I-loaded CG position. The scenarios which have been analyzed include: 1) one engine failed out of position; other engine has active TVC, and 2) both engines in CG position (TVC inactive); RCS maintaining orbiter control (normal TAL post-

MECO situation).

Because of a lack of data which indicates that RCS propellant over-consumption is not a problem for the failure scenario in question, IOA recommends that the TAL abort criticality be classified as a 1/1 on applicable FMEAs. If it is determined that, for the worst case TVC failure during two engine post-MECO OMS activities, the orbiter can be adequately controlled within RCS capabilities and with no RCS consequences for the remainder of the abort, then IOA would have no TAL crit 1 issues for TVC failures.

4.1.A.2 Additional Items and Failure Modes

A number of OMS hardware subsystem items and failure modes identified by IOA during the analysis phase are not covered in the current NASA FMEA/CIL. IOA recommends that these items and failure modes be incorporated into the FMEA/CIL. These issues are identified in Appendix F by issue codes HDW 4 and HDW 5.

4.1.B EPD&C

4.1.B.1 Loss of Valve Talkbacks

IOA considers the loss of data to determine the actual position of a valve to be a 3/2R PPP criticality. Valve position data is provided by the GPC/MDM discretes and the event indicators, which provide redundancy for each other. Loss of all redundancy may lead to falsely failing the valve closed or open which could effect mission operations. NASA FMEAs have a 3/3 criticality for these failures.

The IOA does not consider pressure or temperature sensors to be redundant to event indicators and discretes to determine valve position.

See JSC 10588 pages 5-18.

4.1.B.2 Multiple Unrelated Failures in Redundancy String

IOA considers the redundancy strings on several current FMEAs to include "multiple unrelated failures", which is beyond the scope of the IOA's interpretation of NSTS 22206. On FMEAs to which this issue applies, IOA recommends that a bellows failure not be considered in the redundancy string and the criticality thus be downgraded. The NASA is right that this failure could cause continuous power on the associated valve(s), since the signal through this item would inhibit closing or opening when the valves reach full closed or open. However, NASA's scenario with another failure consisting of bellows rupture is irrelevant. A bellows rupture anytime exposing electrical components and valve motor to propellant is serious, not just when the valve motor is continuously on and hot. That is, this failure does not significantly contribute to the bellows rupture failure.

Furthermore, the valves are protected from continuous power by an electrical thermal shutoff device within the valve motor at no more than 352 F, and according to the specs, "the motor and actuation mechanism shall not fail as a result of prolonged power application."

See AC Motor Valve Spec MC284-0430 Sect. 3.1, 3.2.1.2.9, 3.2.1.2.11

4.1.B.3 Multiple Unrelated Failures in Effects

IOA considers the effects on several current FMEAs to include "multiple unrelated failures", which is beyond the scope of the IOA's interpretation of NSTS 22206. IOA concurs with the NASA's criticalities and screens, but recommends that a bellows failure not be considered in this FMEA's effects field. The NASA is right that this failure could cause continuous power on the associated valve(s), since the signal through this item would inhibit closing or opening when the valves reach full closed or open. However, the NASA's scenario with another failure consisting of bellows rupture is irrelevant. A bellows rupture anytime exposing electrical components and valve motor to propellant is serious, not just when the valve motor is continuously on and hot. That is, this failure does not significantly contribute to the bellows rupture failure.

Furthermore, the valves are protected from continuous power by an electrical thermal shutoff device within the valve motor at no more than 352 F, and according to the specs, "the motor and actuation mechanism shall not fail as a result of prolonged power application."

See AC Motor Valve Spec MC284-0430 Sect. 3.1, 3.2.1.2.9, 3.2.1.2.11

4.1.B.4 Additional Items and Failure Modes

A number of OMS EPD&C subsystem items and failure modes identified by IOA during the analysis phase are not covered in the current NASA FMEA/CIL. The IOA recommends that these items and failure modes be incorporated into the FMEA/CILs. These issues are identified in Appendix F by issue codes EPD&C 4 and EPD&C 5.

4.1.B.5 Failure Mode Differences

Several EPD&C issues exist because of differences in the failure modes defined by the IOA and the NASA for these items. See the applicable issues.

4.1.B.6 Failed-On Heaters Detected Too Late

Several issues on current thermal control component FMEAs exist because of the detectability of failed-on heaters. IOA recommends upgrading the criticality of these FMEAs based on the following argument. The first failure results in the associated heater set failed on. A second failure in the same heater group would result in both elements of two or more heaters on simultaneously when the redundant heater group is active. This results in a temperature exceeding the pod structural qualified limit of 425 F in approximately two minutes and possible loss of crew/vehicle due to structural damage.

The NASA baseline FMEA hazards field partially supports this: "Failed on heater may cause potential fracture mechanical problem depending on heater location and application of increased propellant pressure (crit 3 - alternative action and time to abort after second failure). Not detectable unless multiple heaters failed on." The NASA's baseline Time to Effect field is "Immediate to Hours".

See Flight Rules 6-72a, and JSC NASA Heater Book.

4.2 Specific Unresolved Issues

The specific OMS hardware and EPD&C unresolved issues are presented in the following sections and paragraphs which were referenced in tables I and II. The organization of the sections and paragraphs follow the OMS breakdown hierarchy shown in Figures 4 and 5, and used in tables I and II.

Unresolved issues which are related to general issues discussed in section 4.1 contain a reference to the applicable general issue. Each issue is presented in a standard format which gives the failure mode, applicable FMEA number and IOA assessment ID, the NASA and IOA criticality and screen assignments, and the rationale behind the IOA issue. Refer to the detailed assessment sheets in Appendix C for further information on each issue.

4.2.1 Helium Pressurization Subsystem

4.2.1.A Hardware

4.2.1.A.1 Tank Isolation Valves

1) FAILURE: RESTRICTED FLOW

03-3-1003-2	2/1R PPP, CIL
OMS-111	2/1R PFF, CIL

ISSUE: IOA recommends that the restricted flow failure mode be placed on a new FMEA separate from the fails closed mode since the restricted flow mode fails the B and C redundancy screens. Both isolation valves are open during ascent (OMS-1 and OMS-2), and restricted flow through one valve would not be detectable (fail B screen). Also, any upstream contamination source could affect the parallel isolation valves simultaneously (fail C screen).

4.2.1.A.2 Regulators

1) FAILURE: FAILS CLOSED, RESTRICTED FLOW, LOW OUTPUT

03-3-1004-2	2/1R PPF, CIL
OMS-119, 120, 121	2/1R PFF, CIL

ISSUE: IOA recommends that the B redundancy screen be failed for these failure modes. These regulator failures would not be detectable during times when both parallel flow paths are open (e.g., ascent).

4.2.1.A.3 Vapor Isolation Valves

1) FAILURE: FAILS TO CLOSE, INTERNAL LEAKAGE

03-3-1006-1	3/3	---	
OMS-127	3/1R	PFP, CIL	(Fails to close)
OMS-128	3/1R	PFP, CIL	(Internal leakage)

ISSUE: IOA recommends that this item and these failure modes be upgraded to 3/1R PFP and placed on the CIL. The current 3/3 criticality does not reflect the worst case potential effects of propellant migration into the helium subsystem due to the loss of all redundancy (vapor isol valve and check valve assembly). IOA contends that the contamination of upstream components by prop or prop vapors which could occur during a mission could result in the inability to repressurize the OMS prop tanks. Contamination of the regulator sensing ports could cause the regulators to fail closed. A failed open redundant quad check valve poppet is not detectable during flight (fail B screen). IOA also recommends that the crossover of prop or prop vapors resulting in a hypergolic reaction in the lines be added as a possible effect on this FMEA.

This issue is supported by the fact that these failures and/or "prop vapor exposure" are listed as causes on other functional crit 1R FMEAs (03-3-1003-2, 1004-1, 1004-2, and 1006-2). The criticality assigned to a failure mode should reflect the worst case ultimate effects of the failure. Since the loss of all redundancy can result in the inability to repressurize the prop tanks, these failures should be classified as a 3/1R PFP. IOA does not consider the potential severity of these failures to be adequately addressed by their listing as a cause on the above 1R FMEAs.

4.2.1.A.4 Quad Check Valves

1) FAILURE: FAILS TO CLOSE, INTERNAL LEAKAGE

03-3-1007-1	3/3	---	
OMS-133	2/1R	PFP, CIL	(Fuel)
OMS-134	3/1R	PFP, CIL	(Oxid)

ISSUE: IOA recommends that a 2/1R PFP FMEA and CIL for the fuel assembly and a 3/1R PFP FMEA and CIL for the oxidizer assembly. The current single 3/3 criticality does not reflect the worst case potential effects of propellant migration into the helium subsystem due to the loss of all redundancy (series poppets for fuel leg; series poppets and vapor isol valve for oxidizer leg). IOA contends that the contamination of upstream components by prop or prop vapors which could occur during a mission could result in the inability to repressurize the OMS prop tanks. Contamination of the regulator sensing ports could cause the regulators to fail closed. A failed open quad check valve poppet is not detectable during flight (fail B screen).

IOA also recommends that the crossover of prop or prop vapors resulting in a hypergolic reaction in the lines be added as a possible effect on these proposed FMEAs.

This issue is supported by the fact that these failures and/or "prop vapor exposure" are listed as causes on other functional crit 1R FMEAs (03-3-1003-2, 1004-1, 1004-2, and 1006-2). The criticality assigned to a failure mode should reflect the worst case ultimate effects of the failure. Since the loss of all redundancy can result in the inability to repressurize the prop tanks, these failures should be classified as 2/1R PFP (fuel assembly), and 3/1R PFP (oxidizer assembly). IOA does not consider the potential severity of these failures to be adequately addressed by their listing as a cause on the above 1R FMEAs.

4.2.1.A.5 Quick Disconnect Couplings

1) FAILURE: EXTERNAL LEAKAGE

03-3-1002-1	2/1R FFP, CIL
OMS-102	2/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open (during flight)" be added as a failure mode on this FMEA. This is a credible failure mode and is addressed on RCS QD coupling FMEAs.

2) FAILURE: EXTERNAL LEAKAGE

03-3-1205-1	3/1R FFP, CIL
OMS-113,123,137,146	3/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open (during flight)" be added as a failure mode on this FMEA. This is a credible failure mode and is addressed on RCS QD coupling FMEAs.

3,4) FAILURE: FAILS TO COUPLE

03-3-1002-3, 1205-3	3/3	---
OMS-103,114,124,138,147	3/3	---

ISSUE: IOA recommends that "fails closed" and "restricted flow" be added to the failure modes on this FMEA. These are credible failure modes and are addressed on RCS QD coupling FMEAs.

4.2.1.B EPD&C

4.2.1.B.1 Remote Power Controllers

1) FAILURE: FAILS HIGH

   05-6L-2176-2 3/1R PPP
   OMS-399 3/1R PFP, CIL

   ISSUE: The IOA recommends failing the B screen. This failure is not detectable until the associated switch is put in OPEN position, but this causes valve to be stuck open. If the crew had known about the failure, they might not have thrown the switch into OPEN, to avoid sticking the valve open. Therefore, failure is detected but detected too late.

4.2.1.B.2 Toggle Switches for Valves

1) FAILURE: FAILS TO SWITCH (STUCK IN THE "OPEN" POSITION)

   NO FMEA
   OMS-438,442 3/1R PPP

   ISSUE: The IOA recommends that the NASA generate a FMEA with this "Stuck in open position (Both contact sets)" Failure Mode. The closest existing match available is the NASA's FMEA 05-6L-2026-1 with a "FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT (ONE CONTACT SET)" Failure Mode, which is already matched to OMS-440 and 443. See 4.1.B.4.

4.2.1.B.3 Meters

1) FAILURE: ERRONEOUS OUTPUT

   05-6L-2153-1 3/3 ---
   OMS-444 3/2R PPP

   ISSUE: The IOA does, but the NASA does not, imply that CRT displays and Mission Control Center are redundant to item to get nitrogen and helium pressure measurements. Loss of function can lead to falsely failing one OMS HE tank or two OMS GN2 tanks, and thus loss of mission or an ATO.

4.2.1.B.4 Pressure Sensors

1) FAILURE: ERRONEOUS OUTPUT (OPEN, SHORTED, FAILS OUT OF TOLERANCE)

03-3-1801-1   3/3 ---
OMS-445,446   3/2R PPP

ISSUE: Loss of all redundancy can result in falsely failing the Helium Tank during ascent requiring an ATO be called, since there may not be enough time to verify the failure. See Flight Rule 6-1.

4.2.1.B.5 Temperature Sensors

1) FAILURE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS OUT OF TOLERANCE)

03-3-1802-1   3/3 ---
OMS-447   3/2R PPP

ISSUE: Loss of all redundancy can result in falsely failing the Helium Tank during ascent requiring an ATO be called, since there may not be enough time to verify the failure. See Flight Rule 6-1.

4.2.1.B.6 Toggle Switches for Instrumentation

1) FAILURE, NASA: ALL CREDIBLE MODES (FAILS TO TRANSFER, SHORTS,OPENS)
FAILURE, IOA: FAILS TO SWITCH (POLES STUCK IN ONE OF THREE POSITIONS OR POLES FAIL TO MAKE CONTACT IN ANY POSITION)

05-6L-2033-1   3/3 ---
OMS-449   3/2R PPP

ISSUE: The IOA does, but the NASA does not, imply that CRT displays and Mission Control Center are redundant to item to get Nitrogen and Helium Pressure measurements. Loss of function can lead to falsely failing one OMS HE tank or two OMS GN2 tanks, and thus loss of mission or an ATO.

4.2.2 Propellant Storage & Distribution Subsystem

4.2.2.A Hardware

4.2.2.A.1 Tank Isolation Valves

1) FAILURE: RELIEF DEVICE FAILS CLOSED

NO FMEA
OMS-20014X 3/1R PNP

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. Failure of the propellant tank isolation valve internal relief device is listed as a cause on current prop line and gimbal bellows external leakage FMEAs, however IOA recommends that a new 3/1R PNP FMEA be generated for this failure mode. The potential 1R effects of this failure (overpressurization and rupture of prop lines and components) warrant a separate FMEA to give this failure the proper amount of attention. AC motor valve relief device failures are currently addressed as failure modes on individual FMEAs (however, IOA takes issue with the criticalities assigned).

The OMS propellant tank isolation valves are nominally open during a mission, therefore a previous failure is required for the valves to be closed and this failure mode to be applicable.

4.2.2.A.2 Crossfeed Valves

1) FAILURE: RELIEF DEVICE FAILS CLOSED

NO FMEA
OMS-20015X 3/1R PNP

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. Failure of the crossfeed valve internal relief device is listed as a cause on current crossfeed line external leakage FMEAs, however IOA recommends that a new 3/1R PNP FMEA be generated for this failure mode. The potential 1R effects of this failure (overpressurization and rupture of crossfeed lines) warrant a separate FMEA to give this failure the proper amount of attention. AC motor valve relief device failures are currently addressed as failure modes on individual FMEAs (however, IOA takes issue with the criticalities assigned).

The OMS crossfeed valves are nominally open during a mission, therefore a previous failure is required for the valves to be closed and this failure mode to be applicable.

4.2.2.A.3 Quick Disconnect Couplings

1,2) FAILURE: EXTERNAL LEAKAGE

03-3-2001-1, 2009-1	2/1R FFP, CIL
OMS-150,156,165,168,171,174 207,210,213,231,234	2/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open (during flight)" be added as a failure mode on this FMEA. This is a credible failure mode and is addressed on RCS QD coupling FMEAs.

3,4) FAILURE: FAILS TO COUPLE

03-3-2001-3, 2009-3	3/3 ---
OMS-151,157,166,169,172,175 208,211,214,232,235	3/3 ---

ISSUE: IOA recommends that "fails closed" and "restricted flow" be added to the failure modes on this FMEA. These are credible failure modes and are addressed on RCS QD coupling FMEAs.

4.2.2.B EPD&C

4.2.2.B.1 Diodes

1) FAILURE: FAILS OPEN

05-6L-2253A-1	2/1R PPP, CIL
OMS-450A,452A	3/1R PPP

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2007-1, since this failure causes Tank Isol valve to fail open. According to the last available NASA criticality, this FMEA should be in the new NASA CIL list but is not. The IOA assumes that the NASA downgraded this to a non-CIL.

2) FAILURE: FAILS SHORT

05-6L-2253A-2	2/1R PPP, CIL
OMS-451A,453A	3/3 ---

ISSUE: The IOA recommends removing this FMEA from the CIL. The IOA believes this failure has no effect, since only a Multiplexer-Demultiplexer (MDM) is behind the "GPC close" diodes, and that is well protected internally from reverse current. According to the last available NASA criticality, this FMEA should be in the new NASA CIL list but is not. The IOA assumes that the NASA downgraded this to a non-CIL, and tentatively concurs.

3) FAILURE: FAILS OPEN

05-6L-2253C-1 3/1R PPP
OMS-450C,452C 3/1R PFP, CIL

ISSUE: The IOA recommends failing the B screen, thus adding this to the CIL list, since the MCA status of relay positions are not readily accessible by the crew. Therefore, "close" relays which do not open and "open" relays which do not close because of a failed open diode are not detectable and the failed diode is not detectable inflight.

4) FAILURE: FAILS OPEN

05-6L-2253D-1 3/2R PPP
OMS-450D,452D 3/1R PPP

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2007-1, since this failure causes Tank Isol valve to fail open.

5) FAILURE: FAILS OPEN

05-6L-2255 -1 3/1R PFP, CIL
OMS-450E,452E 3/3 ---

ISSUE: See 4.1.B.2.

6) FAILURE: FAILS OPEN

05-6L-2256 -1 2/1R PFP, CIL
OMS-450F,452F 3/3 ---

ISSUE: See 4.1.B.2.

7) FAILURE: FAILS OPEN

05-6L-2256A-1 3/1R PFP, CIL
OMS-450G,452G 3/3 ---

ISSUE: See 4.1.B.2.

8) FAILURE: FAILS SHORT

05-6L-2256B-2 3/1R PFP, CIL
OMS-451C,453C 3/3 ---

ISSUE: See 4.1.B.2.

9) FAILURE: FAILS OPEN

05-6L-2257-1	3/1R PPP
OMS-454,456	3/2R PFP, CIL

ISSUE: The IOA's recommended criticality is indirectly driven by OMS Hardware FMEA 03-3-2008-2, since loss of redundancy causes crossfeed valve to fail closed. The IOA recommends failing the B screen, thus adding this to the CIL list, since the MCA status of relay positions are not readily accessible by the crew. Therefore, "close" relays which do not open and "open" relays which do not close because of a failed open diode are not detectable and so the failed diode is not detectable inflight.

10) FAILURE: FAILS SHORT

05-6L-2257-2	3/1R PPP
OMS-455,457	3/2R PPP

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2008-2, since this failure causes the crossfeed valve to fail closed.

11) FAILURE: FAILS OPEN

05-6L-2257A-1	2/1R PPP, CIL
OMS-454A,456A	3/2R PPP

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2008-2, since this failure causes the crossfeed valve to fail closed. According to the last available NASA criticality, this FMEA should be in the new NASA CIL list but is not. The IOA assumes that the NASA downgraded this to a non-CIL.

12) FAILURE: FAILS SHORT

05-6L-2257A-2	2/1R PPP, CIL
OMS-455A,457A	3/3 ---

ISSUE: The IOA recommends removing this FMEA from the CIL. The IOA believes this failure has no effect, since only a Multiplexer-Demultiplexer (MDM) is behind the "GPC close" diodes, and that is well protected internally from reverse current. According to the last available NASA criticality, this FMEA should be in the new NASA CIL list but is not. The IOA assumes that the NASA downgraded this to a non-CIL, and tentatively concurs.

13) FAILURE: FAILS OPEN

05-6L-2257C-1 3/1R PPP
OMS-454C,456C 3/1R PFP, CIL

ISSUE: The IOA recommends failing the B screen, thus adding this to the CIL list, since the MCA status of relay positions are not readily accessible by the crew. Therefore, "close" relays which do not open and "open" relays which do not close because of a failed open diode are not detectable and the failed diode is not detectable inflight.

14) FAILURE: FAILS OPEN

05-6L-2259 -1 3/1R PFP, CIL
OMS-454F,456F 3/3 ---

ISSUE: See 4.1.B.2.

15) FAILURE: FAILS OPEN

05-6L-2260 -1 2/1R PFP, CIL
OMS-454G,456G 3/3 ---

ISSUE: See 4.1.B.2.

16) FAILURE: FAILS OPEN

05-6L-2260A-1 3/1R PFP, CIL
OMS-454H,456H 3/3 ---

ISSUE: See 4.1.B.2.

17) FAILURE: FAILS OPEN

05-6L-2260B-2 3/1R PFP, CIL
OMS-454I,456I 3/3 ---

ISSUE: See 4.1.B.2.

4.2.2.B.2 Hybrid Drivers

1) FAILURE: FAILS OPEN

05-6L-2202-1 3/3 ---
OMS-466,470 3/2R PPP

ISSUE: The IOA recommends 3/2R. Worst case would be falsely failing the A or B valve closed resulting in loss of mission due to safety considerations. See 4.1.B.1.

2) FAILURE: FAILS HIGH

05-6L-2202-2	3/3 ---
OMS-469,473	3/2R PPP

ISSUE: The IOA recommends 3/2R. Worst case would be falsely failing the A or B valve closed resulting in loss of mission due to safety considerations. See 4.1.B.1.

3) FAILURE: FAILS OPEN

05-6L-2204-1	3/3 ---
OMS-458,459,460,461,462,463,464,465	3/2R PPP

ISSUE: The IOA recommends 3/2R. Worst case is valve declared failed closed and redundant valve is used to complete crossfeed. Loss of all redundancy could result in falsely failing the crossfeed system resulting in loss of mission. See 4.1.B.1.

4.2.2.B.3 Fuses

1) FAILURE: OPENS, INADVERTENTLY OPENS

05-6L-2004-1	3/1R PFP, CIL
OMS-474,475,476,477	3/2R PFP, CIL

ISSUE: See 4.1.B.2.

4.2.2.B.4 Relays

1) FAILURE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

05-6L-2126-1	3/1R PNP
OMS-492,496,508,513	3/1R PFP, CIL

ISSUE: The IOA recommends failing the B screen, thus adding this to the CIL list. These relays are not Standby Redundant to any other items since they are normally operational. Some of these relays failing have no immediate effect and cannot be detected except via MCA status signals which are not readily used by the crew.

2) FAILURE: INADVERTENT OPERATION, INADVERTENTLY TRANSFERS, FAILS CLOSED

05-6L-2126-2	2/1R PFP, CIL
OMS-493,497,509,510	2/1R PFP, CIL

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2007-1. See 4.1.B.3.

3) FAILURE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

05-6L-2127 -2	3/1R PFP, CIL
OMS-491,495,507,512	3/1R PFP, CIL

ISSUE: See 4.1.B.3.

4) FAILURE: INADVERTENT OPERATION, INADVERTENTLY TRANSFERS, FAILS CLOSED

05-6L-2130-2	2/1R PFP, CIL
OMS-485,489,501,505	3/2R PFP, CIL

ISSUE: See 4.1.B.2.

5) FAILURE: FAILS CLOSED (ENERGIZED)

05-6L-2131 -2	3/1R PFP, CIL
OMS-483,487,499,503	3/3 ---

ISSUE: See 4.1.B.2.

4.2.2.B.5 Resistors

1) FAILURE: FAILS OPEN

05-6L-2078-1	3/3 ---
OMS-530,537,576,584	3/2R PPP

ISSUE: Worst case would be falsely failing the A or B valve closed resulting in loss of mission due to safety considerations. See 4.1.B.1.

2) FAILURE: FAILS OPEN

05-6L-2079-2	2/1R PPP, CIL
OMS-572,578	3/2R PPP

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2007-1. See 4.1.B.2.

3) FAILURE: FAILS OPEN

05-6L-2079A-2	2/1R PFP, CIL
OMS-526,532,570,580	3/2R PPP

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2007-1. The IOA recommends passing the B screen since the effect of the failure (barberpole indicated on a valve position indicator) is readily detectable. The problem remains to determine if the valve or this item failed. See 4.1.B.2.

4) FAILURE: FAILS OPEN

05-6L-2082-1 3/3 ---
OMS-518,524,562,568 3/2R PPP

ISSUE: The IOA recommends 3/2R. Worst case is valve declared failed closed and redundant valve is used to complete crossfeed. Loss of all redundancy could result in falsely failing the crossfeed system resulting in loss of mission. See 4.1.B.1. See JSC 10588 pg. 5-18.

5) FAILURE: FAILS OPEN

05-6L-2083-1 2/1R PPP, CIL
OMS-514,520,558,564 3/2R PPP

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2007-1. See 4.1.B.2.

6) FAILURE: FAILS OPEN

05-6L-2083A-1 2/1R PFP, CIL
OMS-538,544 3/2R PPP

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2007-1. The IOA recommends passing the B screen since the effect of the failure (barberpole indicated on a valve position indicator) is readily detectable. The problem remains to determine if the valve or this item failed. See 4.1.B.2.

4.2.2.B.6 Toggle Switches

1) FAILURE: FAILS TO SWITCH (STUCK IN THE "OPEN" POSITION)

NO FMEA
OMS-593,596 3/3 ---

ISSUE: The IOA recommends that the NASA generate a FMEA with this "STUCK IN OPEN POSITION (BOTH CONTACT SETS)" Failure Mode. The closest existing match available is the NASA's FMEA 05-6L-2027-1 with a "FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT (ONE CONTACT SET)" Failure Mode, which is already matched to OMS-592 and 595. See 4.1.B.4.

2) FAILURE, NASA: INADVERTENT OPERATION, SHORTS, INADVERTENTLY CLOSES (ONE CONTACT SET)
FAILURE, IOA: FAILS TO SWITCH (STUCK IN THE "CLOSED" POSITION)

05-6L-2027-2 3/1R PNP
OMS-594,597 2/1R PPP, CIL

ISSUE: The IOA's recommended criticality is driven by OMS Hardware FMEA 03-3-2007-2, since this failure causes the tank isolation valve to fail closed. Also, the NASA failed only one pole, considering the other pole as redundant, whereas the IOA considered the worst case failure mode by failing a part common to both poles (e.g. toggle lever). This is the reason for the IOA's higher criticality. The NASA considered one pole to be standby redundant to the other and so had "Not Applicable" for B screen. See 4.1.B.5.

3) FAILURE, NASA: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT (BOTH CONTACT SETS)
FAILURE, IOA: FAILS TO SWITCH (STUCK IN GPC POSITION)

05-6L-2028-1 3/1R PFP, CIL
OMS-586,589 3/1R PFP, CIL

ISSUE: According to the last available NASA criticality, this FMEA should be in the new NASA CIL list, but it is not. Therefore, the IOA assumes that the NASA downgraded this FMEA to a non-CIL. The IOA recommends that the NASA use the previous (last available to the IOA) criticality and screens (3/1R PFP) and reinstate this FMEA as a CIL.

4) FAILURE, NASA: INADVERTENTLY OR PREMATURELY TRANSFERS TO CLOSE, FAILED IN THE "CLOSE" POSITION (BOTH CONTACT SETS)
FAILURE, IOA: FAILS TO SWITCH (STUCK IN CLOSED POSITION)

05-6L-2028-2 3/1R PFP, CIL
OMS-588,591 3/1R PPP

ISSUE: The IOA concurs with the NASA's criticality, since it agrees with OMS Hardware FMEA 03-3-2008-2 (causes crossfeed valve to fail closed). However, the NASA failed the B screen because one of the two poles failing is undetectable. The IOA believes this is a carry-over from when the NASA failed only one contact set, and recommends passing this B screen. See 4.1.B.5.

