## 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

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

## 26 FEBRUARY 1988

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## Independent Orbiter Assessment Assessment of the Orbital Maneuvering System

### 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, thirtyone (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.

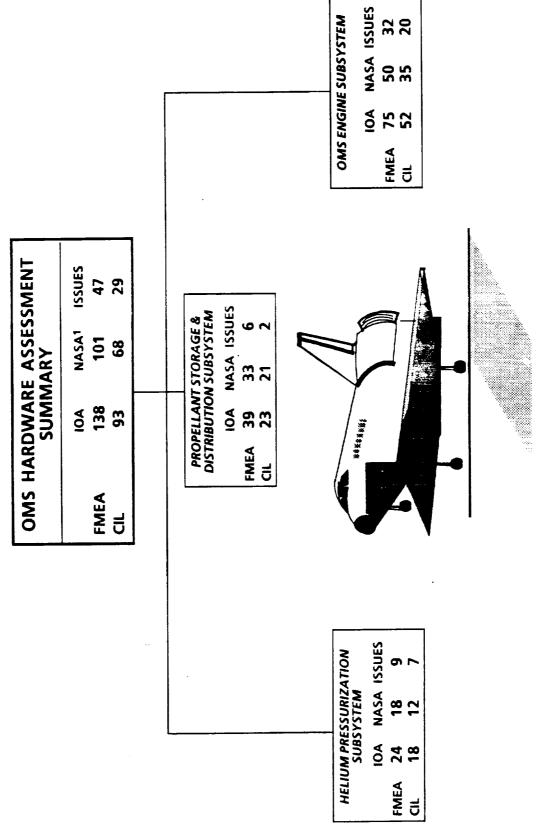
The remaining unresolved OMS hardware and EPD&C issues result because of differences between the IOA and NASA/RI analyses of the OMS subsystem which resulted in criticality, redundancy screen, or failure effect differences.

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

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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



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&CITEMS.

## OMS EPD&C ASSESSMENT OVERVIEW

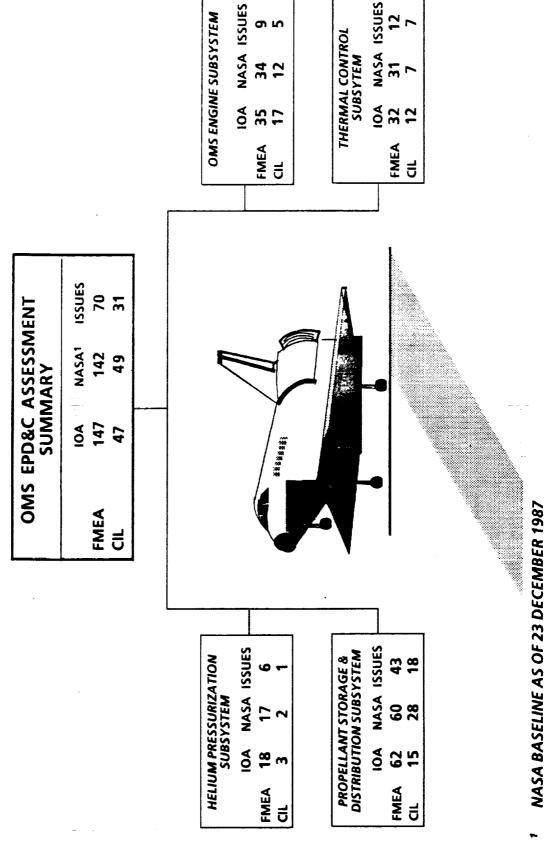


Figure 2 - OMS EPD&C OVERVIEW

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**IOA AND NASA TOTALS INCLUDE INSTRUMENTATION AND THERMAL CONTROL ITEMS.** 

## 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.

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## 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

## ORBITAL MANEUVERING SYSTEM

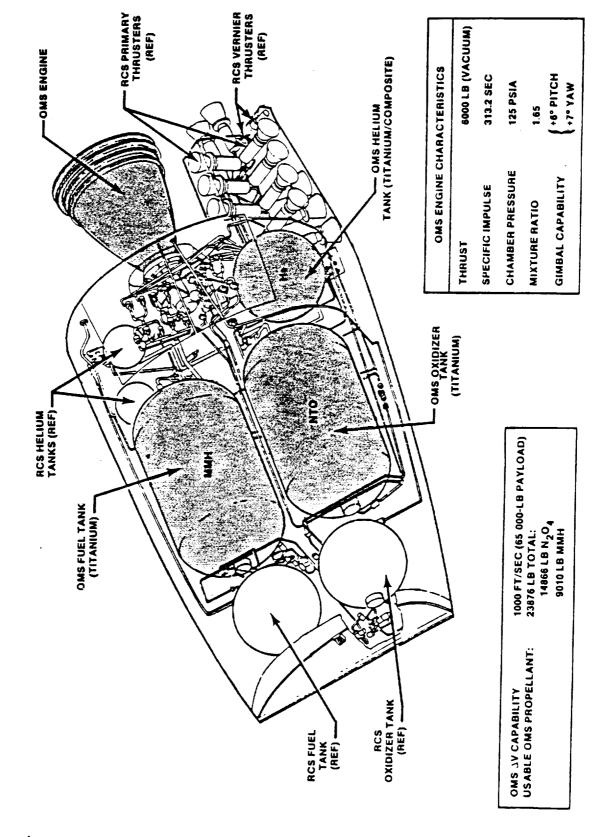


Figure 3 - ORBITAL MANEUVERING SYSTEM OVERVIEW

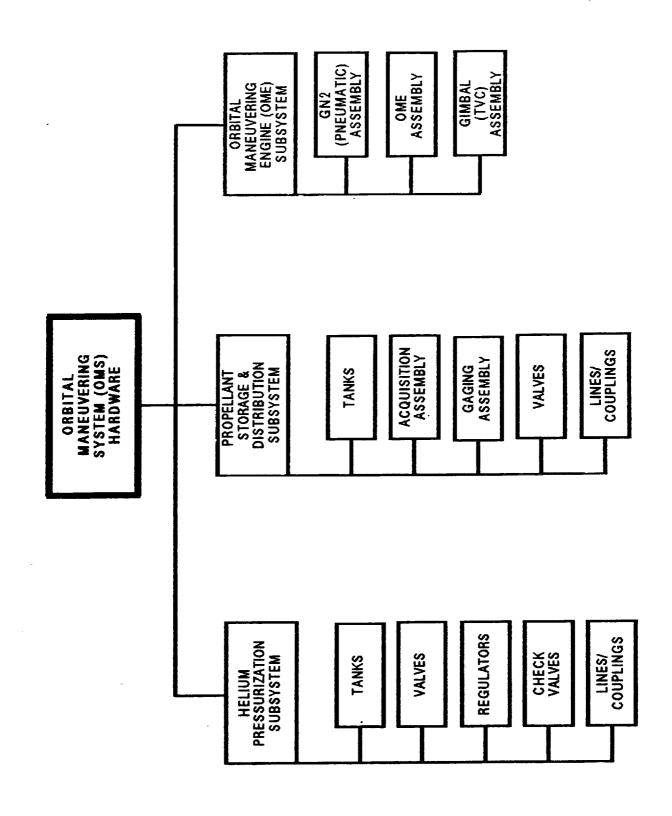


Figure 4 - OMS HARDWARE BREAKDOWN HIERARCHY

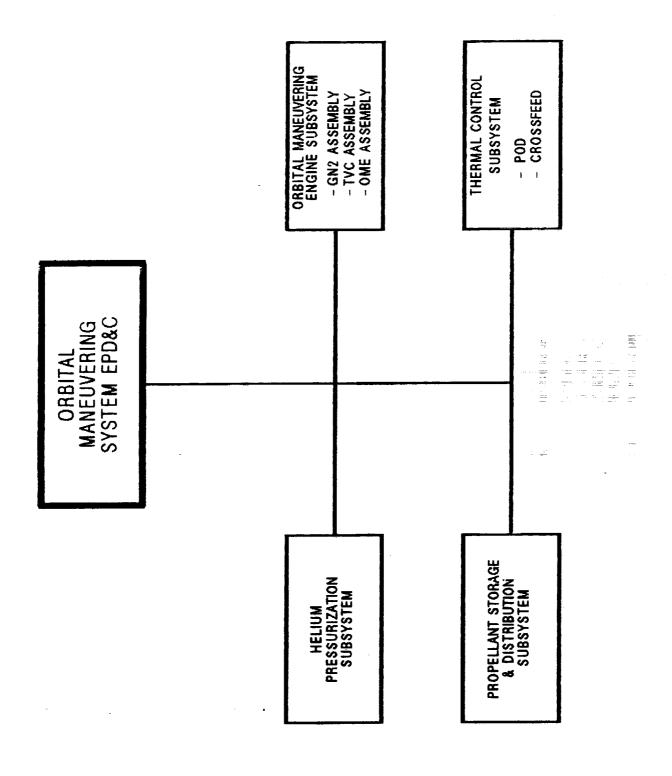


Figure 5 - OMS EPD&C BREAKDOWN HIERARCHY

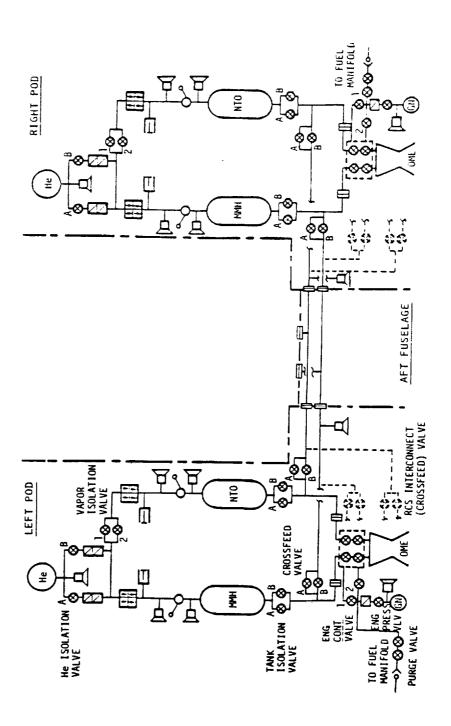


Figure 6 - OMS SCHEMATIC

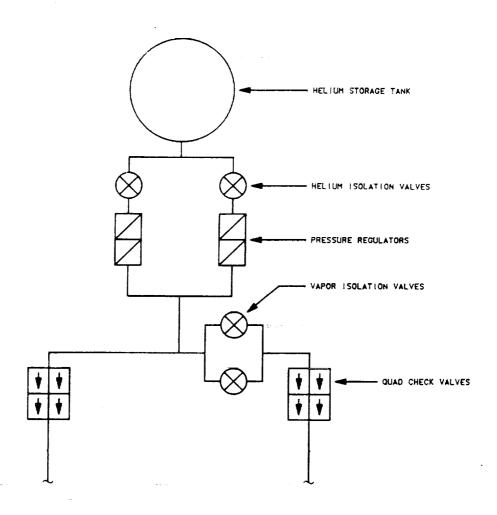


Figure 7 - HELIUM PRESSURIZATION SUBSYSTEM

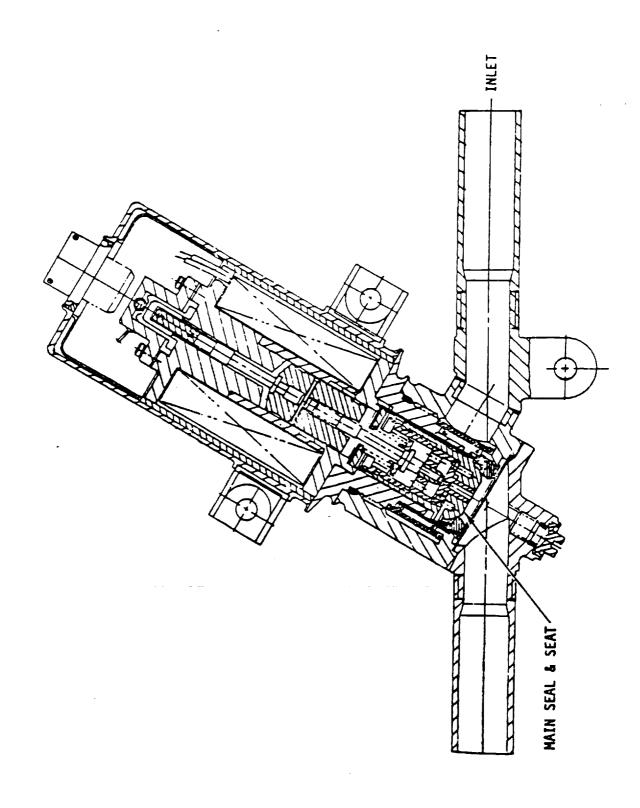


Figure 8 - HELIUM ISOLATION VALVE

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 psia	271 psia		

## 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.

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## OMS-RCS REGULATOR

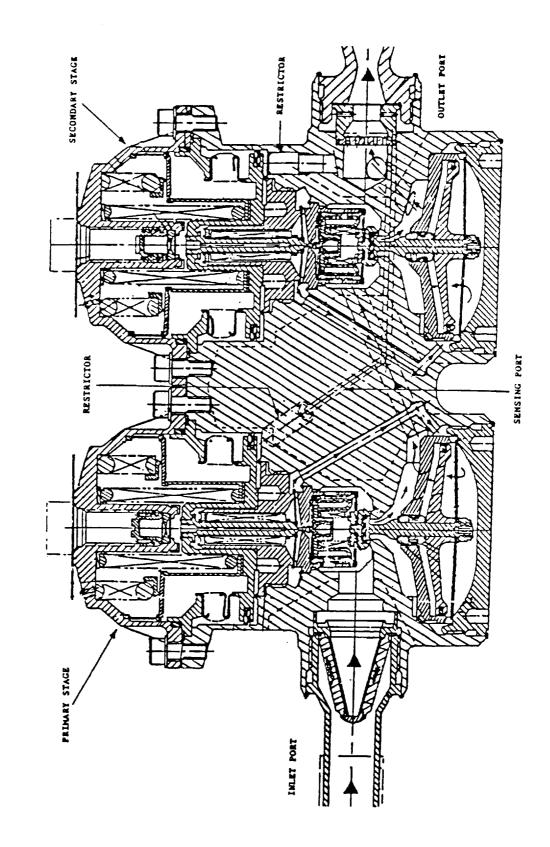


Figure 9 - HELIUM PRESSURE REGULATOR ASSEMBLY

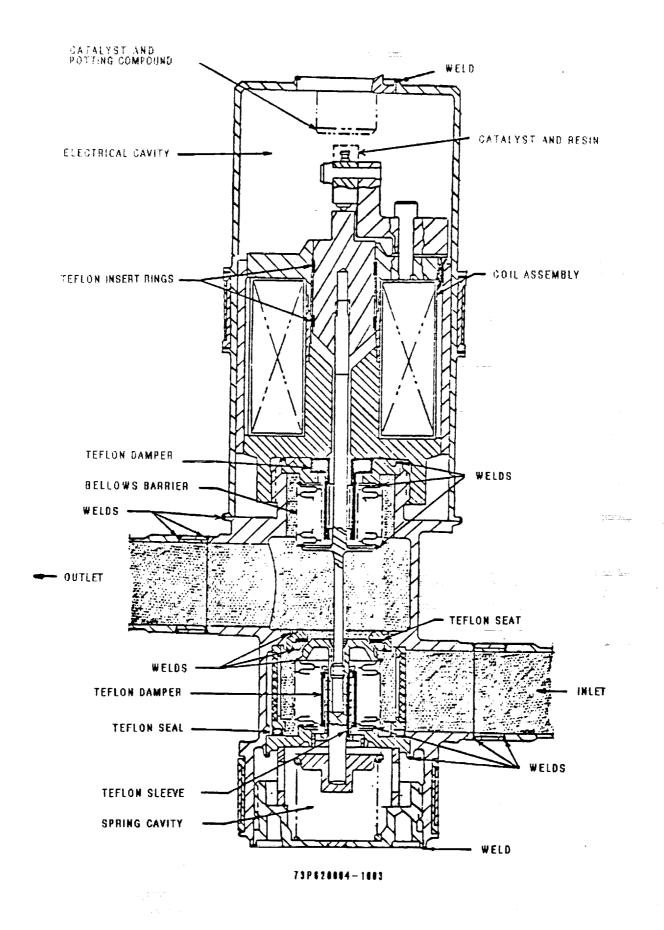


Figure 10 - VAPOR ISOLATION VALVE

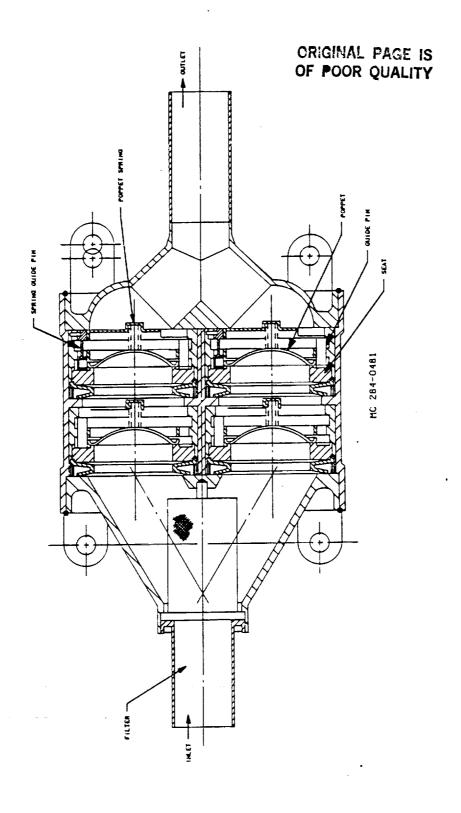


Figure 11 - QUAD CHECK VALVE

## 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

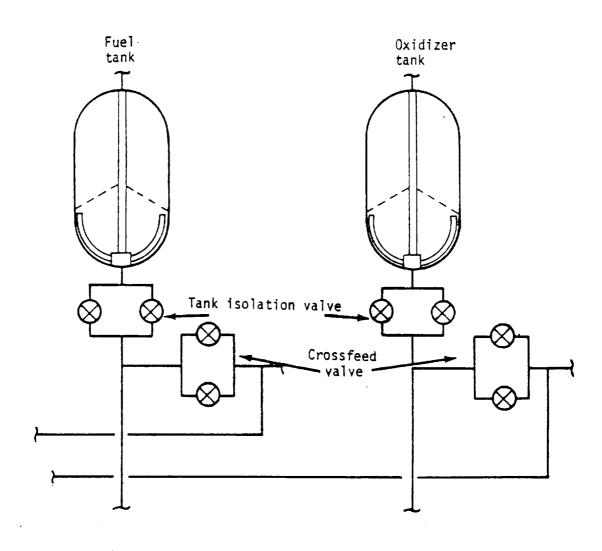


Figure 12 - PROPELLANT STORAGE AND DISTRIBUTION SUBSYSTEM

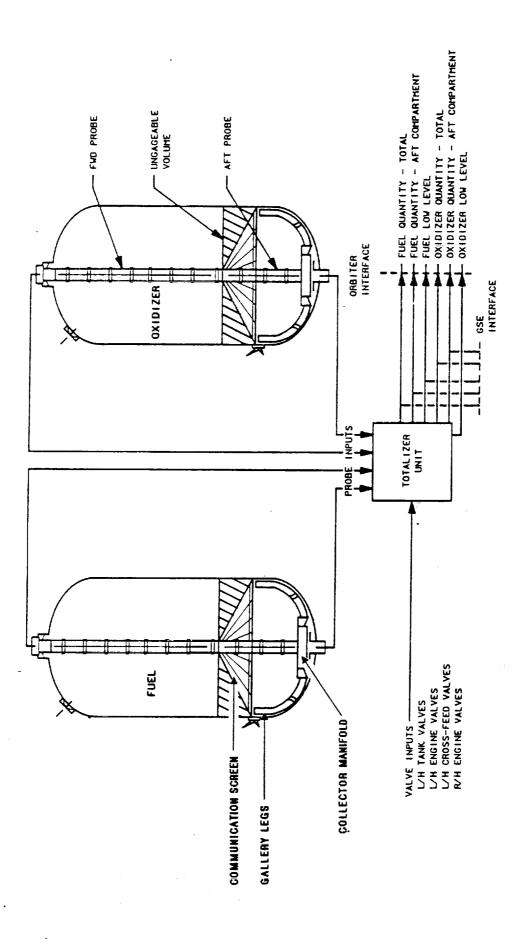


Figure 13 - PROPELLANT TANKS WITH ASSEMBLIES

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.