5) FAILURE, NASA: INADVERTENTLY TRANSFERS TO OPEN,FAILED IN THE "OPEN" POSITION (BOTH CONTACT SETS).
FAILURE, IOA: FAILS TO SWITCH (STUCK IN OPEN POSITION)

05-6L-2028-3 3/1R PFP, CIL
OMS-587,590 3/2R PPP

ISSUE: The IOA recommends passing the B screen, and thus removing this as a CIL, since the effect of this failure (inability to close a valve) is detectable via the valve position indicator. See 4.1.B.2.

4.2.2.B.7 Event Indicators

1) FAILURE: ERRONEOUS INDICATION (FAILS HIGH, FAILS LOW, FAILS MIDTRAVEL)

05-6L-2151-1 3/3 ---
OMS-602,603 3/2R PPP

ISSUE: The IOA recommends 3/2R. Worst case would be falsely failing the A or B valve closed resulting in loss of mission due to safety considerations. See 4.1.B.1.

2) FAILURE: ERRONEOUS INDICATION (FAILS HIGH, FAILS LOW, FAILS MIDTRAVEL)

05-6L-2152-1 3/3 ---
OMS-600,601 3/2R PPP

ISSUE: The IOA recommends 3/2R. Worst case is valve declared failed closed and redundant valve is used to complete crossfeed. Loss of all redundancy could result in falsely failing the crossfeed system resulting in loss of mission. See 4.1.B.1. See Malfunction Procedure RCS 103a and JSC 10588 pg. 5-18.

4.2.2.B.8 Meters

1) FAILURE: ERRONEOUS OUTPUT

05-6L-2155-1 3/3 ---
OMS-605,607 3/2R PPP

ISSUE: The IOA recommends 3/2R. Loss of all redundancy in prelaunch and onorbit phases would result in OMS Helium tank being declared failed resulting in a loss of delta velocity and loss of mission capability, unless sensor failure is determined. See 4.1.B.1. See Flight Rule 6-41.

2) FAILURE: ERRONEOUS OUTPUT

05-6L-2157-1
OMS-604 3/2R PPP

ISSUE: The NASA's Review Comments stated "Delete this FMEA". The IOA recommends that the NASA not delete this FMEA. This item is associated with the flight-dependent Payload Bay Kit, but also displays Forward RCS and OMS tank pressures which are not flight-dependent. The IOA also recommends a change from NASA's original 3/3 criticality to 3/2R, because false indications of OMS tank pressure giving an appearance of a leak could lead to loss of mission for safety reasons.

4.2.2.B.9 Temperature Sensors

1) FAILURE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS OUT OF TOLERANCE)

03-3-2803-1 3/3 ---
OMS-610,611 2/2 ---, CIL

ISSUE: The IOA recommends 2/2 since loss of mission could occur in the liftoff phase with no redundancy. A temperature sensor failure could lead to wrongly failing the OMS fuel propellant tank leading to the establishment of a shallow ATO before sensor failure is determined.
See JSC 20923 PCN-1 and Flight Rule 6-2 then 6-40k.

4.2.2.B.10 Rotary Switches

1) FAILURE: FAILS TO SWITCH (POLES STUCK IN ONE OF THREE POSITION OR POLES FAIL TO MAKE CONTACT IN ANY POSITION)

05-6L-2034-1 3/3 ---
OMS-612 3/2R PPP

ISSUE: The IOA does, but the NASA does not, imply that CRT displays and MCC are redundant to this item to get OMS propellant tank ullage, (and RCS R/L/FWD prop ullage and RCS R/L/FWD Helium Tank pressure) measurements. Loss of redundancy can result in loss of mission for safety reasons since the actual status of the systems are unavailable, implying a criticality of 3/2R.

4.2.3 OME Subsystem Issues

4.2.3.A Hardware

4.2.3.A.1 Engine Inlet Filter and Orifice

1) FAILURE: STRUCTURAL FAILURE, CONTAMINATION PASSAGE

03-3-4002-2	3/3	---
OMS-248	1/1	---, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 1/1 and placed on the CIL. The current 3/3 criticality does not reflect the worst case potential effects of engine contamination due to an inlet filter failure. Contamination of the OMS engine injector orifices or cooling channels could result in combustion chamber burn-through. This issue is supported by the fact that this failure is listed as a cause on other 1/1 FMEAs (03-3-4004-1, 4005-2). The criticality assigned to a failure mode should reflect the worst case ultimate effects of the failure. Since this failure can result in burn-through of the engine, it should be classified as a 1/1. IOA does not consider the potential severity of this failure to be adequately addressed by its listing as a cause on the above 1/1 FMEAs.

This failure should at least be upgraded to a 2/1R PPP, 1/1 abort since it could result in the loss of one OMS engine.

4.2.3.A.2 Bipropellant Valve Assembly

1) FAILURE: RESTRICTED FLOW OF ENGINE CONTROL VALVE

NO FMEA
OMS-330 2/1R PPP, 1/1 ABORT, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA recommends that a 2/1R PPP, 1/1 abort FMEA and CIL be generated for this item and failure mode. IOA does not consider this failure to be adequately addressed on 03-3-4001-2, which lists "plugged opening orifice" as a cause for a failed closed control valve resulting in failed closed biprop valves. IOA considers restricted flow to be a credible failure mode for components with integral filters and/or orifices, and recommends that it be addressed as a failure mode (as opposed to a cause) to ensure that it gets the proper amount of attention. IOA does not consider the potential severity of this failure to be adequately addressed by its listing only as a cause on the above FMEA.

2) FAILURE: PROP LEAKAGE INTO ACTUATOR

NO FMEA
OMS-342 3/1R PFP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA recommends that a 3/1R PFP FMEA and CIL be generated for this failure mode. Leakage of propellant past the biprop ball valve seals and actuator seals could result in mixing of hypergolic propellants in actuator cavities or venting of propellant into the pod causing possible corrosion, fire, explosion, and exposure of EVA and ground crews. Seal failures not detectable in flight (fail B screen).

4.2.3.A.3 Biprop Cavity Pressure Relief Valve

1,2) FAILURE: FAILS CLOSED, RESTRICTED FLOW

NO FMEA			
OMS-262	1/1	---, CIL	(Fails closed)
OMS-20005X	1/1	---, CIL	(Restricted flow)

ISSUE: These failure modes are not currently addressed on the NASA FMEA/CIL. IOA recommends that these failure modes be addressed as 1/1's on the FMEA/CIL. The fails closed mode is currently listed as a cause on 03-3-4001-6, however IOA does not consider the potential severity of this failure to be adequately addressed by its listing only as a cause. These failures each result in overpressurization of the biprop valve cavity during post OMS burn heat soak-back. IOA considers the worst case effect of overpressurization to be structural failure of the biprop valve housing resulting in leakage of propellant into the pod causing possible corrosion, fire, explosion, and exposure of EVA and ground crews.

Less severe (2/1R PPP, 1/1 abort) effects of these failures would be loss of the affected OMS engine or failure of the ball valve seals causing subsequent biprop valve internal leakage. However, tests have shown that the ball valve seals may not fail and relieve the pressure build-up until 1700 psi. The valve housing is designed only to 825 psi. Therefore, a housing leakage could occur before the ball valve seals fail. Per NSTS 22206 (p. 2-11, item h), any external leakage of propellant should be classified as a crit 1.

3) FAILURE: FAILS OPEN

NO FMEA
OMS-263 2/1R PFP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. It is addressed as a cause on 03-3-4001-6, however IOA does not consider the potential severity of this failure to be adequately addressed by its listing only as a cause. The internal leakage mode is adequately addressed as a failure mode on 03-3-4001-6. IOA recommends that the "fails open" mode also be addressed as a failure mode on a new 2/1R PFP FMEA and CIL to ensure that it gets the proper amount of attention. A failed open relief valve would not be detectable in flight (fail B screen).

4) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA
OMS-265 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA recommends that this valve housing be added to the other valve housings listed on 03-3-2101-1, with corresponding retention rationale. Failure of this valve housing would also result in leakage of propellant into the pod causing possible corrosion, fire, explosion, and exposure of EVA and ground crews.

4.2.3.A.4 Propellant Quick Disconnect Couplings

1) FAILURE: EXTERNAL LEAKAGE

03-3-4507-1 2/1R FFP, CIL
OMS-253,267,273,277 2/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open (during flight)" be added as a failure mode on this FMEA. This is a credible failure mode and is addressed on RCS QD coupling FMEAs.

2) FAILURE: FAILS TO COUPLE

03-3-4507-3 3/3 ---
OMS-254,268,264,278 3/3 ---

ISSUE: IOA recommends that "fails closed" and "restricted flow" be added to the failure modes on this FMEA. These are credible failure modes and are addressed on RCS QD coupling FMEAs.

3) FAILURE: EXTERNAL LEAKAGE OF ENGINE PORTS

NO FMEA
OMS-345 3/3 ---

ISSUE: Leakage of these engine ports (CP001, CP002, CP005, CP006, CP007, and CP008) does not appear to be addressed on the current NASA FMEA/CIL. IOA recommends that leakage of all engine ports be addressed on the FMEA/CIL and/or the OMRSD. Leakage of these ports would expose internal engine parts to ambient, and could lead to contamination. However, leakage by itself is no effect.

4) FAILURE: FAILS TO COUPLE (ENGINE PORTS)

NO FMEA
OMS-346 3/3 ---

ISSUE: Failure of these engine ports (CP001, CP002, CP005, CP006, CP007, and CP008) does not appear to be addressed on the current NASA FMEA/CIL. IOA recommends that "fails to couple" of all applicable engine ports be addressed on the FMEA/CIL for completeness. Failure has no effect.

5) FAILURE: FAILS TO OPEN, FAILS TO CLOSE, RESTRICTED FLOW (ENGINE PORTS)

NO FMEA
OMS-347 3/3 ---

ISSUE: Failure of these engine ports (CP001, CP002, CP005, CP006, CP007, and CP008) does not appear to be addressed on the current NASA FMEA/CIL. IOA recommends that these failures be addressed for all engine ports on the FMEA/CIL for completeness. Failures have no effect.

4.2.3.A.5 GN2 Fill/Vent Valve

1) FAILURE: INTERNAL LEAKAGE, FAILS OPEN, FAILS TO REMAIN CLOSED

03-3-4511-1 3/1R PFP, CIL
OMS-294 3/1R PFP, CIL

ISSUE: IOA recommends that the redundancy string listed in the "E" effects be revised. IOA considers the string to include only the fill/vent coupling seal and cap, accumulator, and other engine. There are no additional redundant valves or couplings.

4.2.3.A.6 GN2 Isolation Valve

1) FAILURE: FAILS TO OPEN, FAILS TO REMAIN OPEN, FAILS CLOSED

03-3-4503-2	3/1R PPP, 1/1 ABORT, CIL
OMS-299	3/1R PPP, 1/1 ABORT, CIL

ISSUE: IOA recommends that the "E" effects on this FMEA be revised. The downstream regulator is not redundant for a failed closed isolation valve.

2) FAILURE: RESTRICTED FLOW

03-3-4503-2	3/1R PPP, 1/1 ABORT, CIL
OMS-303	2/1R PFP, 1/1 ABORT, CIL

ISSUE: IOA recommends that the restricted flow failure mode be upgraded to a 2/1R PFP, 1/1 abort criticality, and placed on a new FMEA separate from the fails closed mode. Restricted flow would not be detectable until the start of an OMS burn when the crew would get a C&W alert 3 seconds after the regulator pressure drops and is not replenished. The crew may then not have time to inhibit the engine purge (to save engine restart capability) if the burn duration is short, thus depleting the accumulator and resulting in inability to restart the affected engine (engine redundancy lost). This is the same scenario which drove 03-3-4505-2 and 03-3-4551-2 to 2/1R PFP, 1/1 abort criticalities.

The fails closed mode for the isolation valve is detectable prior to the start of a burn, and the remaining engine start can be saved (engine redundancy not lost).

4.2.3.A.7 GN2 Accumulator

1) FAILURE: RUPTURE, EXTERNAL LEAKAGE

03-3-4552-1	2/1R PPP, 1/1 ABORT, CIL
OMS-322	1/1 ---, CIL (Rupture)
OMS-323	2/1R PPP, 1/1 ABORT, CIL (External leakage)

ISSUE: IOA recommends that the "rupture" mode be upgraded to a 1/1 and placed on a new FMEA and CIL to distinguish the potential effects form the 2/1R PPP, 1/1 abort effects of external leakage. NSTS 22206 requires that the criticality assigned to non-filament-wound pressure containers with design limit pressures greater than 100 psi include the effects of potential shrapnel damage. The accumulator is a non-filament-wound titanium tank which stores GN2 at 325 psi. Based on the NSTS 22206 groundrule and the possibility of material flaws, IOA makes the above recommendation.

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4.2.3.A.8 GN2 Quick Disconnect Couplings

1,2) FAILURE: EXTERNAL LEAKAGE

03-3-4502-1, 4506-1	3/1R FFP, CIL
OMS-287,312	3/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open (during flight)" be added as a failure mode on these FMEAs. This is a credible failure mode and is addressed on RCS QD coupling FMEAs.

3,4) FAILURE: FAILS TO COUPLE

03-3-4502-3, 4506-3	3/3 ---
OMS-288,313	3/3 ---

ISSUE: IOA recommends that "fails closed" and "restricted flow" be added to the failure modes on these FMEAs. These are credible failure modes and are addressed on RCS QD coupling FMEAs.

4.2.3.A.9 TVC Gimbal Ring Bearings

1) FAILURE: PHYSICAL BINDING/JAMMING

03-3-6409-1	2/1R PPP, CIL
OMS-363	2/1R PPP, 1/1 ABORT, CIL

ISSUE: IOA recommends that this failure mode be classified as a crit 1/1 for TAL aborts. Failure results in loss of TVC for the affected engine. See 4.1.A.1.

2) FAILURE: STRUCTURAL FAILURE, DISATTACHMENT OF GIMBAL RING AND MOUNTING PAD

NO FMEA
OMS-20002X 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-3-6409-1 addresses only the physical binding/jamming failure mode. IOA recommends that a new 1/1 FMEA and CIL be generated for a structural failure of a gimbal ring bearing which results in disattachment of the gimbal ring and mounting pad. IOA considers the worst case structural failure of a bearing at an attachment point to result in disattachment. Such a failure of a gimbal bearing would result in loss of OMS engine restraint and possible prop line rupture or vehicle damage.

4.2.3.A.10 TVC Actuator Gimbal Drive Motors

1) FAILURE: ERRONEOUS/ERRATIC OPERATION

NO FMEA
OMS-366 3/1R PPP

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers this to be a credible failure mode and recommends that it be added to 03-3-6401-1. A severe rotation of the motor synchro armature with respect to the motor shaft could result in motor output opposite of that commanded (CAR AB9612). Therefore, IOA also recommends that "motor synchro armature rotation" be included as a cause on 03-3-6401-1.

4.2.3.A.11 TVC Actuator Gimbal Drive Assembly

1) FAILURE: PHYSICAL BINDING/JAMMING

03-3-6402-2	2/1R PPP, CIL
OMS-367, 376, 379, 20009X, 20011X	2/1R PPP, 1/1 ABORT, CIL

ISSUE: IOA recommends that this failure mode be classified as a crit 1/1 for TAL aborts. Failure results in loss of TVC for the affected engine. See 4.1.A.1.

4.2.3.A.12 TVC Actuator Reduction Gears

1,2) FAILURE: PHYSICAL BINDING/JAMMING, STRUCTURAL FAILURE

NO FMEA
OMS-369 3/1R PPP (Physical binding/jamming)
OMS-370 3/1R PPP (Structural failure)

ISSUE: This item and failure mode are not currently addressed on the NASA FMEA/CIL. IOA recommends that these credible reduction gear failure modes be addressed. The reduction gear is a moving, load-bearing component whose failure would result in the loss of one channel. IOA recommends a that new 3/1R PPP FMEA be generated for each of these reduction gear failure modes. The reduction gears in the TVC actuator assembly are at the same level of detail as other TVC hardware items which are addressed on the current NASA FMEA/CIL.

4.2.3.A.13 TVC Actuator Anti-Back Devices

1) FAILURE: STRUCTURAL FAILURE, FAILS TO TRANSMIT TORQUE
OR FAILS TO STOP ROTATION OF INACTIVE CHANNEL

NO FMEA
OMS-372 3/1R PPP

ISSUE: "Structural failure" of the antiback device is not currently addressed on the NASA FMEA/CIL. FMEA 03-3-6403-1 addresses only the physical binding/jamming failure mode. A structural failure causing the inability to transmit motor torque would result in the loss of the operational channel (crit 3/1R). A structural failure causing the inability to stop rotation of the unused channel would also result in the loss of one channel (crit 3/1R). IOA recommends that a new 3/1R PPP FMEA be generated for these anti-back device failure modes.

2) FAILURE: STRUCTURAL FAILURE, FAILS TO TRANSMIT TORQUE
AND FAILS TO STOP ROTATION OF INACTIVE CHANNEL

NO FMEA
OMS-373 2/1R PPP, 1/1 ABORT, CIL

ISSUE: "Structural failure" of the antiback device is not currently addressed on the NASA FMEA/CIL. FMEA 03-3-6403-1 addressed only the physical binding/jamming failure mode. A structural failure causing both the inability to transmit motor torque and the inability to stop rotation of the unused channel would result in the loss of the actuator and the effected OMS engine. IOA recommends that a new 2/1R PPP, 1/1 abort FMEA and CIL be generated for this anti-back device failure mode. See 4.1.A.1.

4.2.3.A.14 TVC Actuator Thrust Bearings

1) FAILURE: PHYSICAL BINDING/JAMMING

03-3-6404-1	3/1R PPP
OMS-375	3/1R PPP (Thrust bearings)
OMS-20007X	3/1R PPP (Secondary drive gear bearings)

ISSUE: SSM states that the bearings on either side of the secondary drive gear are thrust bearings and are covered by 03-3-6404-1. However, the quantity on 03-3-6404-1 shows only two bearings per actuator, and the "functional description" portion of the FMEA describes only two bearings per actuator. The correct quantity is four per actuator. IOA recommends that the quantity and "functional description" on 03-3-6404-1 be corrected to include the thrust bearings on either side of the secondary drive gear. IOA was unable to confirm that these bearings are thrust bearings.

2) FAILURE: STRUCTURAL FAILURE

NO FMEA
OMS-374 2/1R PPP, 1/1 ABORT, CIL

ISSUE: Structural failure of the thrust bearings is a credible failure mode which is not currently addressed on the NASA FMEA/CIL. FMEA 03-3-6404-1 addresses only the physical binding/jamming failure mode. A structural failure of a bearing could cause binding of the gimbal drive or loss of gear meshing with one channel, and subsequent loss of TVC for one OMS engine. IOA recommends that a new 2/1R PPP, 1/1 abort FMEA and CIL be generated for this thrust bearing failure mode. See 4.1.A.1.

3) FAILURE: STRUCTURAL FAILURE (SECONDARY DRIVE GEAR BEARINGS)

NO FMEA
OMS-20008X 2/1R PPP, 1/1 ABORT, CIL

ISSUE: The SSM states that the bearings on either side of the secondary drive gear are also thrust bearings. IOA was unable to confirm that these bearings are thrust bearings. Structural failure of the thrust bearings is a credible failure mode which is not currently addressed on the NASA FMEA/CIL. FMEA 03-3-6404-1 addresses only the physical binding/jamming failure mode. A structural failure of a bearing could cause binding of the gimbal drive or loss of gear meshing with one channel, and subsequent loss of TVC for one OMS engine. IOA recommends that a new 2/1R PPP, 1/1 abort FMEA and CIL be generated for this thrust bearing failure mode. See 4.1.A.1.

4.2.3.A.15 TVC Actuator Mechanical Stop, Snubber

1) FAILURE: STRUCTURAL FAILURE

03-3-6406-1 3/3 NNN
OMS-378 2/1R PPP, 1/1 ABORT, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 2/1R PPP, 1/1 abort and placed on the CIL. IOA maintains concern that a snubber structural failure could result in binding or jamming of the gimbal output drive assembly or incorrect TVC resulting in loss of the affected engine. See 4.1.A.1. The "remarks" section on the 3/7/87 FMEA page also supports a higher criticality for this item and failure mode.

4.2.3.B EPD&C

4.2.3.B.1 Hybrid Drivers

1) FAILURE: FAILS HIGH

   05-6L-2206-2 3/1R PPP
   OMS-633,641 3/1R PFP, CIL

   ISSUE: The IOA recommends failing the B screen, thus adding this to the CIL list, since the first failure's effect (GN2 Pressure Isolation Valve stuck open) is not detectable, except via an MDM valve position signal. But since the FSSRs do not mention that signal, the IOA assumed that the software does not use the signal to detect valve stuck open.

4.2.3.B.2 Toggle Switches

1) FAILURE, NASA: INADVERTENT OPERATION, SHORTS, INADVERTENTLY CLOSES ONE CONTACT SET
   FAILURE, IOA 672: FAILS TO SWITCH (STUCK IN ARM/PRESS POSITION)
   FAILURE, IOA 673: FAILS TO SWITCH (STUCK IN ARM POSITION)

   05-6L-2029-2 3/1R ???
   OMS-672,673 3/1R PFP, CIL

   ISSUE: The IOA concurs with the NASA's criticality, since it agrees indirectly with OMS Hardware FMEA 03-3-4001-1. This NASA FMEA's Redundancy Screens were missing from the latest available NASA report. Since this FMEA did not appear in the NASA's new CIL package, the IOA assumes that the NASA passed all of the screens. The IOA recommends failing the B screen, since this failure is not detectable except during an OMS burn, which could be too late. The IOA also recommends considering both contact sets in the Failure Mode.

2) FAILURE, NASA: INADVERTENT OPERATION - SHORTS (ONE CONTACT SET)
FAILURE, IOA: FAILS TO SWITCH (STUCK IN "ON" POSITION)

05-6L-2030-2	3/1R PNP
OMS-676	3/1R PFP, CIL

ISSUE: The IOA concurs with the NASA's criticality, since the NASA's crit agrees indirectly with OMS Hardware FMEA 03-3-4001-1. The NASA failed only one pole, considering the other pole as redundant, whereas the IOA considered the worst case failure mode by failing a part common to both poles (e.g. toggle lever). The NASA considered one pole to be standby redundant to the other and so had "Not Applicable" for B screen. The IOA recommends failing the B screen since this failure would not be readily detectable until it is too late.

4.2.3.B.3 Fuses

1) FAILURE: FAILS OPEN

05-6L-2008-1	3/1R PPP
OMS-685,686	3/1R PNP

ISSUE: The fuse in the STANDBY circuit is Standby Redundant to the fuse in the ACTIVE circuit. Therefore, since B screens will differ ("NA" and "P"), the IOA recommends splitting this FMEA into two FMEAs.

4.2.3.B.4 Pressure Sensors for GN2 Assembly

1) FAILURE: ERRONEOUS OUTPUT (OPEN, SHORTED, FAILS OUT OF TOLERANCE)

03-3-4581-1	3/3 ---
OMS-687,688	3/2R PPP

ISSUE: The IOA recommends 3/2R. If lose all redundancy, the real status of the OMS Engine Gaseous Nitrogen Tank will be unavailable or falsely indicated (loss of N2) and can result in falsely failing two OMS GN2 Tanks as leaking or failed. Therefore, mission capabilities could be lost or an ATO could be called, implying crit 3/2R. See Flight Rule 6-40.

4.2.3.B.5 Position Sensors

1) FAILURE: ERRONEOUS OUTPUT (OPEN, SHORTED, FAILS OUT OF TOLERANCE)

03-3-4081-1 3/3 ---
OMS-693,694 3/2R PPP

ISSUE: The IOA recommends 3/2R. False indication of valve position could lead to limiting OMS engine use, especially when little time to verify. The engine will be used only if the other engine has failed and then only for deorbit burn. Loss of all redundancy during LiftOff or OnOrbit phase would lead to failure to reach desired altitude (limit altitude to RCS redlines to ensure deorbit capability) so could lose some altitude-sensitive missions, implying crit 3/2R.

The NASA Review Comment's Action Item partially supports this: "Will use engine if LVDT > 70%. Between 8 and 70% will not use engine unless no other option available for deorbit." See OMS Training Manual 2102 page 79.

4.2.3.B.6 Pressure Sensors for OME Assembly

1) FAILURE: ERRONEOUS OUTPUT (OPEN, SHORTED, FAILS OUT OF TOLERANCE)

NO FMEA
OMS-689 2/2 ---, 1/1 ABORT, CIL

ISSUE: The IOA recommends adding a FMEA for this item with a 2/2, 1/1 Abort criticality, thus adding to the CIL list. The NASA has no apparent FMEA to explicitly cover this item. The closest NASA FMEA is 03-3-4581-1 for "OMS Engine Pneumatic Pressure Sensor" instead of "OMS Engine Regulator Outlet Pressure Sensor". See 4.1.B.4.

This failure could lead to falsely failing one OMS engine or preventing its use for non-critical burns (see Flight Rule 6-4, Line Failure), possibly resulting in loss of mission. The 1/1 Abort is a weak or tentative recommendation. Loss of one OMS engine during RTLS or TAL could result in inability to perform time critical propellant dump.

4.2.3.B.7 Temperature Sensors

1) FAILURE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS OUT OF TOLERANCE)

03-3-4802-1	3/3	---
OMS-698	3/2R	PPP, 1/1 ABORT, CIL

ISSUE: The IOA recommends crit 3/2R and crit 1/1 for aborts, thus adding this FMEA to the CIL list. After this failure, the associated OMS engine would be declared failed because of apparent engine temperatures outside the desired limits (<25 F or >130 F), unless sensor failure was determined. Failure of all redundancy (the other OMS engine's sensor failed) could lead to incorrectly failing both OMS engines and possible early mission termination and loss of mission. However, this is an especially serious criticality 1/1 during aborts because of insufficient time to determine failure.
See JSC 20923 PCN-1 Rule 6-3

4.2.3.B.8 Signal Conditioners

1) FAILURE: LOSS OF OUTPUT

03-3-8001-1	3/2R	PPP
OMS-21001X	2/2	---, 1/1 ABORT, CIL

ISSUE: The IOA recommends upgrading this FMEA to 2/2, 1/1 Abort, thus adding this to the CIL list. The IOA's crit is based on the highest criticality of the signals routed through the signal conditioners. These worst case signals are from the OMS engine temperature and pressure sensors (e.g. Engine Regulator Outlet Pressure Sensor; see OMS-689 or Section 4.2.3.B.6). Loss of a vital engine measurement will prevent the crew from using that OMS engine for non-critical burns, resulting in loss of mission.

4.2.4 Thermal Control Subsystem Issues

4.2.4.A Hardware

IOA analyzed and assessed thermal control subsystem items as EPD&C items. See 4.2.4.B for assessment results.

4.2.4.B EPD&C

4.2.4.B.1 Pod Hybrid Drivers

1) FAILURE: FAILS HIGH

05-6L-2210-2	3/2R PPP
OMS-706,708,710,712,714,715,718,720, 722,724,726,728,730,732,734,736, 738,740,742,744,746,748	2/1R PPP, CIL

ISSUE: The IOA recommends raising this criticality to 2/1R, thus adding this to the CIL list, since this failure is one failure away from loss of crew/vehicle and damage may occur before it is detected. See 4.1.B.6. See Flight Rules 6-72a, and JSC NASA Heater Book.

4.2.4.B.2 Pod Heaters

1) FAILURE: FAILS CLOSED

03-3-7001-1	3/2R PPP
OMS-783,785,787,789,791,793,795,797, 815,817,819,821,823,825,827,829, 831,835,837,807,809,811,813	---- --- (NON-CREDIBLE)

ISSUE: The IOA recommends deleting these FMEAs, since Heater elements cannot fail closed or short such that they are continuously on.

4.2.4.B.3 Pod Relays

1) FAILURE: FAILS HIGH (ENERGIZED POSITION)

05-6L-2134-2	3/2R PFP, CIL
OMS-846,848,850,852	2/1R PFP, CIL

ISSUE: The IOA recommends raising this criticality to 2/1R, thus adding this to the CIL list, since this failure is one failure away from loss of crew/vehicle and damage may occur before it is detected. See 4.1.B.6. See Flight Rules 6-72a, and JSC NASA Heater Book.

4.2.4.B.4 Pod Temperature Sensors

1) FAILURE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS OUT OF TOLERANCE)

NO FMEA		
OMS-882,883,884,885,886,887, 888,889,890,891,892,893	3/3	---

ISSUE: The IOA recommends adding a FMEA. The NASA has no apparent FMEA to explicitly cover these pod temperature sensors. The closest FMEA is 03-3-2804-1 for Crossfeed instead of Pod temperature sensors.

4.2.4.B.5 Pod Thermal Switches

1) FAILURE: FAILS SHORT

03-3-7002-2	3/2R PPP
OMS-895,897,899,901,903,905,907,909, 911,913,915,917,919,921,923,925	2/1R PPP, CIL

ISSUE: The IOA recommends raising this criticality to 2/1R, thus adding this to the CIL list, since this failure is one failure away from loss of crew/vehicle and damage may occur before it is detected. See 4.1.B.6. See Flight Rules 6-72a, and JSC NASA Heater Book.

The IOA also recommends splitting this FMEA since this FMEA covers both pod and crossfeed thermal switches, but their criticalities and effects are quite different. See 4.2.4.B.10.

4.2.4.B.6 Pod Toggle Switches

1) FAILURE, NASA: INADVERTENTLY OR PREMATURELY TRANSFERS TO "AUTO" POSITION (ONE CONTACT SET)
   FAILURE, IOA: FAILS TO SWITCH (STUCK IN "ON" POSITION)

05-6L-2031-2	3/2R PFP, CIL
OMS-926,927	2/1R PPP, CIL

ISSUE: The IOA recommends raising this crit to 2/1R and passing the B screen. The NASA failed only one pole or contact set, considering the other pole as redundant, whereas the IOA considered the worst case failure mode by failing a part common to both poles (e.g. toggle lever). This is the reason for the IOA's higher criticality and the NASA's failed B screen, since one pole may be undetectable, but not both. Also, the NASA's ITEM field mentions GROUP1 only, but has no separate FMEA for GROUP2 heater system. The IOA assumes this FMEA was meant to cover both groups.

4.2.4.B.7 Crossfeed Hybrid Drivers

1) FAILURE: FAILS HIGH

05-6L-2137-2	3/2R PNP
OMS-931,933,935,937,939,941	3/2R PPP

ISSUE: The NASA implies, with a B Screen of Not/Applicable, that this item is Standby Redundant to some other item. The IOA disagrees and recommends passing the B screen, since this driver operates normally in the string, not passively waiting for another item to fail before it operates.

4.2.4.B.8 Crossfeed Heaters

1) FAILURE: FAILS SHORT

03-3-7011-1	3/2R PPP
OMS-953,955,957,965,973,959, 961,963,967,969,971	---- --- (NON-CREDIBLE)

ISSUE: The IOA recommends deleting these FMEAs, since Heater elements cannot fail closed or short such that they are continuously on.

4.2.4.B.9 Crossfeed Temperature Sensors

1) FAILURE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS OUT OF TOLERANCE)

03-3-2804-1	3/3 ---
OMS-994A,997A,998A,1001A,1002A	2/2 ---, CIL

ISSUE: The IOA recommends raising this crit to 2/1R, thus adding this to the CIL list. The IOA assumed no launch if a sensor indicates crossfeed temps outside the desired limits (<50 F or >90 F) unless sensor failure was determined and the risks of loss of detectability for the thermal system is accepted (this ensures crossfeed for aborts). Worst case effect would be a false indication of heater system failed off on a mission critical crossfeed line, leading to delayed launch and/or possible loss of mission due to loss of interconnect/crossfeed capability. This implies a crit 2/2 since there is no redundancy.
See Flight Rules 6-9a (vs) 6-73d and Malf. Proc. OMS 11.5a notes 2,3,4.

2) FAILURE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS OUT OF TOLERANCE)

03-3-7801-1	3/3	---
OMS-994,997,998,1001,1002	2/2	---, CIL

ISSUE: The IOA recommends raising this crit to 2/1R, thus adding this to the CIL list. The IOA assumed no launch if a sensor indicates crossfeed temps outside the desired limits (<50 F or >90 F) unless sensor failure was determined and the risks of loss of detectability for the thermal system is accepted (this ensures crossfeed for aborts). Worst case effect would be a false indication of heater system failed off on a mission critical crossfeed line, leading to delayed launch and/or possible loss of mission due to loss of interconnect/crossfeed capability. This implies a crit 2/2 since there is no redundancy.
See Flight Rules 6-9a (vs) 6-73d and Malf. Proc. OMS 11.5a notes 2,3,4.

4.2.4.B.10 Crossfeed Thermal Switches

1) FAILURE: FAILS SHORT

03-3-7002-2	3/2R PPP
OMS-1004,1006,1008,1010,1012,1016, 1024,1026,1030,1038,1040,1044	3/2R FFP, CIL

ISSUE: The IOA recommends failing the A screen and B screen, thus adding this to the CIL list. The IOA also recommends splitting this FMEA, since this FMEA covers both pod and crossfeed thermal switches, but their crits and effects are quite different (see 4.2.4.B.5). This FMEA covers both 'Control Temp' and 'Over Temp' thermal switches. Over Temp is Standby Redundant to Control Temp. Since there are NO TEST POINTS between them, and no way to artificially fail a Control Temp thermal switch, there is no way to test on the ground or inflight for a failed closed Over Temp thermal switch.

4.2.4.B.11 Crossfeed Toggle Switches

1) FAILURE, NASA: FAILS TO CONDUCT, FAILS TO TRANSFER, FAILS OPEN
FAILURE, IOA: FAILS TO SWITCH (STUCK IN "OFF" POSITION)

05-6L-2036-1	3/3	---
OMS-1047,1049	3/2R PPP.	

ISSUE: The IOA recommends criticality of 3/2R since the loss of all redundancy (other switch fails) is a possible loss of mission due to loss of interconnect/crossfeed capability.

4.3 Resolved Issues

4.3.A Hardware

Several meetings and/or data exchanges between IOA and the NASA OMS and OMS TVC subsystem managers occurred between June and December 1987 in an effort to resolve the OMS hardware FMEA/CIL issues. During this period, resolution was reached on the majority of the issues originally identified by IOA. All resolved hardware issues are documented in the detailed assessment sheets (Appendix C). Those resolved issues which resulted in changes to the OMS hardware FMEA/CIL are also denoted in Appendix F with "resolution codes".

The forty-seven (47) OMS hardware FMEA/CIL issues which remain unresolved are presented in sections 4.1 and 4.2.

4.3.B EPD&C

Resolution of the OMS EPD&C FMEA/CIL issues with the OMS subsystem manager was not initiated due to time constraints. Therefore, all of the EPD&C issues identified by IOA remain unresolved, and are presented in section 4.1 and 4.2.

4.4 Additional Comments and Concerns

During the assessment of the NASA OMS FMEA/CIL, IOA identified several areas of concern which may not be evinced by the individual failure mode issues presented in this report. These concerns are discussed in the following hardware and EPD&C sections. Several general comments about the IOA assessment and resolution process are also given.

4.4.A Hardware Comments and Concerns

The assessment of both the OMS and OMS TVC subsystems are included in this report. IOA interfaced with both the OMS and OMS TVC subsystem managers to obtain data and resolve issues. Unless otherwise noted, general discussions in this report about the "OMS subsystem" pertain to the combined OMS and OMS TVC subsystems.

The IOA OMS hardware FMEA and CIL assessments were performed on the NASA/RI FMEA/CIL reevaluation information received by IOA as of 1/01/88. Any updates or changes in this information made by NASA/RI after this date are not reflected in this report. The IOA assessment of the OMS hardware CILs was performed against the post-CCB CIL package dated 12/05/87. This information was presented at OMS PRCB on 23 December 1987. Assessment of the OMS TVC CILs was performed against the 11/14/87 versions of the CIL sheets. As of 1/01/88, the OMS TVC CILs had not been presented to a CCB or PRCB. The IOA assessment of the OMS hardware FMEAs (non-CILs) was performed against a criticality and screen summary package dated 10/22/87. Assessment of the OMS TVC FMEAs (non-CILs) was performed against FMEA pages received as of 1/01/88, with revision dates ranging from 3/7/87 to 11/14/87.

The NASA/RI FMEA/CIL reevaluation was primarily concerned with CIL items. FMEA (non-CIL) criticalities and screens were also reviewed, however updated FMEA sheets (except for TVC FMEAs) were not generated. Instead, summary sheets showing only criticalities and screens were produced. Therefore, IOA assessed FMEA (non-CIL) crits and screens only. The "effects" and other areas listed on a FMEA sheet could not be assessed. Issues identified on FMEAs (non-CILs) which were agreed to by the subsystem manager are documented in this report as resolved, even though incorporation of the issues on updated FMEA sheets could not be verified.

OMS thermal control and instrumentation items are covered on the NASA OMS hardware FMEA/CIL, however IOA analyzed and assessed these items as EPD&C items. See the EPD&C portions of this report for the assessment results on these items.

On the current NASA FMEA/CIL, one FMEA or CIL sheet may include several components and/or failure modes. The criticality and screens assigned on the FMEA or CIL reflect only the worst case component failure mode. IOA accepted this practice (with reservation) since the components and failure modes are addressed, however IOA is concerned that this lumping of components and failure modes on FMEAs and CILs reduces insight into the effects of individual OMS subsystem component failures and may lessen the attention given to critical failure modes. The components and failure modes lumped together on one FMEA or CIL could have different criticality and screen assignments if they were separated onto individual FMEAs and CILs, and better insight would be obtained. For example, the bipropellant valve assembly FMEAs (03-3-4001) include the engine control valve, pneumatic actuator, rack & pinion assembly, bipropellant valves, and bipropellant valve cavity pressure relief valve. IOA recommends that the engine control valve and pressure relief valve be addressed on individual FMEAs and assigned unique criticalities since they are not mechanically linked to the bipropellant valves, pneumatic actuator, and rack & pinion. This would provide better insight into the effects of the failures of these components and would ensure that they receive the appropriate amount of individual attention.

Another example of this concern is the TVC gimbal actuator output drive assembly FMEAs (03-3-6402) which include the acme screw, nut tube assembly, end bearings, attach hardware, drive shaft, drive shaft bearings, and primary and secondary drive gears. IOA again recommends that these components be separated onto individual FMEAs and assigned unique criticalities to provide better insight into the variety and severity of possible failure modes in the assembly. Lumping the failures of components on one FMEA lessens insight into which failures are more or less important and which deserve more or less attention.

Related to this concern are the issues raised by IOA (and agreed to by the SSM) that leakage of valve housings should be addressed on the FMEA/CIL. IOA recommended that a new FMEA and CIL be generated for each valve housing, however accepted the lumping of all valve housings onto existing helium, propellant, and GN2 line leakage FMEAs.

Some OMS subsystem failures do not exist as "failure modes" on current FMEAs and CILs. Instead, they are listed only as causes on FMEAs and CILs for other failure modes. IOA does not consider a failure mode to be adequately addressed only by its listing as a cause on a FMEA or CIL. For example, the "failed closed" and "failed open" failure modes for the bipropellant valve cavity pressure relief valve are addressed only as causes on 03-3-4001-6 (see section 4.2.3.A.3). All critical failures should be listed as failure modes on FMEAs and CILs to ensure that they receive the appropriate amount of attention.

In several instances in the OMS hardware FMEA/CIL, a failure mode listed on a FMEA is also listed as a cause on another FMEA with a more severe criticality. IOA considers this to be an inconsistency. The criticality assigned to a failure mode should reflect the worst case ultimate effect of the failure. If a failure mode can cause another critical failure, the criticality assigned to the failure mode should reflect that fact. See 4.2.3.A.1 as an example.

4.4.B EPD&C Comments and Concerns

The IOA OMS EPD&C FMEA and CIL assessments were performed on the NASA/RI FMEA/CIL reevaluation information received by IOA as of 1/01/88. Any updates or changes in this information made by NASA/RI after this date are not reflected in this report. The IOA assessment of the OMS EPD&C CILs was performed against the post-CCB CIL package dated 12/08/87. This information was presented at OMS PRCB on 23 December 1987. The IOA assessment of the OMS EPD&C FMEAs (non-CILs) was performed against a criticality and screen summary package dated 5/6/87. Since updated FMEA (non-CIL) sheets were not generated by NASA/RI, only the criticalities and screens could be assessed.

IOA takes issue with the NASA interpretations of NSTS 22206, Section 2.1.s, page 2-4, the definition of redundancy. The NASA-applied definition of the redundancy string allowed the selection of specific failures which were required to cause known problems, e.g., failures required to cause continuous power to valves. IOA considers many NASA redundancy strings to include multiple unrelated failures.

IOA analyzed the function of the item or the item's circuit string and determined the impact of the failure. Per NSTS 22206 interpretation, the redundancy string was defined as any other item that is capable of performing the function of this item or string. Criticalities were then assigned based on this redundancy. In general, the NASA definition tended to be more conservative (assigned a more severe criticality on the FMEA). However, IOA was requested to follow NSTS 22206. The difference in interpretations accounts for the high number of issues cited.

Because of time constraints, IOA did not generate new analysis worksheets to match the diode groupings that NASA used.

In general, each item was considered to have two functions: to control a valve open or closed, and to prevent inadvertently opening or closing a valve. These two functions correspond to the two main failure modes, fail open and fail closed. Also, redundancy often depends on the failure mode. Two parallel items can be considered redundant to each other for the failed open failure mode, and two series items can be considered redundant for the failed closed failure mode.

The electrical components within valves (microswitches, diodes, etc.) are not specifically addressed on the current NASA FMEA/CIL. Due to time constraints, IOA also did not individually address these items. However, IOA recommends that the EPD&C components within a valve be addressed individually on FMEAs and CILs to provide better insight into the effects of their failures, and to ensure that critical failures receive the proper amount of attention. Failures of valve EPD&C components are not visible on the current valve hardware FMEAs.

5.0 REFERENCES

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

1. JSC 10588, Flight Procedures Handbook, OMS/RCS Operations, Preliminary, November 1980.
2. JSC 12770, 8C-OMS, Shuttle Flight Operations Manual, Preliminary, 6-6-80.
3. JSC 18958, OMS/RCS Systems Briefs Handbook, Basic, 10-1-84.
4. JSC 19950, OMS 2102, Orbiter Systems Training Manual, March 84.
5. NSTS 22206, Instructions for Preparation of FMEA and CIL, October 10, 1986.
6. Reliability Desk Instruction, No. 100-2G, Flight Hardware FMEA & CIL, 1-31-84.
7. OMS OMRSD, V43 File III, 6-13-86.
8. OMS FPR, Report M4001002, 7-22-86.
9. OMS Single Barrier Failures, MDAC-HOU TM 1.1.-TM-ES86009-43., 7-17-86.
10. Orbiter Actuation Subsystem Presentation Charts, J. Vernon.
11. JSC 11174, Rev C, DCN-5, Space Shuttle Subsystems Handbook, Vols. 1 & 2, Secs. 1-20, 9-13-85.
12. MB0160-007, Rev M, 3-11-80, Steel Tubing, Mat'l spec., RI.
13. MB0160-035, Rev G, 7-5-77, Steel Tubing, Mat'l spec., RI.
14. MC276-0017, Rev D, 6-23-84, Helium High Pressure Coupling, Proc. spec., RI.
15. MC276-0018, Rev B, 2-14-84, Hypergolic Service Coupling, Proc. spec., RI.
16. MC282-0082, Rev D, 3-17-82, Pressurant Storage Tank, Proc. spec., RI.
17. MC284-0421, Rev E, 5-3-82, Pressure Relief Valve, Proc. spec., RI.
18. MC284-0430, Rev E, 6-22-81, AC Motor Valve, Proc. spec., RI.
19. MC284-0480, Rev C, 5-3-82, Manual Operated Valve, Proc. spec., RI.

20. MC284-0481, Rev B, 6-23-84, Quad Check Valve, Proc. spec., RI

21. MC363-0031, Rev C, 3-15-78, Electrical Heater, Detail Proc. spec., RI.

22. MC621-0009, Rev E, 7-7-82, OMS Engine, Proc. spec., RI.

23. MC621-0059, Rev E, 6-4-82, APS, Proc. spec., RI.

24. ME271-0092, Rev D, 4-1-80 (?), Gimbal Joint, Spec. Control Dwg., RI.

25. ME276-0032, Rev B, 7-20-79, Test Point Coupling, Spec. Control Dwg., RI.

26. ME449-0177, Rev F, 7-15-74 (?), Pressure Transducer, Low, Med., & High Range, Spec. Control Dwg., RI.

27. MF0004-400, EEE Orbital Parts List

28. AMS5562A, 7-15-80, Steel Tubing, Mat'l spec., SAE.

29. 73A000014, Rev J, 1-13-83, APS Fluid Schematics, 4 sheets, MDAC.

30. 73A620096, 2-3-77, Regulator Sensing Port Drawing, MDAC.

31. 73A740000, Rev H, 9-13-82, OMS Tank Assembly Drawings, MDAC.

32. 73A740066, Rev C, 3-15-85, Tank Acq. System Gallery Assembly Drawings, MDAC.

33. 73B740001, Rev D, Communication Screen Assy., Source Dwg., MDAC.

34. 73B740002, Rev D, Band Screen Assy., Source Dwg., MDAC.

35. 73B740003, Rev C, Arresting Screen Assy., Source Dwg., MDAC.

36. 73B740004, Rev C, Gallery Screen Assy., Source Dwg., MDAC.

37. 73P550003, Rev B, 3-22-82, Alignment Bellows, Proc. spec., MDAC.

38. 73P550013, Revs A,B,C,D, 3-9-82, Propellant Tank, Proc. spec., MDAC.

39. 73P550015, Rev B, 3-22-82, Gimbal Bellows, Proc. spec., MDAC.

40. 73P620001, Rev B, 3-19-82, DC Solenoid Valve, High Pressure, Proc. spec., MDAC.

41. 73P620002, Rev D, 10-20-82, Helium Pressure Regulator, Proc. spec., MDAC.

42. 73P620004, Rev A, 4-27-79, DC Solenoid Valve, Low Pressure, Proc. spec., MDAC.

43. 73P880001, Rev D, 9-9-83, Propellant Quantity Gaging Assy., Proc. spec., RI.

44. 73P880001-1001, CR # 12-880001-101D, 9-3-82, OMS Gaging Subsystem, MDAC.

45. VS70-430202, Rev E, 6-30-84, OMS Subsystem Control Schematic, Right Pod.

46. VS70-430209, Rev B, 8-17-82, OMS Subsystem Control Schematic, Right Pod.

47. VS70-430302, Rev D, 7-12-84, OMS Subsystem Control Schematic, Left Pod.

48. VS70-430309, Rev D, 6-29-84, OMS Subsystem Control Schematic, Left Pod.

49. VS70-430402, Rev A, 6-10-81, OMS Subsystem Control Schematic, OMS Kit.

50. VS70-430409, 8-8-81, OMS Subsystem Control Schematic, OMS Kit

51. VS70-431001, Rev E, 9-19-79, APS Schematic, (102 only).

52. VS70-431099, Rev D, 7-29-85, APS Schematic, RI.

53. VS70-943099, Rev A, 3-1-82, OMS/RCS Integrated System Schematics, 099, 103, 104, RI Level III.

54. VS70-943102, Rev C, 10-29-80, OMS/RCS Integrated System Schematics, 102, RI Level III.

55. VO70-435011, Rev B, 7-15-84, Crossfeed Lines Installation, OMS Propellant, Installations drawings.

56. JSC 20923, STS Operational Flight Rules Rationale, PCN-1, 2-14-86.

57. 73A550001, Rev E, OMS Fuel Feed System Installation drawings

58. 73A550002, Rev G, OMS Oxidizer Feed System Installation drawings.

59. 73A800001, Rev E, Equipment Installation Pod DFI.

60. 73A801001, Rev C, Equipment Installation RCS Housing DFI.

61. 1181220, Rev A, 8-23-74(?), Injector, Thrust Chamber Detail, 5 sheets, Aerojet.

62. 1181700, 2-27-75, Series Valve (Biprop valve) Assembly Detail, 3 sheets, Aerojet.

63. 1181710, 2-24-75, Actuator Assembly, Bipropellant Valve, 2 sheets, Aerojet.

64. 1181900, Rev D, Date?, Nozzle Extension Detail, 4 sheets, Aerojet.

65. 1186895, Rev H, 7-23-83(?), Controller, Gimbal Actuator, Source Control Drawing, 1 sheet, Aerojet.

66. JSC 17952, Orbiter Crash and Rescue Information, March 1982.

67. 621-0009-2161, 1-5-82, As-Built Configuration Record, OMS Gimbal Actuator Parts List, AiResearch.

68. JSC 19413, Rev H, January 1986, Shuttle Flight Data and Inflight Anomaly List.

69. 73A550128, 11-2-79, Flange Assy - Crossfeed Interface Detail Dwg., MDAC.

70. 73P760001, Rev B, 2-26-82, APS Procurement Spec for Electrical Heaters.

71. STS83-0010A, 6-30-85, Sec 4.10, pp4-169 through 4-182, Space Shuttle Operational Level C FSSR Document, GN&C, Part D, RM, RI.

72. JSC 08934, Rev D, 10-84, Vol. 1, pp 3.4.3.3-1 through -6, Shuttle Systems Performance and Constraints Data.

73. 73A760210, Rev E, Electrical Installation POD Operational drawing.

74. 73A760060, Rev A, Marker, Wire harnesses drawing.

APPENDIX A
ACRONYMS

Ac - Nozzle inlet plane area
ac - Alternating Current
Ae - Nozzle exit plane area
AOA - Abort Once Around
At - Nozzle throat area
ARCS - Aft Reaction Control Subsystem
ASSY - Assembly
ATO - Abort to Orbit
ATT - Attitude
BFS - Backup Flight System
CIL - Critical Items List
CL - Close (Closed)
CRIT - Criticality
CRT - Cathode Ray Tube
C&W - Caution and Warning System
D/C - Displays and Controls
DAP - Digital Autopilot
dc - direct current
DISP - Display
DPS - Data Processing System
EPD&C - Electrical Power Distribution and Control
EPDCS - Electrical Power Distribution and Control System
F - Functional, Fahrenheit
FC - Flight Critical
FDA - Fault Detection Annunciation
FM - Failure Mode
FMEA - Failure Mode and Effects Analysis
FRCS - Forward Reaction Control System
FSSR - Flight Systems Software Requirements
ft - Feet
FU - Fuel
G - Gravity
GFE - Government Furnished Equipment
GN2 - Gaseous Nitrogen
GNC - Guidance Navigation and Control
GPC - General Purpose Computer
GSE - Ground Support Equipment
He - Helium
HW - Hardware
Hz - Hertz (cycles per second)
IOA - Independent Orbiter Assessment
Isol - Isolation
JSC - Johnson Space Center
LPS - Launch Processing System
LRU - Line Replaceable Unit
LVDT - Linear Variable Differential Transformer
MCA - Motor Control Assembly
MCC - Mission Control Center (JSC)
MDAC - McDonnell Douglas Astronautics Company

MDM	- Multiplexer/Demultiplexer
MECO	- Main Engine Cutoff
MM	- Major Mode
MMH	- Monomethyl Hydrazine
MNVR	- Maneuver
MOD	- Mission Operations Directorate
MSEC	- millisecond
N2O4	- Nitrogen Tetroxide
NA	- Not Applicable
NASA	- National Aeronautics and Space Administration
NSTS	- National Space Transportation System
NTO	- Nitrogen Tetroxide
O.D.	- Outside Diameter
OI	- Operational Instrumentation
OMRSD	- Operational Maintenance Requirements and Specifications Document
OME	- Orbital Maneuvering Engine
OMS	- Orbital Maneuvering System
OP	- Open
OPS	- Operations
OX	- Oxidizer
OXID	- Oxidizer
PASS	- Primary Avionics Software System
PBI	- Push-Button Indicator
Pc	- Chamber Pressure
PCI	- Potential Critical Item
PCMMU	- Pulse Code Modulator Master Unit
PLS	- Primary Landing Site
PRESS	- Pressure
psi	- Pounds Per Square Inch
psia	- Pounds Per Square Inch Absolute
psid	- Pounds Per Square Inch Differential
psig	- Pounds Per Square Inch Gage
RCS	- Reaction Control System
RHC	- Rotational Hand Controller
RI	- Rockwell International
RM	- Redundancy Management
RPC	- Remote Power Controller
RTLS	- Return to Launch Site
scfm	- Standard Cubic Feet per Minute
SFOM	- Shuttle Flight Operations Manual
SM	- Systems Management
SPEC	- Specification
STS	- Space Transportation System
SSM	- Subsystem Manager (NASA)
SSSH	- Space Shuttle Systems Handbook
SW	- Software
TAL	- Transatlantic Abort Landing
TCA	- Thrust Chamber Assembly
TD	- Touch Down
TK	- Tank
TPS	- Thermal Protection System
TVC	- Thrust Vector Control
V	- Velocity, Volts
VLV	- Valve

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 OMS Ground Rules and Assumptions

The IOA analysis and assessment was performed to the component or assembly level. The analysis and assessment considered the worst case effects of the hardware or functional failure on the subsystem, mission, and crew and vehicle safety.

1. Top level redundancy is considered in determining functional criticality. The OMS function is to provide delta-V for orbit insertion, on-orbit ops, and deorbit. From a top down system analysis approach, the OMS has redundancy via the left and right subsystems. In determining redundancy for hardware items downstream of the crossfeed line, items which perform the same function in each pod may be considered redundant to each other, depending on the failure mode.

2. No RCS backup deorbit capability exists in the event of loss of OMS deorbit capability. It cannot be ensured that enough OMS propellant will remain to complete an RCS deorbit burn since the RCS jets have a lower Isp. However, OMS through RCS can be used to achieve orbit insertion. An AOA abort can be accomplished without OMS engines.

3. Loss of an OME is, at a minimum, a loss of mission during the on-orbit phase. Loss of the first OME is possible loss of mission objectives (ref. flight rule 6-48), and loss of the next OME will lead to loss of deorbit capability (no RCS deorbit assumed) and loss of life/vehicle. An OMS engine which will be used only for critical burns is not considered lost.

4. The OMS payload bay kit hardware is not addressed in this analysis.

5. Flight rules and Flight Systems Software Requirements (FSSR) are not used to downgrade criticalities, only to upgrade and provide better system understanding.

6. Analysis of component filters are covered in the analysis of the component. Filters which are not integral to other components are analyzed separately.

7. For the thermal control analysis it is assumed that, at the time of vehicle liftoff, all areas of the thermal environment are within redlines.

8. If applicable, the redundancy and criticalities assigned to an electrical component are tied to those assigned to mechanical parts affected by the failure of the electrical component.