<u>Aft Probe</u> - 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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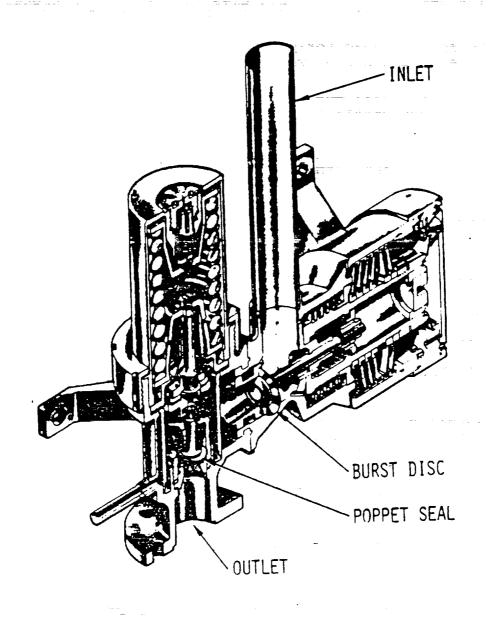


Figure 14 - PRESSURE RELIEF VALVE

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 08 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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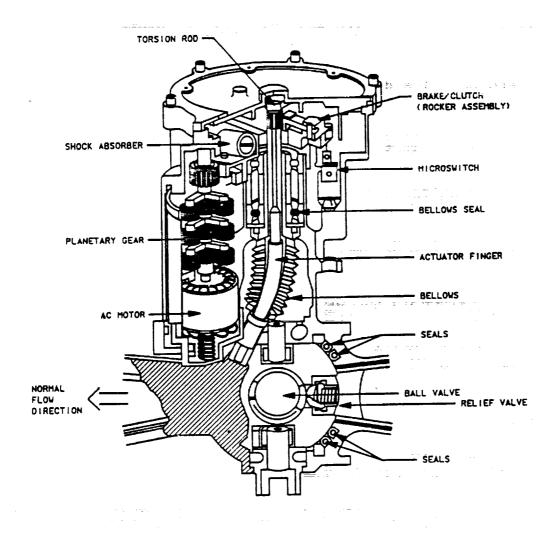


Figure 15 - TANK AND CROSSFEED ISOLATION VALVE

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).

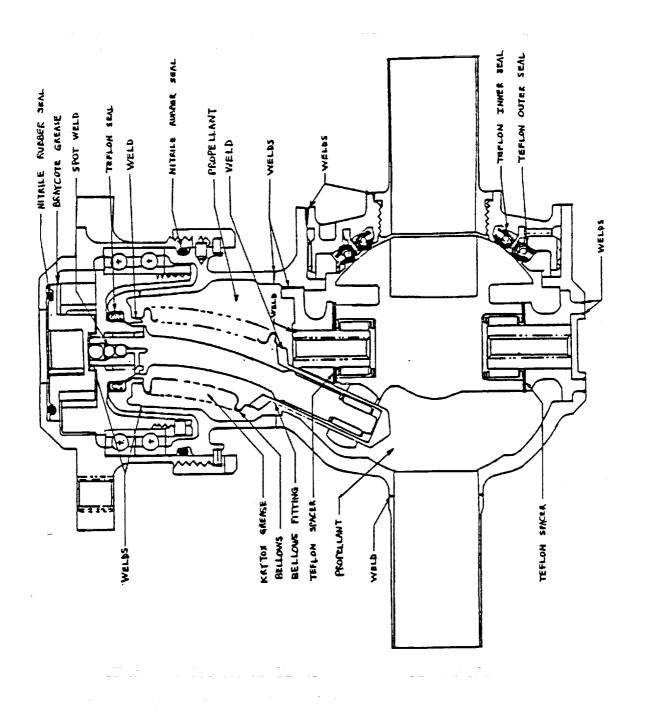


Figure 16 - MANUAL ISOLATION VALVE

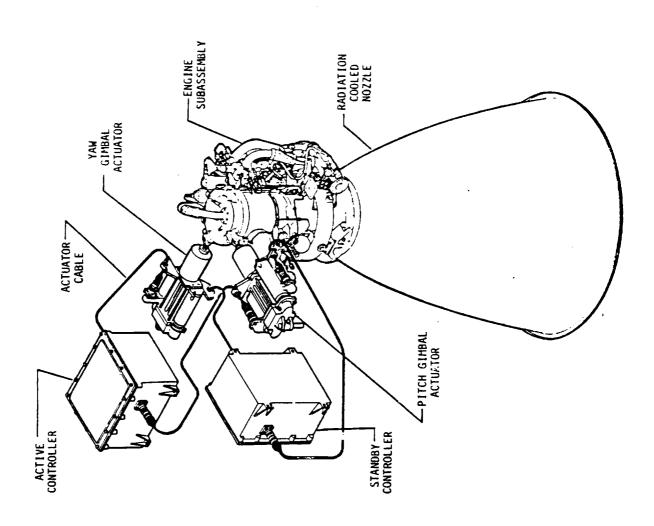


Figure 17 - ORBITAL MANEUVERING ENGINE SUBSYSTEM

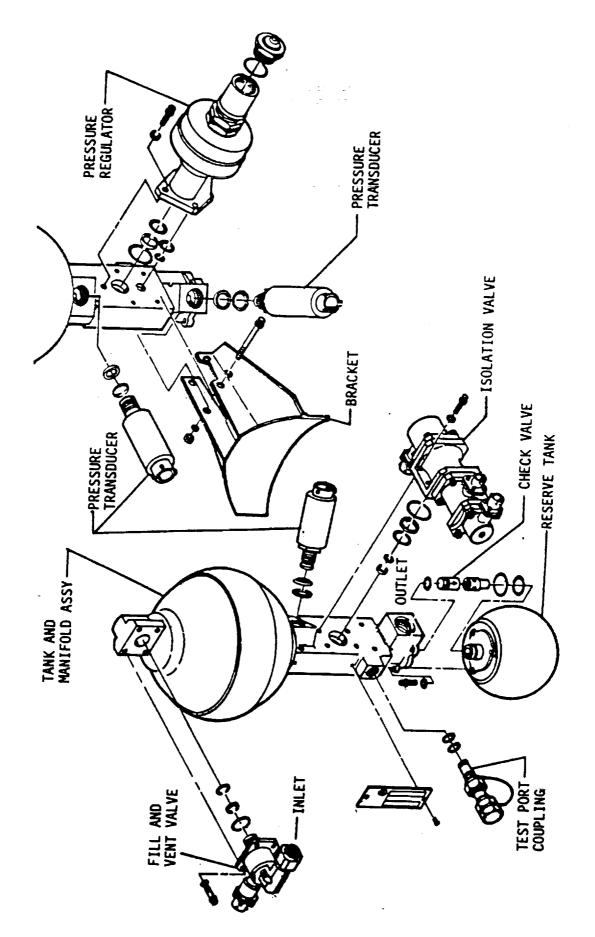


Figure 18 - GN2 PNEUMATIC PACK ASSEMBLY

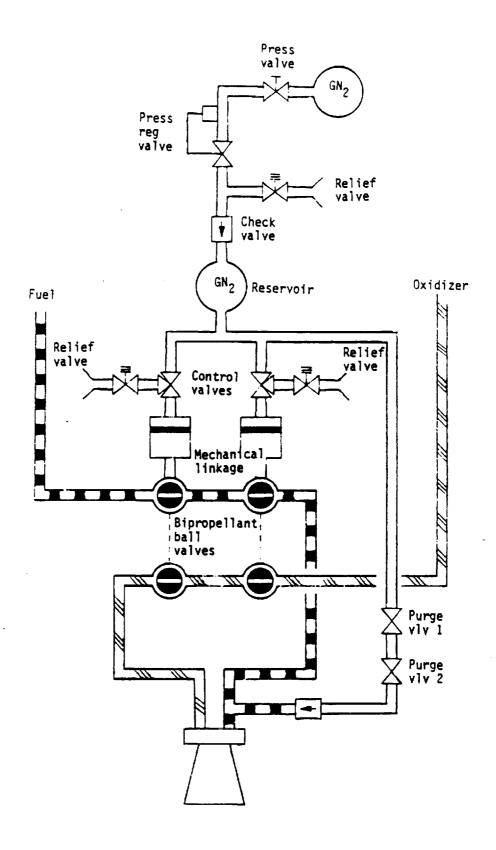


Figure 19 - GN2 PRESSURIZATION ASSEMBLY SCHEMATIC

### 3.1.3.a.1 Fill and Vent Valve

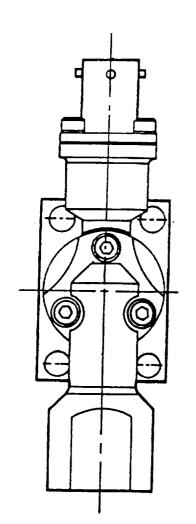
The fill and vent valve is a two-way, high-pressure coaxial, single solenoid-operated valve (Figure 20). The valve is used only during ground operations to pressurize or vent the GN2 (pneumatic) assembly. There is no electrical power to the solenoid coil during flight. The valve is designed to fail closed 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. 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 twoway, high-pressure, dual solenoid-operated shutoff The purpose of this valve is to start and stop valve. the flow of GN2 in the pneumatic actuation system. 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 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



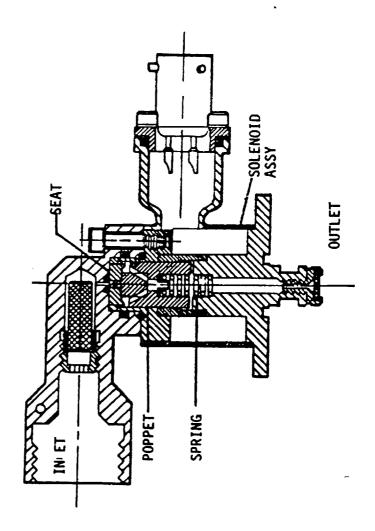


Figure 20 - GN2 FILL AND VENT VALVE

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

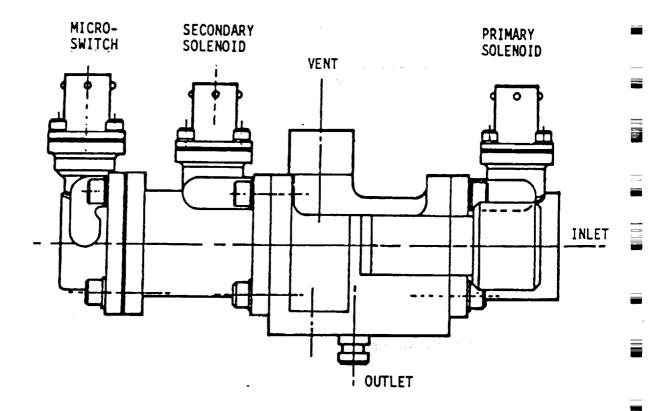
flange, which is part of the GN2 storage tank. The reservoir nominally holds about 0.0008 pounds of GN2 at 320 psia and 70 degrees F. This quantity is enough to guarantee a minimum of one engine start. Instrumentation consists of one strain gage-type pressure transducer located between the check valve 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.



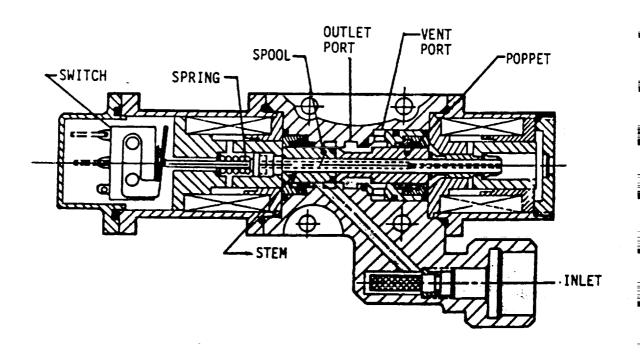


Figure 21 - ENGINE CONTROL VALVE

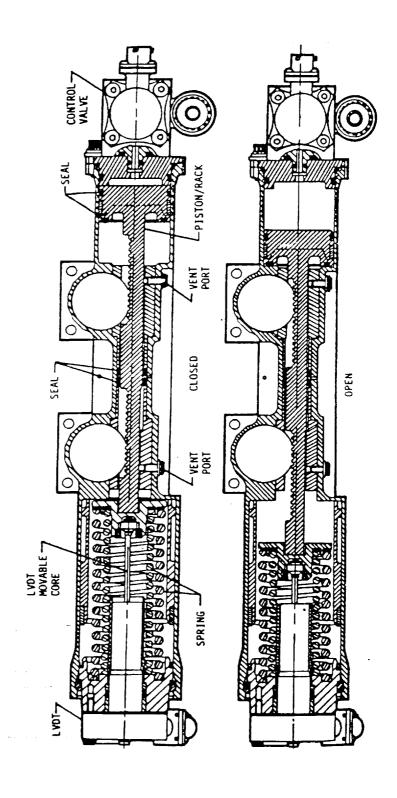


Figure 22 - ACTUATOR ASSEMBLY CROSS SECTION

# 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. 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 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.

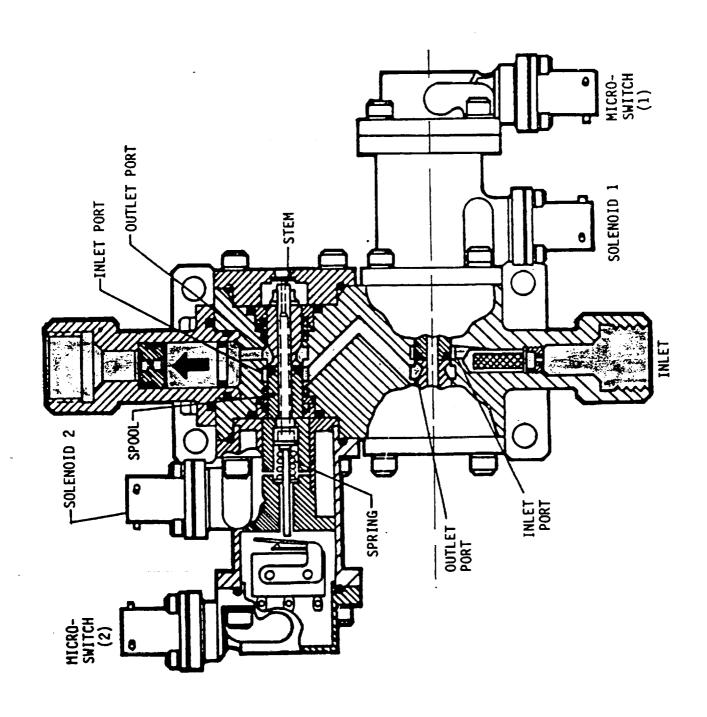


Figure 23 - PURGE VALVE ASSEMBLY CROSS SECTION

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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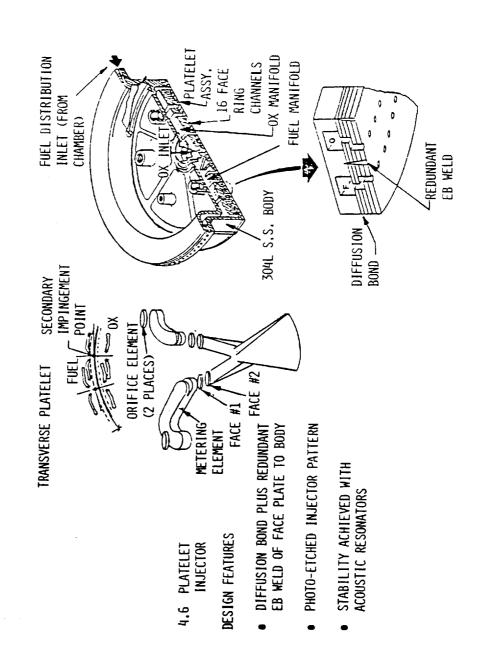