9. Electrical components which enable and inhibit operation (e.g., allows a valve to be opened and closed) are not redundant to electrical components which control the operation (e.g., actually opens and closes the valve).

10. Instrumentation passage of screen B does not require the ability to discern between sensor or hardware failure, but on detection of the measurement being out of a predefined limit. The ability to differentiate between sensor and hardware failure is reflected in the criticality assignment.

11. Two OMS engines are required to ensure the successful completion of RTLS and TAL pre and post-MECO OMS dumps. Loss of one engine may result in the inability to complete a planned dump leading to violations of propellant tank landing constraints and/or orbiter mass properties constraints. For post-MECO OMS dumps, both engines must have successful purges between the pre and post-MECO dumps. Loss of TVC control of one engine will result in either loss of the affected engine and inability to complete the OMS dump, or loss of vehicle control using the affected engine. An OMS TVC failure does not affect the ability to perform an OMS dump before MECO.

12. The crew will manually shut down an OMS engine in response to an OMS FDA caused by the violation of engine operating limits before the effects become life/vehicle threatening (e.g., engine explosion). However, this action may not preclude damage to and loss of the engine. This assumption does not apply to failures which lead directly to catastrophic effects (e.g., engine structural failures).

13. IOA-OMS assumed the inability to re-open a propellant tank isolation valve on ascent is not a credible event. These valves are open prelaunch and are used to supply propellants for orbital insertion, orbital circularization, and RTLS/TAL aborts.

14. IOA-OMS assumed if a valve was closed for some reason (i.e. to isolate a leak) after ascent, the inability to re-open this valve was a credible failure and the reason to close was not in the redundancy string.

15. MDM discretes and the event indicators (talkbacks) provide the logic and visual status of the valve position. Resistors, diodes, and hybrid drivers are used in the circuitry that provide this data. IOA-OMS claims the failure of these items may lead to a false indication of the valve position. The worst effect of these indicators would be to falsely fail the valve closed which may affect on-orbit operations.

16. IOA-OMS did not analyze electrical components within the valve (microswitches, diodes, etc.) for this assessment report, unlike the IOA-RCS EPD&C report.

APPENDIX C
DETAILED ASSESSMENT

This section contains the IOA assessment worksheets generated during the assessment of this 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. Each of these worksheets identifies the NASA FMEA being assessed, corresponding MDAC Analysis Worksheet ID, 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: 1/01/88
ASSESSMENT ID: OMS-100
NASA FMEA #: 03-3-1001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 100
ITEM: TANK, HELIUM STORAGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-101
NASA FMEA #: 03-3-1001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 101
ITEM: TANK, HELIUM STORAGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-102
NASA FMEA #: 03-3-1002-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 102
ITEM: COUPLING, HELIUM FILL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI ORIGINALLY PASSED A SCREEN. HOWEVER, DURING MEETING BETWEEN IOA AND SSM, IT WAS AGREED THAT THE A SCREEN SHOULD BE FAILED FOR ALL QD COUPLINGS BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION.
IOA AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-103
NASA FMEA #: 03-3-1002-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 103
ITEM: COUPLING, HELIUM FILL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-104
NASA FMEA #: 03-3-1002-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 104
ITEM: COUPLING, HELIUM FILL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-105
NASA FMEA #: 03-3-1101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 105
ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-106
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 106
ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 1/1 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-107
NASA FMEA #: 03-3-1003-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 107
ITEM: VALVE, HELIUM ISOLATION

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES FOR THE FAILS CLOSED FAILURE MODE. SEE ASSESSMENT SHEET OMS-111.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF PROPELLANT TANK LANDING CONSTRAINTS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-108
NASA FMEA #: 03-3-1003-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 108
ITEM: VALVE, HELIUM ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY PASSED B SCREEN, HOWEVER CHANGED B SCREEN TO FAIL PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE PROP TANK OVERPRESSURIZATION AND RUPTURE WITH THE LOSS OF ALL REDUNDANCY (INCLUDING THE PRESSURE RELIEF ASSEMBLY).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:	1/01/88	NASA DATA:
ASSESSMENT ID:	OMS-109	BASELINE [ ]
NASA FMEA #:	03-3-1003-1	NEW [X]

SUBSYSTEM: OMS
MDAC ID: 109
ITEM: VALVE, HELIUM ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY PASSED B SCREEN, HOWEVER CHANGED B SCREEN TO FAIL PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE PROP TANK OVERPRESSURIZATION AND RUPTURE WITH THE LOSS OF ALL REDUNDANCY (INCLUDING THE PRESSURE RELIEF ASSEMBLY).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-110
NASA FMEA #: 03-3-1101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 110
ITEM: VALVE, HELIUM ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER MASS PROPERTIES CONSTRAINTS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-111
NASA FMEA #: 03-3-1003-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 111
ITEM: VALVE, HELIUM ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[P]	[F]	[F]	[ ] (ADD/DELETE)

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

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). HOWEVER, NASA/RI ADDED "RESTRICTED FLOW" TO THE FAILURE MODES ON 03-3-1003-2 (FAILS CLOSED).
IOA RECOMMENDS THAT "RESTRICTED FLOW" BE PLACED ON A NEW FMEA SEPARATE FROM "FAILS CLOSED", AND THAT THE B AND C SCREENS BE FAILED. A FLOW RESTRICTION DURING DUAL-LEG OPERATION WOULD NOT BE DETECTABLE (FAIL B SCREEN).
ALSO, ANY CONTAMINATION CAN AFFECT BOTH VALVES SIMULTANEOUSLY (FAIL C SCREEN).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-112
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 112
ITEM: VALVE, HELIUM ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DID NOT COVER THIS FAILURE MODE (DELAYED OPERATION). IOA AGREES WITH NASA/RI THAT THIS FAILURE MODE NEED NOT BE ADDED TO THE FMEA/CIL. WORST CASE OF "DELAYED OPERATION" IS COVERED BY "FAILS TO OPEN".

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-113
NASA FMEA #: 03-3-1205-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 113
ITEM: COUPLING-TEST PORT, HIGH PRESSURE HELIUM

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AND AGREES WITH FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEALS AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-114
NASA FMEA #: 03-3-1205-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 114
ITEM: COUPLING-TEST PORT, HIGH PRESSURE HELIUM

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW". IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-115
NASA FMEA #: 03-3-1205-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 115
ITEM: COUPLING-TEST PORT, HIGH PRESSURE HELIUM

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-116
NASA FMEA #: 03-3-1101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 116
ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[ ]	[ ]	[ ]	[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 [ ]
INADEQUATE [ ]

REMARKS:
IOA ORIGINALLY CONSIDERED THE TWO HE LINE SEGMENTS BETWEEN THE HE ISOL VLVS AND HE PRESS REGS TO BE REDUNDANT TO EACH OTHER. IOA AGREES WITH NASA/RI REEVALUATION AND RATIONALE FOR A 1/1 CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-117
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 117
ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 2/1R PFP EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-118
NASA FMEA #: 03-3-1004-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 118
ITEM: REGULATOR ASSY, HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH NASA/RI RATIONALE FOR 3/1R CRITICALITY. SSM AGREED TO REMOVE STATEMENT IN EFFECTS WHICH DESCRIBES 2/1R CRITICALITY, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-119
NASA FMEA #: 03-3-1004-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 119
ITEM: REGULATOR ASSEMBLY, HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[P]	[F]	[F]	[ ] (ADD/DELETE)

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

REMARKS:
IOA RECOMMENDS THAT THE B SCREEN BE FAILED. A FAILED CLOSED REGULATOR WOULD NOT BE DETECTABLE DURING DUAL-LEG OPERATION. IOA ACCEPTS NASA/RI FAILURE OF C SCREEN.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF THE PROPELLANT TANK LANDING CONSTRAINT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-120
NASA FMEA #: 03-3-1004-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 120
ITEM: REGULATOR ASSEMBLY, HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[P]	[F]	[F]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT THE B SCREEN BE FAILED. A FAILED CLOSED REGULATOR WOULD NOT BE DETECTABLE DURING DUAL-LEG OPERATION. IOA ACCEPTS NASA/RI FAILURE OF C SCREEN.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF THE PROPELLANT TANK LANDING CONSTRAINT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:	1/01/88	NASA DATA:	
ASSESSMENT ID:	OMS-121	BASELINE	[ ]
NASA FMEA #:	03-3-1004-2	NEW	[X]

SUBSYSTEM: OMS
MDAC ID: 121
ITEM: REGULATOR ASSEMBLY, HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[P]	[F]	[F]	[ ] (ADD/DELETE)

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

REMARKS:
IOA RECOMMENDS THAT THE B SCREEN BE FAILED. A FAILED CLOSED REGULATOR WOULD NOT BE DETECTABLE DURING DUAL-LEG OPERATION. IOA ACCEPTS NASA/RI FAILURE OF C SCREEN.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF THE PROPELLANT TANK LANDING CONSTRAINT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-122
NASA FMEA #: 03-3-1101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 122
ITEM: REGULATOR ASSEMBLY, HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[ ]	[ ]	[ ]	[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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI AGREED TO ADD THIS REGULATOR BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET PER IOA ISSUE.
IOA AGREES WITH NASA/RI REEVALUATION AND RATIONALE FOR A 1/1 CRITICALITY.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-123
NASA FMEA #: 03-3-1205-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 123
ITEM: COUPLING-TEST PORT, VAPOR ISOLATION CHECK-OUT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEALS AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-124
NASA FMEA #: 03-3-1205-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 124
ITEM: COUPLING-TEST PORT, VAPOR ISOLATION CHECK-OUT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-125
NASA FMEA #: 03-3-1205-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 125
ITEM: COUPLING-TEST PORT, VAPOR ISOLATION CHECK-OUT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-126
NASA FMEA #: 03-3-1006-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 126
ITEM: VALVE, VAPOR ISOLATION-OXIDIZER

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
IOA ACCEPTS NASA/RI FAILURE OF B SCREEN, BASED ON RESTRICTED FLOW FAILURE MODE. HOWEVER, IOA CONSIDERS THE FAILED OPEN FAILURE MODE TO BE READILY DETECTABLE DURING FLIGHT. SEE ASSESSMENT SHEET OMS-130.
IOA RECOMMENDS ADDING STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF PROPELLANT TANK LANDING CONSTRAINT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-127
NASA FMEA #: 03-3-1006-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 127
ITEM: VALVE, VAPOR ISOLATION-OXIDIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 3/1R PFP AND PLACED ON THE CIL. WITH FAILED OPEN VAPOR ISOL VALVE AND SERIES OXID CHECK VALVE POPPETS, THE CONTAMINATION OF UPSTREAM COMPONENTS BY PROP OR PROP VAPORS COULD RESULT IN LOSS OF PROP TANK REPRESS CAPABILITY RESULTING IN INABILITY TO USE OR DEPLETE OMS PROP, AND OXIDIZER CROSSOVER TO THE FUEL SIDE CAUSING A POSSIBLE HYPERGOLIC REACTION IN THE LINES.
FAILURE OF ONE LEG OF REDUNDANCY (CHECK VALVE POPPET) IS NOT DETECTABLE DURING FLIGHT (FAIL B SCREEN).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-128
NASA FMEA #: 03-3-1006-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 128
ITEM: VALVE, VAPOR ISOLATION-OXIDIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 3/1R PFP AND PLACED ON THE CIL. WITH INTERNALLY LEAKING VAPOR ISOL VALVE AND SERIES OXID CHECK VALVE POPPETS, THE CONTAMINATION OF UPSTREAM COMPONENTS BY PROP OR PROP VAPORS COULD RESULT IN LOSS OF PROP TANK REPRESS CAPABILITY RESULTING IN INABILITY TO USE OR DEPLETE OMS PROP, AND OXIDIZER CROSSOVER TO THE FUEL SIDE CAUSING A POSSIBLE HYPERGOLIC REACTION IN THE LINES. FAILURE OF ONE LEG OF REDUNDANCY (CHECK VALVE POPPET) IS NOT DETECTABLE DURING FLIGHT (FAIL B SCREEN).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-129
NASA FMEA #: 03-3-1101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 129
ITEM: VALVE, VAPOR ISOLATION-OXIDIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL STREET, PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-130
NASA FMEA #: 03-3-1006-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 130
ITEM: VALVE, VAPOR ISOLATION-OXIDIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). HOWEVER, NASA/RI ADDED "RESTRICTED FLOW" TO THE FAILURE MODES ON 03-3-1006-2 (FAILS CLOSED), AND CHANGED THE B SCREEN TO "FAIL".
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF THE PROPELLANT TANK LANDING CONSTRAINT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-131
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 131
ITEM: VALVE, VAPOR ISOLATION-OXIDIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DID NOT COVER THIS FAILURE MODE (DELAYED OPERATION). IOA AGREES WITH NASA/RI THAT THIS FAILURE MODE NEED NOT BE ADDED TO THE FMEA/CIL. WORST CASE OF "DELAYED OPERATION" IS COVERED BY "FAILS TO OPEN".

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-132
NASA FMEA #: 03-3-1007-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 132
ITEM: VALVE, QUAD CHECK VALVES

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-133
NASA FMEA #: 03-3-1007-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 133
ITEM: VALVE, QUAD CHECK VALVES, FUEL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[P]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 2/1R PFP AND PLACED ON THE CIL (SEPARATE FROM THE OXIDIZER ASSY). WITH FAILED OPEN FUEL CHECK VALVE POPPETS, THE CONTAMINATION OF UPSTREAM COMPONENTS BY PROP OR PROP VAPORS COULD RESULT IN LOSS OF PROP TANK REPRESS CAPABILITY RESULTING IN INABILITY TO USE OR DEPLETE OMS PROP, AND FUEL CROSSOVER TO THE OXID SIDE CAUSING A POSSIBLE HYPERGOLIC REACTION IN THE LINES. FAILURE OF ONE POPPET IS NOT DETECTABLE DURING FLIGHT (FAIL B SCREEN).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-134
NASA FMEA #: 03-3-1007-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 134
ITEM: VALVE, QUAD CHECK VALVES, OXIDIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 3/1R PFP AND PLACED ON THE CIL (SEPARATE FROM THE FUEL ASSY). WITH FAILED OPEN OXID CHECK VALVE POPPETS AND VAPOR ISOL VALVE, THE CONTAMINATION OF UPSTREAM COMPONENTS BY PROP OR PROP VAPORS COULD RESULT IN LOSS OF PROP TANK REPRESS CAPABILITY RESULTING IN INABILITY TO USE OR DEPLETE OMS PROP, AND OXID CROSSOVER TO THE FUEL SIDE CAUSING A POSSIBLE HYPERGOLIC REACTION IN THE LINES.
FAILURE OF ONE POPPET IS NOT DETECTABLE DURING FLIGHT (FAIL B SCREEN).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-135
NASA FMEA #: 03-3-1101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 135
ITEM: VALVE, QUAD CHECK VALVES

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS, AND ABOUT POSSIBLE PROP OR PROP VAPOR LEAKAGE RESULTING IN POSSIBLE CORROSION, FIRE, EXPLOSION AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-136
NASA FMEA #: 03-3-1007-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 136
ITEM: VALVE, QUAD CHECK VALVES

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (RESTRICTED FLOW OF SINGLE INLET FILTER). NASA/RI AGREED TO ADD THIS NEW FMEA (03-3-1007-3) TO COVER THIS 1/1 FAILURE, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-137
NASA FMEA #: 03-3-1205-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 137
ITEM: COUPLING-TEST PORT, QUAD CHECK VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEALS AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-138
NASA FMEA #: 03-3-1205-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 138
ITEM: COUPLING-TEST PORT, QUAD CHECK VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-139
NASA FMEA #: 03-3-1205-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 139
ITEM: COUPLING-TEST PORT, QUAD CHECK VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-140
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 140
ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 3/3 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-141
NASA FMEA #: 03-3-1009-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 141
ITEM: VALVE-PRESSURE RELIEF ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA NO LONGER CONSIDERS RELIEF VALVE TO BE AN EMERGENCY SYSTEM, AND CONCURS WITH NASA/RI CRITICALITY AND SCREEN ASSIGNMENTS. NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-141A
NASA FMEA #: 03-3-1009-4

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 141
ITEM: VALVE-PRESSURE RELIEF ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA NO LONGER CONSIDERS RELIEF VALVE TO BE AN EMERGENCY SYSTEM, AND CONCURS WITH NASA/RI CRITICALITY AND SCREEN ASSIGNMENTS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-142
NASA FMEA #: 03-3-1009-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 142
ITEM: VALVE-PRESSURE RELIEF ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA ACCEPTS NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS ADDING STATEMENTS TO EFFECTS ABOUT POSSIBLE LEAKAGE OF PROP OR PROP VAPORS RESULTING IN POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-143
NASA FMEA #: 03-3-1009-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 143
ITEM: VALVE-PRESSURE RELIEF ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (BURST DISK INTERNAL LEAKAGE). NASA/RI AGREED TO ADD "INTERNAL LEAKAGE" TO THE FAILURE MODES ON 03-3-1009-3 (BURST DISK PREMATURE RUPTURE), PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF B SCREEN. BURST DISK LEAK IS NOT DETECTABLE DURING FLIGHT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-144
NASA FMEA #: 03-3-1009-5

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 144
ITEM: VALVE-PRESSURE RELIEF ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA NO LONGER CONSIDERS RELIEF VALVE TO BE AN EMERGENCY SYSTEM, AND CONCURS WITH NASA/RI CRITICALITY AND SCREEN ASSIGNMENTS. NASA/RI ORIGINALLY PASSED B SCREEN, HOWEVER HAS RECLASSIFIED B SCREEN AS "NA" PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-145
NASA FMEA #: 03-3-1009-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 145
ITEM: VALVE-PRESSURE RELIEF ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
SSM REMOVED FAILURE MODE STATEMENT WHICH DESCRIBE "DIAPHRAGM LEAK", PER IOA ISSUE. A BURST DISK LEAK IS NOT REQUIRED FOR THIS FAILURE TO OCCUR.
IOA RECOMMENDS ADDING STATEMENTS TO EFFECTS REGARDING POSSIBLE LEAKAGE OF PROP OR PROP VAPORS RESULTING IN FIRE/EXPLOSION HAZARD AND EXPOSURE OF EVA AND GROUND CREWS TO PROP.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-145A
NASA FMEA #: 03-3-1101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 145
ITEM: VALVE-PRESSURE RELIEF ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS, AND ABOUT POSSIBLE LEAKAGE OF PROP RESULTING IN CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-146
NASA FMEA #: 03-3-1205-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 146
ITEM: COUPLING-TEST PORT, PRESSURE RELIEF VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEALS AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-147
NASA FMEA #: 03-3-1205-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 147
ITEM: COUPLING-TEST PORT, PRESSURE RELIEF VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-148
NASA FMEA #: 03-3-1205-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 148
ITEM: COUPLING-TEST PORT, PRESSURE RELIEF VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-149
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 149
ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 1/1 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-150
NASA FMEA #: 03-3-2001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 150
ITEM: COUPLING-TEST PORT, PROPELLANT PRESSURE CHECK

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD405, 406, 505, 506) HAVE BEEN ADDED TO 03-3-2001-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLED. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT THE EFFECTS INCLUDE POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS, AND POSSIBLE PROP LEAKAGE RESULTING IN CONTAMINATION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-151
NASA FMEA #: 03-3-2001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 151
ITEM: COUPLING-TEST PORT, PROPELLANT PRESSURE CHECK

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD405, 406, 505, 506) HAVE BEEN ADDED TO 03-3-2001-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-152
NASA FMEA #: 03-3-2001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 152
ITEM: COUPLING-TEST PORT, PROPELLANT PRESSURE CHECK

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD405, 406, 505, 506) HAVE BEEN ADDED TO 03-3-2001-2, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-153
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 153
ITEM: VALVE-GROUND, MANUAL ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (FAILS TO REMAIN OPEN). IOA NOW CONSIDERS THE CREDIBILITY OF THIS FAILURE MODE TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT THIS FAILURE MODE BE ADDRESSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-154
NASA FMEA #: 03-3-1008-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 154
ITEM: VALVE-GROUND, MANUAL ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-155
NASA FMEA #: 03-3-1101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 155
ITEM: VALVE-GROUND, MANUAL ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS, AND ABOUT PROP LEAKAGE RESULTING IN POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-156
NASA FMEA #: 03-3-2001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 156
ITEM: COUPLING-TANK VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI ORIGINALLY PASSED A SCREEN. HOWEVER, DURING MEETING BETWEEN IOA AND SSM, IT WAS AGREED THAT THE A SCREEN SHOULD BE FAILED FOR ALL QD COUPLINGS BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION.
IOA AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS ADDING STATEMENTS TO EFFECTS ABOUT POSSIBLE VIOLATIONS OF PROPELLANT TANK LANDING CONSTRAINTS AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY, AND ABOUT PROP LEAKAGE RESULTING IN POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-157
NASA FMEA #: 03-3-2001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 157
ITEM: COUPLING-TANK VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-158
NASA FMEA #: 03-3-2001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 158
ITEM: COUPLING-TANK VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-159
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 159
ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 1/1 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-160
NASA FMEA #: 03-3-2601-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 160
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI AGREED TO ADD "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. THE RETENTION RATIONALE ON THE CIL SHEET SHOULD ADDRESS THIS NEW CAUSE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA ALSO RECOMMENDS THAT "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS A CAUSE ON THIS FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-161
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 161
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (NO BELLOWS ANGULAR DEFLECTION). IOA RECOMMENDS THAT THIS FAILURE MODE BE INCLUDED AS A CAUSE ON LINE AND BELLOWS RUPTURE FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-162
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 162
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-163
NASA FMEA #: 03-3-2002-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 163
ITEM: PROPELLANT TANK

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-164
NASA FMEA #: 03-3-2002-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 164
ITEM: PROPELLANT TANK

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA DID NOT CONSIDER INDIVIDUAL TANK SEAL FAILURES. IOA AGREES WITH NASA/RI REEVALUATION AND RATIONALE FOR 2/1R PFP ASSIGNMENT. IOA RECOMMENDS ADDING STATEMENTS TO THE EFFECTS ABOUT POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-165
NASA FMEA #: 03-3-2009-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 165
ITEM: COUPLING-PROP TANK, HORIZONTAL DRAIN PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD479, 480, 579, 580) HAVE BEEN ADDED TO 03-3-2009-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT A STATEMENT BE ADDED TO THE EFFECTS ABOUT POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-166
NASA FMEA #: 03-3-2009-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 166
ITEM: COUPLING-PROP TANK, HORIZONTAL DRAIN PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD479, 480, 579, 580) HAVE BEEN ADDED TO 03-3-2009-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-167
NASA FMEA #: 03-3-2009-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 167
ITEM: COUPLING-PROP TANK, HORIZONTAL DRAIN PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD479, 480, 579, 580) HAVE BEEN ADDED TO 03-3-2009-2.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-168
NASA FMEA #: 03-3-2001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 168
ITEM: COUPLING-TANK ACQ. SYSTEM TRAP FILL/VENT PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD426, 427, 526, 527) HAVE BEEN ADDED TO 03-3-2001-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLED. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT THE EFFECTS INCLUDE POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS, AND POSSIBLE PROP LEAKAGE RESULTING IN CONTAMINATION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-169
NASA FMEA #: 03-3-2001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 169
ITEM: COUPLING-TANK ACQ. SYSTEM TRAP FILL/VENT PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD426, 427, 526, 527) HAVE BEEN ADDED TO 03-3-2001-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-170
NASA FMEA #: 03-3-2001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 170
ITEM: COUPLING-TANK ACQ. SYSTEM TRAP FILL/VENT PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD426, 427, 526, 527) HAVE BEEN ADDED TO 03-3-2001-2, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-171
NASA FMEA #: 03-3-2001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 171
ITEM: COUPLING-TANK ACQ. SYSTEM FILL/VENT PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD421, 422, 521, 522) HAVE BEEN ADDED TO 03-3-2001-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLED. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT THE EFFECTS INCLUDE POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS, AND POSSIBLE PROP LEAKAGE RESULTING IN CONTAMINATION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-172
NASA FMEA #: 03-3-2001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 172
ITEM: COUPLING-TANK ACQ. SYSTEM FILL/VENT PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD421, 422, 521, 522) HAVE BEEN ADDED TO 03-3-2001-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-173
NASA FMEA #: 03-3-2001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 173
ITEM: COUPLING-TANK ACQ. SYSTEM FILL/VENT PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD421, 422, 521, 522) HAVE BEEN ADDED TO 03-3-2001-2, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-174
NASA FMEA #: 03-3-2001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 174
ITEM: COUPLING-PROPELLANT, TANK TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD416, 417, 516, 517) HAVE BEEN ADDED TO 03-3-2001-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLED. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT THE EFFECTS INCLUDE POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS, AND POSSIBLE PROP LEAKAGE RESULTING IN CONTAMINATION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-175
NASA FMEA #: 03-3-2001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 175
ITEM: COUPLING-PROPELLANT, TANK TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD416, 417, 516, 517) HAVE BEEN ADDED TO 03-3-2001-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-176
NASA FMEA #: 03-3-2001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 176
ITEM: COUPLING-PROPELLANT, TANK TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD416, 417, 516, 517) HAVE BEEN ADDED TO 03-3-2001-2, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-177
NASA FMEA #: 03-3-3202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 177
ITEM: GAGING PROBE, FORWARD COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-178
NASA FMEA #: 03-3-3202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 178
ITEM: GAGING PROBE, FORWARD COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-179
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 179
ITEM: GAGING PROBE, FORWARD COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE. THIS FAILURE MODE, "ERRATIC OPERATION", IS CONSIDERED BY IOA TO BE ADEQUATELY COVERED UNDER THE NASA/RI FMEA WITH FAILURE MODE "ERRONEOUS INDICATION, LOSS OF OUTPUT" (03-3-3202-1). THE EFFECTS OF THESE TWO FAILURE MODES ARE THE SAME. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-180
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 180
ITEM: GAGING PROBE, FORWARD COMPARTMENT, FUEL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (GLASS FRACTURE). IOA RECOMMENDS ADDING THIS FAILURE MODE AS A CAUSE ON THE FORWARD PROBE "ERRONEOUS INDICATION" FMEA (03-3-3202-1). A SEPARATE FMEA IS NOT REQUIRED.
FAILURE HISTORY OF PROBE INCLUDES THIS FAILURE. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-181
NASA FMEA #: 03-3-3202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 181
ITEM: GAGING PROBE, FORWARD COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES. NASA/RI LISTS "PROP INTERNAL LEAKAGE" AS CAUSE ON "ERRONEOUS INDICATION, LOSS OF OUTPUT" FMEA. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-182
NASA FMEA #: 03-3-3202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 182
ITEM: GAGING PROBE, AFT COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS REGARDING THE INABILITY TO DETECT FAILURE OF COMMUNICATION SCREEN AFTER LOSS OF OUTPUT FROM AFT PROBE. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-182A
NASA FMEA #: 03-3-3202-4