Figure 24 - INJECTOR ASSEMBLY

# 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

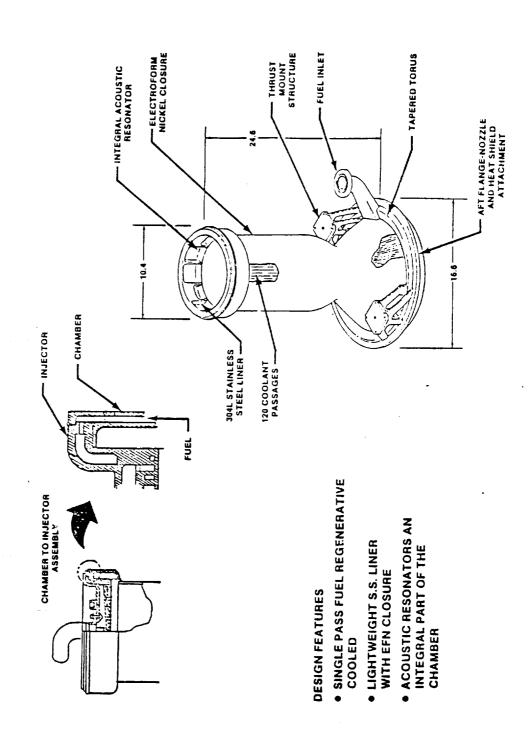


Figure 25 - COMBUSTION CHAMBER ASSEMBLY

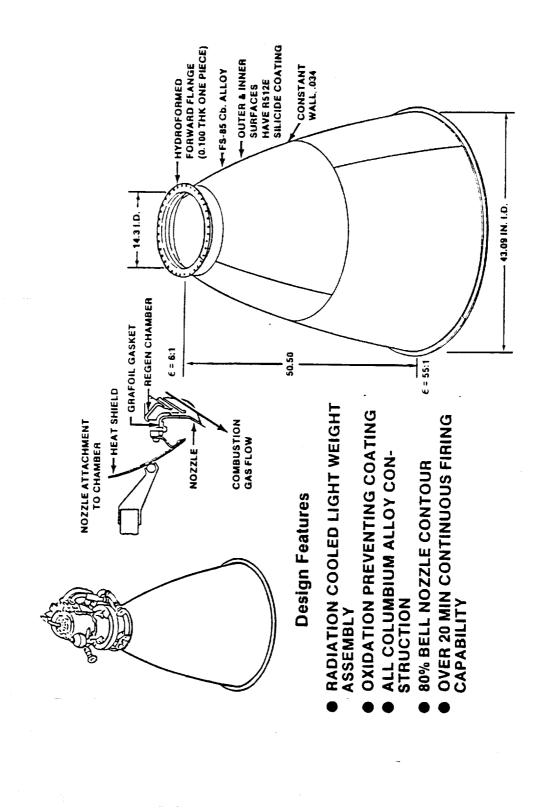


Figure 26 - NOZZLE EXTENSION

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

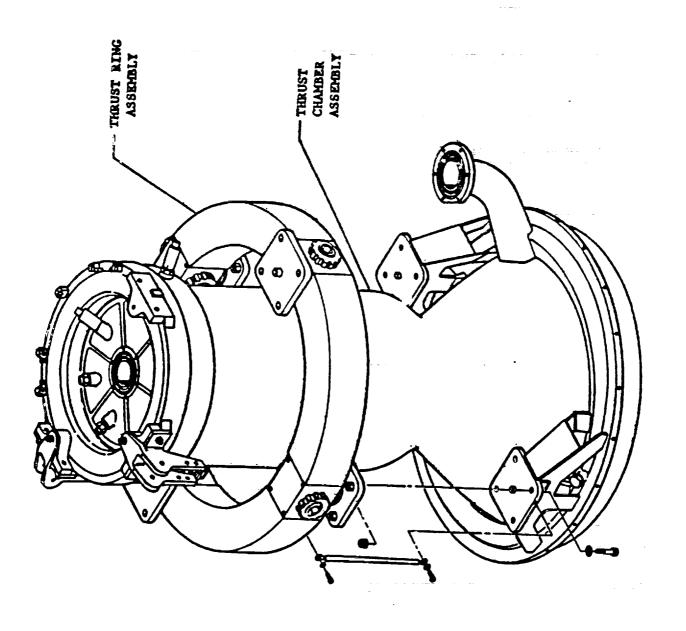


Figure 27 - THRUST RING TO TCA ATTACHMENT

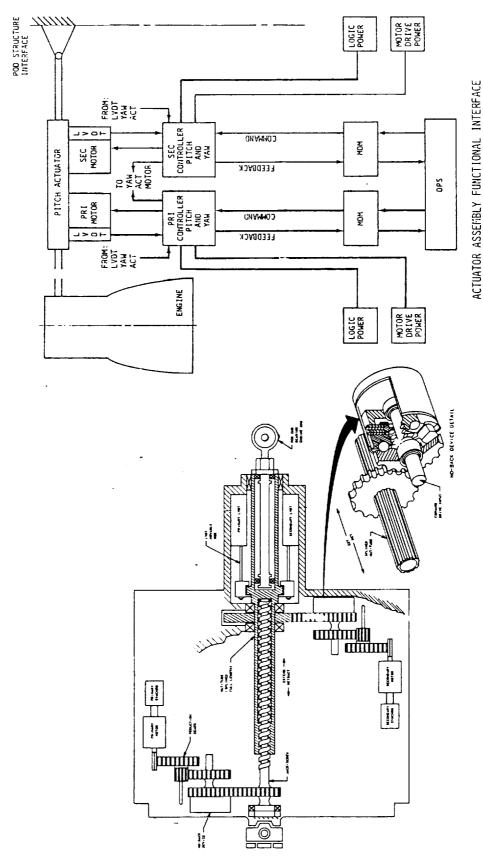


Figure 28 - OMS GIMBAL ACTUATOR

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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 downlist 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.

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#### 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 IOA mapped one hundred thirty-eight (138) hardware CIL items. 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.

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TABLE I-A Summary of IOA FMEA Assessment - OMS Hardware								
Components	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES			
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVE REGULATOR VAPOR ISOLATION VALVE QUAD CHECK VALVE COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	26565395	1 3 3 2 4 5 5	1 2 3 2 3 3 3 1	0 1 1 2 2 2 2	4.2.1.A.1 4.2.1.A.2 4.2.1.A.3 4.2.1.A.4 4.2.1.A.5 4.2.1.A.5			
PROP STOR & DIST SUBSYSTEM PRESSURE RELIEF ASSEMBLY GROUND MANUAL ISOLATION VALVE PROPELLANT TANK GAGING PROBES TOTALIZER COMMUNICATION SCREEN GALLERY LEG SCREEN COLLECTOR MANIFOLD SCREEN TANK ISOLATION VALVE CROSSFEED VALVE COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) GIMBAL BELLOWS FLEX LINE ASSEMBLY ALIGNMENT BELLOWS LINES AND FITTINGS	5 3 2 10 3 2 1 1 8 8 33 3 15 2 3	5 1 2 3 1 1 1 4 4 10 0 2 1 1 2	5 1 2 3 1 1 1 3 3 6 0 2 1 1 2	0 0 0 0 0 0 0 1 1 4 0 0 0 0 0	4.2.2.A.1 4.2.2.A.2 4.2.2.A.3			
OME SUBSYSTEM OME ASSEMBLY INLET FILTER & ORIFICE BIPROPELLANT VALVE ASSEMBLY BIPROP CAVITY PRESS RLF VALVE PLATELET INJECTOR COMBUSTION CHAMBER NOZZLE EXTENSION COUPLINGS (SINGLE SEAL) TVC GIMBAL BELLOWS ALIGNMENT BELLOWS LINES AND FITTINGS	2 27 5 3 2 2 12 3 3	2 8 4 2 2 1 8 1 1	2 6 0 2 2 1 3 1 0	1 2 4 0 0 0 5 0 0	4.2.3.A.1 4.2.3.A.2 4.2.3.A.3 4.2.3.A.3			

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

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

TABLE I-B Summary Of IOA FM	MEA Ass	essmen	t - OMS	EPD&C	(cont'd)
Criticality:	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES
OME SUBSYSTEM					
CONTROLS					
GN2 ASSEMBLY					
VALVES	8	2	2	o	
DIODE DRIVER	22	8	8	1	4.2.3.B.1
FUSE	8	3	3	0	4.2.3.5.1
RESISTOR	20	3	3	Ö	
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	•	١,	٠,	0	
FUSE	2 1	1 1	1 1	0	
METER SENSOR, POSITION	2	ī	1	1	4.2.3.B.5
SENSOR, POSITION SENSOR, PRESSURE	3	3	2	ī	4.2.3.B.6
SENSOR, TEMPERATURE	4	3.	3	ī	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	44	2	2	1	4.2.4.B.1
DRIVER FUSE	32	3	3	Ō	4.2.4.0.1
HEATER	64	ĭ	l i	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			_	_	4 0 4 5 5
DRIVER	12	2	2	1	4.2.4.B.7
FUSE	10	3	3	0	4.2.4.B.8
HEATER	22 4	1 2	1 2	1 0	4.2.4.D.0
RELAY 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	ī	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 STORAGE TANK TANK ISOLATION VALVE REGULATOR VAPOR ISOLATION VALVE QUAD CHECK VALVE COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	2 5 5 5 1 0 4	1 3 3 2 4 2 2	1 2 3 1 2 1 1	0 1 1 2 1 1 0	4.2.1.A.1 4.2.1.A.2 4.2.1.A.3 4.2.1.A.4 4.2.1.A.5 4.2.1.A.5			
PROP STOR & DIST SUBSYSTEM PRESSURE RELIEF ASSEMBLY GROUND MANUAL ISOLATION VALVE PROPELLANT TANK GAGING PROBES TOTALIZER COMMUNICATION SCREEN GALLERY LEG SCREEN COLLECTOR MANIFOLD SCREEN TANK ISOLATION VALVE CROSSFEED VALVE COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) GIMBAL BELLOWS FLEX LINE ASSEMBLY ALIGNMENT BELLOWS LINES AND FITTINGS	5 2 2 0 0 2 1 1 5 3 11 0 15 2 3	4 0 2 0 0 1 1 1 3 1 4 0 2 1 1 2	4 0 2 0 0 1 1 1 3 1 2 0 2 1 1 2	0 0 0 0 0 0 0 0 0 0 0 0 0 0	4.2.2.A 4.2.2.A.3			
OME SUBSYSTEM OME ASSEMBLY INLET FILTER & ORIFICE BIPROPELLANT VALVE ASSEMBLY BIPROP CAVITY PRESS RLF VALVE PLATELET INJECTOR COMBUSTION CHAMBER NOZZLE EXTENSION COUPLINGS (SINGLE SEAL) TVC GIMBAL BELLOWS ALIGNMENT BELLOWS LINES AND FITTINGS	2 26 2 3 2 2 4 3 2	2 8 4 2 2 1 2 1 1	1 6 0 2 2 1 1 1	1 2 4 0 0 0 0 1 0	4.2.3.A.1 4.2.3.A.2 4.2.3.A.3 4.2.3.A.3			

TABLE II-A Summary of IOA	CIL Ass	essmen	t - oms	5 Hardwa	are (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	o	1	1	1	4.2.3.A.5
STORAGE TANK	1	1	1	0	
GN2 PNEUMATIC PACK HOUSING PRESSURE ISOLATION VALVE	1 1	0	0	0	4.2.3.A.6
REGULATOR	3	1	2	0	4.2.3.A.0
PRESSURE RELIEF VALVE	0	2	2 2	0	
CHECK VALVE ACCUMULATOR	3 2	2 2	1	0 1	4.2.3.A.7
PURGE VALVE ASSEMBLY	3	2	2	0	
COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL)	0	0	0 2	0 2	4.2.3.A.8
LINES & FITTINGS	3	i	ī	ō	
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 0	1 0	1 0	0	
GIMBAL DRIVE MOTOR GIMBAL DRIVE ASSEMBLY	5	2	2	1	4.2.3.A.11
REDUCTION GEAR	0		0	0	4 0 0 3 3 30
ANTIBACK DEVICE GIMBAL DRIVE THRUST BEARING	1 0	1 2	0	1 2	4.2.3.A.13 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 Asse	essmen	t - oms	S EPD&C	
Criticality:	IOA IOA NASA ISSUES CILS				PARAGRAPHS FOR ISSUES
HE PRESS SUBSYSTEM CONTROLS					
VALVES					
CONTROLLER	1	1	0	1	4.2.1.B.1
DIODE	6	ī	li	Ō	
DRIVER	Ö	ō	ō	0	
FUSE	0	0	0	0	
RESISTOR	0	0	0	0	
SWITCH, TOGGLE	4	1	1	0	
INSTRUMENTATION	:		İ		
METER	0	0	0	0	
SENSOR, PRESSURE	0	0	0	0	
SENSOR, TEMPERATURE	0	0	0	0	
SWITCH, TOGGLE	0	0	0	0	
PROP STOR & DIST SUBSYSTEM					
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 PRESSURE	0	0	0	0	÷
SENSOR, PRESSURE	0	1	0	1	4.2.2.B.9
SENSOR, TEMPERATURE	2	1 0	0	0	4.2.2.5.5
SWITCH, ROTARY		U			

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 DRIVER	0 14	2 6	2 5	0 1	4.2.3.B.1		
FUSE RESISTOR	8 6	2 1	2	0			
SWITCH, TOGGLE TVC ASSEMBLY	5	4	2	2	4.2.3.B.2		
CONTROLLER FUSE INSTRUMENTATION GN2 ASSEMBLY	0	0 0	0	0	-		
SENSOR, PRESSURE OME ASSEMBLY	1	0	0	0			
FUSE METER	0 0 0	0 0 0	0 0 0	0 0 0			
SENSOR, POSITION SENSOR, PRESSURE SENSOR, TEMPERATURE	0	1 0	0 0	1 0	4.2.3.B.6		
SIGNAL CONDITIONER TVC ASSEMBLY SENSOR, POSITION	0	0	0	0	.4.2.3.B.8		
THERMAL CONTROL SUBSYSTEM							
POD DRIVER FUSE	22 0	1 2	0 2	1 0	4.2.4.B.1		
HEATER RELAY RESISTOR	41 4 0	0 1 2	0 1 2	0 1 0	4.2.4.B.3		
SENSOR, TEMPERATURE SWITCH, THERMAL SWITCH, TOGGLE	0 16 2	0 1 1	0 0 1	0 1 1	4.2.4.B.5 4.2.4.B.6		
CROSSFEED DRIVER FUSE	0	0 0	0 0	0			
HEATER RELAY RESISTOR	10 1 0	0 1 0	0 1 0	0 0 0	•		
SENSOR, TEMPERATURE SWITCH, THERMAL SWITCH, TOGGLE	5 17 0	2 1 0	0 0 0	2 1 0	4.2.4.B.9 4.2.4.B.10		
TOTAL	216	47	49	31			

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

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

TABLE III-B IOA Recommended	l Crit	ticali	ities	- oms	EPD8	<sub>k</sub> C	
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
HE PRESS SUBSYSTEM CONTROLS							
VALVES CONTROLLER	0	o	0	2	0	0	2
DIODE	0	0	0	3	0	1	4
DRIVER FUSE	0	0	0	2 1	0	0	2 1
RESISTOR	ő	Ö	ŏ	ō	ő	2	2
SWITCH, TOGGLE	0	1	0	2	0	0	3
INSTRUMENTATION METER	0	0	o	0	1	0	1
SENSOR, PRESSURE	Ö	Ŏ	ŏ	o	ī	O	1
SENSOR, TEMPERATURE	0	0	0	0	1	0	1
SWITCH, TOGGLE	0	0	0	0		<u> </u>	<u> </u>
PROP STOR & DIST SUBSYSTEM							
CONTROLS VALVES							
DIODE	0	1	0	8	4	12	25
DRIVER	0	0	0	0	3	0	3 2
FUSE RELAY	0	2	0	3	li	1	7
RESISTOR	0	0	0	0	6	3	9
SWITCH, TOGGLE INSTRUMENTATION	.0	1	0	3	1	1	6
FUSE	0	0	0	0	0	1	1
INDICATOR, EVENT	0	0	0	0	2	0	2
METER PRESSURE	0	0	0	0	2	1	3
SENSOR, PRESSURE SENSOR, TEMPERATURE	0	0	1	0	ő	ō	1
SWITCH, ROTARY	o	0	0	0	1	1	2

TABLE III-B IOA Recommende	d Cri	tical	ities	- OMS	S EPD	≨C (c	ont'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							1
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			
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVE REGULATOR VAPOR ISOLATION VALVE QUAD CHECK VALVE COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 0 0 0 1 0 0	0 2 1 1 2 2 0 0	0 0 0 0 0 0	0 1 1 1 0 2	0 0 1 0 0 0	0 0 0 0 0 0	1 3 3 2 4 2 2			
PROP STOR & DIST SUBSYSTEM PRESSURE RELIEF ASSEMBLY GROUND MANUAL ISOLATION VALVE PROPELLANT TANK GAGING PROBES TOTALIZER COMMUNICATION SCREEN GALLERY LEG SCREEN COLLECTOR MANIFOLD SCREEN TANK ISOLATION VALVE CROSSFEED VALVE COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) GIMBAL BELLOWS FLEX LINE ASSEMBLY ALIGNMENT BELLOWS LINES AND FITTINGS	1 0 1 0 0 1 0 0 1 0 0 2 1 2	2 0 1 0 0 0 0 0 2 0 4 0 0 0	0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0	4 0 2 0 1 1 3 1 4 0 2 1 1 2			
OME SUBSYSTEM OME ASSEMBLY INLET FILTER & ORIFICE BIPROPELLANT VALVE ASSEMBLY BIPROP CAVITY PRESS RLF VALVE PLATELET INJECTOR COMBUSTION CHAMBER NOZZLE EXTENSION COUPLINGS (SINGLE SEAL) TVC GIMBAL BELLOWS ALIGNMENT BELLOWS LINES AND FITTINGS	1 0 3 2 2 1 0 1	1 7 1 0 0 0 2 0 0	0 0 0 0 0 0 0 0	0 1 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	2 8 4 2 2 1 2 1 1 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		
OME SUBSYSTEM GN2 ASSEMBLY TANK FILL/VENT VALVE STORAGE TANK GN2 PNEUMATIC PACK HOUSING PRESSURE ISOLATION VALVE REGULATOR PRESSURE RELIEF VALVE CHECK VALVE ACCUMULATOR PURGE VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES & FITTINGS	0 1 0 0 0 0 0 1 0	0 0 0 1 1 1 1 0 0	0 0 0 0 0 0 0 0 0 0 0	1 0 0 2 0 1 1 0 1 0 4	00000000000	000000000000000000000000000000000000000	1 0 3 1 2 2 2 2 0 4 1		
OME SUBSYSTEM TVC ASSEMBLY GIMBAL RING GIMBAL RING BEARING GIMBAL RING MOUNTING PAD GIMBAL DRIVE MOTOR GIMBAL DRIVE ASSEMBLY REDUCTION GEAR ANTIBACK DEVICE GIMBAL DRIVE THRUST BEARING MECHANICAL STOP, SNUBBER CONTROLLER, GIMBAL ACTUATOR	1 1 0 1 0 0 0	0 1 0 0 1 0 1 2	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	000000000	1 2 1 0 2 0 1 2 1 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			
HE PRESS SUBSYSTEM CONTROLS VALVES						_				
CONTROLLER DIODE DRIVER FUSE	0 0 0 0	0 0 0	0 0 0	1 1 0 0	0 0 0	0 0 0	1 0 0			
RESISTOR SWITCH, TOGGLE INSTRUMENTATION	0	0	0	0	0	0	0 1			
METER SENSOR, PRESSURE SENSOR, TEMPERATURE SWITCH, TOGGLE	0 0 0	0 0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0			
PROP STOR & DIST SUBSYSTEM CONTROLS VALVES DIODE	0	1	0	3	1	0	- 5			
DRIVER FUSE RELAY RESISTOR SWITCH, TOGGLE	0 0 0	0 0 2 0 1	0 0 0 0	0 0 3 0 1	0 1 1 0	0 0 0 0	0 1 6 0 2			
INSTRUMENTATION FUSE INDICATOR, EVENT METER SENSOR, PRESSURE SENSOR, TEMPERATURE SWITCH, ROTARY	0 0 0 0	0 0 0 0 0	0 0 0 0 1	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 1			

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	ı		ŀ							
VALVES	l									
DIODE	0	Ιo	Ιo	2	0	0	2			
DRIVER	0	١٥	0	5	0	1	6			
FUSE	ا ٥	١ŏ	ō	2	o	Ō	2			
RESISTOR	lő	١ŏ	ŏ	0	Ö	li	1			
	0	2	Ö	2	ő	ō	4			
SWITCH, TOGGLE	0		"		٠		*			
TVC ASSEMBLY			١ ۾		_	_				
CONTROLLER	0	0	0	0	0	0	0			
FUSE	0	0	0	0	0	0	0			
INSTRUMENTATION							1			
GN2 ASSEMBLY										
SENSOR, PRESSURE	0	0	0	0	0	0	0			
OME ASSEMBLY	Į									
FUSE	lo	0	0	0	0	0	0			
METER	1 0	1 0	0	0	0	0	0			
SENSOR, POSITION	0	0	0	lo	.0	0	0			
SENSOR, PRESSURE	l ŏ	lo	1	0	Ō	0	1			
SENSOR, TEMPERATURE	Ιŏ	Ŏ	ō	Ō	Ö	Ŏ	Ō			
SIGNAL CONDITIONER	١٥	o	i	Ö	ő	٥	li			
TVC ASSEMBLY	"	"	_				1 -			
SENSOR, POSITION	0	0	0	0	0	0	0			
			0	0	-		-			
THERMAL CONTROL SUBSYSTEM POD										
	0	lı	0	0	0	0	1			
DRIVER		٦	ő	0	2	ő	2			
FUSE	0	_	_			Ö	1			
HEATER	0	0	0	0	0	1	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							1			
DRIVER	0	0	0	0	0	0	0			
FUSE	0	0	0	0	0	0	0			
HEATER	Ö	O	ō	0	0	0	0			
RELAY	Ō	Ö	Ö	Ö	1	ō	1			
RESISTOR	ő	Ö	ő	ŏ	ō	ő	ō			
SENSOR, TEMPERATURE	Ö	Ö	2	ő	Ö	ő	2			
· ·	0	ő	ő	ŏ	1	ő	1			
SWITCH, THERMAL	0	0	0	0	0	0	6			
SWITCH, TOGGLE	U	0	U		U	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.