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 182
ITEM: GAGING PROBE, AFT COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-183
NASA FMEA #: 03-3-3202-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 183
ITEM: GAGING PROBE, AFT COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-183A
NASA FMEA #: 03-3-3202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 183
ITEM: GAGING PROBE, AFT COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS ADDITION OF FOLLOWING INFORMATION TO EFFECTS: FALSE INDICATION OF COMMUNICATION SCREEN FAILURE (LESS THAN FULL AFT COMPARTMENT READING WITH PROP REMAINING IN FORWARD COMPARTMENT) MAY RESULT IN PERFORMANCE OF SETTLING BURNS PRIOR TO OMS BURNS AND LOSS OF ONORBIT INTERCONNECT. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-184
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 184
ITEM: GAGING PROBE, AFT COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE. THIS FAILURE MODE, "ERRATIC OPERATION", IS CONSIDERED BY IOA TO BE ADEQUATELY COVERED BY THE NASA/RI FMEA WITH THE FAILURE MODE "ERRONEOUS INDICATION, LOSS OF OUTPUT" (03-3-3202-1). THE EFFECTS OF THESE TWO FAILURE MODES ARE THE SAME. IOA RECOMMENDS ADDING STATEMENT TO EFFECTS REGARDING THE INABILITY TO DETECT A FAILURE OF THE COMMUNICATION SCREEN AFTER LOSS OF OUTPUT FROM AFT PROBE. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-185
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 185
ITEM: GAGING PROBE, AFT COMPARTMENT, FUEL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (GLASS FRACTURE). IOA RECOMMENDS ADDING THIS FAILURE MODE AS A CAUSE ON THE AFT PROBE "ERRONEOUS INDICATION" FMEA (03-3-3202-1). A SEPARATE FMEA IS NOT REQUIRED.
FAILURE HISTORY OF PROBE INCLUDES THIS FAILURE MODE. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-186
NASA FMEA #: 03-3-3202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 186
ITEM: GAGING PROBE, AFT COMPARTMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. NASA/RI LIST "PROP INTERNAL LEAKAGE" AS CAUSE ON "ERRONEOUS INDICATION, LOSS OF OUTPUT" FMEA. IOA ANALYZED FORWARD AND AFT PROBES SEPARATELY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-187
NASA FMEA #: 03-3-3284-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 187
ITEM: TOTALIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS ADDING STATEMENTS TO EFFECTS ADDRESSING LOSS OF LOW PROP QUANTITY WARNING AND INABILITY TO DETECT COMMUNICATION SCREEN FAILURE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-188
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 188
ITEM: TOTALIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE. THIS FAILURE MODE, "ERRONEOUS INDICATION", IS CONSIDERED BY IOA TO BE ADEQUATELY COVERED BY THE NASA/RI FMEA WITH THE FAILURE MODE "ERRATIC OPERATION" (03-3-3284-1). IOA RECOMMENDS ADDING STATEMENTS TO EFFECTS WHICH ADDRESS FALSE INDICATIONS OF PROP LOW QUANTITY WARNING AND COMMUNICATION SCREEN FAILURE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-189
NASA FMEA #: 03-3-3284-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 189
ITEM: TOTALIZER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS ADDING STATEMENTS TO EFFECTS ADDRESSING LOSS OF LOW PROP QUANTITY WARNING AND INABILITY TO DETECT COMMUNICATION SCREEN FAILURE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-190
NASA FMEA #: 03-3-2006-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 190
ITEM: COMMUNICATION SCREEN

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA WILL NOT DISPUTE NASA/RI 1/1 CRIT ASSIGNMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-191
NASA FMEA #: 03-3-2006-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 191
ITEM: COMMUNICATION SCREEN

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA WILL NOT DISPUTE NASA/RI 1/1 CRIT ASSIGNMENT. HOWEVER, IOA RECOMMENDS THAT THE 3/2R EFFECTS OF A LESS SEVERE SCREEN FAILURE (WHICH ONLY ALLOWS SOME HELIUM TO PASS INTO THE AFT COMPARTMENT) ALSO BE INCLUDED ON THIS FMEA. IOA CONSIDERS THIS DEGREE OF FAILURE TO BE MORE CREDIBLE THAN A TOTAL (1/1) SCREEN FAILURE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-192
NASA FMEA #: 03-3-2005-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 192
ITEM: GALLERY LEGS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS REGARDING POSSIBLE LOSS OF ONE OMS ENGINE OR RCS THRUSTERS AS A RESULT OF THE LOSS OF ALL REDUNDANCY. ENGINE AND TANK ASSEMBLY IN OTHER POD NOT CONSIDERED BY IOA TO BE REDUNDANT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-193
NASA FMEA #: 03-3-2004-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 193
ITEM: COLLECTOR MANIFOLD

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH NASA/RI REEVALUATION AND RATIONALE FOR 2/2 CRITICALITY. STRUCTURAL FAILURE OF DEVICE MAY ALLOW HELIUM TO BYPASS GALLERY LEGS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-194
NASA FMEA #: 03-3-2101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 194
ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. THE RETENTION RATIONALE ON THE CIL SHEET SHOULD ADDRESS THIS NEW CAUSE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA ALSO RECOMMENDS THAT "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS A CAUSE ON THIS FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-194A
NASA FMEA #: 03-3-2102-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 194
ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. THE RETENTION RATIONALE ON THE CIL SHEET SHOULD ADDRESS THIS NEW CAUSE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-195
NASA FMEA #: 03-3-2601-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 195
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. THE RETENTION RATIONALE ON THE CIL SHEET SHOULD ADDRESS THIS NEW CAUSE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA ALSO RECOMMENDS THAT "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS A CAUSE ON THIS FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-196
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 196
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (NO BELLOWS ANGULAR DEFLECTION). IOA RECOMMENDS THAT THIS FAILURE MODE BE INCLUDED AS A CAUSE ON LINE AND BELLOWS RUPTURE FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-197
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 197
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-198
NASA FMEA #: 03-3-2007-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 198
ITEM: VALVE-PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
IOA CONSIDERS A FAILED CLOSED VALVE TO BE READILY DETECTABLE DURING FLIGHT (PASS B SCREEN). HOWEVER IOA WILL NOT DISPUTE NASA/RI B SCREEN FAILURE (WHICH IS BASED ON RESTRICTED FLOW FAILURE MODE). SEE ASSESSMENT SHEET OMS-203.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF THE PROP TANK LANDING WEIGHT CONSTRAINT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-199
NASA FMEA #: 03-3-2007-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 199
ITEM: VALVE-PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH NASA/RI REEVALUATION AND RATIONALE REGARDING 2/1R PNP ASSIGNMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-200
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 200
ITEM: VALVE-PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (FAILS MID-TRAVEL, PARTIALLY OPEN/CLOSED). IOA RECOMMENDS THAT THESE FAILURE MODES BE ADDED TO 03-3-2007-2, HOWEVER FMEA/CIL IS ADEQUATE WITHOUT THESE ADDITIONS. THE EFFECTS OF THESE FAILURE MODES ARE COVERED 03-3-2007-2.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-201
NASA FMEA #: 03-3-2007-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 201
ITEM: VALVE-PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH NASA/RI REEVALUATION AND RATIONALE FOR 2/1R PNP ASSIGNMENT FOR INTERNAL LEAKAGE FAILURE MODE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-202
NASA FMEA #: 03-3-2101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 202
ITEM: VALVE-PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE. NASA/RI ALSO ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-202A
NASA FMEA #: 03-3-2007-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 202
ITEM: AC VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT "FAILED CLOSED ACMV RELIEF DEVICE" BE ADDED AS A CAUSE ON THIS FMEA, HOWEVER FMEA IS ADEQUATE WITHOUT THIS ADDITION.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS REGARDING POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROPELLANT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-203
NASA FMEA #: 03-3-2007-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 203
ITEM: VALVE-PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). NASA/RI AGREED TO ADD "RESTRICTED FLOW" TO THE FAILURE MODES ON 03-3-2007-2 (FAILS CLOSED), PER IOA ISSUE. NASA/RI ALSO CHANGED THE B SCREEN ON 03-3-2007-2 TO "FAIL" FOR RESTRICTED FLOW, PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF THE PROP TANK LANDING WEIGHT CONSTRAINT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-204
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 204
ITEM: VALVE-PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[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 NOW CLASSIFIES THIS FAILURE AS A 3/3. VALVES ARE OPEN DURING ALL PHASES OF FLIGHT. VALVES ARE VERIFIED OPEN BEFORE BURN ATTEMPTED. IOA 3/2R BASED ON VALVE IN GPC POSITION IS INCORRECT. NASA/RI DO NOT COVER THIS FAILURE MODE (DELAYED OPERATION). THIS FAILURE MODE NEED NOT BE ADDED TO THE FMEA/CIL. THE WORST CASE EFFECTS OF "DELAYED OPERATION" ARE COVERED BY "FAILS CLOSED" (03-3-2007-2).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-205
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 205
ITEM: VALVE-PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (INTERNAL RELIEF VALVE FAILS TO RELIEVE) ON A SEPARATE FMEA. HOWEVER, THIS FAILURE MODE IS LISTED AS A CAUSE ON PROP LINE AND GIMBAL BELLOWS EXTERNAL LEAKAGE FMEAS.
IOA RECOMMENDS THAT THIS FAILURE BE ADDRESSED AS A FAILURE MODE ON A SEPARATE FMEA TO ENSURE THAT IT GETS THE PROPER AMOUNT OF ATTENTION, BUT DOES NOT REGARD THIS RECOMMENDATION TO BE AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-206
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 206
ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 2/1R EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-207
NASA FMEA #: 03-3-2009-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 207
ITEM: COUPLING - PROPELLANT LOW-POINT DRAIN

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD469, 470, 569, 570) HAVE BEEN ADDED TO 03-3-2009-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT A STATEMENT BE ADDED TO THE EFFECTS ABOUT POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-208
NASA FMEA #: 03-3-2009-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 208
ITEM: COUPLING - PROPELLANT LOW-POINT DRAIN

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD469, 470, 569, 570) HAVE BEEN ADDED TO 03-3-2009-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-209
NASA FMEA #: 03-3-2009-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 209
ITEM: COUPLING - PROPELLANT LOW-POINT DRAIN

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD469, 470, 569, 570) HAVE BEEN ADDED TO 03-3-2009-2.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-210
NASA FMEA #: 03-3-2009-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 210
ITEM: COUPLING-OMS/RCS PROPELLANT FILL PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI ORIGINALLY PASSED A SCREEN. HOWEVER, DURING MEETING BETWEEN IOA AND SSM, IT WAS AGREED THAT THE A SCREEN SHOULD BE FAILED FOR ALL QD COUPLINGS BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION.
IOA AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREW DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-211
NASA FMEA #: 03-3-2009-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 211
ITEM: COUPLING-OMS/RCS PROPELLANT FILL PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-212
NASA FMEA #: 03-3-2009-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 212
ITEM: COUPLING-OMS/RCS PROPELLANT FILL PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-213
NASA FMEA #: 03-3-2009-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 213
ITEM: COUPLING - PROPELLANT GROUND-PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD461, 462, 561, 562) HAVE BEEN ADDED TO 03-3-2009-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT A STATEMENT BE ADDED TO THE EFFECTS ABOUT POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-214
NASA FMEA #: 03-3-2009-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 214
ITEM: COUPLING - PROPELLANT GROUND-PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD461, 462, 561, 562) HAVE BEEN ADDED TO 03-3-2009-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-215
NASA FMEA #: 03-3-2009-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 215
ITEM: COUPLING - PROPELLANT GROUND-PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD461, 462, 561, 562) HAVE BEEN ADDED TO 03-3-2009-2.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-216
NASA FMEA #: 03-3-20010-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 216
ITEM: CROSSFEED GIMBAL JOINT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA ALSO RECOMMENDS THAT "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS A CAUSE ON THIS FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-217
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 217
ITEM: CROSSFEED GIMBAL JOINT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (NO BELLOWS ANGULAR DEFLECTION). IOA RECOMMENDS ADDING THIS FAILURE MODE AS A CAUSE ON CROSSFEED LINE AND BELLOWS RUPTURE FMEAs.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-218
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 218
ITEM: CROSSFEED GIMBAL JOINT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-219
NASA FMEA #: 03-3-20011-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 219
ITEM: FLEXIBLE LINE ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-220
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 220
ITEM: FLEXIBLE LINE ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-221
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 221
ITEM: CROSSFEED PROPELLANT LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 3/2R EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-222
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 222
ITEM: CROSSFEED PROPELLANT LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 1/1 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-223
NASA FMEA #: 03-3-2008-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 223
ITEM: VALVE-CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA ACCEPTS NASA/RI REEVALUATION AND RATIONALE REGARDING 3/1R CRITICALITY. NASA/RI DELETED THE 1/1 ABORT CRITICALITY BASED ON S/W CHANGES WHICH WILL HAVE BOTH XFEED VALVE SWITCHES IN THE GPC POSITION FOR LAUNCH BEGINNING WITH STS-26.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-224
NASA FMEA #: 03-3-2008-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 224
ITEM: VALVE-CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH NASA/RI REEVALUATION AND RATIONALE REGARDING 3/2R CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-225
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 225
ITEM: VALVE-CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DID NOT COVER THIS FAILURE MODE (FAILS MIDTRAVEL). IOA RECOMMENDS THAT THIS FAILURE MODE BE ADDED TO 03-3-2008-2, HOWEVER FMEA/CIL IS ADEQUATE WITHOUT THIS ADDITION. THE EFFECTS OF THIS FAILURE MODE ARE COVERED ON 03-3-2008-2.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-226
NASA FMEA #: 03-3-2008-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 226
ITEM: VALVE-CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH NASA/RI RATIONALE FOR 3/2R CRITICALITY ASSIGNMENT. HOWEVER, IOA MAINTAINS CONCERN REGARDING DETECTABILITY OF INTERNAL LEAKAGE DURING FLIGHT. IOA ACCEPTS SSM POSITION THAT A LEAKAGE LARGE ENOUGH TO CAUSE ANY PROBLEMS WOULD BE DETECTABLE. LEAKAGES TOO SMALL TO DETECT ARE OF NO CONSEQUENCE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-227
NASA FMEA #: 03-3-2101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 227
ITEM: VALVE-CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE. NASA/RI ALSO ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. IOA RECOMMENDS ADDING STATEMENTS TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-227A
NASA FMEA #: 03-3-2008-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 227
ITEM: AC VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT "FAILED CLOSED ACMV RELIEF DEVICE" BE ADDED AS A CAUSE ON THIS FMEA, HOWEVER FMEA IS ADEQUATE WITHOUT THIS ADDITION.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS REGARDING POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROPELLANT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-228
NASA FMEA #: 03-3-2008-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 228
ITEM: VALVE-CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). NASA/RI AGREED TO ADD "RESTRICTED FLOW" TO THE FAILURE MODES ON 03-3-2008-2 (FAILS CLOSED), PER IOA ISSUE.
IOA AGREES WITH NASA/RI RATIONALE FOR 3/1R PPP CRIT ASSIGNMENT.
IOA B SCREEN FAILURE WAS BASED ON THE USE OF BOTH XFEED VALVES FOR OMS XFEED OPS. HOWEVER, OMS XFEED IS A CONTINGENCY OPERATION. OMS/RCS INTERCONNECT NOMINALLY USES ONLY ONE OMS XFEED VALVE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-229
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 229
ITEM: VALVE-CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DID NOT COVER THIS FAILURE MODE (DELAYED OPERATION). THIS FAILURE MODE NEED NOT BE ADDED TO THE FMEA/CIL. WORST CASE EFFECTS OF "DELAYED OPERATION" ARE COVERED BY THE "FAILS CLOSED" FMEA (03-3-2008-2).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-230
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 230
ITEM: VALVE-CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (INTERNAL RELIEF VALVE FAILS TO RELIEVE) ON A SEPARATE FMEA. HOWEVER, THIS FAILURE MODE IS LISTED AS A CAUSE ON CROSSFEED PROP LINE AND GIMBAL BELLOWS EXTERNAL LEAKAGE FMEAS.
IOA RECOMMENDS THAT THIS FAILURE BE ADDRESSED AS A FAILURE MODE ON A SEPARATE FMEA TO ENSURE THAT IT GETS THE PROPER AMOUNT OF ATTENTION, BUT DOES NOT REGARD THIS RECOMMENDATION TO BE AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-231
NASA FMEA #: 03-3-2001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 231
ITEM: COUPLING - HIGH-POINT BLEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD667, 668) HAVE BEEN ADDED TO 03-3-2001-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLED. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT THE EFFECTS INCLUDE POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS, AND POSSIBLE PROP LEAKAGE RESULTING IN CONTAMINATION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-232
NASA FMEA #: 03-3-2001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 232
ITEM: COUPLING - HIGH-POINT BLEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD667, 668) HAVE BEEN ADDED TO 03-3-2001-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-233
NASA FMEA #: 03-3-2001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 233
ITEM: COUPLING - HIGH-POINT BLEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD667, 668) HAVE BEEN ADDED TO 03-3-2001-2, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-234
NASA FMEA #: 03-3-2009-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 234
ITEM: COUPLING-CROSSFEED DRAIN

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD673, 674, 679, 686) HAVE BEEN ADDED TO 03-3-2009-1, PER IOA ISSUE.
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS THAT A STATEMENT BE ADDED TO THE EFFECTS ABOUT POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-235
NASA FMEA #: 03-3-2009-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 235
ITEM: COUPLING-CROSSFEED DRAIN

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD673, 674, 679, 686) HAVE BEEN ADDED TO 03-3-2009-3, PER IOA ISSUE.
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-236
NASA FMEA #: 03-3-2009-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 236
ITEM: COUPLING-CROSSFEED DRAIN

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. HOWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD673, 674, 679, 686) HAVE BEEN ADDED TO 03-3-2009-2.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-237
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 237
ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 3/3 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-238
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 238
ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 2/1R EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-239
NASA FMEA #: 03-3-2601-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 239
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI AGREED TO ADD "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. THE RETENTION RATIONALE ON THE CIL SHEET SHOULD ADDRESS THIS NEW CAUSE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA ALSO RECOMMENDS THAT "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS A CAUSE ON THIS FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-240
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 240
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (NO BELLOWS ANGULAR DEFLECTION). IOA RECOMMENDS ADDING THIS FAILURE MODE AS A CAUSE ON LINE AND BELLOWS RUPTURE FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-241
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 241
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-242
NASA FMEA #: 03-3-2601-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 242
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI AGREED TO ADD "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. THE RETENTION RATIONALE ON THE CIL SHEET SHOULD ADDRESS THIS NEW CAUSE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA ALSO RECOMMENDS THAT "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS A CAUSE ON THIS FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-243
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 243
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (NO BELLOWS ANGULAR DEFLECTION). IOA RECOMMENDS ADDING THIS FAILURE MODE AS A CAUSE ON LINE AND BELLOWS RUPTURE FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-244
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 244
ITEM: GIMBAL BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-245
NASA FMEA #: 03-3-2602-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 245
ITEM: ALIGNMENT BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI AGREED TO ADD "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. THE RETENTION RATIONALE ON THE CIL SHEET SHOULD ADDRESS THIS NEW CAUSE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA ALSO RECOMMENDS THAT "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS A CAUSE ON THIS FMEA.
REDUNDANCY SCREENS SHOULD BE BLANK PER NSTS 22206.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-246
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 246
ITEM: ALIGNMENT BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (NO BELLOWS ANGULAR DEFLECTION). IOA RECOMMENDS ADDING THIS FAILURE MODE AS A CAUSE ON LINE AND BELLOWS RUPTURE FMEAS.

ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-247
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 247
ITEM: ALIGNMENT BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-248
NASA FMEA #: 03-3-4002-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 248
ITEM: ENGINE INLET FILTER AND ORIFICE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[1 /1]	[ ]	[ ]	[ ]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA NOW CLASSIFIES THIS FAILURE MODE AS A 1/1 SINCE IT CAN CAUSE A CATASTROPHIC ENGINE FAILURE. CONTAMINATION OF ENGINE INJECTOR ORIFICES OR COOLING CHANNELS COULD RESULT IN COMBUSTION CHAMBER BURN-THROUGH.
IOA RECOMMENDS THAT THIS FAILURE MODE BE UPGRADED TO A 1/1 AND PLACED ON THE CIL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-249
NASA FMEA #: 03-3-4002-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 249
ITEM: ENGINE INLET FILTER AND ORIFICE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH NASA/RI RATIONALE FOR PASSAGE OF B SCREEN.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-250
NASA FMEA #: 03-3-4601-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 250
ITEM: BELLOWS-TVC GIMBAL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT "FAILED CLOSED ACMV RELIEF DEVICE" BE ADDED TO THE CAUSES ON THIS FMEA WITH CORRESPONDING RETENTION RATIONALE.
IOA ALSO RECOMMENDS ADDING STATEMENTS TO THE EFFECTS ABOUT POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROPELLANT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-251
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 251
ITEM: BELLOWS-TVC GIMBAL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (NO BELLOWS ANGULAR DEFLECTION) ON A SEPARATE FMEA. IOA RECOMMENDS ADDING THIS FAILURE MODE AS A CAUSE ON ALL PROP LINE AND BELLOWS EXTERNAL LEAKAGE FMEAS. A SEPARATE FMEA IS NOT REQUIRED.
THE PROPOSED IOA CAUSE IS ALREADY ADDRESSED ON FMEA 03-3-4601-1, WHICH LISTS "EXCESS GIMBALLING TORQUE" AS A CAUSE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-252
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 252
ITEM: BELLOWS-TVC GIMBAL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-253
NASA FMEA #: 03-3-4507-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 253
ITEM: COUPLING - HIGH-POINT BLEED TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-254
NASA FMEA #: 03-3-4507-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 254
ITEM: COUPLING - HIGH-POINT BLEED TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-255
NASA FMEA #: 03-3-4507-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 255
ITEM: COUPLING - HIGH-POINT BLEED TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-256
NASA FMEA #: 03-3-4001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 256
ITEM: VALVE - BIPROPELLANT VALVE

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "RESTRICTED FLOW". THE EFFECTS OF "RESTRICTED FLOW" ARE COVERED BY THE ENGINE INLET FILTER (03-3-4002-1), AND THE BIPROP VLV ASSY (03-3-4001-3).
NO DIFFERENCES.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-257
NASA FMEA #: 03-3-4001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 257
ITEM: VALVE - BIPROPELLANT VALVE

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT THE POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROPELLANTS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-258
NASA FMEA #: 03-3-4001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 258
ITEM: VALVE - BIPROPELLANT VALVE

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (FAILS MID-TRAVEL) FOR THE BIPROPELLANT VALVE. NASA/RI NOW COVERS THIS FAILURE MODE ON 03-3-4001-3.
IOA ACCEPTS NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-259
NASA FMEA #: 03-3-4001-6

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 259
ITEM: VALVE - BIPROPELLANT VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY PASSED B SCREEN FOR "INTERNAL LEAKAGE" FAILURE MODE. HOWEVER, NASA/RI CHANGED B SCREEN TO "FAIL", PER IOA ISSUE. LEAKAGE PAST UPSTREAM BALL VALVE IS UNDETECTABLE.
IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROPELLANTS.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-260
NASA FMEA #: 03-3-2101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 260
ITEM: VALVE - BIPROPELLANT VALVE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE. NASA/RI ALSO ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON THIS FMEA, PER IOA ISSUE. IOA RECOMMENDS ADDING STATEMENTS TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-261
NASA FMEA #: 03-3-4001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 261
ITEM: VALVE - BIPROPELLANT VALVE

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (DELAYED OPERATION). NASA/RI NOW COVERS THIS FAILURE MODE ON 03-3-4001-3. IOA ACCEPTS NASA/RI FAILURE OF B SCREEN. THIS FAILURE MODE IS LISTED AS A CAUSE ON 1/1 FMEAS (03-3-4004-1 AND 03-3-4004-2), HOWEVER THE SSM STATES THAT THIS FAILURE MODE IS NOT A CAUSE FOR THE 1/1 EFFECTS ON THESE FMEAS.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-262
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 262
ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[1 /1]	[ ]	[ ]	[ ]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA NOW CLASSIFIES THIS ITEM AND FAILURE MODE (RELIEF VALVE FAILS CLOSED) AS A 1/1 SINCE IT COULD RESULT IN STRUCTURAL FAILURE OF THE BIPROP VALVE HOUSING AND LEAKAGE OF PROPELLANTS.
THIS ITEM AND FAILURE MODE ARE CURRENTLY ONLY ADDRESSED AS A CAUSE ON 03-3-4001-6. IOA RECOMMENDS A NEW 1/1 FMEA FOR THIS ITEM AND FAILURE MODE TO ENSURE THAT THEY RECEIVE ADEQUATE ATTENTION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-263
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 263
ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[P]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
IOA NOW CLASSIFIES THIS ITEM AND FAILURE MODE (RELIEF VALVE FAILS OPEN) AS A 2/1R PFP. IOA DID NOT CONSIDER DOWNSTREAM BIPROP VALVE TO BE REDUNDANT TO RELIEF VALVE IN ORIGINAL ANALYSIS. THIS ITEM AND FAILURE MODE ARE CURRENTLY ADDRESSED ONLY AS A CAUSE ON 03-3-4001-6. IOA RECOMMENDS A NEW 2/1R PFP FMEA FOR THIS ITEM AND FAILURE MODE TO ENSURE THAT THEY RECEIVE ADEQUATE ATTENTION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-264
NASA FMEA #: 03-3-4001-6

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 264
ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (INTERNAL LEAKAGE). HOWEVER, NASA/RI NOW COVERS THIS FAILURE MODE ON 03-3-4001-6, BOTH AS A FAILURE MODE AND A CAUSE.
IOA AGREES WITH NASA/RI RATIONALE FOR 2/1R PFP ASSIGNMENT.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-265
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 265
ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[1 /1]	[ ]	[ ]	[ ]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI DO NOT COVER STRUCTURAL FAILURE, RUPTURE, OR EXTERNAL LEAKAGE OF THIS VALVE HOUSING ON THE FMEA/CIL. IOA RECOMMENDS THAT THIS VALVE HOUSING BE ADDED TO THE OTHER VALVE HOUSINGS COVERED ON 03-3-2101-1 WITH CORRESPONDING RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-266
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 266
ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (OPERATES AT LOWER THAN NORMAL PSID). THE PROPOSED IOA FAILURE MODE IS ADEQUATELY COVERED BY THE "FAILS OPEN" FAILURE MODE. SEE ASSESSMENT SHEET OMS-263.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-267
NASA FMEA #: 03-3-4507-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 267
ITEM: COUPLING - BIPROP VALVE DRAIN/PURGE TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-268
NASA FMEA #: 03-3-4507-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 268
ITEM: COUPLING - BIPROP VALVE DRAIN/PURGE TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-269
NASA FMEA #: 03-3-4507-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 269
ITEM: COUPLING - BIPROP VALVE DRAIN/PURGE TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-270
NASA FMEA #: 03-3-4003-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 270
ITEM: OME ALIGNMENT BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT "FAILED CLOSED ACMV RELIEF DEVICE" AND "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS CAUSES ON THIS FMEA.
IOA ALSO RECOMMENDS ADDING STATEMENTS TO THE EFFECTS ABOUT POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROPELLANT LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-271
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 271
ITEM: OME ALIGNMENT BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (NO BELLOWS ANGULAR DEFLECTION). IOA RECOMMENDS ADDING THIS FAILURE MODE AS A CAUSE ON LINE AND BELLOWS RUPTURE FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-272
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 272
ITEM: OME ALIGNMENT BELLOWS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). IOA NOW CONSIDERS THE CREDIBILITY OF RESTRICTED FLOW IN A BELLOWS TO BE QUESTIONABLE. IOA DOES NOT REGARD THE ABSENCE OF THIS FAILURE MODE IN THE FMEA/CIL TO BE AN OPEN ISSUE, BUT DOES RECOMMEND THAT IT BE ADDRESSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-273
NASA FMEA #: 03-3-4507-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 273
ITEM: COUPLING - BIPROP VALVE DRAIN PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

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

REMARKS:
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-274
NASA FMEA #: 03-3-4507-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 274
ITEM: COUPLING - BIPROP VALVE DRAIN PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-275
NASA FMEA #: 03-3-4507-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 275
ITEM: COUPLING - BIPROP VALVE DRAIN PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-276
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 276
ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 2/1R EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-277
NASA FMEA #: 03-3-4507-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 277
ITEM: COUPLING-OMS ENGINE TRICKLE PURGE PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[F]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEAL AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-278
NASA FMEA #: 03-3-4507-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 278
ITEM: COUPLING-OMS ENGINE TRICKLE PURGE PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-279
NASA FMEA #: 03-3-4507-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 279
ITEM: COUPLING-OMS ENGINE TRICKLE PURGE PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-280
NASA FMEA #: 03-3-4004-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 280
ITEM: PLATELET INJECTOR ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-281
NASA FMEA #: 03-3-4004-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 281
ITEM: PLATELET INJECTOR ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-282
NASA FMEA #: 03-3-4004-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 282
ITEM: PLATELET INJECTOR ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI 1/1 CRITICALITY IS CORRECT. FAILURE COULD LEAD TO ENGINE BURN-THROUGH. NASA/RI CHANGED "BLOCKAGE OF ENGINE INLET FILTER" TO "STRUCTURAL FAILURE OF ENGINE INLET FILTER" AS A CAUSE, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-283
NASA FMEA #: 03-3-4005-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 283
ITEM: COMBUSTION CHAMBER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS THAT THE CAUSES ON THIS FMEA INCLUDE "BIPROP VALVE IMPROPER TIMING OR FAILS MID-TRAVEL".