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# 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 --
0MS-127 3/1R PFP, CIL (Fails to close)

0MS-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 propline 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 proplines 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 0MS-150,156,165,168,171,174 2/1R FFP, CIL 207,210,213,231,234

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 3/3 --208,211,214,232,235

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.

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.

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.

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 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.

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.

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 0MS-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 0MS-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 0MS-322 1/1 ---, CIL (Rupture) 0MS-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.



# 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

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, 2/1R PPP, CIL 722,724,726,728,730,732,734,736, 738,740,742,744,746,748

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

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, 3/3 --888,889,890,891,892,893

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, 2/1R PPP, CIL 911,913,915,917,919,921,923,925

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 3/2R PPP ---- (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.

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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, 3/2R FFP, CIL 1024,1026,1030,1038,1040,1044

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.

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#### 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. assessment of the OMS hardware CILs was performed against the post-CCB CIL package dated 12/05/87. This information was Assessment of the OMS presented at OMS PRCB on 23 December 1987. TVC CILs was performed against the 11/14/87 versions of the CIL As of 1/01/88, the OMS TVC CILs had not been presented to The IOA assessment of the OMS hardware FMEAs (nona CCB or PRCB. 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:

- 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

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- 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.
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- 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.
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- 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.
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- 73. 73A760210, Rev E, Electrical Installation POD Operational drawing.
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# APPENDIX A ACRONYMS

```
- Nozzle inlet plane area
Ac

    Alternating Current

ac

    Nozzle exit plane area

Aе
       - Abort Once Around
AOA
       - Nozzle throat area
At
ARCS
       - Aft Reaction Control Subsystem
       - Assembly
ASSY
       - Abort to Orbit
ATO
       - Attitude
ATT
       - Backup Flight System
BFS
       - Critical Items List
CIL
       - Close (Closed)
CL
CRIT
       - Criticality
CRT
       - Cathode Ray Tube
       - Caution and Warning System
C&W
       - Displays and Controls
D/C
DAP

    Digital Autopilot

       - direct current
dc
       - Display
DISP
       - Data Processing System
DPS
EPD&C - Electrical Power Distribution and Control
EPDCS - Electrical Power Distribution and Control System
       - Functional, Fahrenheit
F
       - Flight Critical
FC
       - Fault Detection Annunciation
FDA
       - Failure Mode
FM
       - Failure Mode and Effects Analysis
FMEA
FRCS
       - Forward Reaction Control System
       - Flight Systems Software Requirements
FSSR
ft
       - Feet
FU
       - Fuel
       - Gravity
       - Government Furnished Equipment
GFE
       - Gaseous Nitrogen
GN2
       - Guidance Navigation and Control
GNC
GPC
       - General Purpose Computer
GSE
       - Ground Support Equipment
       - Helium
He
HW
       - Hardware
Ηz
       - Hertz (cycles per second)
       - Independent Orbiter Assessment
IOA
       - Isolation
Isol
       - Johnson Space Center
JSC

    Launch Processing System

LPS
       - Line Replaceable Unit
LRU
       - Linear Variable Differential Transformer
LVDT
MCA
       - Motor Control Assembly
MCC
       - Mission Control Center (JSC)
```

- McDonnell Douglas Astronautics Company

MDAC

- Multiplexer/Demultiplexer MDM - Main Engine Cutoff MECO MM - Major Mode MM - major mode MMH - Monomethyl Hydrazine MNVR - Maneuver MOD - Mission Operations Directorate MSEC - millisecond N204 - Nitrogen Tetroxide - Not Applicable NA NASA - National Aeronautics and Space Administration NSTS - National Space Transportation System NTO - Nitrogen Tetroxide O.D. - Outside Diameter
OI - Operational Inst - Operational Instrumentation OI OMRSD - Operational Maintenance Requirements and Specifications Document OME - Orbital Maneuvering Engine OMS - Orbital Maneuvering System - Open OP - Operations OPS - Oxidizer OX OXID - Oxidizer PASS - Primary Avionics Software System - Push-Button Indicator PBI - Chamber Pressure PC - Potential Critical Item PCI 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 - Reaction Control System RCS 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 - Shuttle Flight Operations Manual SFOM - Systems Management SM SPEC - Specification STS - Space Transportation System - Subsystem Manager (NASA) SSM SSSH - Space Shuttle Systems Handbook - Software SW - Transatlantic Abort Landing TAL - Thrust Chamber Assembly TCA - Touch Down tatji kure t TD - Tank TK

TPS - Thermal Protection System
TVC - Thrust Vector Control

- Velocity, Volts

V

VLV - Valve

#### APPENDIX B

### DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

- B.1 Definitions
- B.2 Project Level Ground Rules and Assumptions
  B.3 OMS-Specific 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

<u>CREDIBLE (CAUSE)</u> - 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

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

<u>EARLY MISSION TERMINATION</u> - 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

<u>MAJOR MODE (MM)</u> - major sub-mode of software operational sequence (OPS)

<u>MC</u> - 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.)

<u>MULTIPLE ORDER FAILURE</u> - 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)

<u>LIFTOFF MISSION PHASE</u> - 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

<u>LANDING/SAFING PHASE</u> - 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 <u>NSTS 22206</u>, <u>Instructions for Preparation of FMEA/CIL</u>, <u>10 October 1986</u>, 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.

# APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

#### 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.

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#### 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)

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-100 03-3-1001	-1	NASA DATA: BASELINE NEW					
SUBSYSTEM: MDAC ID: ITEM:	OMS 100 TANK, HEL			ingto de la composición de la				
LEAD ANALYST:	C.D. PRUS	r		English of the street	1 A B LT			
ASSESSMENT:								
CRITICAL: FLIGHT	ITY R	EDUNDANCY	SCREENS	5	CIL ITEM			
HDW/FUI		В		C	11LM			
NASA [ 1 /1 .IOA [ 1 /1	<u>j</u> [	] [	] [		[ X ] *			
COMPARE [ /	] [	] [	] [	] .	[ ]			
RECOMMENDATIONS:	(If dif	ferent fr		ali na marana ang manana ang mana Manana ang manana ang	· Santa da S			
[ /	] [	] [	][	] (AI	[ ] DD/DELETE)			
* CIL RETENTION 1	RATIONALE:	(If appl		ADEQUATE NADEQUATE				
REMARKS: NO DIFFERENCES. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-101										
SUBSYSTEM: MDAC ID: ITEM:	OMS 101 TANK, HELI										
LEAD ANALYST: C.D. PRUST											
ASSESSMENT:											
CRITICAL FLIGH	ITY RE	DUNDANCY	SCREENS		CIL ITEM						
HDW/FU		В	C	C							
NASA [ 1 /1 IOA [ 1 /1	] [	] [	] [	]	[ X ] * [ X ]						
COMPARE [ /	] [	] [	] [	J	[ ]						
RECOMMENDATIONS:	(If diff	erent fr	om NASA)								
[ /	] [	] [	] [	] (AI	[ DD/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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-102 03-3-1002-1	NASA DATA: BASELINE [ ] NEW [ X ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 102 COUPLING, HELIUM FILL	
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
CRITICAL: FLIGHT	ITY REDUNDANCY SCREENS	TATEM
	NC A B	<b>C</b> ****
NASA [ 2 /1R IOA [ 2 /1R	] [F] [F] [ ] [P] [NA] [	P ] [ X ] * P ] [ X ]
COMPARE [ /	] [N] [N] [	] [ ]
RECOMMENDATIONS:	(If different from NASA)	
· [ 2 /1R	] [F] [F] [	P ] [ A ] (ADD/DELETE)
	RATIONALE: (If applicable) IN	ADEQUATE [ ] NADEQUATE [ ]
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-103 03-3-1002-3	1/01/88 NASA DATA: OMS-103 BASELINE 03-3-1002-3 NEW								
	OMS 103 COUPLING, HEL									
LEAD ANALYST:	C.D. PRUST	C.D. PRUST								
ASSESSMENT:										
CRITICAL FLIGH	ITY REDUN	DANCY SCRE		CIL ITEM						
HDW/FU	NC A	В	С							
NASA [ 3 /3 IOA [ 3 /3	] [ ]	[ ]	[ ]	[ ] *						
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]						
RECOMMENDATIONS:	(If differe	nt from NA	ASA)							
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* CIL RETENTION	RATIONALE: (If	applicabl	Le) ADEQUATE INADEQUATE							
REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".										
IOA RECOMMENDS T TO THE FAILURE M MODES AND ARE AD	ODES ON THIS F	MEA. THES	SE ARE CREDI	FLOW" BE ADDED BLE FAILURE						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-104	-2	NASA DATA: BASELINE [ ] NEW [ X ]						
SUBSYSTEM: MDAC ID: ITEM:	OMS 104 COUPLING,	HELIUM	FILL						
LEAD ANALYST:	C.D. PRUS	T							
ASSESSMENT:							<u> </u>		
CRITICAL		EDUNDANC	Y SCRE	ENS		CIL ITEM			
FLIGH HDW/FU	INC A		В	<b>C</b>		LIEM			
NASA [ 3 /3 IOA [ 3 /3	] [	] [	]	[ ]		[ ]	*		
COMPARE [ /	] [	] [	]	[ ]		[ ]			
RECOMMENDATIONS:	(If dif	ferent f	rom NA	SA)					
[ /	] [	ı [	]	[ ]	(AD	[ ] D/DEI	ETE)		
* CIL RETENTION	RATIONALE:	(If app	licabl	ADEQ	QUATE QUATE	[ ]			
REMARKS: IOA FAILURE MODE OPEN" AND "RESTE NO DIFFERENCES.			т ѕнои	LD NOT	INCLUD	E "FA	AILS TO		

ASSESSME ASSESSME NASA FME	TN	I		OMS	3-10 -3-1		-1			_		LINE	[	x ]		
SUBSYSTE MDAC ID:				OMS 105 LII	5	AND	MECI	HANIC	ΑL	FITTIN	GS-H	ELIU	M P	RES	su	RE
LEAD ANA	LY:	ST	:	C.I	). I	PRUS'	r					=				
ASSESSME	:NT	:														
	CR		ICAL LIGH			R	EDUN	DANCY	sc	CREENS			CI			
	1		W/FU			A		В		C						
NASA IOA	[	1	/1 /1	]		[	]	[ [	]	[ [	]		[ ]	х ] х ]	*	
COMPARE	[		/			[	]	[	]	[	]		[	]		
RECOMMEN	IDA'	TI	ons:		(If	dif	fere	nt fr	mc	NASA)						
	[		/	]		[	]	נ	]	[	]	(A	[ DD/	DEI	•	'E)
* CIL R	e <b>te</b> i	NT	ION	RAT:	ION	ALE:	(If	appl	ica	A	DEQU DEQU	ATE ATE	[	]	İ	
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ASSESSMENT ID: NASA FMEA #:						ASA DATA BASELINE NEW		]
SUBSYSTEM: MDAC ID: ITEM:	OMS 106 LINES AND	месна	NICA	L FIT		S-HELIU	M PR	ESSURE
LEAD ANALYST:	C.D. PRUS	T						
ASSESSMENT:								
FLIGH				SCREE			CIL ITE	
HDW/FU	INC A	7	В		С			
NASA [ / IOA [ 1 /1	] [	]	[	]	[	]	[ x	] * ]
COMPARE [ N /N	] [	]	[	]	[	]	[ N	]
RECOMMENDATIONS:	(If dif	ferent	fro	m NAS	SA)			
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* CIL RETENTION	RATIONALE:	(If a	ppli	cable	ΑI	EQUATE		]
REMARKS: IOA CAUSES ON AN BLOCKAGE"	ALYSIS SHE	ET SHO	ULD	NOT I			•	
NASA/RI DO NOT CONSTRUCTION OR DESTRUCTION OR DESTRUCTION OR DESTRUCTION OF DESTR	OVER RESTR DEFORMATION FECTS, HOW ESTIONABLE OR COMPO SSED ON TH	RICTED I (CRIM IEVER T I. ANY DNENT. IE FMEA	FLOW PING HE C CON IOA	REDIE	UCH SILIT IATIO MMEN	AN OCCUI TY OF SUC ON WOULD IDS THAT	RREN CH A FLO SUC	CE COULD N W TO H A

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-107 03-3-100		N	IASA DATA: BASELINE NEW						
0000	OMS 107 VALVE, H	ELIUM ISOI	ATION							
LEAD ANALYST:	ALYST: C.D. PRUST									
ASSESSMENT:										
CRITICALI FLIGHT		REDUNDANC	SCREENS		CIL ITEM					
HDW/FU		A I	3 (	2	TIDM					
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] [ ]	? ] [ I	? ]	[ X ] *					
COMPARE [ /	] [	] [	] [	]	[ ]					
RECOMMENDATIONS:	(If di	fferent fi	com NASA)							
[ /	.] [	] [	] [	] (AI	[ DD/DELETE)					
* CIL RETENTION I	RATIONALE	E: (If app	7	ADEQUATE ADEQUATE	[ ]					
REMARKS: NO DIFFERENCES FO SHEET OMS-111.										
IOA RECOMMENDS AN VIOLATION OF PRO					UT POSSIBLE					

ASSESSME ASSESSME NASA FME	ד ידיאי	D:	OMS-10	8(	03-	·1						ASA DATA: BASELINE NEW		]
SUBSYSTE MDAC ID: ITEM:			OMS 108 VALVE,	, F	ΗEΙ	IUM I	sc	)L/	ATION		-		a exist	
LEAD ANA	LYSI	::	C.D. I	PRU	JSI	1								
ASSESSME	NT:													
		CICAL	[TY		RE	DUND	/N(	CY	SCREE	ens	3		CIL	
			1C		A			В			С		1111	4
NASA IOA	[ 3 [ 3	3 /1R 3 /1R	]	[	P P	]	[	F F	]	[	P P	]	[ x	] * ]
COMPARE	[	/	]	[		]	[		]	[		]	[ N	J
RECOMMEN	IDATI	ONS:	(If	đi	Lff	erent	: 1	fro	om NAS	SA)				
	[	/	]	[		]	[		]	[		] (AI	[ DD/DI	] ELETE)
* CIL RE	TENI	I NOI	RATIONA	LI	Ξ:	(If a	pp	1:	icable			EQUATE	[	
												EQUATE	_	j
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														
REDUNDAN														

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-109 03-3-100	3-1		NASA DATA BASELINE NEW	
MDAC ID:	OMS 109 VALVE, H				
LEAD ANALYST:	C.D. PRU	IST			
ASSESSMENT:					
CRITICAL: FLIGHT		REDUNDAN	ICY SCREE	INS	CIL ITEM
	4C	A	В	С	
NASA [ 3 /1R IOA [ 3 /1R	] [	P ] [	F ] F ]	[ P ] [ P ]	[ x ] *
COMPARE [ /	] [	] (	: 1	[ ]	[ N ]
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)	
[ /	] [	] [	[ ]	(A)	[ ] DD/DELETE)
* CIL RETENTION 1	RATIONALE	E: (If ag	oplicable	ADEQUATE INADEQUATE	[ ]
REMARKS: NASA/RI ORIGINAL: FAIL PER IOA ISSI IOA RECOMMENDS AI PROP TANK OVERPRI	UE. DDING A S ESSURIZAT	STATEMENT	TO THE	EFFECTS ABO	UT POSSIBLE
REDUNDANCY (INCL	UDING THE	E PRESSUI	KE RELIER	ASSEMBLY).	

ASSESSMENT ASSESSMENT NASA FME	NT D. NT I: A #:	ATE: D:	1/01/8 OMS-1: 03-3-:	38 LO L101	-1			7.7	ASA DATA BASELINE NEW		]
SUBSYSTEM MDAC ID:			OMS 110 VALVE	, HE	LIUM	ISOL	ATION				
LEAD ANA	LYST	:	C.D. PRUST								
ASSESSME	NT:										
•			ITY	RI	EDUND	ANCY	SCRE	ENS		CIL	
		LIGH W/FU	AC L	A		В		С		ITE	<b>VI</b>
NASA IOA	[ 1	/1 /1	]	[	]	[	]	( (	]	( X	] *
COMPARE	[	/	]	[	]	[	]	[	]	[	]
RECOMMEN	DATI	ons:	(If	dif	feren	t fro	om NAS	SA)			
	[	/	]	[	]	[	]	[	] (A	[ DD/DI	] ELETE)
* CIL RE	rent:	ION I	RATIONA	ALE:	(If	appli	icable			r	1
									DEQUATE DEQUATE		]
REMARKS: NASA/RI A FMEA, ANI SHEET, PI	D TO ER I	ADD OA IS	CORRES	PONI	DING	RETE	NTION	RAT	IONALE T	O THI	E CIL
IOA RECOI										OT PO	POSTRUE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-111 03-3-1003-2		NASA DATA BASELINE NEW							
SUBSYSTEM: MDAC ID: ITEM:	AC ID: 111									
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL FLIGH	ITY REDUNDA	NCY SCRE	ENS	CIL ITEM						
:	NC A	В	С							
NASA [ 2 /1R IOA [ 2 /1R	[ P ] [ P ]	[ P ] [ F ]	[ P ] [ P ]	[ X ] * [ X ]						
COMPARE [ /	] [ ]	[ N ]	[ ]	[ ]						
RECOMMENDATIONS:	(If different	from NA	SA)							
[ 2 /1R	[P]	[ F ]	[ F ] (A	[ DD/DELETE)						
* CIL RETENTION	RATIONALE: (If a	pplicabl	ADEOHATE	[ ]						
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).										

ASSESSMI ASSESSMI NASA FMI	ENT	II	<b>5:</b>	OMS-112						ASA DATA: BASELINE NEW			
SUBSYSTE MDAC ID:			OMS 112 VALVE, HELIUM ISOLATION						ag.n;				
LEAD ANA	ST	•	C.D. PRUST										
ASSESSME	ENT	:						•					
		F	LIGH'			REDUNDANCY SO						CIL ITEM	
NASA IOA	[	3	/ /3	]	[	]	]	]	[	]	[	] * ]	
COMPARE	[	N	/N	1	[	]	[	]	E	]	[	]	
RECOMMENDATIONS: (If different from NASA)													
	[		/	1	[	]	[	] .	[	] (AI	[ DD/DE	] :LETE)	
* CIL RE	ETEI	NT	ION 1	RATIONA	LE:	(If a	ppli	icable		DEQUATE DEQUATE	[	]	
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".													

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-113	OMS-113 BASELIN						
SUBSYSTEM: MDAC ID: ITEM:	OMS 113 COUPLING-TEST P							
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
CRITICAL: FLIGH	ITY REDUNDA T	NCY SCREENS	CIL ITEM					
HDW/FUI		ВС						
NASA [ 3 /1R IOA [ 3 /1R	] [ F ] ] [ P ]	[F] [P] [P]	[ X ] * [ ]					
COMPARE [ /	] [ N ]	[и] [і]	[ N ]					
RECOMMENDATIONS:	(If different	from NASA)						
[ 3 /1R	] [F]	[F] [P]	[ A ] (ADD/DELETE)					
* CIL RETENTION	RATIONALE: (If a		ne r 1					
, , , , , , , , , , , , , , , , , , ,		ADEQUAT INADEQUAT	E [ ] E [ ]					
VERIFY CONDITION AGREES WITH NASA, IOA RECOMMENDS TO	OF CAP SEALS AF /RI FAILURE OF B HAT "POPPET FAIL E ON THIS FMEA.	S OPEN (DURING FLI THIS IS A CREDIBL	ON. IOA ALSO GHT)" BE ADDED					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-114	OMS-114 BASELINE							
SUBSYSTEM: MDAC ID: ITEM:	OMS 114 COUPLING-TE	ST PORT, HI	GH PRESSURE	HELIUM					
LEAD ANALYST:	C.D. PRUST								
ASSESSMENT:									
CRITICAL FLIGH	ITY REI	OUNDANCY SCR	REENS	CIL ITEM					
HDW/FU	NC A	В	C . Att	PA,					
NASA [ 3 /3 IOA [ 3 /3	] [ ]	[ ]	[ ]	[ ] *					
COMPARE [ /	] [ ]	[. ]	[ ]	[ ]					
RECOMMENDATIONS:	(If diffe	erent from N	IASA)						
[ 3 /3	] [ ]	[ ]	. [ ]	[ ] ADD/DELETE)					
* CIL RETENTION	RATIONALE: (	If applicab	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.									

ASSESSMEN ASSESSMEN NASA FMEA	T II	D:	1/01/ OMS-1 03-3-	15	-2		BASELINE [ ] NEW [ X ]						
SUBSYSTEM MDAC ID: ITEM:	:		OMS 115 COUPL	15 OUPLING-TEST PORT, HIGH PRESSURE HEI									
LEAD ANAL	YST	r: c.D. PRUST											
ASSESSMEN	T:	٠											
							CI	L EM					
			NC	A		F	3	C	!				
NASA IOA	[ 3 [ 3	/3 /3	]	[ [	]	[	]	] [	]	]	]	*	
COMPARE	[	/	]	[	]	[	]	[	]	[	]		
RECOMMEND	ATI	ons:	(If	dif	fere	nt fr	om N	ASA)					
	[	7	]	[	]	[	]	[	]	[ (ADD/	DELE	ETE)	
* CIL RET	'ENT	ION 1	RATION	ALE:	(If	appl	icab.	A	DEQUAT		]		
REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW". NO DIFFERENCES.													

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-116	BASELINE NEW							
SUBSYSTEM: MDAC ID: ITEM:	OMS 116	MS							
LEAD ANALYST: C.D. PRUST									
ASSESSMENT:									
CRITICAL: FLIGHT		· <del>-</del>	CIL ITEM						
HDW/FUI		<b>B C</b> $\gamma_{113_1,\dots,3_k,12_{k+1}}$							
NASA [ 1 /1 IOA [ 2 /1R	] [ ] [ ] [ P ]	P ] [ P ]	[ X ] * [ X ]						
COMPARE [ N /N	] [N][	N ] [ N ]	[ ]						
RECOMMENDATIONS:	(If different i	from NASA)							
. [ /	] [ ] [	] ·[ ] (AD	[ ] D/DELETE)						
* CIL RETENTION I	RATIONALE: (If app	olicable) 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.									

NASA DATA:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-117 NONE		NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 117 LINES AND ME	CHANICAL FITT	'INGS-HELIUM	M PRESSURE
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL: FLIGH		NDANCY SCREEN	rs	CIL ITEM
	NC A	В	С	
NASA [ / IOA [ 2 /1R	] [ p ]	[ ] [ [ <b>F</b> ] [	<b>P</b> ]	[ X ]
COMPARE [ N /N	] [N]	[ N ]	N ]	[ N ]
RECOMMENDATIONS:	(If differ	ent from NASA	7)	
[ /	] [ ]	[ ] [	[ ] (AI	[ DD/DELETE)
* CIL RETENTION	RATIONALE: (I		ADEQUATE NADEQUATE	[ ]
REMARKS: IOA CAUSES ON AN. BLOCKAGE".	ALYSIS SHEET	SHOULD NOT IN	CLUDE "FILT	TER
NASA/RI DO NOT COORSTRUCTION OR DO	EFORMATION (C	RIMPING). SU	ICH AN OCCUP	RRENCE COULD
RESULT IN 2/1R P. OCCURRENCE IS QU	ESTIONABLE.	ANY CONTAMINA	ATION WOULD	FLOW TO
DOWNSTREAM FILTE FAILURE BE ADDRES RECOMMENDATION A	SSED ON THE F	MEA/CIL, BUT	MENDS THAT DOES NOT RE	SUCH A EGARD THIS

ASSESSMEN ASSESSMEN NASA FMEA	T I	D:	OMS-1	18		-1						ASA DAT BASELII NI	NE	[		]	1841 -
SUBSYSTEM MDAC ID: ITEM:			OMS 118 REGUL	ATC	or.	ASSY		HE	LIU	M PR	ESS	SURE					
LEAD ANAL	YST	:	C.D. 1	PRI	JST	r											
ASSESSMEN	T:																
C	F	LIGH					AN			REEN					L EM		
	HD	w/FUI	NC		A			В			С						
NASA IOA	[ 3 [ 2	/1R /1R	]	[	P P	]	[	F F	]	[	P P	]		[	X X	]	*
COMPARE	[ N	/	]	[		]	[		]	[		]		[		]	
RECOMMEND	ITA	ons:	(If	d:	Ĺfſ	feren	t	fro	o <b>m</b>	NASA	)						
	[	/	]	[		]	[		]	(		]	(AD		DE		ETE)
* CIL RET	ENT	ION 1	RATION	ALI	Ξ:	(If	ap	pl:	ica	ble)	AI	DEQUATI	E	 ſ	:	1	
REMARKS: IOA AGREE	re w	रक्ष १	NACA/D	7 1	ייעכ	PTONA'	न. न.	F(	מר			DEQUATI DEQUATI					
AGREED TO CRITICALI	RE TY,	MOVE PER	STATE	MEI SSU	VT JE.	IN E	FF	EC.	rs	WHIC	H I	DESCRI	BES	2	2/1	LR	
				-						n ta la							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-119			NASA DATA BASELINE NEW				
SUBSYSTEM: MDAC ID: ITEM:	OMS 119 REGULAT							
LEAD ANALYST: C.D. PRUST								
ASSESSMENT:								
CRITICALITY REDUNDANCY SCREENS C								
	NC	A	В	С	ITEM			
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] P ]	[ P ] [ F ]	[ F ] [ P ]	[ X ] * [ X ]			
COMPARE [ /	] [	]	[и]	[и]	[ ]			
RECOMMENDATIONS:	(If d	ifferent	from NAS	5A)				
[ 2 /1R	[	P ]	[ F ]	[ F ] · (A	[ ] DD/DELETE)			
* CIL RETENTION	RATIONAL	E: (If a	pplicable	<b>ΑΠΕΛΙΙΑΠΕ</b>	[ ]			
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.								

SUBSYSTEM: OMS	ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-120 03-3-100	4-2		BASELINE NEW	
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT HDW/FUNC A B C  NASA [ 2 / 1R ] [ P ] [ P ] [ F ] [ X ] * IOA [ 2 / 1R ] [ P ] [ F ] [ N ] [ N ] [ N ]  COMPARE [ / ] [ ] [ N ] [ N ] [ N ] [ ]  RECOMMENDATIONS: (If different from NASA)  [ 2 / 1R ] [ P ] [ F ] [ F ] [ ]  * CIL RETENTION RATIONALE: (If applicable)  * CIL RETENTION RATIONALE: (If applicable)  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	MDAC ID:	0MS 120				र चर्मा ।
CRITICALITY REDUNDANCY SCREENS CIL ITEM HDW/FUNC A B C  NASA [ 2 /1R ] [ P ] [ P ] [ F ] [ X ] * IOA [ 2 /1R ] [ P ] [ F ] [ X ] * IOA [ 2 /1R ] [ P ] [ F ] [ N ]	LEAD ANALYST:	C.D. PRU	ST			
FLIGHT HDW/FUNC A B C  NASA [ 2 /1R ] [ P ] [ P ] [ F ] [ X ] * IOA [ 2 /1R ] [ P ] [ F ] [ N ] [ X ]  COMPARE [ / ] [ ] [ N ] [ N ] [ ]  RECOMMENDATIONS: (If different from NASA)  [ 2 /1R ] [ P ] [ F ] [ F ] [ ] (ADD/DELETE)  * CIL RETENTION RATIONALE: (If applicable)  * CIL RETENTION RATIONALE: (If applicable)  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	ASSESSMENT:					to president and security
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	FLIGH!	r				
RECOMMENDATIONS: (If different from NASA)  [ 2 /1R ] [ P ] [ 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	NASA [ 2 /1R IOA [ 2 /1R	] . [	P ]   P ]	[ P ] [ F ]	[ F ] [ P ]	[ X ] * [ X ]:
[ 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	COMPARE [ /	] [	]	[и]	[и]	[ ]
* 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	RECOMMENDATIONS:	(If di	fferent	from NAS	A)	
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	[ 2 /1R	] [	P ] .	[ <b>F</b> ]	[ F ] (A)	[ ] DD/DELETE)
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	* CIL RETENTION 1	RATIONALE	: (If ap	_	ADEQUATE	
	IOA RECOMMENDS TI REGULATOR WOULD I IOA ACCEPTS NASA, IOA ALSO RECOMME	NOT BE DE /RI FAILU NDS ADDIN	TECTABLI TRE OF C IG A STAT	BE FAILE E DURING SCREEN. TEMENT TO	D. A FAILE DUAL-LEG OPI THE EFFECTS	CLOSED ERATION.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-121	04-2		NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	121	OR ASSEM	BLY, HELIU	M PRESSURE	
LEAD ANALYST:	C.D. PRO	JST			
ASSESSMENT:					
CRITICAL FLIGH	CIL ITEM				
HDW/FU		A	В	C	
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] P ]	[ P ] [ [ F ] [	F ] P ]	[ X ] *
COMPARE [ /	] [	]	[ N ] [	[ N ]	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NASA	7)	
[ 2 /1R	] [	P ]	[ F ] [		[ ] DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a		ADEQUATE INADEQUATE	
REMARKS: IOA RECOMMENDS T	ዘልጥ ጥ <b>ዞ</b> ድ ነ	R SCRFFN	FE FATLE	). A FATLEI	CLOSED
REGULATOR WOULD	NOT BE D	ETECTABL	E DURING I	OUAL-LEG OPI	ERATION.
IOA ACCEPTS NASA IOA ALSO RECOMME POSSIBLE VIOLATI	NDS ADDI	NG A STA	TEMENT TO		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-122	1-1		NASA DATA: BASELINE NEW	
MDAC ID:	OMS 122 REGULATO	R ASSEMB	LY, HELI	UM PRESSURE	·
LEAD ANALYST:	C.D. PRU	ST			
ASSESSMENT:					i i i i i i i i i i i i i i i i i i i
CRITICAL: FLIGHT HDW/FUI	r	REDUNDAN A	CY SCREE	cns C	CIL ITEM
NASA [ 1 /1 IOA [ 2 /1R	] [	p ] [	p ]	[ ] [ P ]	[ X ] * [ X ]
COMPARE [ N /N	] [	и] [	n ]	[ N ]	[ ]
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)	
[ /	] [	] [	]		[ ] DD/DELETE)
* CIL RETENTION 1	RATIONALE	: (If ap	plicable	ADEQUATE INADEQUATE	[ ]
REMARKS: NASA/RI AGREED TO THIS FMEA, AND TO CIL SHEET PER IO IOA AGREES WITH I CRITICALITY.	O ADD COR A ISSUE. NASA/RI R	RESPONDI EEVALUAT	NG RETEN	TO THE ITENTION RATIONALE FO	M LIST ON ALE TO THE OR A 1/1
IOA RECOMMENDS A	DDING A S	TATEMENT	TO THE	EFFECTS ABOU	UT POSSIBLE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 OMS-123 03-3-120	95-1		NASA DATA: BASELINE NEW					
MDAC ID:	123	3 OUPLING-TEST PORT, VAPOR ISOLATION							
LEAD ANALYST:	C.D. PRU	JST							
ASSESSMENT:									
FLIGH		REDUNDANC A	Y SCREENS B	c c	CIL ITEM				
NASA [ 3 /1R IOA [ 3 /1R	] [	F ] [ P ] [	F ] [ NA] [	P ] P ]	[ X ] *				
COMPARE [ /	] [	N ] [	и][	]	[ N ]				
RECOMMENDATIONS:	(If di	ifferent f	rom NASA						
[ 3 /1R	] [	F ] [	F ] [	P ] (AI	[ A ] DD/DELETE)				
* CIL RETENTION	RATIONALI	E: (If app		ADEQUATE NADEQUATE	[ ]				
REMARKS: IOA AGREES WITH CONDITION OF CAP WITH NASA/RI FAI IOA RECOMMENDS T AS A FAILURE MOD AND IS ADDRESSED	SEALS AND LURE OF NEW THAT "POPINE ON THIS	FTER CAP I B SCREEN. PET FAILS B FMEA. I	OPEN (DUI	ION. IOA A RING FLIGHT	ALSO AGREES []" BE ADDEI				
14.5 10 1100110000	· · · · · · · · · · · · · · · · · · ·	<u>.                                    </u>							

ASSESSMENT ASSESSMENT NASA FMEA	ID:	OMS-12	1/01/88 NASA DATA: OMS-124 BASELINE 03-3-1205-3 NEW							]	
SUBSYSTEM: MDAC ID: ITEM:		OMS 124 COUPLI									OUT
LEAD ANALY	ST:	C.D. P	D. PRUST								
ASSESSMENT	?:										
CR	RITICALI FLIGHT		RE	DUND	ANCY	SCREE	ens		CIL	4	
	HDW/FUI		A		В		С			_	
NASA [ IOA [	3 /3	]	[	]	[	]	[	]	[	]	*
COMPARE [	. /	]	[	]	[	]	[	]	[	]	
RECOMMENDA	TIONS:	(If	diff	eren	t fro	om NAS	SA)				
. [	3 /3	]	[	]	[	]	[	] (A)	[ DD/DI	] ELE	TE)
* CIL RETE	ENTION I	RATIONA	LE:	(If	appl	icable	Al	DEQUATE	•	֖֚֭֝֞֞֝֞֝֟ <b></b>	-
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 DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-125 03-3-1205-	-2	NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTEM: MDAC ID: ITEM:	OMS 125 COUPLING-T	EST PORT,	, VAPOR	ISOLATION	CHECK-OUT			
LEAD ANALYST:	C.D. PRUST	?						
ASSESSMENT:		•						
CRITICAL		DUNDANCY	SCREEN	S	CIL ITEM			
FLIGH HDW/FU		В		С	TIEM			
NASA [ 3 /3 IOA [ 3 /3	] [	] [	] [	].	[ ] *			
COMPARE [ /	] [	] [	] [	]	[ ]			
RECOMMENDATIONS:	(If diff	ferent fro	om NASA	) .				
[ /	] [	] [	] [	] (A	[ ] DD/DELETE)			
* CIL RETENTION	RATIONALE:	(If appl:		ADEQUATE NADEQUATE				
REMARKS: IOA FAILURE MODE OPEN" AND "RESTR NO DIFFERENCES.			SHOULD	NOT INCLU	DE "FAILS TO			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-126 03-3-1006-2		8 NASA DATA: 6 BASELINE .006-2 NEW			
SUBSYSTEM: MDAC ID:			ZIDIZER			
LEAD ANALYST:	C.D. PRUST					
ASSESSMENT:	·					
CRITICAL: FLIGHT	ITY REDUNI		ıs	CIL		
HDW/FUI		В	C			
NASA [ 2 /1R IOA [ 2 /1R	] [ P ]	[ F ] [ [ P ] [	P ] P ]	[ X ] *		
COMPARE [ /	] [ ]	[и] [	1	[ ]		
RECOMMENDATIONS:	(If differer	nt from NASA	7)			
[ /	1 . [ 1	[ ] [	[ ] (A)	[ ] DD/DELETE)		
* CIL RETENTION 1	RATIONALE: (If		ADEQUATE NADEQUATE			
REMARKS: IOA ACCEPTS NASA, FAILURE MODE. HO MODE TO BE READI: SHEET OMS-130.	OWEVER, IOA CON LY DETECTABLE I	SIDERS THE OURING FLIGH	FAILED OPEN IT. SEE ASS	N FAILURE SESSMENT		
IOA RECOMMENDS AN VIOLATION OF PRO	DDING STATEMENT PELLANT TANK LA	TO THE EFF ANDING CONST	ECTS ABOUT RAINT.	POSSIBLE		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-127 03-3-1006-1		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:	OMS 127 VALVE, VAPOR I		IDIZER	
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICALI FLIGHT	TY REDUNE	DANCY SCREENS	5	CIL ITEM
HDW/FUN	NC A	В	С	
NASA [ 3 /3 IOA [ 3 /1R	] [ p ]	[	P ]	[ x ] *
COMPARE [ /N	] [ N ]	[и].	N ]	[ N ]
RECOMMENDATIONS:	(If differen	nt from NASA	)	
[ 3 /1R	] [P]	[ F ] [	P ] (A	[ A ] DD/DELETE)
* CIL RETENTION F	RATIONALE: (If	applicable)	ADEQUATE NADEQUATE	[ ]
REMARKS:  10A RECOMMENDS THE 3/1R PFP AND PLACE VALVE AND SERIES UPSTREAM COMPONEN OF PROP TANK REPE DEPLETE OMS PROP, A POSSIBLE HYPERO FAILURE OF ONE LE DETECTABLE DURING	CED ON THE CIL. OXID CHECK VAI NTS BY PROP OR RESS CAPABILITY , AND OXIDIZER GOLIC REACTION EG OF REDUNDANC	AND FAILURE IN WITH FAILS LVE POPPETS, PROP VAPORS RESULTING CROSSOVER TO IN THE LINES	MODE BE UPOPEN VA THE CONTAI COULD RESI IN INABILITY THE FUEL	GRADED TO A POR ISOL MINATION OF ULT IN LOSS TY TO USE OR SIDE CAUSING

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-128 03-3-1006-1	NASA DATA: BASELINE [ ] NEW [ X ]
SUBSYSTEM:	OMS 128 VALVE, VAPOR ISOLATION-OX	XIDIZER
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
CRITICAL: FLIGH	ITY REDUNDANCY SCREEN	IS CIL ITEM
HDW/FU	NC A B	C
NASA [ 3 /3 IOA [ 3 /1R	] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [	[ ] * [ X ]
COMPARE [ /N	] [и] [и] [	[ N ] [ N ]
. RECOMMENDATIONS:	(If different from NASA	7)
[ 3 /1R	] [P] [F]	[P] [A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applicable)	ADEQUATE [ ]
3/1R PFP AND PLA ISOL VALVE AND S OF UPSTREAM COMP IN LOSS OF PROP USE OR DEPLETE O CAUSING A POSSIB FAILURE OF ONE L	HAT THIS ITEM AND FAILURE CED ON THE CIL. WITH INTE ERIES OXID CHECK VALVE POR ONENTS BY PROP OR PROP VAINTANK REPRESS CAPABILITY RE MS PROP, AND OXIDIZER CROSS LE HYPERGOLIC REACTION IN EG OF REDUNDANCY (CHECK VAINTANCE).	MODE BE UPGRADED TO A ERNALLY LEAKING VAPOR PPETS, THE CONTAMINATION PORS COULD RESULT ESULTING IN INABILITY TO SOVER TO THE FUEL SIDE THE LINES.