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-284
NASA FMEA #: 03-3-4005-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 284
ITEM: COMBUSTION CHAMBER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES. IOA RECOMMENDS THAT THE CAUSES ON THIS FMEA INCLUDE "BIPROP VALVE IMPROPER TIMING OR FAILS MID-TRAVEL".

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-285
NASA FMEA #: 03-3-4006-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 285
ITEM: NOZZLE EXTENSION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-285A
NASA FMEA #: 03-3-4005-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 285
ITEM: NOZZLE EXTENSION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
IOA ANALYZED COMBUSTION CHAMBER-TO-NOZZLE EXTENSION FLANGE LEAKAGE AS A NOZZLE FAILURE. NASA/RI ANALYZED IT AS A COMBUSTION CHAMBER FAILURE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-286
NASA FMEA #: 03-3-4006-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 286
ITEM: NOZZLE EXTENSION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[ ]	[ ]	[ ]	[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 [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH NASA/RI CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-287
NASA FMEA #: 03-3-4502-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 287
ITEM: COUPLING-GN2 TANK FILL/VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY PASSED A SCREEN. HOWEVER, DURING MEETING BETWEEN IOA AND SSM, IT WAS AGREED THAT THE A SCREEN SHOULD BE FAILED FOR ALL QD COUPLINGS BASED ON INABILITY TO VERIFY CONDITION OF CAP SEALS AFTER CAP INSTALLATION.
IOA AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-288
NASA FMEA #: 03-3-4502-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 288
ITEM: COUPLING-GN2 TANK FILL/VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-289
NASA FMEA #: 03-3-4502-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 289
ITEM: COUPLING-GN2 TANK FILL/VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-290
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 290
ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA ACCEPTS NASA/RI 2/1R PPP, 1/1 ABORT ASSIGNMENT. IOA ANALYZED INDIVIDUAL LINE SEGMENTS SEPARATELY IN ORIGINAL ANALYSIS. NASA/RI FMEA INCLUDES ALL GN2 LINE SEGMENTS. IOA CONSIDERS LEAKAGE OF THIS SEGMENT TO BE A 3/1R PFP.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-291
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 291
ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 3/3 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-292
NASA FMEA #: 03-3-4511-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 292
ITEM: VALVE-GN2 TANK FILL/VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
FAILURE MODES ASSIGNED BY IOA ON ASSESSMENT SHEET OMS-292 APPLY TO GROUND OPERATIONS ONLY. "FAILS OPEN" DURING FLIGHT IS ADDRESSED BY ASSESSMENT SHEET OMS-294.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-293
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 293
ITEM: VALVE-GN2 TANK FILL/VENT

LEAD ANALYST: C.D. PRUST

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 ACCEPTS NASA/RI 2/1R PPP, 1/1 ABORT ASSIGNMENT. NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE) BUT AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-294
NASA FMEA #: 03-3-4511-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 294
ITEM: VALVE-GN2 TANK FILL/VENT

LEAD ANALYST: C.D. PRUST

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 AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT THE REDUNDANCY STRING LISTED UNDER THE "E" EFFECTS BE REVISED. IOA CONSIDERS THE STRING TO INCLUDE ONLY THE FILL/VENT COUPLING SEAL AND CAP, ACCUMULATOR, AND OTHER ENGINE. THERE ARE NO ADDITIONAL REDUNDANT VALVES OR COUPLINGS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-295
NASA FMEA #: 03-3-4501-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 295
ITEM: TANK-GN2 STORAGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.
IOA CONSIDERS SHRAPNEL TO BE A POSSIBLE EFFECT WHICH SHOULD BE ADDRESSED PER NSTS 22206.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-296
NASA FMEA #: 03-3-4501-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 296
ITEM: TANK-GN2 STORAGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA ACCEPTS NASA/RI 1/1 ASSIGNMENT. IOA DIFFERENTIATED BETWEEN VEHICLE DAMAGE EFFECTS (1/1), AND EXTERNAL LEAKAGE (3/1R) EFFECTS. IOA RECOMMENDS THAT THE EXTERNAL LEAKAGE (3/1R) EFFECTS ALSO BE INCLUDED ON THIS FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-297
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 297
ITEM: PNEUMATIC PACK ASSEMBLY HOUSING

LEAD ANALYST: C.D. PRUST

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 ACCEPTS NASA/RI 2/1R PPP, 1/1 ABORT ASSIGNMENT.
NASA/RI AGREED TO ADD THIS MECHANICAL CONNECTION TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-298
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 298
ITEM: PNEUMATIC PACK HOUSING ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 2/1R EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-299
NASA FMEA #: 03-3-4503-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 299
ITEM: VALVE-GN2 PRESSURE ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA NOW CLASSIFIES THIS FAILURE (FAILS CLOSED) AS A CRIT 1 DURING A TAL ABORT, BASED ON INABILITY TO COMPLETE ALL ENGINE STARTS AND PURGES WHICH MAY BE REQUIRED DURING A TAL ABORT.
NASA/RI AGREED TO MAKE THIS FMEA AN ABORT CRIT 1, PER IOA ISSUE. SEE ASSESSMENT SHEET OMS-303.
IOA RECOMMENDS THAT THE "E" EFFECTS BE REVISED. THE DOWNSTREAM REGULATOR IS NOT REDUNDANT FOR A FAILED CLOSED ISOL VALVE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-300
NASA FMEA #: 03-3-4503-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 300
ITEM: VALVE-GN2 PRESSURE ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI FAILS B SCREEN ON 03-3-4503-1 BECAUSE OF "INTERNAL LEAKAGE" FAILURE MODE ISSUE. (SEE ASSESSMENT SHEET OMS-301). "FAILS OPEN" MODE IS DETECTABLE VIA CRT DISPLAY "GNC SYS SUMM 2".

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-301
NASA FMEA #: 03-3-4503-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 301
ITEM: VALVE-GN2 PRESSURE ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[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 NOW FAILS B SCREEN.
NASA/RI ORIGINALLY PASSED B SCREEN, HOWEVER CHANGED B SCREEN TO "FAIL" FOR THE "INTERNAL LEAKAGE" FAILURE MODE, PER IOA ISSUE. LEAKAGE IS UNDETECTABLE DURING FLIGHT SINCE REG GOES TO LOCKUP AFTER EVERY BURN.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-302
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 302
ITEM: VALVE-GN2 PRESSURE ISOLATION

LEAD ANALYST: C.D. PRUST

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 ACCEPTS NASA/RI 2/1R PPP, 1/1 ABORT ASSIGNMENT. NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE), BUT AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-303
NASA FMEA #: 03-3-4503-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 303
ITEM: VALVE-GN2 PRESSURE ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (RESTRICTED FLOW), BUT ADDED IT TO 03-3-4503-2, PER IOA ISSUE. HOWEVER, IOA RECOMMENDS THAT "RESTRICTED FLOW" (ONLY) BE UPGRADED TO A 2/1R PFP, 1/1 ABORT AND PLACED ON A SEPARATE FMEA.
THE INABILITY TO DETECT A FLOW RESTRICTION THROUGH THE VALVE UNTIL THE ACCUMULATOR HAS BEEN DEPLETED AND CANNOT BE REPLENISHED MAKE THE EFFECTS OF THIS FAILURE THE SAME AS 03-3-4505-2 (2/1R PFP, 1/1 ABORT). SEE ASSESSMENT SHEET OMS-305.
THIS SINGLE FAILURE RESULTS IN THE LOSS OF ONE OMS ENGINE. THE "FAILED CLOSED" MODE IS DETECTABLE AND THE REMAINING ENGINE START CAN BE SAVED (3/1R PPP, 1/1 ABORT). THE DOWNSTREAM REGULATOR AND ACCUMULATOR ARE NOT REDUNDANT FOR THE "RESTRICTED FLOW" MODE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-304
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 304
ITEM: VALVE-GN2 PRESSURE ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (DELAYED OPERATION). THIS FAILURE MODE NEED NOT BE ADDED TO THE FMEA/CIL. THE WORST CASE EFFECTS OF "DELAYED OPERATION" ARE COVERED BY THE "FAILS CLOSED" FMEA (03-3-4503-2). SEE ASSESSMENT SHEET OMS-299.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-305
NASA FMEA #: 03-3-4505-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 305
ITEM: GN2 PRESSURE REGULATOR

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY CLASSIFIED THIS FAILURE MODE (FAILS TO OPEN) AS A 3/1R PPP. HOWEVER, NASA/RI UPGRADED TO 2/1R PFP, 1/1 ABORT PER IOA ISSUE. CREW MAY NOT HAVE TIME FOR CORRECTIVE ACTION (INHIBIT PURGE) DURING SHORT OMS BURN. FIRST FAILURE COULD RESULT IN LOSS OF ONE ENGINE. FAILURE DURING TAL ABORT RESULTS IN INABILITY TO COMPLETE ALL NECESSARY ENGINE STARTS AND PURGES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-306
NASA FMEA #: 03-3-4505-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 306
ITEM: GN2 PRESSURE REGULATOR

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES.
NOT 1/1 DURING TAL ABORT SINCE 400 PSI LEFT IN STORAGE TANK AND ACCUMULATOR. INFORMATION INDICATES THAT THIS IS ENOUGH TO PERFORM A START-PURGE-START CYCLE REQUIRED DURING TAL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-307
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 307
ITEM: GN2 PRESSURE REGULATOR

LEAD ANALYST: C.D. PRUST

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 ACCEPTS NASA/RI 2/1R PPP, 1/1 ABORT ASSIGNMENT.
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE), BUT AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-308
NASA FMEA #: 03-3-4505-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 308
ITEM: GN2 PRESSURE REGULATOR

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
IOA NOW FAILS B SCREEN.
NASA/RI ORIGINALLY CLASSIFIED THIS FAILURE MODE (LOW OUTPUT) AS A 3/1R PPP. HOWEVER, NASA/RI UPGRADED TO 2/1R PPP, 1/1 ABORT PER IOA ISSUE. CREW MAY NOT HAVE TIME FOR CORRECTIVE ACTION (INHIBIT PURGE) DURING SHORT OMS BURN. FIRST FAILURE COULD RESULT IN LOSS OF ONE ENGINE. FAILURE DURING TAL ABORT RESULTS IN INABILITY TO COMPLETE ALL NECESSARY ENGINE STARTS AND PURGES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-309
NASA FMEA #: 03-3-4505-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 309
ITEM: GN2 PRESSURE REGULATOR

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY CLASSIFIED THIS FAILURE MODE (RESTRICTED FLOW) AS A 3/1R PPP. HOWEVER, NASA/RI UPGRADED TO 2/1R PFP, 1/1 ABORT PER IOA ISSUE. CREW MAY NOT HAVE TIME FOR CORRECTIVE ACTION (INHIBIT PURGE) DURING SHORT OMS BURN. FIRST FAILURE COULD RESULT IN LOSS OF ONE ENGINE. FAILURE DURING TAL ABORT RESULTS IN INABILITY TO COMPLETE ALL NECESSARY ENGINE STARTS AND PURGES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-310
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 310
ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

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 ACCEPTS NASA/RI 2/1R PPP, 1/1 ABORT ASSIGNMENT. IOA ANALYZED INDIVIDUAL LINE SEGMENTS SEPARATELY IN ORIGINAL ANALYSIS. NASA FMEA INCLUDES ALL GN2 LINE SEGMENTS. IOA CONSIDERS LEAKAGE OF THIS SEGMENT TO BE A 3/1R PPP.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-311
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 311
ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 3/3 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-312
NASA FMEA #: 03-3-4506-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 312
ITEM: COUPLING, GN2 REGULATOR TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH NASA/RI FAILURE OF A SCREEN BASED ON INABILITY TO VERIFY CONDITION OF CAP SEALS AFTER CAP INSTALLATION. IOA ALSO AGREES WITH NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-313
NASA FMEA #: 03-3-4506-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 313
ITEM: COUPLING, GN2 REGULATOR TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".
IOA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED TO THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE MODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-314
NASA FMEA #: 03-3-4506-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 314
ITEM: COUPLING, GN2 REGULATOR TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW".
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-315
NASA FMEA #: 03-3-45011-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 315
ITEM: VALVE-GN2 PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

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 NOW CLASSIFIES B SCREEN AS "NA".
NASA/RI ORIGINALLY CLASSIFIED THIS FAILURE MODE (FAILS CLOSED) AS A 3/3, BASED ON TEST DATA WHICH SHOWED THAT DOWNSTREAM LINES COULD WITHSTAND HIGH PRESSURE. HOWEVER, NASA/RI UPGRADED CRIT TO 3/1R PNP BASED ON IOA ISSUE WITH USING TEST DATA IN CRITICALITY DETERMINATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-316
NASA FMEA #: 03-3-45011-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 316
ITEM: VALVE-GN2 PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY DID NOT CLASSIFY THIS FMEA AS AN ABORT CRIT 1, HOWEVER NASA/RI UPGRADED THIS FMEA TO A CRIT 1 FOR A TAL ABORT PER IOA ISSUE ON THE "INTERNAL LEAKAGE", AND "LOW OUTPUT" FAILURE MODES (SEE ASSESSMENT SHEETS OMS-317 AND 318).
IOA DOES NOT CONSIDER THE "POPPET DOES NOT RESEAT" FAILURE MODE TO BE AN ABORT CRIT 1 SINCE A PREVIOUS FAILURE IS REQUIRED TO CAUSE OVERPRESSURIZATION. IOA CONSIDERS THE CORRECT CRIT FOR THIS FAILURE MODE TO BE 3/1R PNP.
HOWEVER, IOA ACCEPTS NASA/RI CRIT ASSIGNMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:	1/01/88	NASA DATA:	
ASSESSMENT ID:	OMS-317	BASELINE	[ ]
NASA FMEA #:	03-3-45011-1	NEW	[X]

SUBSYSTEM: OMS
MDAC ID: 317
ITEM: VALVE-GN2 PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT CLASSIFY THIS FAILURE MODE (INTERNAL LEAKAGE) AS ABORT CRIT 1. HOWEVER, NASA/RI UPGRADED TO AN ABORT CRIT 1, PER IOA ISSUE. FAILURE COULD RESULT IN INABILITY TO COMPLETE ALL ENGINE STARTS AND PURGES REQUIRED DURING A TAL ABORT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-318
NASA FMEA #: 03-3-45011-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 318
ITEM: VALVE-GN2 PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY DID NOT CLASSIFY THIS FAILURE MODE (LOW OUTPUT) AS AN ABORT CRIT 1. HOWEVER, NASA/RI UPGRADED TO AN ABORT CRIT 1, PER IOA ISSUE. FAILURE COULD RESULT IN INABILITY TO COMPLETE ALL ENGINE STARTS AND PURGES REQUIRED DURING A TAL ABORT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-319
NASA FMEA #: 03-3-4551-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 319
ITEM: CHECK VALVE-GN2

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "RESTRICTED FLOW".
NASA/RI ORIGINALLY PASSED B SCREEN, AND DID NOT CLASSIFY THIS FAILURE MODE (FAILS CLOSED) AS AN ABORT CRIT 1. HOWEVER, NASA/RI CHANGED B SCREEN TO "FAIL", AND UPGRADED TO AN ABORT CRIT 1, PER IOA ISSUE. FIRST FAILURE COULD RESULT IN LOSS OF ONE OMS ENGINE AND IN INABILITY TO COMPLETE ALL ENGINE STARTS AND PURGES REQUIRED DURING A TAL ABORT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-320
NASA FMEA #: 03-3-4551-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 320
ITEM: CHECK VALVE-GN2

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-321
NASA FMEA #: 03-3-4551-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 321
ITEM: CHECK VALVE-GN2

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-322
NASA FMEA #: 03-3-4552-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 322
ITEM: GN2 ACCUMULATOR

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT THE RUPTURE MODE BE UPGRADED TO A 1/1 AND PLACED ON A NEW FMEA, SEPARATE FROM THE EXTERNAL LEAKAGE FAILURE MODE. NSTS 22206 REQUIRES THAT POTENTIAL SHRAPNEL EFFECTS BE INCLUDED IN THE CRITICALITY ASSIGNMENT FOR RUPTURE OF NON-FILAMENT-WOUND PRESSURE VESSELS. SHRAPNEL COULD RESULT IN DAMAGE TO VEHICLE, TPS, OMS ENGINE, AND PROP LINES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-323
NASA FMEA #: 03-3-4552-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 323
ITEM: GN2 ACCUMULATOR

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES FOR EXTERNAL LEAKAGE FAILURE MODE. SEE ASSESSMENT SHEET OMS-322.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-324
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 324
ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-325
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 325
ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 2/1R EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-326
NASA FMEA #: 03-3-4001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 326
ITEM: VALVE-ENGINE CONTROL

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
IOA RECOMMENDS A SEPARATE FMEA FOR THIS ITEM SINCE IT IS NOT MECHANICALLY LINKED TO THE BIPROP VALVES.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-327
NASA FMEA #: 03-3-4001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 327
ITEM: VALVE-ENGINE CONTROL

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.
IOA RECOMMENDS A SEPARATE FMEA FOR THIS ITEM SINCE IT IS NOT MECHANICALLY LINKED TO THE BIPROP VALVES.
IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROPELLANT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-328
NASA FMEA #: 03-3-4001-4

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 328
ITEM: VALVE-ENGINE CONTROL

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.
IOA RECOMMENDS A SEPARATE FMEA FOR THIS ITEM SINCE IT IS NOT MECHANICALLY LINKED TO THE BIPROP VALVES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-329
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 329
ITEM: VALVE-ENGINE CONTROL

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-330
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 330
ITEM: VALVE-ENGINE CONTROL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[P]	[P]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI DO NOT COVER RESTRICTED FLOW OF THE CONTROL VALVE AS A FAILURE MODE ON A FMEA.
03-3-4001-2 DOES INCLUDE "CONTAMINATION" AND "PLUGGED OPENING ORIFICE" AS CAUSES, HOWEVER IOA RECOMMENDS THAT A NEW 2/1R PPP, 1/1 ABORT FMEA BE GENERATED FOR THIS ITEM AND FAILURE MODE. IOA CONSIDERS RESTRICTED FLOW TO BE A CREDIBLE FAILURE MODE FOR COMPONENTS WITH INLET FILTERS OR ORIFICES. THIS ITEM IS NOT MECHANICALLY LINKED TO THE BIPROP VALVES AND SHOULD NOT BE INCLUDED ON THE "FAILS CLOSED" BIPROP VALVE FMEA (03-3-4001-2).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-331
NASA FMEA #: 03-3-4001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 331
ITEM: VALVE-ENGINE CONTROL

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY CLASSIFIED THIS FAILURE MODE (DELAYED OPERATION) AS A 3/3. HOWEVER, NASA/RI HAS UPGRADED TO A 2/1R PFP, 1/1 ABORT, PER IOA ISSUE. IOA ACCEPTS NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.
IOA RECOMMENDS A SEPARATE FMEA FOR THIS ITEM SINCE IT IS NOT MECHANICALLY LINKED TO THE BIPROP VALVES. THIS FAILURE MODE IS LISTED AS A CAUSE ON SEVERAL 1/1 FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-332
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 332
ITEM: ORIFICE-ENGINE CONTROL VALVE INLET

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
THIS ITEM AND FAILURE MODE (RESTRICTED FLOW) ARE ADEQUATELY COVERED ON 03-3-4001-2, WHICH LISTS "PLUGGED OPENING ORIFICE" AS A CAUSE FOR FAILURE TO OPEN. AN ADDITIONAL FMEA AT THE SUB-COMPONENT LEVEL IS NOT REQUIRED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-333
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 333
ITEM: ORIFICE-ENGINE CONTROL VALVE VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
THIS ITEM AND FAILURE MODE (RESTRICTED FLOW) ARE ADEQUATELY COVERED ON 03-3-4001-1, WHICH LISTS "FAILS TO VENT" AS A CAUSE FOR FAILED OPEN CONTROL VALVE. AN ADDITIONAL FMEA AT THE SUB-COMPONENT LEVEL IS NOT REQUIRED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-334
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 334
ITEM: CHECK VALVE-ENGINE CONTROL VALVE VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
THIS ITEM AND FAILURE MODE (FAILS CLOSED) ARE ADEQUATELY COVERED ON 03-3-4001-1, WHICH LISTS "FAILS TO VENT" AS A CAUSE FOR A FAILED OPEN CONTROL VALVE. A SEPARATE FMEA AT THE SUB-COMPONENT LEVEL IS NOT REQUIRED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-335
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 335
ITEM: CHECK VALVE-ENGINE CONTROL VALVE VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE (FAILS OPEN) BE ADDED AS A CAUSE ON FMEA 03-3-4001-2. AN ADDITIONAL FMEA AT THE SUB-COMPONENT LEVEL IS UNNECESSARY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-336
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 336
ITEM: CHECK VALVE-ENGINE CONTROL VALVE VENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE (INTERNAL LEAKAGE) BE ADDED AS A CAUSE ON FMEA 03-3-4001-2. AN ADDITIONAL FMEA AT THE SUB-COMPONENT LEVEL IS UNNECESSARY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-337
NASA FMEA #: 03-3-4001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 337
ITEM: PNEUMATIC ACTUATOR

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-338
NASA FMEA #: 03-3-4001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 338
ITEM: PNEUMATIC ACTUATOR

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.
IOA ALSO RECOMMENDS ADDING STATEMENTS TO THE EFFECTS REGARDING POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROPELLANT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-339
NASA FMEA #: 03-3-4001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 339
ITEM: PNEUMATIC ACTUATOR

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY CLASSIFIED THIS FAILURE MODE (FAILS MID-TRAVEL) AS A 3/3. HOWEVER, NASA/RI HAS UPGRADED TO A 2/1R PFP, 1/1 ABORT, PER IOA ISSUE. IOA ACCEPTS NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.
THIS FAILURE MODE IS LISTED AS A CAUSE ON SEVERAL 1/1 FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-340
NASA FMEA #: 03-3-4001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 340
ITEM: PNEUMATIC ACTUATOR

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER PISTON SEAL LEAKAGE AS A FAILURE MODE, HOWEVER DO LIST PISTON SEAL LEAKAGE AS CAUSE FOR A FAILED CLOSED ACTUATOR ON FMEA 03-3-4001-2. IOA CONSIDERS THIS ACCEPTABLE. IOA ACCEPTS NASA/RI REEVALUATION AND RATIONALE FOR 2/1R PPP, 1/1 ABORT CRIT ASSIGNMENT. IOA INCLUDED REDUNDANT PISTON SEAL IN 3/1R CRIT ASSIGNMENT.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-341
NASA FMEA #: 03-3-4001-5

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 341
ITEM: PNEUMATIC ACTUATOR

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA ORIGINALLY IDENTIFIED SHRAPNEL EFFECTS OF ACTUATOR RUPTURE. IOA RECOMMENDS THAT SHRAPNEL EFFECTS BE CONSIDERED BUT DOES NOT CONSIDER THIS RECOMMENDATION TO BE AN OPEN ISSUE. IOA AGREES WITH NASA/RI RATIONALE FOR 2/1R PPP, 1/1 ABORT CRIT ASSIGNMENT. IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-342
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 342
ITEM: PNEUMATIC ACTUATOR

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA NOW FAILS B SCREEN.
NASA/RI DO NOT COVER THIS FAILURE MODE (PROP LEAKAGE OR MIXING DUE TO SEAL FAILURES). LEAKAGE OF PROP PAST BALL VALVE SEALS AND ACTUATOR SEALS COULD RESULT IN MIXING OF HYPERGOLIC PROPS IN ACTUATOR CAVITIES OR LEAKAGE INTO THE POD CAUSING POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA RECOMMENDS THAT A 3/1R PFP FMEA BE ADDED FOR PROP LEAKAGE PAST SEALS INTO THE ACTUATOR CAVITIES. SEAL FAILURES NOT DETECTABLE DURING FLIGHT (FAIL B SCREEN).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-343
NASA FMEA #: 03-3-4001-5

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 343
ITEM: PNEUMATIC ACTUATOR

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-344
NASA FMEA #: 03-3-4001-3

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 344
ITEM: PNEUMATIC ACTUATOR

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (DELAYED OPERATION). HOWEVER, NASA/RI HAS ADDED THIS FAILURE MODE TO 03-3-4001-3. IOA ACCEPTS NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-345
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 345
ITEM: COUPLING, VENT PORT ACTUATOR SHAFT SEAL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
LEAKAGE OF THESE COUPLINGS (CP001, CP002, CP005, CP006, CP007, CP008) DOES NOT APPEAR TO BE ADDRESSED ON THE FMEA/CIL. IOA RECOMMENDS THAT LEAKAGE OF ALL ENGINE TEST PORTS BE ADDRESSED ON THE FMEA/CIL AND/OR THE OMRSD. LEAKAGE OF THESE PORTS WOULD EXPOSE THE BIPROP VALVE ASSEMBLY INTERNAL PARTS TO AMBIENT, AND COULD LEAD TO CONTAMINATION OF THE ASSEMBLY. HOWEVER, LEAKAGE BY ITSELF IS NO EFFECT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-346
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 346
ITEM: COUPLING, VENT PORT ACTUATOR SHAFT SEAL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
FAILURE OF THESE COUPLINGS (CP001, CP002, CP005, CP006, CP007, CP008) TO COUPLE DOES NOT APPEAR TO BE ADDRESSED ON THE FMEA/CIL. IOA RECOMMENDS THAT FAILURE TO COUPLE OF ALL ENGINE TEST PORTS BE ADDRESSED ON THE FMEA/CIL AND/OR THE OMRSD. FAILURE HAS NO EFFECT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-347
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 347
ITEM: COUPLING, VENT PORT ACTUATOR SHAFT SEAL

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
THESE FAILURES (FAILS TO OPEN, FAILS TO CLOSE) FOR THESE COUPLINGS (CP001, CP002, CP005, CP006, CP007, CP008) DO NOT APPEAR TO BE ADDRESSED ON THE FMEA/CIL.
IOA RECOMMENDS THAT THESE FAILURE FOR ALL ENGINE TEST PORTS BE ADDRESSED ON THE FMEA/CIL AND/OR THE OMRSD. FAILURES HAVE NO EFFECT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-348
NASA FMEA #: 03-3-4001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 348
ITEM: PINION GEAR AND DRIVE ASSEMBLY