ASSESSME ASSESSME NASA FME	NT NT A #	DATE: ID:	1/01/ OMS-1 03-3-	1/01/88 OMS-129 03-3-1101-1					ASA DATA BASELINE NEW		[ ]	
SUBSYSTE MDAC ID: ITEM:	: M:		OMS 129 VALVE			oxid	OIZER					
LEAD ANA	LYS	T:	C.D.	PRUS	T							
ASSESSME	NT:											
	CRI	TICAL		R	EDUNI	DANCY	SCRE	ENS		CII		
	H			A B			C	;	TIEN			
NASA IOA	[	1 /1 1 /1	]	[	]	[ [	]	[	]	[ ]	<pre>[ ]</pre>	*
COMPARE	[	/	]	τ	]	[	]	[	]	[	]	
RECOMMEN	ŢAGI	cions:	(If	dif	fere	nt fr	om NA	SA)				
	[	/	]	ί	] .	[	1	[	] (A	[ .DD/I		ETE)
* CIL RE	ETEN	TION	RATION	ALE:	(If	appl	icabl	74	DEQUATE	[	]	
REMARKS: NASA/RI FMEA, AN STREET,	AGF	O ADD	CORRE	SPON	VAL DING	VE BO RETE	DY TO NTION	THE	ITEM LI	ST	ON S	THIS CIL
IOA RECO	MME	ENDS A	DDING	A ST	ATEM Y MA	ENT T SS PR	O THE	E EFF	FECTS ABO CONSTRAI	UT I	os:	SIBLE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 OMS-130 03-3-1006-2	:	NASA DATA: BASELINE NEW	
MDAC ID:	OMS 130 VALVE, VAPOR ISO		DIZER	
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICALI FLIGHT	ITY REDUNDAN	ICY SCREENS		CIL ITEM
	NC A	В	C	+ + ***.
NASA [ 2 /1R IOA [ 2 /1R	] [ P ] [	F ] [	P ] P ]	[ X ] *
COMPARE [ /	] [ ] [	] [	]	[ ]
RECOMMENDATIONS:	(If different	from NASA)		
[ /	] [ ] [	] [	] (AD	[ ] D/DELETE)
* CIL RETENTION F	RATIONALE: (If ag	oplicable) IN	ADEQUATE ADEQUATE	[ ]
NASA/RI ORIGINALI FLOW). HOWEVER, MODES ON 03-3-100 "FAIL".	NASA/RI ADDED "F 06-2 (FAILS CLOSE	RESTRICTED ( ED), AND CH	FLOW" TO T ANGED THE	HE FAILURE B SCREEN TO
IOA RECOMMENDS AT VIOLATION OF THE	PROPELLANT TANK	LANDING CO	NSTRAINT.	T POSSIBLE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-131			NASA DATA BASELINI NEV					
SUBSYSTEM: MDAC ID: ITEM:	131								
LEAD ANALYST:	C.D. PRU	JST							
ASSESSMENT:									
FLIGH	T	REDUNDANC			CIL				
HDW/FU	NC	A	В	С					
NASA [ / IOA [ 3 /3	] [	] [	]	[ ] [ ]	[	] *			
COMPARE [ N /N	] [	] [	]	[ ]	[	]			
RECOMMENDATIONS:	(If di	ifferent f	rom NAS	A)					
[ /	] [	] [	]	[ ]		] ELETE)			
* CIL RETENTION	RATIONALE	E: (If app		) ADEQUATE INADEQUATE	[	]			
REMARKS: NASA/RI DID NOT AGREES WITH NASA THE FMEA/CIL. W "FAILS TO OPEN".	/RI THAT ORST CASE	THIS FAIL	MODE (	DELAYED OPI E NEED NOT	ERATI BE A	ON). IOA			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-132 03-3-1007	-2		NASA DATA: BASELINE [ ] NEW [ X ]				
MDAC ID:	OMS 132 VALVE, QU	AD CHE	CCK VALVES	<b>S</b>				
LEAD ANALYST:	C.D. PRUS	T						
ASSESSMENT:								
CRITICAL FLIGH		EDUNDA	NCY SCREI	ens	CIL ITEM			
HDW/FU	7		В	C	11211			
NASA [ 2 /1R IOA [ 2 /1R	] [ P	]	[ F ] [ F ]	[ P ] [ P ]	[ X ] *			
COMPARE [ /	] [	]	[ ]	[ ]	[ ]			
RECOMMENDATIONS:	(If dif	ferent	from NAS	SA)				
[ /	] [	]	[ ]	[ ] (A)	[ ] DD/DELETE)			
* CIL RETENTION I	RATIONALE:	(If a	ipplicable	e) ADEQUATE INADEQUATE	[ ]			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-133 03-3-1007-1	NASA DATA: BASELINE [ ] NEW [ X ]
	OMS 133 VALVE, QUAD CHECK VALVES,	FUEL
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
CRITICAL: FLIGH	ITY REDUNDANCY SCREENS	CIL ITEM
	<del>-</del>	С
NASA [ 3 /3 IOA [ 2 /1R	] [ ] [ ] [ ] [ P ] [ F ] [	P ] [ ] *
COMPARE [ N /N	] [и] [и] [	и] [и]
RECOMMENDATIONS:	(If different from NASA)	-
[ 2 /1R	] [P] [F] [	P ] [ A ] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applicable)	ADEQUATE [ ] ADEQUATE [ ]
2/1R PFP AND PLA WITH FAILED OPEN UPSTREAM COMPONE IN LOSS OF PROP USE OR DEPLETE OF CAUSING A POSSIB	HAT THIS ITEM AND FAILURE M CED ON THE CIL (SEPARATE FR FUEL CHECK VALVE POPPETS, NTS BY PROP OR PROP VAPORS TANK REPRESS CAPABILITY RES MS PROP, AND FUEL CROSSOVER LE HYPERGOLIC REACTION IN T OPPET IS NOT DETECTABLE DUR	ODE BE UPGRADED TO A OM THE OXIDIZER ASSY) THE CONTAMINATION OF COULD RESULT ULTING IN INABILITY TO THE OXID SIDE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-134 03-3-1007	-1	e es s	NASA DATA: BASELINE NEW	: [
	OMS 134			OXIDIZER	
LEAD ANALYST:	C.D. PRUS	T			
ASSESSMENT:					ny mandra <u>d</u> a matana
CRITICAL FLIGH	ITY R	EDUNDANC	Y SCREEN		CIL ITEM
HDW/FU	NC A		В	<b>C</b>	
NASA [ 3 /3 IOA [ 3 /1R	] _ [ P	] [	F ] [	P ]	[ X ] *
COMPARE [ /N	] [ N	] [	N ] [	n j	[ N ]
RECOMMENDATIONS:	(If dif	ferent f	rom NASA	<b>.</b> )	<u></u>
[ 3 /1R	] . [ P	] [	F ] [		[ A ] DD/DELETE)
* CIL RETENTION	RATTONALE:	(If app	licable)		
		( ~PP		ADEQUATE NADEQUATE	
REMARKS:		MD14 3.11D		MODE DE UDA	SDADED MO A
IOA RECOMMENDS TO 3/1R PFP AND PLACE	CED ON THE	CIL (SE	PARATE F	ROM THE FUL	EL ASSY).
WITH FAILED OPEN	OXID CHEC	K VALVE	POPPETS	AND VAPOR I	ISOL VALVE,
THE CONTAMINATION PROP VAPORS COUL					CADARTITTY
RESULTING IN INA	BILITY TO	USE OR D	EPLETE O	MS PROP, AN	ND OXID
CROSSOVER TO THE	FUEL SIDE	CAUSING	A POSSI	BLE HYPERGO	OLIC REACTION
IN THE LINES.	ODDET TO M	<u> የተመድረ</u>	TARLE DI	PTNG FITCH	r /FATT. R
SCREEN).	OEEEI IS N	OI DELEC	TYDDG DA	Wind Luigh	r (term n

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-135 03-3-110	1-1		NASA DATA BASELINE NEV				
SUBSYSTEM: MDAC ID:	OMS 135	OMS						
LEAD ANALYST:	C.D. PRU	ST						
ASSESSMENT:				·				
CRITICAL FLIGH	ITY	REDUNDAN	CY SCREE	INS	CIL ITEM			
		A	В	С	112			
NASA [ 1 /1 IOA [ 1 /1	] [	] [	]	[ ]	[ X ] * [ X ]			
COMPARE [ /	] [	] [	]	[ ]	[ ]			
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)				
[ /	] [	] [	]		[ ] ADD/DELETE)			
* CIL RETENTION	RATIONALE	: (If ap	plicable	ADEQUATE INADEQUATE	[ ]			
REMARKS: NASA/RI AGREED T	דאי ממג סי	S WAINE	BODY TO					
FMEA, AND TO ADD	CORRESPO	NDING RE	ETENTION	RATIONALE S	TO THE CIL			
SHEET, PER IOA I IOA RECOMMENDS A	DDING A S	TATEMENT	TO THE	EFFECTS ABO	OUT POSSIBLE			
VIOLATIONS OF OR ABOUT POSSIBLE P	ROP OR PR	OP VAPOR	R LEAKAGE	E RESULTING	IN POSSIBLE			
CORROSTON, FIRE.	FYDIACTA	N AND EX	CPOSURE C	F EVA AND (	GROUND CREWS			

ASSESSMENT DA ASSESSMENT ID NASA FMEA #:	TE: 1/01/8 : OMS-13 03-3-1	8 6 .007-3		NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTEM: MDAC ID: ITEM:	OMS 136 VALVE,								
LEAD ANALYST:	C.D. F	RUST							
ASSESSMENT:				•					
	CALITY IGHT	REDU	JNDANCY	SCREE	NS		CIL		
	/FUNC	A	В		С			••	
NASA [ 1 ]	/1 ] /1 ]	[ ]	[	]	[	]	[ X	]	*
COMPARE [	/ 1	[ ]	[	]	[	]	[	]	
RECOMMENDATIO	NS: (If	diffe	rent fr	om NAS	A)				
ι	/ ]	[ ]	[	]	[	] (Al	[ DD/D		TE)
* CIL RETENTI	ON RATIONA	ALE: (	[f appl	icable	) AI TNAI	EQUATE EQUATE	[	]	
REMARKS: NASA/RI ORIGI FLOW OF SINGL FMEA (03-3-10	E INLET FI	LTER)	. NASA	IS FAI /RI AG	LURE REEL	MODE (I	REST THI	RIC S N	EW

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-137	5-1	BASELINE [ ] NEW [ X ]						
	OMS 137 COUPLING	-TEST POF	RT, QUAD	CHECK VALVI	3				
LEAD ANALYST:	C.D. PRU	ST							
ASSESSMENT:									
CRITICAL: FLIGHT	ITY	REDUNDANC	CY SCREEN	S	CIL ITEM				
HDW/FUI		A	В	С	TIEM				
NASA [ 3 /1R IOA [ 3 /1R	] [	F ] [ P ] [	F ] [ NA] [	P ] P ]	[ X ] *				
COMPARE [ /	] [	и][	и][	]	[ N ]				
RECOMMENDATIONS:	(If di	fferent f	from NASA	)					
[ 3 /1R	] [	F ] [	F ] [	P ] (AI	[ A ] OD/DELETE)				
* CIL RETENTION	RATIONALE	: (If app	•	ADEQUATE NADEQUATE	[ ]				
REMARKS:									
IOA AGREES WITH I									
WITH NASA/RI FAIL	нат "РОРР	ET FAILS	OPEN (DU	RING FLIGHT	r)" BE ADDED				
AS A FAILURE MODE	E ON THIS	FMEA. T	THIS IS A	CREDIBLE 1	FAILURE MODE				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:					OMS	-138	i <b>-</b> 3		NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYST MDAC ID ITEM:		:		51 3 1	OMS 138 COU	PLING-	·TEST	r port	, QU	JAD CH	IECK	VAL	VE	3		
LEAD AN	AL	YS	T	:	C.D	. PRUS	T									
ASSESSM	EN'	T:														
	C			ICA LIGI		F	EDUI	NDANCY	SCF	REENS			CII			
					UNC	A		В		C	:					
NASA IOA		[	3 3	/3 /3	]	[	]	[	]	[	]	. <del>-</del> ·	[ [	]	*	
COMPARE		[		/	]	[	]	[	]	[	]	•	Γ	]		
RECOMME	ND.	ΑT	I	ons	: (	If dif	fere	ent fr	om N	IASA)						
		[	3	/3	]	[	]	. [	] _	C	]	(.	[ ADD/I	] DELE	TE)	
* CIL R		EN	T:	ION	RATI	ONALE:	(II	f appl	icak	A		UATE UATE		]		
REMARKS	: T.IT	RE	1	MODI	ES ON	ANAT.Y	SIS	SHEET	SHC	OULD I	NCL	UDE	"FAII	LS C	LOSED"	
IOA FAI AND "RE	OI.	$L_{T}$	u.	لانتد	LTOH	•										
IOA REC TO THE MODES A	FA	ΙL	U)	RE I	MODES	ON TH	IIS I	MEA.	THE	SE AR	E C	REDI				
								~- #								

有許多寶麗等的 医铁马氏 医神经氏征炎

ASSESSMENT ASSESSMENT NASA FMEA #	ID:	1/01/88 OMS-139 03-3-120	)5-2		NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM:		OMS 139 COUPLING										
LEAD ANALYS	T:	C.D. PRUST										
ASSESSMENT:												
	TICALI FLIGHT	•	REDUND	ANCY	SCREEN	S		CII				
	DW/FUN		A B			С		111	<b>311</b>			
NASA [ IOA [	3 /3 3 /3	] [	]	[ [	] [	]		[	] <b>*</b>			
COMPARE [	/	] [	]	[	] [	]		[	]			
RECOMMENDAT	ions:	(If d	ifferen	t fro	om NASA	.)						
[	/	] [	3	[	] [	3	(AD	[ DD/I	] DELETE	)		
* CIL RETEN	TION R	LIANOITA	E: (If	appl:	icable)	ADEC	QUATE	[	]			
DEWARKS.					I		QUATE		]			
REMARKS: IOA FAILURE OPEN" AND " NO DIFFEREN	RESTRI			HEET	SHOULD	NOT	INCLUE	E '	'FAILS	TO		

ASSESSMI ASSESSMI NASA FMI	I	D:	OMS	-140		NASA DATA: BASELINE [ ] NEW [ ]								
SUBSYSTIMDAC ID		\$ + · [		OMS 140 LIN		) MEC	CHANIC	AL I	FITTIN	IGS-HI	ELIŲ	M PI	RESS	URE
LEAD AND	ALY	ST	:	C.D	. PRUS	ST								
ASSESSMI	ENŢ	:												
	LIGI	HT	F							CII				
		HDI	N/FI	JNC	I	1	В			•				
NASA IOA	[	3	/ /3	]	[	]	[	] ]	]	]		[	]	*
COMPARE	[	N	/N	]	[	]	[	]	[	]		[	]	
RECOMME	NDA	TI	ONS	: (	If dif	fere	ent fr	om 1	NASA)					
	[		/	]	. [	]	[	]	ľ	]	(Ai		] DELE	TE)
* CIL R		NT:	ION	RATI	ONALE:	(If	appl	ical	A	DEQUA			]	
REMARKS IOA CAUS BLOCKAG	SES	O	N Al	NALYS	IS SHI	EET	HOULD	NO	r inci	UDE '	'FIL	rer		1.12. 1.11.
NASA/RI	DO	N	OT (	COVER	REST	RICTE	ED FLO	W II	N A SE	GMENT	OF	LI	NE D	UE TO
OBSTRUC	rio	N (	OR	DEFOR	MATION	(CF	RIMPIN	G).	SUCH	I AN (	CCUI	REI	VCE	COULD
RESULT :	NCE TN	3/. T:	S OI	TESTI	S, HOV ONABLE	vever	NY CO	NTAI	MINATI	ON WO	ULD	FL(	W T	0
DOWNSTR	EAM	F	ILT	ER OR	COMPO	NENT	r. IO	A R	ECOMME	NDS 7	TAH	SUC	CH A	
FAILURE RECOMMEN	BE NDA	A TI	DDRI ON I	essed As an	ON TH	IE FN ISSU	MEA/CI JE.	L, 1	BUT DO	es no	T RI	<b>EGAI</b>	RD T	HIS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-141								
MDAC ID:	OMS 141 VALVE-PR	ESSURE	SEMBLY						
LEAD ANALYST:	C.D. PRU	ST		-					
ASSESSMENT:	•								
CRITICAL FLIGH HDW/FU		REDUNDA A	NCY SCREE	ens C	CIL ITEM				
•									
NASA [ 3 /1R IOA [ 1 /1	] [	F ]	[ NA] [ ]	[ P ] [ ]	[ X ] * [ X ]				
COMPARE [ N /N	1 . [	n j	[ N ]	[ N ]	[ ]				
RECOMMENDATIONS:	(If di	.fferent	from NAS	SA)					
[ /	] [	1	[ ]	[ ]	[ ] ADD/DELETE)				
* CIL RETENTION	RATIONALE	: (If a	pplicable	ADEQUATE					
REMARKS:				INADEQUATE	[ ]				
IOA NO LONGER CO AND CONCURS WITH NO DIFFERENCES.									

	1/01/88 OMS-141A 03-3-1009-4	NASA I BASEI	en e señas de la companya del companya del companya de la companya									
MDAC ID:	OMS 141 VALVE-PRESSURE											
LEAD ANALYST:	C.D. PRUST											
ASSESSMENT:												
CRITICAL: FLIGHT	<b>r</b>	ANCY SCREENS	CIL ITEM									
HDW/FUI	NC A	В с	10 10 10 10 10 10 10 10 10 10 10 10 10 1									
NASA [ 3 /1R IOA [ 1 /1	] [ P ]	[ NA] [ P ] [ ] [ ]	[ x ] *									
COMPARE [ N /N	] [N]	[ и ] [ и ]	[ N ]									
RECOMMENDATIONS:	(If different	: from NASA)										
[ /	] [ ]	[ ] [ ]	[ ] (ADD/DELETE)									
	* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]											
REMARKS: IOA NO LONGER COL AND CONCURS WITH	EMARKS: OA NO LONGER CONSIDERS RELIEF VALVE TO BE AN EMERGENCY SYSTEM, ND CONCURS WITH NASA/RI CRITICALITY AND SCREEN ASSIGNMENTS.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-142		NASA DATA: BASELINE [ ] NEW [ X ]								
MDAC ID:	OMS 142 VALVE-PI	SEMBLY									
LEAD ANALYST:	C.D. PR	UST									
ASSESSMENT:											
CRITICAL: FLIGH	r		NCY SCREE		CIL ITEM						
HDW/FUI	NC	A	В	С							
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] P ]	[ F ] [ NA]	[ P ] [ P ]	[ X ] * [ X ]						
COMPARE [ /	] [	]	[и]	[ ]	[ ]						
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)							
[ /	) [	]	[ ]	[ ]	[ ] .DD/DELETE)						
* CIL RETENTION 1	RATIONAL	E: (If a	pplicable	e) 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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-143	NASA DATA BASELINE NEW									
SUBSYSTEM: MDAC ID: ITEM:	OMS 143 VALVE-PRESSURE RELI										
LEAD ANALYST:	C.D. PRUST	C.D. PRUST									
ASSESSMENT:											
CRITICAL FLIGH	ITY REDUNDANCY	SCREENS	CIL ITEM								
HDW/FU											
NASA [ 2 /1R IOA [ 2 /1R	] [P] [F]	] [P] A] [P]	[ x ] *								
COMPARE [ /	] [ ] [ N	] [ ]	[ N ]								
RECOMMENDATIONS:	(If different fr	om NASA)									
[ /	] [ ] [	] [. ] (A	[ ] DD/DELETE)								
	RATIONALE: (If appl	icable) 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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-144	9-5		NASA DATA: BASELINE [ ] NEW [ X ]								
SUBSYSTEM: MDAC ID: ITEM:	OMS 144 VALVE-PR	RESSURE F	RELIEF AS	SEMBLY								
LEAD ANALYST:	C.D. PRU	C.D. PRUST										
ASSESSMENT:												
FLIGH				ens C	CIL ITEM							
HDW/FU	NC	A	В	C								
NASA [ 2 /1R IOA [ 1 /1	] [	P ] [	[ NA]	[ P ] [ ]	[ X ] *							
COMPARE [ N /N	] [	N ] [	[и]	[ N ]	[ ]							
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)								
	] [	] [	[ ]	[ ] (A)	[ ] DD/DELETE)							
* CIL RETENTION	RATIONALE	E: (If ap	pplicable	ADEQUATE								
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.												

ASSESSME ASSESSME NASA FME	DA ID :	TE:	1/01/88 OMS-145 03-3-1009-1							DATA: ELINE [ ] NEW [ X ]		
SUBSYSTE MDAC ID: ITEM:				OMS 145 VALVE-PRESSURE RELIEF ASSEM							IBLY	
LEAD ANA	LYS	T:		C.D	. F	RUS	T					
ASSESSMENT:												
			CAL IGH			R	EDUN	IDANCY	SCI	REENS		CIL
				NC		A B				C	:	ITEM
NASA IOA											]	[ X ] * [ X ]
COMPARE	[		/	]		[	]	[	]	[	]	[ ]
RECOMMEN	DAT	'IO	ns:	(	If	dif	fere	ent fr	om 1	NASA)		
	[	,	/	]		[	. 1	. [	]	[	3	[ ] (ADD/DELETE)
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]												
SSM REMO	REMARKS: SSM REMOVED FAILURE MODE STATEMENT WHICH DESCRIBE "DIAPHRAGM LEAK", PER IOA ISSUE. A BURST DISK LEAK IS NOT REQUIRED FOR THIS											
IOA RECO	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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	0MS-145A 03-3-1101	BASELINE NEW									
SUBSYSTEM: MDAC ID:	OMS 145	OMS									
LEAD ANALYST:	C.D. PRUS	T									
ASSESSMENT:											
CRITICA FLIG		TY REDUNDANCY SCREENS									
*	JNC A	В		С	ITEM						
NASA [ 1 /1 IOA [ 1 /1				•	[ X ] *						
COMPARE [ /	] [	] [	] [	]	[ ]						
RECOMMENDATIONS	: (If dif	ferent fr	om NASA	<b>'</b> )							
[ /	·] [	j .	] [	(A	[ DD/DELETE)						
* CIL RETENTION	RATIONALE:	(If appl	icable) I	ADEQUATE NADEQUATE							
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.											

ASSESSMENT NASA FMEA	#:	): 	1/01/88 OMS-146 03-3-1205-1							NASA DATA: BASELINE NEW					
SUBSYSTEM: MDAC ID: ITEM:			OMS 146 COUPLING-TEST PORT, PRESSURE RELIEF							RELIEF	VA	.LV	E		
LEAD ANALY	ST	:	C.D. P	RU	ST										
ASSESSMENT	<b>':</b>	_													
	TY IC		DANCY SCREENS B C							L EM					
NASA [ IOA [	3	/1R /1R	]	[	F P	]	[	F NA	]	[	P P	]	[ [	X X	] *
COMPARE [		/	]	[	N	]	[	N	]	[		]	[		]
RECOMMENDA	TIC	ons:	(If	di	ff	erent	f	ro	m NAS	A)					
. [	3	/1R	1	Ĺ	F	]	[	F	]		P	] (AD			] LETE)
* CIL RETE	NTI	ON F	RATIONA	LE	:	(If a	PP	li	cable		AD AD	EQUATE EQUATE	[		]
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 RECOMM AS A FAILU AND IS ADD	ENI RE	OS TH	IAT "PO	PP IIS	ET F	FAIL MEA.	s T	'HI	SIS	A	IN CR	G FLIGHT EDIBLE F	') " 'AI	B LU	E ADDED
					4							1.24			

	ASSESSME ASSESSME NASA FME	D2 II #:	ATE: D:	1/ OM 03	01/8 S-14 -3-1	8 7 .205	-3		NASA DATA: BASELINE [ NEW [ X							
	SUBSYSTEMDAC ID:	M:			OM 14	S 7				, PI	RESSUI	RE RELI	EF	VAL	VE	
	LEAD ANA	LY	ST	:	c.	C.D. PRUST										
	ASSESSME	ASSESSMENT:														
	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM															
FLIGHT HDW/FUNC A B C																
	NASA [3/3] [] [] [] * IOA [3/3] [] [] []															
	COMPARE	[		/	]		[	]	[	]	[	]		[	]	
	RECOMMEN	DA'	TI(	ons:		(If	dif	fere	nt fr	om 1	NASA)					
		[	3	/3	]		[	]	[	]	[	]	(A)	[ DD/D		TE)
	* CIL RE	TE	NT:	ION	RAT	IONA	LE:	(If	appl	ica	7	ADEQUAT ADEQUAT		•	]	
	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.															
	MUDES AN	υ.	AK.	E AL	UKE	OOLL	UN	RUS	א עט כ	JUP.	TING .	rnead.				

ASSESSME ASSESSME NASA FME	ENT I	D:	OMS-14	18	-2	NASA DATA BASELINE NEW					] [	
SUBSYSTE MDAC ID:			OMS 148 COUPL	ING-1	TEST I	PORT	, PRES	SURI	RELIEF	VAI	LVE	
LEAD ANA	ALYST	<b>':</b>	C.D. 1	PRUST	ľ							
ASSESSME	ENT:								-			
			ITY	RI	EDUND <i>a</i>	NCA	SCREE	ENS		CII		
		LIGHT W/FU		A		В		С	1 1 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	111	r.	
NASA IOA	[ 3	/3 /3	]	[	]	[	]	[	]	[	] *	
COMPARE	[	/	1	[	]	[	]	[	]	[	]	
RECOMMEN	IDATI	ons:	(If	difi	ferent	fro	om NAS	SA)				
	[	/	]	[	]	[	]	[	] (AI	[ DD/I	] DELETE	)
	CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]											
REMARKS: IOA FAII OPEN" AN NO DIFFE	LURE ND "R	ESTR	S ON AI	NALYS FLOW'	SIS SI	EET	SHOUI	TD NO	T INCLUI	DE '	'FAILS	TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-149 NONE		NASA DA BASELI N										
SUBSYSTEM: MDAC ID: ITEM: NTO	OMS 149 PROPELLANT	MECHANICAL F	ITTINGS-MMH ANI										
LEAD ANALYST:	C.D. PRUST												
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C													
NASA [ / IOA [ 1 /1	] [		[ ]	[ x ] *									
COMPARE [ N /N	] [	] [ ]	[ ]	[ N ]									
RECOMMENDATIONS:	(If diff	erent from	NASA)										
1	] [	] [ ]	[ ]	[ ] (ADD/DELETE)									
* CIL RETENTION	RATIONALE:	(If applica	ble) ADEQUAT INADEQUAT										
	ALYSIS SHEE	T SHOULD NO	T INCLUDE "F	ILTER									
NASA/RI DO NOT COMPANY OF THE CONTROL OF THE CONTRO	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 A	S AN OPEN I	SSUE.											

ASSESSME ASSESSME NASA FME	NT DATE: NT ID: A #:	1/01/88 OMS-150 03-3-20	01-1		: [ x ]			
SUBSYSTEM MDAC ID:		150	G-TEST I	PELLANT PRES	SURE CHECK			
LEAD ANA	LYST:	C.D. PRI	UST					
ASSESSME	NT:							
(	CRITICAL FLIGH HDW/FU	ITY T NC	REDUNDANCY SCREENS  C  C  C  C  C  C  C  C  C  C  C  C  C					
NASA IOA	[ 2 /1R [ 2 /1R	] [	F ] P ]	[ F ] [ NA]	[ P ] [ P ]	[ X ] *		
COMPARE	[ /	] [	N ]	[ N ]	[ ]	[ ]		
RECOMMEN		·		from NAS		,		
	[ 2 /1R	] [	F ]	[ F ]	[ P ] (A)	[ A ] DD/DELETE)		
* CIL RE		-	E: (If a	applicable	ADEQUATE	[ ]		
NASA/RI HOWEVER, 506) HAV IOA AGRE VERIFY C AGREES W IOA RECO AS A FAI AND IS A IOA ALSO OF ORBIT LANDING	DID NOT THE REF E BEEN A ES WITH TOUTH NASA MMENDS T LURE MOD DDRESSED RECOMME ER ENTRY WEIGHT COMMINATION	APPEAR TO DES NUM DDED TO NASA/RI OF CAP /RI FAIL HAT "POP E ON THI ON RCS NDS THAT MASS PRO	BERS FOR CONTROL FOR THE EFF FOR THE EFF FOR THE EFF FOR THE EFF FOR THE FOR THE EFF FOR THE EFF FOR THE EFF FOR THE EFF FOR TS, AND	R THIS COUD 1-1, PER OF A SCREEN. S OPEN (INTERESTRATE OF SCREEN COUD THIS IS CONSTRAIN POSSIBLE	IOA ISSUE. EEN BASED ON ISTALLED. IO DURING FLIGHT A CREDIBLE	5, 406, 505,  INABILITY TO DA ALSO  I) " BE ADDED FAILURE MODE  E VIOLATIONS P TANK E RESULTING		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-151 03-3-2001-3	ı	NASA DATA: BASELINE [ ] NEW [ X ]										
SUBSYSTEM: MDAC ID:	OMS			PRESSURE CH	неск								
LEAD ANALYST:	C.D. PRUST		•										
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C													
HDW/FU	NC A	В	C										
NASA [3/3] [] [] [] * IOA [3/3] [] [] [] []													
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]									
RECOMMENDATIONS:	(If diffe	erent from	NASA)										
[ 3 /3	<b>j</b> [ -]	[ ]	[ ]	[ ] (ADD/DELI									
* CIL RETENTION	RATIONALE: (	(If applica	able) ADEQU INADEQU	JATE [ ] JATE [ ]									
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.													

ASSESSMI ASSESSMI NASA FMI	ENT D ENT I EA #:	ATE: D:	1/01/8 OMS-15 03-3-2	88 52 2001-	-2			[ [ X			
SUBSYSTI MDAC ID: ITEM:			OMS 152 COUPLI	ing-1	rest	PORT,	PROF	PELLA	ANT PRESS	URE	СНЕСК
LEAD ANA	ALYST	:	C.D. I	RUST	C						
ASSESSMI	ENT:										1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		ICALI	LTY L	RI	EDUND	ANCY	SCREE	ens		CIL	
			NC	A		В		С			
NASA IOA	[ 3	/3 /3	]	[	]	[	]	[	]	[	] *
COMPARE	[	/	]	[	]	[	]	(	]	[	]
RECOMMEN	ITAGN	ons:	(If	difi	feren	t fro	m NAS	SA)			
	C	/	]	[	]	[	] .	[	] (AI	[ DD/DE	] ELETE)
* CIL RI	ETENT	ION I	RATIONA	ALE:	(If	appli	.cable	ΑI	DEQUATE DEQUATE	[	]
REMARKS:		MODES	S ON AN	IALYS	SIS S	HEET	SHOUI	LD NO	T INCLUE	E "F	FAILS TO
OPEN" Al	ND "R	ESTR.	ICTED I	LOW	T.				A		
HOWEVER	, THE	REF	DES N	<b>JMBEI</b>	RS FO	R THI	S COU	JPLIN	G (MD405	, 40	6, 505,
506) HAY	JE BE	EN AI	DDED TO	03-	-3-20	001-2, PER IOA ISSUE.					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-153			BASELINE NEW	[	]
	OMS 153 VALVE-GROU	JND, MANUA	AL ISOLAT	ION		
LEAD ANALYST:	C.D. PRUST					
ASSESSMENT:						
FLIGHT					CIL ITEN	
HDW/FU	NC A	В	C	;		
NASA [ / IOA [ 1 /1	] [	] [	] [	]	[ x	] * ]
COMPARE [ N /N	] [	] [	] [	1	[ N	]
RECOMMENDATIONS:	(If diff	ferent fr	om NASA)			
[ / -	] [	] [	] [·	] (AI	[ ID/DI	] ELETE)
* CIL RETENTION 1	RATIONALE:	(If appl	P	ADEQUATE ADEQUATE	_	]
REMARKS: NASA/RI DO NOT CO IOA NOW CONSIDERS QUESTIONABLE. IO MODE IN THE FMEA, BUT DOES RECOMMEN	S THE CREDI OA DOES NOT /CIL TO BE	[BILITY O] F REGARD ' AN OPEN	F THIS FA THE ABSEN ISSUE,	ILURE MOU	E TO	) BE

ASSESSME ASSESSME NASA FME	NT :	ID:	1/01/ OMS-1 03-3-	54		NASA DATA BASELINE NEW							
SUBSYSTE MDAC ID: ITEM:	M:		OMS 154 VALVE	-GRO	UND,	MANU	AL IS	SOLA	rion			-	
LEAD ANA	LYS'	T:	C.D.	PRUS'	r								
ASSESSME	NT:												
			ITY	R	EDUNI	DANCY	SCRI	EENS			CIL		
		FLIGH DW/FU		A		В	1	•	C		111	ri	
NASA IOA	[ :	3 /3	]	]	]	]	]	[	] ]		[	] * ]	
COMPARE	[	/	1	[	]	[	]	[	]		[	]	
RECOMMEN	DAT:	ions:	(If	dif	fere	nt fr	om N2	ASA)					
	[	/	]	[	]	[ .	]	(	]	(AI	[ D/D	] ELET	E)
* CIL RE	TEN'	TION	RATION.	ALE:	(If	appl	icab]	2	ADEQU ADEQU	ATE	[	]	
REMARKS:	DFN	Cፑር						T147	TDEQU	WI II	L	J	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-155 03-3-1101	-1			ASA DATA BASELINE NEW								
SUBSYSTEM:			AL IS	OLAT:	ION								
LEAD ANALYST:	C.D. PRUS	T											
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
	NC A	В	•	C		11111							
NASA [ 1 /1 ] [ ] [ ] [ X ] * IOA [ 1 /1 ] [ ] [ ] [ X ]													
COMPARE [ /	] [	] [	]	[	]	[ ]							
RECOMMENDATIONS:	(If dif	ferent fr	om NAS	5 <b>A</b> )									
[ /	] [	] [	]	[	] (A	[ ] DD/DELETE	2)						
* CIL RETENTION	RATIONALE:	(If appl	icable	Al	DEQUATE DEQUATE								
NASA/RI AGREED T FMEA, AND TO ADD	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												
IOA RECOMMENDS A VIOLATIONS OF OF ABOUT PROP LEAKA	CHEET, PER IOA ISSUE.  COA 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.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	0MS-156 03-3-2001-1	21.02221.2	BASELINE [ ] NEW [ X ]			
SUBSYSTEM: MDAC ID: ITEM:	OMS 156 COUPLING-TANK VEN					
LEAD ANALYST:	C.D. PRUST	en en en en en en en en en en en en en e	• •			
ASSESSMENT:		Ξ	:			
CRITICAL: FLIGHT HDW/FUI		B C	CIL ITEM			
NASA [ 2 /1R IOA [ 2 /1R	] [ F ] [ ] [ P ] [	F ] [ P ] NA] [ P ]	[ X ] * [ X ]			
COMPARE [ /	] [ N ] [	N ] [ ]	[ ]			
	(If different i		3			
[ 2 /1R	] [F] [	F ] [ P ] (AI	[ A ] DD/DELETE)			
	RATIONALE: (If app	plicable) ADEQUATE INADEQUATE	r 1			
BETWEEN IOA AND S FAILED FOR ALL QI CONDITION OF CAP IOA AGREES WITH I IOA RECOMMENDS TO AS A FAILURE MODI AND IS ADDRESSED IOA ALSO RECOMMEN VIOLATIONS OF PRO MASS PROPERTIES OF	SSM, IT WAS AGREED D COUPLINGS BASED SEAL AFTER CAP IN NASA/RI FAILURE OF HAT "POPPET FAILS E ON THIS FMEA. TO ON RCS QD COUPLIN NDS ADDING STATEME OPELLANT TANK LAND SIBLE CORROSION, F	N. HOWEVER, DURING THAT THE A SCREEN ON INABILITY TO VERNITALLATION.  B SCREEN.  OPEN (DURING FLIGHT THIS IS A CREDIBLE IN THE STATE OF	SHOULD BE RIFY  T) " BE ADDED FAILURE MODE  UT POSSIBLE D ORBITER PROP LEAKAGE			

ASSESSM ASSESSM NASA FM	EN'	Г	II	<b>):</b>	O	4S-15	57	<del>-</del> 3		NASA DATA: BASELINE [ ] NEW [ X ]						
SUBSYST		:			01 15 C0	57	[NG-	TANK	VENT							
LEAD AN	AL'	YS	T	:	C	.D. I	PRUS	r								
ASSESSM	EN'	T:														
	C:		F	LIG	HT				ANCY E	SCR	EENS			CIL ITEM	1	
		r	ועו	N/ F	JNC		A			•	•	•				
NASA IOA		] [	3 3	/3 /3	] ]		[	]	[	]	[	]		[	]	*
COMPARE		[		/	]		[	]	[	]	[	1		[	]	
RECOMME	ND.	ľA	ľI	SMC	:	(If	dif	feren	nt fi	com N	ASA)					
	•	[	3	/3	]		[	]	[	]	[	]		[ D/DE		TE)
* CIL R		ΕN	T:	ION	RA!	rion	ALE:	(If	app]	licab	1	ADEQUAT ADEQUAT		[	]	
REMARKS IOA FAI AND "RE IOA REC TO THE MODES A	LU ST OM FA	R] ME II	C' ENI LUI	TED DS : RE 1	FLA THA' MOD	ow". I"fi Es oi	AILS N TH	CLOS	SED"	AND THE	"REST SE AI	TRICTED RE CRED	FL	OW"	BE	ADDED

ASSESSME ASSESSME NASA FME	ENT I	D:	OMS-1	58	-2			NASA DATA: BASELINE [ ] NEW [ X ]				
SUBSYSTE MDAC ID:			OMS 158 COUPL	ing-	TANK	VENT		ŕ				
LEAD ANA	LYST	C:	c.D. 1	PRUS	T							
ASSESSME	ASSESSMENT:											
		'ICAL' FLIGH	ITY	R	EDUND	ANCY	SCRE	ENS		CIL		
		W/FU		A		В		С		+110		
NASA IOA	[ 3	3 /3	]	[	]	[ [	]	[	]	[	]	*
COMPARE	[	/	]	(	]	[	]	(	]	[	]	
RECOMMEN	IDATI	cons:	(If	dif	feren	t fr	om NA	SA)				
	[	/	]	[	]	[	]	[	] (A	[ DD/D1		TE)
		CION 1	RATION	ALE:	(If	appl	icabl	A	DEQUATE DEQUATE	[	]	
REMARKS: IOA FAII OPEN" AN NO DIFFE	URE	ESTR	S ON AI	NALY FLOW	SIS S	HEET	SHOU	ĽD Ν	OT INCLU	DE "	FAI	LS TO