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES WITH "FAILS CLOSED" FAILURE MODE.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-348A
NASA FMEA #: 03-3-4001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 348
ITEM: PINION GEAR AND DRIVE ASSEMBLY

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES WITH "FAILS OPEN" FAILURE MODE.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.
IOA ALSO RECOMMENDS ADDING STATEMENTS TO THE EFFECTS REGARDING POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROPELLANT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-349
NASA FMEA #: 03-3-4001-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 349
ITEM: PINION GEAR AND DRIVE ASSEMBLY

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.
NASA/RI LIST BROKEN GEARS, TEETH, OR SHAFT AS CAUSE FOR FAILURE OF GEAR DRIVE ASSEMBLY ON 03-3-4001-2. A SEPARATE GEAR ASSEMBLY STRUCTURAL FAILURE FMEA IS UNNECESSARY.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-350
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 350
ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[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 CAUSES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FILTER BLOCKAGE".
NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 3/3, 1/1 ABORT EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-351
NASA FMEA #: 03-3-4508-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 351
ITEM: VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[X] *
IOA	[3 /2R]	[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 AGREES WITH NASA/RI RATIONALE REGARDING 3/3, 1/1 ABORT CRITICALITY. TWO DUAL-ENGINE OMS BURNS WITHIN 10 MINUTES IS NON-CREDIBLE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-352
NASA FMEA #: 03-3-4508-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 352
ITEM: VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

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:
STATUS OF PURGE VALVE POSITION IS TELEMETERED TO GROUND AND IS NOT AVAILABLE TO CREW. THEREFORE, PER NSTS 22206, NASA/RI IS CORRECT IN FAILING B SCREEN.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-353
NASA FMEA #: 03-3-4508-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 353
ITEM: VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-354
NASA FMEA #: 03-3-4510-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 354
ITEM: VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "(DOWNSTREAM OF FIRST VALVE)".
IOA AGREES WITH NASA/RI RATIONALE FOR 2/1R PPP, 1/1 ABORT CRITICALITY ASSIGNMENT.
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (EXTERNAL LEAKAGE) FOR THIS ITEM. HOWEVER, NASA/RI AGREED TO ADD THIS VALVE BODY TO THE ITEM LIST ON THIS FMEA, AND TO ADD CORRESPONDING RETENTION RATIONALE TO THE CIL SHEET, PER IOA ISSUE.
A FAILURE OF THE HOUSING NEAR THE INTERNAL CHECK VALVE COULD RESULT IN PROP LEAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-355
NASA FMEA #: 03-3-4508-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 355
ITEM: VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI DID NOT ORIGINALLY COVER THIS FAILURE MODE (RESTRICTED FLOW). HOWEVER, NASA/RI ADDED RESTRICTED FLOW AS A FAILURE MODE ON THIS FMEA.
IOA AGREES WITH NASA/RI RATIONALE FOR 3/3, 1/1 ABORT CRITICALITY ASSIGNMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-356
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 356
ITEM: VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DID NOT COVER THIS FAILURE MODE (DELAYED OPERATION). THIS FAILURE MODE NEED NOT BE ADDED TO THE FMEA/CIL. THE WORST CASE EFFECTS OF "DELAYED OPERATION" ARE COVERED BY THE "FAILS CLOSED" FMEA (03-3-4508-2).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-357
NASA FMEA #: 03-3-4508-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 357
ITEM: CHECK VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[X] *
IOA	[3 /2R]	[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 AGREES WITH NASA/RI RATIONALE FOR 3/3, 1/1 ABORT CRITICALITY ASSIGNMENT. NASA/RI ADDED CHECK VALVE TO PURGE VALVE ASSEMBLY FMEA (03-3-4508-2) DURING REEVALUATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-358
NASA FMEA #: 03-3-4508-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 358
ITEM: CHECK VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES. NASA/RI ADDED CHECK VALVE TO PURGE VALVE ASSEMBLY FMEA (03-3-4508-1) DURING REEVALUATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-359
NASA FMEA #: 03-3-4508-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 359
ITEM: CHECK VALVE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES. NASA/RI ADDED CHECK VALVE TO PURGE VALVE ASSEMBLY FMEA (03-3-4508-1) DURING REEVALUATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-360
NASA FMEA #: 03-3-4508-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 360
ITEM: ORIFICE-GN2 PURGE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[X] *
IOA	[3 /2R]	[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 AGREES WITH NASA/RI RATIONALE FOR 3/3, 1/1 ABORT CRITICALITY ASSIGNMENT. NASA/RI ADDED ORIFICE TO PURGE VALVE ASSEMBLY FMEA (03-3-4508-2) DURING REEVALUATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-361
NASA FMEA #: 03-3-4508-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 361
ITEM: GN2 PURGE VALVES TEST PORT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS ITEM (CP010) AND FAILURE MODE (EXTERNAL LEAKAGE). HOWEVER, NASA/RI ADDED THE TEST PORT TO THE PURGE VALVE FMEAs (03-3-4508).
IOA AGREES WITH NASA/RI RATIONALE FOR 3/3, 1/1 ABORT CRITICALITY ASSIGNMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-362
NASA FMEA #: 03-3-6408-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 362
ITEM: GIMBAL RING

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-363
NASA FMEA #: 03-3-6409-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 363
ITEM: BEARING-GIMBAL RING

LEAD ANALYST: C.D. PRUST

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)

[2 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 2/1R PPP, 1/1 ABORT. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-364
NASA FMEA #: 03-3-64011-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 364
ITEM: GIMBAL RING MOUNTING PAD

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-365
NASA FMEA #: 03-3-6401-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 365
ITEM: MOTOR-GIMBAL DRIVE

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-366
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 366
ITEM: MOTOR-GIMBAL DRIVE

LEAD ANALYST: C.D. PRUST

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:
NASA/RI DO NOT COVER THIS FAILURE MODE (ERRONEOUS/ERRATIC OPERATION).
IOA RECOMMENDS THAT THIS FAILURE MODE BE ADDED TO 03-3-6401-1 AND THAT "MOTOR SYNCHRO ARMATURE ROTATION" BE ADDED AS A CAUSE. THE FAILURE HISTORY OF THIS ITEM INCLUDES THIS FAILURE MODE AND THIS CAUSE. THE SSM AGREED WITH THE IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-367
NASA FMEA #: 03-3-6402-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 367
ITEM: ACME SCREW/NUT TUBE

LEAD ANALYST: C.D. PRUST

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)

	[2 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

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

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 2/1R PPP, 1/1 ABORT. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.
03-3-6402-2 COVERS THE "GIMBAL OUTPUT DRIVE ASSEMBLY".
IOA ALSO RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-368
NASA FMEA #: 03-3-6402-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 368
ITEM: ACME SCREW/NUT TUBE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[ ]	[ ]	[ ]	[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 [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH NASA/RI RATIONALE FOR 1/1 CRIT ASSIGNMENT. 03-3-6402-1 COVERS THE "GIMBAL OUTPUT DRIVE ASSEMBLY". THE SSM REVISED THE EFFECTS PER IOA ISSUE.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-369
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 369
ITEM: REDUCTION GEAR

LEAD ANALYST: C.D. PRUST

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:
NASA/RI DO NOT COVER THIS ITEM OR FAILURE MODE (BINDING/JAMMING). IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE ADDRESSED ON THE FMEA/CIL. THE REDUCTION GEAR IS A MOVING, LOAD-BEARING COMPONENT WHOSE FAILURE WOULD RESULT IN THE LOSS OF A CHANNEL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-370
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 370
ITEM: REDUCTION GEAR

LEAD ANALYST: C.D. PRUST

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:
NASA/RI DO NOT COVER THIS ITEM OR FAILURE MODE (STRUCTURAL FAILURE).
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE ADDRESSED ON THE FMEA/CIL. THE REDUCTION GEAR IS A MOVING, LOAD-BEARING COMPONENT WHOSE FAILURE WOULD RESULT IN THE LOSS OF A CHANNEL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-371
NASA FMEA #: 03-3-6403-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 371
ITEM: ANTIBACK DEVICE

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-372
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 372
ITEM: ANTIBACK DEVICE

LEAD ANALYST: C.D. PRUST

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:
NASA/RI DO NOT COVER THIS FAILURE MODE (FAILS TO STOP ROTATION OF UNUSED CHANNEL).
IOA RECOMMENDS THAT THIS FAILURE MODE BE ADDRESSED ON THE FMEA/CIL. A STRUCTURAL FAILURE CAUSING THE INABILITY TO STOP ROTATION OF THE UNUSED CHANNEL WOULD RESULT IN THE LOSS OF ONE CHANNEL.
THE SSM AGREED THAT "STRUCTURAL FAILURE" SHOULD BE ADDED AS A CAUSE ON 03-3-6403-1. SEE ASSESSMENT SHEET OMS-373.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-373
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 373
ITEM: ANTIBACK DEVICE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[P]	[P]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE). IOA RECOMMENDS THAT THIS FAILURE MODE BE ADDRESSED ON THE FMEA/CIL WITH A 2/1R PPP, 1/1 ABORT CRIT. A STRUCTURAL FAILURE OF THE ANTI-BACK DEVICE CAUSING THE INABILITY TO TRANSMIT TORQUE AND STOP ROTATION OF THE UNUSED CHANNEL CAUSES LOSS OF THE ACTUATOR AND LOSS OF TVC FOR ONE ENGINE. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.
THE SSM AGREED THAT "STRUCTURAL FAILURE" SHOULD BE ADDED AS A FAILURE MODE ON 03-3-6403-1, HOWEVER THIS IS A 3/1R PPP.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-374
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 374
ITEM: BEARING-GIMBAL THRUST DRIVE

LEAD ANALYST: C.D. PRUST

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)

	[2 /1R]	[P]	[P]	[P]	[A] (ADD/DELETE)

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

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE). IOA RECOMMENDS THAT THIS FAILURE MODE BE ADDRESSED ON THE FMEA/CIL WITH A 2/1R PPP, 1/1 ABORT CRITICALITY. A STRUCTURAL FAILURE OF THIS BEARING COULD CAUSE LOSS OF THE ACTUATOR DUE TO BINDING OF THE GIMBAL DRIVE OR LOSS OF MESHING BETWEEN THE GIMBAL DRIVE AND ONE CHANNEL. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-375
NASA FMEA #: 03-3-6404-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 375
ITEM: BEARING-GIMBAL THRUST DRIVE

LEAD ANALYST: C.D. PRUST

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:
THE FUNCTIONAL DESCRIPTION AND QUANTITY NEED TO BE CORRECTED TO ACCOUNT FOR THE SECONDARY DRIVE GEAR BEARINGS, WHICH THE SSM SAYS ARE THRUST BEARINGS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-376
NASA FMEA #: 03-3-6402-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 376
ITEM: BEARING-SPHERICAL ROD END

LEAD ANALYST: C.D. PRUST

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)

[2 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

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

REMARKS:
IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 2/1R PPP, 1/1 ABORT. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.
03-3-6402-2 COVERS THE "GIMBAL OUTPUT DRIVE ASSEMBLY".
IOA ALSO RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-377
NASA FMEA #: 03-3-6402-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 377
ITEM: BEARING-SPHERICAL ROD END

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[ ]	[ ]	[ ]	[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 [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH NASA/RI RATIONALE FOR 1/1 CRIT ASSIGNMENT. 03-3-6402-1 COVERS THE "GIMBAL OUTPUT DRIVE ASSEMBLY". THE SSM REVISED THE EFFECTS PER IOA ISSUE.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-378
NASA FMEA #: 03-3-6406-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 378
ITEM: MECHANICAL STOP-SNUBBER

LEAD ANALYST: C.D. PRUST

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)

	[2 /1R]	[P]	[P]	[P]	[A] (ADD/DELETE)

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

REMARKS:
SSM STATES THAT CRIT WAS DOWNGRADED FROM 2/1R TO 3/3 AS A RESULT OF A REVIEW WITH THE VENDOR. IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 2/1R PPP, 1/1 ABORT AND PLACED ON THE CIL.
IOA MAINTAINS CONCERN THAT THE WORST CASE EFFECT OF A SNUBBER FAILURE COULD BE BINDING OR JAMMING OF THE GIMBAL OUTPUT DRIVE ASSEMBLY OR INCORRECT TVC RESULTING IN LOSS OF THE AFFECTED ENGINE. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.
REDUNDANCY SCREENS SHOULD BE BLANK PER NSTS 22206.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-379
NASA FMEA #: 03-3-6402-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 379
ITEM: BEARING-NUT TUBE/OUTPUT SHAFT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[2 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

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

REMARKS:
IOA RECOMMENDS A 2/1R PPP, 1/1 ABORT FOR BINDING/JAMMING OF THESE BEARINGS, WHICH ALLOW THE DRIVE SHAFT TO ROTATE WITHIN THE SURROUNDING TUBULAR HOUSING. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.
THIS ITEM AND FAILURE MODE (BINDING/JAMMING) ARE APPARENTLY INCLUDED ON 03-3-6402-2, WHICH COVERS THE "GIMBAL OUTPUT DRIVE ASSEMBLY".
IOA RECOMMENDS THAT THE COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-380
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 380
ITEM: BEARING-NUT TUBE/OUTPUT SHAFT

LEAD ANALYST: C.D. PRUST

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 RECOMMENDS THAT "STRUCTURAL FAILURE" OF THESE BEARINGS (BETWEEN THE DRIVE SHAFT AND THE SURROUNDING TUBULAR HOUSING) BE ADDED AS A CAUSE ON 03-3-6402-2 (GIMBAL OUTPUT DRIVE ASSEMBLY, BINDING JAMMING). SUCH A FAILURE WOULD CAUSE BINDING OF THESE BEARINGS, AND LOSS OF THE ACTUATOR. SEE ASSESSMENT SHEET OMS-379.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-381
NASA FMEA #: 03-3-6402-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 381
ITEM: OUTPUT SHAFT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
03-3-6402-1 COVERS THE "GIMBAL OUTPUT DRIVE ASSEMBLY". THE SSM REVISED THE EFFECTS PER IOA ISSUE.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-382
NASA FMEA #: 03-3-64071-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 382
ITEM: GIMBAL ACTUATOR CONTROLLER

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-383
NASA FMEA #: 03-3-64071-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 383
ITEM: GIMBAL ACTUATOR CONTROLLER

LEAD ANALYST: C.D. PRUST

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20001X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 20001
ITEM: GN2 FILTER

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA/RI DELETED THE FMEA FOR THIS GN2 FILTER (03-3-4504-2) PER IOA ISSUE. THE GN2 FILTER IS A SUBASSEMBLY COMPONENT AND IS ADEQUATELY COVERED UNDER THE ANALYSIS OF THE GN2 REGULATOR.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20002X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 20002
ITEM: GIMBAL RING BEARING, GIMBAL RING/MOUNTING PAD ATTACHMENT

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[1 /1]	[ ]	[ ]	[ ]	[A] (ADD/DELETE)

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

REMARKS:
IOA DID NOT ANALYZE THIS FAILURE MODE (STRUCTURAL FAILURE OF A GIMBAL RING BEARING) IN THE ORIGINAL ANALYSIS. NASA/RI DO NOT CURRENTLY ADDRESS THIS FAILURE MODE ON THE FMEA/CIL (BINDING OF THIS BEARING IS COVERED ON 03-3-6409-1).
IOA RECOMMENDS THAT A NEW 1/1 FMEA BE GENERATED FOR THIS ITEM AND FAILURE MODE. A STRUCTURAL FAILURE OF THIS BEARING COULD RESULT IN DISATTACHMENT BETWEEN THE ENGINE AND GIMBAL RING OR GIMBAL RING AND VEHICLE, RESULTING IN LOSS OF ENGINE RESTRAINT AND POSSIBLE VEHICLE DAMAGE OR PROP LINE BREAKAGE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20003X
NASA FMEA #: 03-3-4001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 20003
ITEM: PINION GEAR AND DRIVE ASSEMBLY

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (DELAYED OPERATION). HOWEVER, NASA/RI NOW ADDRESS THIS FAILURE MODE ON 03-3-4001-3. IOA ACCEPTS NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20004X
NASA FMEA #: 03-3-1009-4

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 20004
ITEM: VALVE - PRESSURE RELIEF ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AND NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). HOWEVER, NASA/RI AGREED TO ADD THIS FAILURE MODE TO 03-3-1009-4, PER IOA ISSUE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20005X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 20005
ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[1 /1]	[ ]	[ ]	[ ]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA DID NOT COVER THIS FAILURE MODE (RESTRICTED FLOW) IN THE ORIGINAL ANALYSIS. NASA/RI DO NOT CURRENTLY ADDRESS THIS FAILURE MODE. IOA RECOMMENDS THAT THIS FAILURE MODE BE ADDRESSED ON A NEW 1/1 FMEA. THIS FAILURE COULD RESULT IN STRUCTURAL FAILURE OF THE BIPROP VALVE HOUSING AND LEAKAGE OF PROP. THE BIPROP VALVE HOUSING COULD FAIL BEFORE THE BALL VALVE SEALS FAIL AND RELIEVE PRESSURE. SEE ASSESSMENT SHEET OMS-262. IOA CONSIDERS RESTRICTED FLOW TO BE A CREDIBLE FAILURE MODE FOR ALL COMPONENTS WITH INTEGRAL FILTERS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20006X
NASA FMEA #: 03-3-4001-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 20006
ITEM: PINION GEAR & DRIVE ASSEMBLY

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (FAILS MID-TRAVEL). HOWEVER, NASA/RI NOW ADDRESS THIS FAILURE MODE ON 03-3-4001-3. IOA ACCEPTS NASA/RI FAILURE OF B SCREEN.
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20007X
NASA FMEA #: 03-3-6404-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 20007
ITEM: BEARING - SECONDARY DRIVE GEAR

LEAD ANALYST: C.D. PRUST

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 RECOMMENDS THAT THE QUANTITY AND FUNCTION DESCRIPTION BE CORRECTED TO INCLUDE THE BEARINGS ON EITHER SIDE OF THE SECONDARY DRIVE GEAR. IOA WAS NOT ABLE TO CONFIRM THAT THESE BEARINGS WERE THRUST BEARINGS, HOWEVER THE SSM STATES THAT THESE ARE THRUST BEARINGS AND ARE COVERED BY 03-3-6404-1.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20008X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 20008
ITEM: BEARING - SECONDARY DRIVE GEAR

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE). IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE ADDRESSED ON THE FMEA/CIL WITH A 2/1R PPP, 1/1 ABORT CRIT. STRUCTURAL FAILURE OF THESE BEARINGS COULD CAUSE BINDING OF THE GIMBAL DRIVE AND LOSS OF TVC FOR THE AFFECTED ENGINE. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.
THE SSM STATES THAT THESE BEARINGS (ON EITHER SIDE OF THE SECONDARY DRIVE GEAR) ARE THRUST BEARINGS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20009X
NASA FMEA #: 03-3-6402-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 20009
ITEM: DRIVE GEARS, PRIMARY AND SECONDARY

LEAD ANALYST: C.D. PRUST

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)

	[2 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

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

REMARKS:
THE SSM STATES THAT THIS FAILURE MODE (STRUCTURAL FAILURE OF THE DRIVE GEARS) IS COVERED BY 03-3-6402-2 (GIMBAL OUTPUT DRIVE ASSEMBLY, BINDING/JAMMING).
IOA RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURE MODES POSSIBLE IN THE ASSEMBLY.
IOA ALSO RECOMMENDS THAT THIS FAILURE MODE BE CLASSIFIED AS A 2/1R PPP, 1/1 ABORT. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP REQUIRED TO COMPLETE THE ABORT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20010X
NASA FMEA #: 03-3-6402-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 20010
ITEM: ENGINE/ACTUATOR AND ACTUATOR/VEHICLE ATTACH HARDWARE

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT "IMPROPER ASSEMBLY" BE ADDED AS A CAUSE ON THIS FMEA/CIL.
IOA ALSO RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURE MODES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20011X
NASA FMEA #: 03-3-6402-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 20011
ITEM: BEARING - ACTUATOR/VEHICLE ATTACHMENT

LEAD ANALYST: C.D. PRUST

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)

[2 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT THIS FAILURE MODE BE UPGRADED TO A 2/1R PPP, 1/1 ABORT. THE INCREASED RCS ACTIVITY REQUIRED TO MAINTAIN VEHICLE CONTROL DURING TAL POST-MECO TWO-ENGINE OMS OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.
IOA ALSO RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURE MODES POSSIBLE IN THE ASSEMBLY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20012X
NASA FMEA #: 03-3-45011-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 20012
ITEM: GN2 PRESSURE REGULATOR AND PRESSURE RELIEF VALVE

LEAD ANALYST: C.D. PRUST

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 [ ]
INADEQUATE [ ]

REMARKS:
IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS (SIMULTANEOUS REG FAIL OPEN AND RELIEF VALVE FAIL CLOSED).
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20013X
NASA FMEA #: 03-3-1004-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 20013
ITEM: HELIUM PRESSURE REGULATOR ASSEMBLY

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20014X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 20014
ITEM: VALVE - PROPELLANT TANK ISOLATION

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RELIEF DEVICE FAILS CLOSED). IOA RECOMMENDS THAT A 3/1R PNP FMEA BE GENERATED FOR THIS FAILURE MODE. FAILURE OF PARALLEL DEVICES COULD RESULT IN OVERPRESSURIZATION AND RUPTURE OF DOWNSTREAM PROP LINES. A PREVIOUS FAILURE IS REQUIRED BEFORE THE VALVES WILL BE CLOSED. FAILURE MODE IS LISTED AS A CAUSE ON PROP LINE RUPTURE FMEA (03-3-2101-1), AND ADDRESSED ON RCS FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-20015X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 20015
ITEM: VALVE - CROSSFEED

LEAD ANALYST: C.D. PRUST

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA/RI DO NOT COVER THIS FAILURE MODE (RELIEF DEVICE FAILS CLOSED). IOA RECOMMENDS THAT A 3/1R PNP FMEA BE GENERATED FOR THIS ITEM AND FAILURE MODE. FAILURE OF ALL REDUNDANT DEVICES COULD RESULT IN OVERPRESSURIZATION AND RUPTURE OF CROSSFEED LINES.
FAILURE IS LISTED AS A CAUSE ON CROSSFEED LINE RUPTURE FMEA (03-3-2102-1), AND IS ADDRESSED ON RCS FMEAS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-384
NASA FMEA #: 05-6L-2176-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 384
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-385
NASA FMEA #: 05-6L-2176-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 385
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-386
NASA FMEA #: 05-6L-2176-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 386
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-387
NASA FMEA #: 05-6L-2176-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 387
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-388
NASA FMEA #: 05-6L-2176-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 388
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-389
NASA FMEA #: 05-6L-2176-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 389
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-390
NASA FMEA #: 05-6L-2176-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 390
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-391
NASA FMEA #: 05-6L-2176-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 391
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-392
NASA FMEA #: 05-6L-2176-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 392
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-393
NASA FMEA #: 05-6L-2176-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 393
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-394
NASA FMEA #: 05-6L-2176-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 394
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-395
NASA FMEA #: 05-6L-2176-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 395
ITEM: CONTROLLER, REMOTE POWER

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-396
NASA FMEA #: 05-6L-2176-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 396
ITEM: CONTROLLER, REMOTE POWER"

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-397
NASA FMEA #: 05-6L-2176-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 397
ITEM: CONTROLLER, REMOTE POWER"

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-398
NASA FMEA #: 05-6L-2176-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 398
ITEM: CONTROLLER, REMOTE POWER"

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-399
NASA FMEA #: 05-6L-2176-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 399
ITEM: CONTROLLER, REMOTE POWER"

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN. THIS FAILURE IS NOT DETECTABLE UNTIL THE ASSOCIATED SWITCH IS PUT IN OPEN POSITION, BUT THIS CAUSES VALVE TO BE STUCK OPEN. IF THE CREW HAD KNOWN ABOUT THE FAILURE, THEY MIGHT NOT HAVE THROWN THE SWITCH INTO OPEN, TO AVOID STICKING THE VALVE OPEN. THEREFORE, FAILURE IS DETECTED BUT DETECTED TOO LATE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-400
NASA FMEA #: 05-6L-2251-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 400
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-401
NASA FMEA #: 05-6L-2251-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 401
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-402
NASA FMEA #: 05-6L-2251-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 402
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-403
NASA FMEA #: 05-6L-2251-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 403
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-404
NASA FMEA #: 05-6L-2251-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 404
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-405
NASA FMEA #: 05-6L-2251-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 405
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-406
NASA FMEA #: 05-6L-2251-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 406
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-407
NASA FMEA #: 05-6L-2251-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 407
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-408
NASA FMEA #: 05-6L-2251-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 408
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-409
NASA FMEA #: 05-6L-2251-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 409
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-410
NASA FMEA #: 05-6L-2252-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 410
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-411
NASA FMEA #: 05-6L-2252-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 411
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-412
NASA FMEA #: 05-6L-2251-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 412
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-413
NASA FMEA #: 05-6L-2251-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 413
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-414
NASA FMEA #: 05-6L-2252-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 414
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-415
NASA FMEA #: 05-6L-2252-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 415
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-416
NASA FMEA #: 05-6L-2251-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 416
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-417
NASA FMEA #: 05-6L-2251-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 417
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-418
NASA FMEA #: 05-6L-2251-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 418
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-419
NASA FMEA #: 05-6L-2251-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 419
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-420
NASA FMEA #: 05-6L-2201-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 420
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-421
NASA FMEA #: 05-6L-2201-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 421
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-422
NASA FMEA #: 05-6L-2201-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 422
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-423
NASA FMEA #: 05-6L-2201-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 423
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-424
NASA FMEA #: 05-6L-2001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 424
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-425
NASA FMEA #: 05-6L-2001-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 425
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

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:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-426
NASA FMEA #: 05-6L-2077-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 426
ITEM: RESISTOR, 1.2K 2W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-427
NASA FMEA #: 05-6L-2077-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 427
ITEM: RESISTOR, 1.2K 2W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-428
NASA FMEA #: 05-6L-2076-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 428
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-429
NASA FMEA #: 05-6L-2076-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 429
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-430
NASA FMEA #: 05-6L-2076-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 430
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-431
NASA FMEA #: 05-6L-2076-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 431
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-432
NASA FMEA #: 05-6L-2077-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 432
ITEM: RESISTOR, 1.2K 2W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-433
NASA FMEA #: 05-6L-2077-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 433
ITEM: RESISTOR, 1.2K 2W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-434
NASA FMEA #: 05-6L-2076-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 434
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-435
NASA FMEA #: 05-6L-2076-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 435
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-436
NASA FMEA #: 05-6L-2076-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 436
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-437
NASA FMEA #: 05-6L-2076-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 437
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-438
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 438
ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A

LEAD ANALYST: W.A. HAUFLER

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 RECOMMENDS THAT NASA GENERATE A FMEA WITH THIS "STUCK IN OPEN POSITION (BOTH CONTACT SETS)" FAILURE MODE. THE CLOSEST EXISTING MATCH AVAILABLE IS NASA'S FMEA 05-6L-2026-1 WITH A "FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT (ONE CONTACT SET)" FAILURE MODE, WHICH IS ALREADY MATCHED TO MDAC-440 AND 443.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-439
NASA FMEA #: 05-6L-2026-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 439
ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A

LEAD ANALYST: W.A. HAUFLER

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 [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-440
NASA FMEA #: 05-6L-2026-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 440
ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A

LEAD ANALYST: W.A. HAUFLER

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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-441
NASA FMEA #: 05-6L-2026-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 441
ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV B

LEAD ANALYST: W.A. HAUFLER

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 [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-442
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 442
ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV B

LEAD ANALYST: W.A. HAUFLER

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 RECOMMENDS THAT NASA GENERATE A FMEA WITH THIS "STUCK IN OPEN POSITION (BOTH CONTACT SETS)" FAILURE MODE. THE CLOSEST EXISTING MATCH AVAILABLE IS NASA'S FMEA 05-6L-2026-1 WITH A "FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT (ONE CONTACT SET)" FAILURE MODE, WHICH IS ALREADY MATCHED TO MDAC-440 AND 443.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:	1/01/88	NASA DATA:	
ASSESSMENT ID:	OMS-443	BASELINE	[ ]
NASA FMEA #:	05-6L-2026-1	NEW	[X]

SUBSYSTEM: OMS
MDAC ID: 443
ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV B

LEAD ANALYST: W.A. HAUFLER

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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:	1/01/88	NASA DATA:	
ASSESSMENT ID:	OMS-444	BASELINE	[ ]
NASA FMEA #:	05-6L-2153-1	NEW	[X]

SUBSYSTEM: OMS
MDAC ID: 444
ITEM: METER, OMS PRESSURE N2/HE TANK

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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 DOES, BUT NASA DOES NOT, IMPLY THAT CRT DISPLAYS AND MISSION CONTROL CENTER ARE REDUNDANT TO ITEM TO GET NITROGEN AND HELIUM PRESSURE MEASUREMENTS. LOSS OF FUNCTION CAN LEAD TO FALSELY FAILING ONE OMS HE TANK OR TWO OMS GN2 TANKS, AND THUS LOSS OF MISSION OR AN ATO.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-445
NASA FMEA #: 03-3-1801-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 445
ITEM: SENSOR PRESSURE, HE TANK NO.1

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
LOSS OF ALL REDUNDANCY CAN RESULT IN FALSELY FAILING THE HELIUM TANK DURING ASCENT REQUIRING AN ATO BE CALLED, SINCE THERE MAY NOT BE ENOUGH TIME TO VERIFY THE FAILURE.
SEE FLIGHT RULE 6-1.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-446
NASA FMEA #: 03-3-1801-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 446
ITEM: SENSOR PRESSURE, HE TANK NO.2

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
LOSS OF ALL REDUNDANCY CAN RESULT IN FALSELY FAILING THE HELIUM TANK DURING ASCENT REQUIRING AN ATO BE CALLED, SINCE THERE MAY NOT BE ENOUGH TIME TO VERIFY THE FAILURE.
SEE FLIGHT RULE 6-1.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-447
NASA FMEA #: 03-3-1802-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 447
ITEM: SENSOR TEMPERATURE, OMS HE TANK UPPER

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
LOSS OF ALL REDUNDANCY CAN RESULT IN FALSELY FAILING THE HELIUM TANK DURING ASCENT REQUIRING AN ATO BE CALLED, SINCE THERE MAY NOT BE ENOUGH TIME TO VERIFY THE FAILURE.
SEE FLIGHT RULE 6-1.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-448
NASA FMEA #: 03-3-1802-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 448
ITEM: SENSOR TEMP, OX/HE TEST PORT FITTING TEMP 1 & TEMP 2

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-449
NASA FMEA #: 05-6L-2033-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 449
ITEM: SWITCH TOGGLE, OMS N2/HE PRESSURE DISPLAY SELECT

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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 DOES, BUT NASA DOES NOT, IMPLY THAT CRT DISPLAYS AND MISSION CONTROL CENTER ARE REDUNDANT TO ITEM TO GET NITROGEN AND HELIUM PRESSURE MEASUREMENTS. LOSS OF FUNCTION CAN LEAD TO FALSELY FAILING ONE OMS HE TANK OR TWO OMS GN2 TANKS, AND THUS LOSS OF MISSION OR AN ATO.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-450
NASA FMEA #: 05-6L-2253-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 450
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-450A
NASA FMEA #: 05-6L-2253A-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 450
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA'S RECOMMENDED CRITICALITY OF 3/1R IS DRIVEN BY OMS HARDWARE FMEA 03-3-2007-1, SINCE THIS FAILURE CAUSES TANK ISOL VALVE TO FAIL OPEN. ACCORDING TO THE LAST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW NASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS TO A NON-CIL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-450B
NASA FMEA #: 05-6L-2253B-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 450
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-450C
NASA FMEA #: 05-6L-2253C-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 450
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN SINCE THE MCA STATUS OF RELAY POSITIONS ARE NOT READILY ACCESSIBLE BY THE CREW. THEREFORE, "CLOSE" RELAYS WHICH DO NOT OPEN AND "OPEN" RELAYS WHICH DO NOT CLOSE BECAUSE OF A FAILED OPEN DIODE ARE NOT DETECTABLE AND THE FAILED DIODE IS NOT DETECTABLE INFLIGHT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-450D
NASA FMEA #: 05-6L-2253D-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 450
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA'S CRITICALITY OF 3/1R IS DRIVEN BY OMS HARDWARE FMEA 03-3-2007-1, SINCE THIS FAILURE CAUSES TANK ISOL VALVE TO FAIL OPEN.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-450E
NASA FMEA #: 05-6L-2255-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 450
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-450F
NASA FMEA #: 05-6L-2256-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 450
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-450G
NASA FMEA #: 05-6L-2256A-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 450
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-451
NASA FMEA #: 05-6L-2253-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 451
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-451A
NASA FMEA #: 05-6L-2253A-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 451
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS REMOVING THIS FMEA FROM THE CIL. ACCORDING TO THE LAST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW NASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS TO A NON-CIL, AND IOA TENTATIVELY CONCURS. IOA BELIEVES THIS FAILURE HAS NO EFFECT, SINCE ONLY A MULTIPLEXER-DEMULTIPLEXER (MDM) IS BEHIND THE "GPC CLOSE" DIODES, AND THAT IS WELL PROTECTED INTERNALLY FROM REVERSE CURRENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-451B
NASA FMEA #: 05-6L-2253B-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 451
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-451C
NASA FMEA #: 05-6L-2256B-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 451
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-452
NASA FMEA #: 05-6L-2253-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 452
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-452A
NASA FMEA #: 05-6L-2253A-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 452
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA'S RECOMMENDED CRITICALITY OF 3/1R IS DRIVEN BY OMS HARDWARE FMEA 03-3-2007-1, SINCE THIS FAILURE CAUSES TANK ISOL VALVE TO FAIL OPEN. ACCORDING TO THE LAST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW NASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS TO A NON-CIL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-452B
NASA FMEA #: 05-6L-2253B-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 452
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-452C
NASA FMEA #: 05-6L-2253C-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 452
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN SINCE THE MCA STATUS OF RELAY POSITIONS ARE NOT READILY ACCESSIBLE BY THE CREW. THEREFORE, "CLOSE" RELAYS WHICH DO NOT OPEN AND "OPEN" RELAYS WHICH DO NOT CLOSE BECAUSE OF A FAILED OPEN DIODE ARE NOT DETECTABLE AND THE FAILED DIODE IS NOT DETECTABLE INFLIGHT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-452D
NASA FMEA #: 05-6L-2253D-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 452
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA'S CRITICALITY OF 3/1R IS DRIVEN BY OMS HARDWARE FMEA 03-3-2007-1, SINCE THIS FAILURE CAUSES TANK ISOL VALVE TO FAIL OPEN.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-452E
NASA FMEA #: 05-6L-2255-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 452
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-452F
NASA FMEA #: 05-6L-2256-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 452
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-452G
NASA FMEA #: 05-6L-2256A-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 452
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-453
NASA FMEA #: 05-6L-2253-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 453
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-453A
NASA FMEA #: 05-6L-2253A-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 453
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS REMOVING THIS FMEA FROM THE CIL. ACCORDING TO THE LAST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW NASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS TO A NON-CIL, AND IOA TENTATIVELY CONCURS. IOA BELIEVES THIS FAILURE HAS NO EFFECT, SINCE ONLY A MULTIPLEXER-DEMULTIPLEXER (MDM) IS BEHIND THE "GPC CLOSE" DIODES, AND THAT IS WELL PROTECTED INTERNALLY FROM REVERSE CURRENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-453B
NASA FMEA #: 05-6L-2253B-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 453
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-453C
NASA FMEA #: 05-6L-2256B-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 453
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454
NASA FMEA #: 05-6L-2257-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA'S RECOMMENDED CRITICALITY OF 3/2R IS INDIRECTLY DRIVEN BY OMS HARDWARE FMEA 03-3-2008-2, SINCE LOSS OF REDUNDANCY CAUSES CROSSFEED VALVE TO FAIL CLOSED. IOA RECOMMENDS FAILING THE B SCREEN SINCE THE MCA STATUS OF RELAY POSITIONS ARE NOT READILY ACCESSIBLE BY THE CREW. THEREFORE, "CLOSE" RELAYS WHICH DO NOT OPEN AND "OPEN" RELAYS WHICH DO NOT CLOSE BECAUSE OF A FAILED OPEN DIODE ARE NOT DETECTABLE AND SO THE FAILED DIODE IS NOT DETECTABLE INFLIGHT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454A
NASA FMEA #: 05-6L-2257A-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[D] (ADD/DELETE)

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

REMARKS:
IOA'S RECOMMENDED CRITICALITY OF 3/2R IS DRIVEN BY OMS HARDWARE FMEA 03-3-2008-2, SINCE THIS FAILURE CAUSES THE CROSSFEED VALVE TO FAIL CLOSED. ACCORDING TO THE LAST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW NASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS TO A NON-CIL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454B
NASA FMEA #: 05-6L-2257B-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454C
NASA FMEA #: 05-6L-2257C-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN SINCE THE MCA STATUS OF RELAY POSITIONS ARE NOT READILY ACCESSIBLE BY THE CREW. THEREFORE, "CLOSE" RELAYS WHICH DO NOT OPEN AND "OPEN" RELAYS WHICH DO NOT CLOSE BECAUSE OF A FAILED OPEN DIODE ARE NOT DETECTABLE AND THE FAILED DIODE IS NOT DETECTABLE INFLIGHT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454D
NASA FMEA #: 05-6L-2257D-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454E
NASA FMEA #: 05-6L-2258-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454F
NASA FMEA #: 05-6L-2259-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454G
NASA FMEA #: 05-6L-2260-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454H
NASA FMEA #: 05-6L-2260A-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-454I
NASA FMEA #: 05-6L-2260B-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 454
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-455
NASA FMEA #: 05-6L-2257-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 455
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA'S RECOMMENDED CRITICALITY OF 3/2R IS DRIVEN BY OMS HARDWARE FMEA 03-3-2008-2, SINCE THIS FAILURE CAUSES THE CROSSFEED VALVE TO FAIL CLOSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-455A
NASA FMEA #: 05-6L-2257A-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 455
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS REMOVING THIS FMEA FROM THE CIL. ACCORDING TO THE LAST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW NASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS TO A NON-CIL, AND IOA TENTATIVELY CONCURS. IOA BELIEVES THIS FAILURE HAS NO EFFECT, SINCE ONLY A MULTIPLEXER-DEMULTIPLEXER (MDM) IS BEHIND THE "GPC CLOSE" DIODES, AND THAT IS WELL PROTECTED INTERNALLY FROM REVERSE CURRENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-455B
NASA FMEA #: 05-6L-2257B-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 455
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456
NASA FMEA #: 05-6L-2257-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA'S RECOMMENDED CRITICALITY OF 3/2R IS INDIRECTLY DRIVEN BY OMS HARDWARE FMEA 03-3-2008-2, SINCE LOSS OF REDUNDANCY CAUSES CROSSFEED VALVE TO FAIL CLOSED. IOA RECOMMENDS FAILING THE B SCREEN SINCE THE MCA STATUS OF RELAY POSITIONS ARE NOT READILY ACCESSIBLE BY THE CREW. THEREFORE, "CLOSE" RELAYS WHICH DO NOT OPEN AND "OPEN" RELAYS WHICH DO NOT CLOSE BECAUSE OF A FAILED OPEN DIODE ARE NOT DETECTABLE AND SO THE FAILED DIODE IS NOT DETECTABLE INFLIGHT.

ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456A
NASA FMEA #: 05-6L-2257A-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[D] (ADD/DELETE)

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

REMARKS:
IOA'S RECOMMENDED CRITICALITY OF 3/2R IS DRIVEN BY OMS HARDWARE FMEA 03-3-2008-2, SINCE THIS FAILURE CAUSES THE CROSSFEED VALVE TO FAIL CLOSED. ACCORDING TO THE LAST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW NASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS TO A NON-CIL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:	1/01/88	NASA DATA:	
ASSESSMENT ID:	OMS-456B	BASELINE	[ ]
NASA FMEA #:	05-6L-2257B-1	NEW	[X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456C
NASA FMEA #: 05-6L-2257C-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN SINCE THE MCA STATUS OF RELAY POSITIONS ARE NOT READILY ACCESSIBLE BY THE CREW. THEREFORE, "CLOSE" RELAYS WHICH DO NOT OPEN AND "OPEN" RELAYS WHICH DO NOT CLOSE BECAUSE OF A FAILED OPEN DIODE ARE NOT DETECTABLE AND THE FAILED DIODE IS NOT DETECTABLE INFLIGHT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456D
NASA FMEA #: 05-6L-2257D-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456E
NASA FMEA #: 05-6L-2258-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456F
NASA FMEA #: 05-6L-2259-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456G
NASA FMEA #: 05-6L-2260-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456H
NASA FMEA #: 05-6L-2260A-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-456I
NASA FMEA #: 05-6L-2260B-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 456
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-457
NASA FMEA #: 05-6L-2257-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 457
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

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

REMARKS:
IOA'S RECOMMENDED CRITICALITY OF 3/2R IS DRIVEN BY OMS HARDWARE FMEA 03-3-2008-2, SINCE THIS FAILURE CAUSES THE CROSSFEED VALVE TO FAIL CLOSED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-457A
NASA FMEA #: 05-6L-2257A-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 457
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS REMOVING THIS FMEA FROM THE CIL. ACCORDING TO THE LAST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW NASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS TO A NON-CIL, AND IOA TENTATIVELY CONCURS. IOA BELIEVES THIS FAILURE HAS NO EFFECT, SINCE ONLY A MULTIPLEXER-DEMULTIPLEXER (MDM) IS BEHIND THE "GPC CLOSE" DIODES, AND THAT IS WELL PROTECTED INTERNALLY FROM REVERSE CURRENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-457B
NASA FMEA #: 05-6L-2257B-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 457
ITEM: DIODE

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-458
NASA FMEA #: 05-6L-2204-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 458
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-459
NASA FMEA #: 05-6L-2204-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 459
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-460
NASA FMEA #: 05-6L-2204-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 460
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-461
NASA FMEA #: 05-6L-2204-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 461
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-462
NASA FMEA #: 05-6L-2204-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 462
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-463
NASA FMEA #: 05-6L-2204-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 463
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-464
NASA FMEA #: 05-6L-2204-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 464
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM	
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ]	*
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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-465
NASA FMEA #: 05-6L-2204-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 465
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-466
NASA FMEA #: 05-6L-2202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 466
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS.
NASA WOULD BE RIGHT IF SENSORS CAN BE USED (REDUNDANTLY TO TALKBACKS) TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS. PHYSICALLY CANNOT DETERMINE VALVE CLOSURE VIA A PRESSURE SENSOR, EXCEPT DURING A BURN. JUST CLOSING A TANK ISOLATION VALVE WILL NOT CAUSE A PRESSURE DIFFERENCE JUST DOWNSTREAM (UNLESS BURNING OMS) SINCE THERE IS NO FLUID MOVEMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-467
NASA FMEA #: 05-6L-2202-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 467
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-468
NASA FMEA #: 05-6L-2202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 468
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-469
NASA FMEA #: 05-6L-2202-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 469
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS.
NASA WOULD BE RIGHT IF SENSORS CAN BE USED (REDUNDANTLY TO TALKBACKS) TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS. PHYSICALLY CANNOT DETERMINE VALVE CLOSURE VIA A PRESSURE SENSOR, EXCEPT DURING A BURN. JUST CLOSING A TANK ISOLATION VALVE WILL NOT CAUSE A PRESSURE DIFFERENCE JUST DOWNSTREAM (UNLESS BURNING OMS) SINCE THERE IS NO FLUID MOVEMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-470
NASA FMEA #: 05-6L-2202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 470
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS.
NASA WOULD BE RIGHT IF SENSORS CAN BE USED (REDUNDANTLY TO TALKBACKS) TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS. PHYSICALLY CANNOT DETERMINE VALVE CLOSURE VIA A PRESSURE SENSOR, EXCEPT DURING A BURN. JUST CLOSING A TANK ISOLATION VALVE WILL NOT CAUSE A PRESSURE DIFFERENCE JUST DOWNSTREAM (UNLESS BURNING OMS) SINCE THERE IS NO FLUID MOVEMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-471
NASA FMEA #: 05-6L-2202-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 471
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-472
NASA FMEA #: 05-6L-2202-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 472
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-473
NASA FMEA #: 05-6L-2202-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 473
ITEM: DRIVER, HYBRID

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
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:
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS.
NASA WOULD BE RIGHT IF SENSORS CAN BE USED (REDUNDANTLY TO TALKBACKS) TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS. PHYSICALLY CANNOT DETERMINE VALVE CLOSURE VIA A PRESSURE SENSOR, EXCEPT DURING A BURN. JUST CLOSING A TANK ISOLATION VALVE WILL NOT CAUSE A PRESSURE DIFFERENCE JUST DOWNSTREAM (UNLESS BURNING OMS) SINCE THERE IS NO FLUID MOVEMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-474
NASA FMEA #: 05-6L-2004-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 474
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-475
NASA FMEA #: 05-6L-2004-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 475
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-476
NASA FMEA #: 05-6L-2004-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 476
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-477
NASA FMEA #: 05-6L-2004-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 477
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-478
NASA FMEA #: 05-6L-2002-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 478
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-479
NASA FMEA #: 05-6L-2002-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 479
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-480
NASA FMEA #: 05-6L-2002-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 480
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-481
NASA FMEA #: 05-6L-2002-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 481
ITEM: FUSE, 1A

LEAD ANALYST: W.A. HAUFLER

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 AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-482
NASA FMEA #: 05-6L-2130-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 482
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-483
NASA FMEA #: 05-6L-2131-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 483
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-484
NASA FMEA #: 05-6L-2130-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 484
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-485
NASA FMEA #: 05-6L-2130-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 485
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-486
NASA FMEA #: 05-6L-2130-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 486
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-487
NASA FMEA #: 05-6L-2131-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 487
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-488
NASA FMEA #: 05-6L-2130-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 488
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

C-7

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-489
NASA FMEA #: 05-6L-2130-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 489
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

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

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-490
NASA FMEA #: 05-6L-2127-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 490
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-491
NASA FMEA #: 05-6L-2127-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 491
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CONCURS WITH NASA'S CRITS AND SCREENS, BUT IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED IN THE EFFECTS FIELD, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F.
SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-492
NASA FMEA #: 05-6L-2126-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 492
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN. THESE RELAYS ARE NOT STANDBY REDUNDANT TO ANY OTHER ITEMS SINCE THEY ARE NORMALLY OPERATIONAL. SOME OF THESE RELAYS FAILING HAVE NO IMMEDIATE EFFECT AND CANNOT BE DETECTED EXCEPT VIA MCA STATUS SIGNALS WHICH ARE NOT READILY USED BY THE CREW.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-493
NASA FMEA #: 05-6L-2126-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 493
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CONCURS WITH NASA'S CRITS AND SCREENS, BUT IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED IN THE EFFECTS FIELD, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F. IOA'S CRITICALITY IS DRIVEN BY OMS HARDWARE FMEA 03-3-2007-1. SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-494
NASA FMEA #: 05-6L-2127-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 494
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-495
NASA FMEA #: 05-6L-2127-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 495
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CONCURS WITH NASA'S CRITS AND SCREENS, BUT IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED IN THE EFFECTS FIELD, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F.
SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-496
NASA FMEA #: 05-6L-2126-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 496
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

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

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

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN. THESE RELAYS ARE NOT STANDBY REDUNDANT TO ANY OTHER ITEMS SINCE THEY ARE NORMALLY OPERATIONAL. SOME OF THESE RELAYS FAILING HAVE NO IMMEDIATE EFFECT AND CANNOT BE DETECTED EXCEPT VIA MCA STATUS SIGNALS WHICH ARE NOT READILY USED BY THE CREW.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-497
NASA FMEA #: 05-6L-2126-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 497
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

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

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CONCURS WITH NASA'S CRITS AND SCREENS, BUT IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED IN THE EFFECTS FIELD, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F. IOA'S CRITICALITY IS DRIVEN BY OMS HARDWARE FMEA 03-3-2007-1. SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-498
NASA FMEA #: 05-6L-2130-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 498
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /2R]	[P]	[F]	[P]	[X]
COMPARE	[/N]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-499
NASA FMEA #: 05-6L-2131-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 499
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

	[3 /3]	[ ]	[ ]	[ ]	[D] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-500
NASA FMEA #: 05-6L-2130-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 500
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /2R]	[P]	[F]	[P]	[X]
COMPARE	[/N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-501
NASA FMEA #: 05-6L-2130-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 501
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-502
NASA FMEA #: 05-6L-2130-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 502
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM	
NASA	[3 /1R]	[P]	[P]	[P]	[ ]	*
IOA	[3 /2R]	[P]	[F]	[P]	[X]	
COMPARE	[/N]	[ ]	[N]	[ ]	[N]	

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-503
NASA FMEA #: 05-6L-2131-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 503
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

	[3 /3]	[ ]	[ ]	[ ]	[D] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-504
NASA FMEA #: 05-6L-2130-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 504
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /2R]	[P]	[F]	[P]	[X]
COMPARE	[/N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-505
NASA FMEA #: 05-6L-2130-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 505
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-506
NASA FMEA #: 05-6L-2127-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 506
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-507
NASA FMEA #: 05-6L-2127-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 507
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CONCURS WITH NASA'S CRITS AND SCREENS, BUT IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED IN THE EFFECTS FIELD, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F.
SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-508
NASA FMEA #: 05-6L-2126-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 508
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[NA]	[P]	[ ] *
IOA	[3 /1R]	[P]	[F]	[P]	[X]
COMPARE	[/]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

	[3 /1R]	[P]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN. THESE RELAYS ARE NOT STANDBY REDUNDANT TO ANY OTHER ITEMS SINCE THEY ARE NORMALLY OPERATIONAL. SOME OF THESE RELAYS FAILING HAVE NO IMMEDIATE EFFECT AND CANNOT BE DETECTED EXCEPT VIA MCA STATUS SIGNALS WHICH ARE NOT READILY USED BY THE CREW.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-509
NASA FMEA #: 05-6L-2126-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 509
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CONCURS WITH NASA'S CRITS AND SCREENS, BUT IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED IN THE EFFECTS FIELD, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F. IOA'S CRITICALITY IS DRIVEN BY OMS HARDWARE FMEA 03-3-2007-1. SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-510
NASA FMEA #: 05-6L-2126-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 510
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CONCURS WITH NASA'S CRITS AND SCREENS, BUT IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED IN THE EFFECTS FIELD, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F. IOA'S CRITICALITY IS DRIVEN BY OMS HARDWARE FMEA 03-3-2007-1. SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-511
NASA FMEA #: 05-6L-2127-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 511
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA AGREES WITH THIS NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-512
NASA FMEA #: 05-6L-2127-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 512
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA CONCURS WITH NASA'S CRITS AND SCREENS, BUT IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED IN THE EFFECTS FIELD, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F.
SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-513
NASA FMEA #: 05-6L-2126-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 513
ITEM: RELAY

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[NA]	[P]	[ ] *
IOA	[3 /1R]	[P]	[F]	[P]	[X]
COMPARE	[/]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

	[3 /1R]	[P]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS FAILING THE B SCREEN. THESE RELAYS ARE NOT STANDBY REDUNDANT TO ANY OTHER ITEMS SINCE THEY ARE NORMALLY OPERATIONAL. SOME OF THESE RELAYS FAILING HAVE NO IMMEDIATE EFFECT AND CANNOT BE DETECTED EXCEPT VIA MCA STATUS SIGNALS WHICH ARE NOT READILY USED BY THE CREW.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-514
NASA FMEA #: 05-6L-2083-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 514
ITEM: RESISTOR, 1.2K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM	
NASA	[2 /1R]	[P]	[P]	[P]	[X]	*
IOA	[3 /2R]	[F]	[P]	[P]	[X]	
COMPARE	[N /N]	[N]	[ ]	[ ]	[ ]	

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[D] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-515
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 515
ITEM: RESISTOR, 1.2K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO ISSUE. IOA IDENTIFIED A NONCREDIBLE FAILURE MODE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-516
NASA FMEA #: 05-6L-2091-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 516
ITEM: RESISTOR, 12K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-517
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 517
ITEM: RESISTOR, 12K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[F]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO ISSUE. IOA IDENTIFIED A NONCREDIBLE FAILURE MODE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-518
NASA FMEA #: 05-6L-2082-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 518
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[F]	[P]	[P]	[X]
COMPARE	[/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:
WORST CASE IS VALVE DECLARED FAILED CLOSED AND REDUNDANT VALVE IS USED TO COMPLETE CROSSFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE CROSSFEED SYSTEM RESULTING IN LOSS OF MISSION. NASA WOULD BE RIGHT IF SENSORS CAN BE USED REDUNDANTLY TO TALKBACKS TO DETERMINE VALVE POSITION. BUT FLIGHT AND MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER SOFTWARE DOES NOT USE THESE TALKBACKS.
SEE JSC 10588 PAGE 5-18.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-519
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 519
ITEM: RESISTOR, 5.1K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO ISSUE. IOA IDENTIFIED A NONCREDIBLE FAILURE MODE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-520
NASA FMEA #: 05-6L-2083-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 520
ITEM: RESISTOR, 1.2K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /2R]	[F]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[P]	[P]	[D] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA RECOMMENDS THAT BELLOWS FAILURE SHOULD NOT BE CONSIDERED AND CRITICALITY THUS REDUCED, SINCE IT CONSTITUTES A "MULTIPLE UNRELATED FAILURE" WHICH IS BEYOND THE SCOPE OF IOA'S INTERPRETATION OF NSTS 22206. NASA IS RIGHT THAT THIS FAILURE COULD CAUSE CONTINUOUS POWER ON THE ASSOCIATED VALVE(S), SINCE THE SIGNAL THROUGH THIS ITEM WOULD INHIBIT CLOSING OR OPENING WHEN THE VALVES REACH FULL CLOSED OR OPEN. HOWEVER, NASA'S SCENARIO WITH ANOTHER FAILURE CONSISTING OF BELLOWS RUPTURE IS IRRELEVANT. A BELLOWS RUPTURE ANYTIME EXPOSING ELECTRICAL COMPONENTS AND VALVE MOTOR TO PROPELLANT IS SERIOUS, NOT JUST WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF DEVICE WITHIN THE VALVE MOTOR AT NO MORE THAN 352 F, AND, ACCORDING TO THE SPECS, "THE MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-521
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: OMS
MDAC ID: 521
ITEM: RESISTOR, 1.2K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO ISSUE. IOA IDENTIFIED A NONCREDIBLE FAILURE MODE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/01/88
ASSESSMENT ID: OMS-522
NASA FMEA #: 05-6L-2091-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: OMS
MDAC ID: 522
ITEM: RESISTOR, 12K 1/4W

LEAD ANALYST: W.A. HAUFLER

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.