ASSESSMENT ASSESSMENT NASA FMEA	ID:	1/01/8 OMS-15 NONE						SA D BASEL		[	;	]	
SUBSYSTEM: MDAC ID: ITEM: NTO		OMS 159 PROPEI	LANT	LINE	s an	D MEC	CHANI	CAL	FITT	IN	GS.	-ммн	AND
LEAD ANALY	ST:	C.D. F	RUST										
ASSESSMENT	:												
	ITICAL:	ľ		DUNDA		SCREE				CI IT			
	HDW/FUI	4C	A		В		С						
NASA [ IOA [	1 /1	]	[	]	[	]	[	] ]		[	X	) * ]	
COMPARE [	n /n	]	[	]	ľ	]	[	]		[	N	]	
RECOMMENDA	TIONS:	(If	diff	erent	fro	m NAS	SA)						
	/	]		]	[	]	[	]		[ D/		] LETE	:)
* CIL RETE	NTION 1	RATIONA	LE:	(If a	ppli	cable	∍)						
				•	• •		AΓ	EQUA EQUA		[ [		]	-
REMARKS: IOA CAUSES 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													
RECOMMENDA	TION A	S AN OI	PEN I	SSUE.	,								

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-160 NASA FMEA #: 03-3-2601-1					1-1			<b>1</b>		DATA: LINE NEW	[	]	
SUBSYSTE MDAC ID: ITEM:			OMS 160	BAL BE				:	+ <u>1                                   </u>			7. 7	
LEAD ANA	LYST	:	C.D.	PRUS	ST								
ASSESSME	ENT:									_			_
		ICAL LIGH	ITY	F	REDUN	DANC	SCR	EENS			CIL [TEM		
			NC	Z	<b>Y</b>	F	3	C	3				
NASA IOA	[ 1	/1 /1	]	[	]	[	]	[	]	1	[ X	] *	•
COMPARE		/	]	[	)	[	]		]		[	]	
RECOMMEN	NDATIC	ons:	(I	f di	fere	nt fi	om N	ASA)					
•	[ ]	1	3	[	]	[	]	(	]	(ADI	[ D/DE	] LETE	)
* CIL RE	ETENT:	ION	RATIC	NALE:	(If	app]	icab	7	ADEQUA ADEQUA	ATE ATE	[	]:	
REMARKS: NASA/RI CAUSES O THE CIL IOA RECO FIRE, EX RECOMMEN CAUSE ON	AGRED ON THE SHEET OMMENI KPLOST	IS F I SH DS A ION, HAT	MEA, OULD DDING AND "BIND	PER I ADDRI A SI EXPOS	OA I ESS T PATEM SURE	SSUE. HIS N ENT T OF EV	TH IEW C TO TH VA AN	MV RE E REI AUSE. E EFI	ELIEF TENTION FECTS	DEVION RAS	CE" TION	ALE ( SSIB: OA A:	ON LE LSO

ASSESSME ASSESSME NASA FME	NT	IL	):	OMS-1					:	NASA 1 BASE1		[		]	
SUBSYSTE MDAC ID: ITEM:	M:			OMS 161 GIMBA	L BE	ELLOW	S	_							
LEAD ANA	LYS	T:		C.D.	PRUS	ST									
ASSESSME	NT:														
	CRI		CAL LIGH	ITY	F	REDUN	DANCY	SC	REENS			CI IT			
	H			NC	7	4	В			С					
NASA IOA	[	1	/1	]	] [	]	[ [	]	] [	]		[	X	]	*
COMPARE	[	N	/N	3	[	]	[	]	[	)		[	N	]	
RECOMMEN	DAT	'IC	ns:	(If	di	fere	nt fr	om 1	NASA)						
	[		/	]	[	]	. [	]	[	]	(A	[ DD/	DE		TE)
* CIL RE	TEN	T	ON	RATION	ALE:	(If	appl	ical	•	ADEQU ADEQU		_		]	
REMARKS: NASA/RI DEFLECTI AS A CAU	ON)		IO	A RECO	MME	NDS T	HAT T	HIS	(NO FAIL	BELLO	WS A	NGU	LA IN	R CL	UDED

ASSESSMI ASSESSMI NASA FMI	ENT	Ιİ	D:	OMS	5-162				N	IASA DA BASELI N		[	]	
SUBSYST				OMS 162 GIN		ELLOW	īs							
LEAD AN	ALYS	ST	:	C.I	. PRU	ST								
ASSESSM	ENT:	:												
	CR		ICAI LIGH			REDUN	IDANCY	SCR	EENS			CIL		
	I		W/FU			A	В		C	3			· <b>-</b>	
NASA IOA	[	1	/1	]	]	]	[	]	[	]		[ x	] * ]	
COMPARE	[	N	/N	]	[	]	[	]	[	1		[ N	]	
RECOMME	NDA:	ΓI	ons:	: (	(If di	ffere	ent fro	om. N	IASA)					
	[		/	]	٦.	]	[	]	[	]	(AI	[     D/D	] ELETE)	)
* CIL R		NT:	ION	RATI	CONALE	: (If	appl	icab	7	ADEQUAT ADEQUAT		[	]	
REMARKS NASA/RI NOW CON BE QUES MODE IN IT BE A	DO SIDI TIOI THI	ER NA E	S TH BLE. FME <i>l</i>	E CE	REDIBI DA DOE	LITY S NOT	OF RES	STRI RD I	CTED HE AF	FLOW I	N I OF	A BE	LLOWS S FAI	TO LURE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-163 03-3-200	2-1				SA DATA SELINE NEW	[	x	]	
SUBSYSTEM: MDAC ID: ITEM:	OMS 163 PROPELLA	NT TAN	ıĸ							
LEAD ANALYST:	C.D. PRU	ST								
ASSESSMENT:										
CRITICAI FLIGH		REDUNI	DANCY	SCREE	ns		CI II	CL CEM	1	
HDW/FU		A	В		С					
NASA [ 1 /1 IOA [ 1 /1	] [	]	[	]			[	X X	]	*
COMPARE [ /	] [	]	[	]	[ ]	I	[		]	
RECOMMENDATIONS:	(If di	fferer	nt fro	om NAS	A)					
	] [	]	[	]	[ ]			/DE		ETE)
* CIL RETENTION	RATIONALE	E: (If	appli	icable	ADI	EQUATE EQUATE	[		]	
REMARKS: NO DIFFERENCES.		-								

ASSESSMENT DATE:	1/01/88			NASA DATA	
ASSESSMENT ID: NASA FMEA #:	OMS-164 03-3-20	02-2		BASELÎNE NEW	[ X ]
	OMS 164 PROPELL	ANT TANE	ζ	. •	€K 18 +
LEAD ANALYST:	C.D. PR	JST			
ASSESSMENT:					
CRITICAL FLIGH		REDUNDA	NCY SCRE	ENS	CIL ITEM
	NC	A	В	C	
NASA [ 2 /1R IOA [ 1 /1	] [	P ]	[ F ] [ ]	[ P ]	[ X ] * [ X ]
COMPARE [ N /N	] [	и ј	[ и ]	[ N ]	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)	
[ /	] .[	1	[ ]	[ ] ·	[ ] .DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	applicabl	e) ADEQUATE INADEQUATE	
REMARKS: IOA DID NOT CONS WITH NASA/RI REE IOA RECOMMENDS A CORROSION, FIRE,	IDER IND VALUATION DDING STA EXPLOSION	N AND RA ATEMENTS ON, AND	TIONALE TO THE	L FAILURES. FOR 2/1R PFF EFFECTS ABOU	IOA AGREES ASSIGNMENT. T POSSIBLE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-165 03-3-2009-1	NASA DATA BASELINE NEW								
SUBSYSTEM: MDAC ID: ITEM:	0MS 165	TANK, HORIZONTAL DRAI	N PORT							
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL FLIGH	ITY REDUND	ANCY SCREENS	CIL ITEM							
HDW/FU		ВС	11211							
NASA [ 2 /1R IOA [ 2 /1R	[ F ] [ P ]	[F] [P] [NA] [P]	[ X ] * [ X ]							
COMPARE [ /	] [N]	[ и ] [ ]	[ ]							
RECOMMENDATIONS:	(If differen	t from NASA)								
[ 2 /1R	[F]		[ A ] ADD/DELETE)							
* CIL RETENTION	RATIONALE: (If	applicable) ADEQUATE INADEQUATE	[ ]							
HOWEVER, THE REF	DES NUMBERS FO	THIS COUPLING ORIGINOR THIS COUPLING (MD47	MALLY. 19, 480, 579,							
580) HAVE BEEN A	DDED TO 03-3-20	09-1, PER IOA ISSUE. OF A SCREEN BASED ON								
VERIFY CONDITION	OF CAP SEAL AF	TER CAP INSTALLATION.	IOA ALSO							
IOA RECOMMENDS T	AGREES WITH NASA/RI FAILURE OF B SCREEN.  IOA RECOMMENDS THAT "POPPET FAILS OPEN (DURING FLIGHT)" BE ADDED  OF A FAILURE MODE ON THIS EMPA. THIS IS A CREDIBLE FAILURE MODE									
AND IS ADDRESSED	S A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE NO IS ADDRESSED ON RCS QD COUPLING FMEAS.									
	OA ALSO RECOMMENDS THAT A STATEMENT BE ADDED TO THE EFFECTS ABOUT POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA									
AND GROUND CREWS										

1/01/88 OMS-166 03-3-2009-	-3	1	BASELINE					
OMS 166			NTAL DRAI	N PORT				
C.D. PRUST	נ							
r				CIL ITEM				
] [	] [	] [	]	[ ] *				
] [	] - [	] [	1	[ ]				
(If diff	ferent fr	om NASA)						
] [	] [	] [		[ ] DD/DELETE)				
RATIONALE:	(If appl	ì	ADEQUATE					
REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".								
ASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLI.  OWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD479, 480, 579, 80) HAVE BEEN ADDED TO 03-3-2009-3, PER IOA ISSUE.  OA RECOMMENDS THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED OF THE FAILURE MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE ODES AND ARE ADDRESSED ON RCS QD COUPLING FMEAS.								
	OMS 166 COUPLING-I C.D. PRUST  ITY RI T NC A  [ ] [ [ ] [ [ ] [ ] [ ] [ ] [ ] [ ] [	OMS 166 COUPLING-PROP TANK C.D. PRUST  ITY REDUNDANCY T NC A B  [	OMS-166 03-3-2009-3  OMS 166 COUPLING-PROP TANK, HORIZOR  C.D. PRUST  ITY REDUNDANCY SCREENS TNC A B  [	OMS 166 COUPLING-PROP TANK, HORIZONTAL DRAI  C.D. PRUST  ITY REDUNDANCY SCREENS T NC A B C  [				

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-167 NASA FMEA #: 03-3-2009-2										DATA LINE NEW	[				
SUBSYSTI MDAC ID ITEM:				OMS 167 COU		PROF	TANK	, но	ORIZON	TAL	DRAI	N P	ORT		
LEAD AN	ALY	ST	:	C.D	. PRUS	T									
ASSESSM	ENT	:													
	CR		ICAL LIGH		F	REDUN	IDANCY	SCF	REENS			CI IT	L EM		
		_			P		В		C	?					
NASA IOA	[	3 3	/3 /3	]	[	]	[	]	[	]	•	[	]	*	
COMPARE	[		/	]	[	1	[	]	[	]		[	]		
RECOMME	NDA	TI:	ons:	(	If dif	fere	ent fr	om 1	NASA)						
	[		/	]	"[	]	[	]	[	]	(A	[ DD/	DELE	ETE)	
* CIL R		NT	ION	RATI	ONALE:	(I1	appl	icab	A	DEQU DEQU	ATE ATE	]	]		
OPEN" ANN NASA/RI	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.														

ASSESSMENT ASSESSMENT NASA FMEA	DATE: DATE:	1/01/88 OMS-168 03-3-20			NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:		OMS 168			TRAP FILL,	VENT PORT
LEAD ANALY	ST:	C.D. PR	UST			
ASSESSMENT	<b>':</b>					
CR			REDUNDA	NCY SCREENS		CIL
	FLIGHT HDW/FUN		<b>A</b>	В		ITEM
NASA [ IOA [	2 /1R 2 /1R	] [	F ] P ]	[ F ] [ [ NA] [	P ] P ]	[ x ] *
COMPARE [	/	] [	n j	[и]	1	[ N ]
RECOMMENDA	TIONS:	(If d	ifferent	from NASA)	1	
[	2 /1R	] [	<b>F</b> _]	[ <b>F</b> _ ] [	P ] (AI	[ A ] DD/DELETE)
* CIL RETE	NTION I	RATIONAL	E: (If a	pplicable) IN	ADEQUATE NADEQUATE	[ ]
HOWEVER, T 527) HAVE IOA AGREES VERIFY CON AGREES WIT IOA RECOMM AS A FAILU AND IS ADD IOA ALSO R OF ORBITER LANDING WE	HE REF BEEN AL WITH N H NASA ENDS TH RE MODI RESSED ECOMMEN ENTRY HE ENTRY	DES NUM DDED TO NASA/RI OF CAP /RI FAIL HAT "POP E ON THI ON RCS NDS THAT MASS PR	BERS FOR 03-3-200 FAILURE SEAL AFT URE OF FOR FAILURE SEAL AFT FAILURE SEAL AFT FAILURE SEAL OUP THE EFF OPERTIES TS, AND	THIS COUPI 1-1, PER IC OF A SCREEN ER CAP INST S SCREEN. S OPEN (DUF THIS IS A LING FMEAS. PECTS INCLUI CONSTRAINT POSSIBLE PE	LING (MD426) A ISSUE. BASED ON CALLED. ICCREDIBLE INC. CREDIBLE INC. CRE	

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-169 NASA FMEA #: 03-3-2001-3								-	ASA I BASEI	DATA: LINE [ NEW [			
SUBSYSTIMDAC ID	EM:			OMS 169					STEM T	RAP I	FILL/VE	ENT PO	RT
LEAD AN	ALYS	ST:	:	C.D	. PRUS	T							
ASSESSM	ENT:	:											
		FI	LIGH	IT	R		ndancy B		REENS C		C]	IL TEM	
NASA IOA	[	3	/3 /3	]	[	]	[	]	[	] ]	]	] * ]	
COMPARE	[		/	]	[	]	[	· ]	[	]	[	]	
RECOMME	NDAT	ric	ons:	(	If dif	fere	ent fr	om 1	NASA)				
	[	3	/3	]	[	]	[	]	τ.	Í		] DELET	E)
* CIL R		T	ION	RATI	ONALE:	(II	f appl	ical	ble) A INA	DEQUA	ATE [	]	
REMARKS IOA FAI AND "RE NASA/RI HOWEVER 527) HA IOA REC TO THE MODES A	LURI STR: DII , TI VE I OMMI FAII	IC! D I HE BEI ENI LUI	red Not Rei En 1 Ds 1 Re 1	FLOW APPE DES ADDED THAT ODES	AR TO NUMBE TO 03 "FAILS	COVI	ER THI FOR TH 2001-3 OSED" FMEA.	S CO IS O , Pl AND THI	OUPLIN COUPLI ER IOA "RESI ESE AF	IG OR: ING (1 L ISSI PRICTI	IGINALI MD426, UE. ED FLOV EDIBLE	LY. 427, √" BE	526, ADDED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-170 03-3-200	1-2			NASA DATA BASELINE NEW		]
SUBSYSTEM: MDAC ID: ITEM:	OMS 170 COUPLING	-TANK	ACQ.	SYSTEM	TRAP FILL	/VEN	r port
LEAD ANALYST:	C.D. PRU	ST			· ·		
ASSESSMENT:							
CRITICALI FLIGHT			ANCY	SCREEN	is C	CIL	M
					-	_	
NASA [ 3 /3 IOA [ 3 /3	] [	]	[	] [	]	[	] *
COMPARE [ /	] [	.J	[	] {	]	[	]
RECOMMENDATIONS:	(If di	fferen	t fro	om NASA	7)		
	j (	3	[	ן (	(A		] ELETE)
* CIL RETENTION I	RATIONALE	: (If	appli		ADEQUATE NADEQUATE	[	]
REMARKS: IOA FAILURE MODES OPEN" AND "RESTRI	CTED FLO	W".					
NASA/RI DID NOT A HOWEVER, THE REF 527) HAVE BEEN AL	DES NUMB	ERS FO	R THI	S COUL	LING (MD42	ALLY 6, 42	27, 526,

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-171 NASA FMEA #: 03-3-2001-1 SUBSYSTEM: OMS NASA DATA: BASELINE NEW								[	x ]					
SUBSYSTE MDAC ID: ITEM:			171							M.	FILL/VENT	PO	RT	
LEAD ANA	LYSI	r:	C.D. F	R	JSī	ŗ								
ASSESSME	NT:													
			ITY		RI	EDUND	AN	CY	SCREEN	NS		CI	L Em	
	_	FLIGHT DW/FUI	NC		A			В			C	11.	cm.	
NASA IOA	[ 2	2 /1R 2 /1R	]	[	F P	]	[ [	F N2	] A]	[ [	P ] P ]	[ :	x ] *	
COMPARE	[	/	]	[	N	]	[	N	]	[	]	[ ]	<b>N</b> ]	
RECOMMEN	DAT	ions:	(If	<b>d</b> :	ifi	feren	t	fro	om NASA	A)				
	[ 2	2 /1R	]	[	F	]	[	F	]	[	P ] <sup>·</sup> (A		A ] DELETE)	
* CIL RE		rion 1	RATIONA	\L	Е:	(If	ap	pl:			ADEQUATE ADEQUATE	[	]	
NASA/RI HOWEVER, 522) HAV IOA AGRE VERIFY CO AGREES W IOA RECO AS A FAI AND IS A IOA ALSO OF ORBIT LANDING	THE THE ES V CONDI VITH MMEN LURI DDRI D REC TER I WEIC	E REF EEN AI WITH I ITION NASA, NDS TI E MODI ESSED COMMEI ENTRY GHT CO	DES NO DDED TO NASA/RI OF CAI /RI FAI HAT "PO E ON TO ON ROS NDS THA MASS I	IMI O I I I I I I I I I I I I I I I I I	BEI 03- FA: SEI URI PE' QD TI OPI	RS FO -3-20 ILURE AL AF E OF I FAI FMEA. COUP HE EF ERTIE , AND	R 01 TE B LS LI FE S	THE F I S CI THE NG CTS	IS COUI , PER TANCE A SCREI CAP INS REEN. PEN (DI IS IS I FMEAS S INCLU NSTRAIN	PL IO EN ST UR A UD NT PR	NG ORIGIN ING (MD42 A ISSUE. BASED ON ALLED. I ING FLIGH CREDIBLE E POSSIBL S AND PRO OP LEAKAG SURE OF E	I, OA T)" FAI E V P T. E R	422, 521 ABILITY ALSO BE ADDE LURE MOD IOLATION ANK ESULTING	TC D E

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	NASA DATA BASELINI NEV	A: E [ ] W [ X ]		
SUBSYSTEM: MDAC ID:			a Repo	ាត់ភាពធាលប់គឺ។
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				The second second
FLIGH	LITY REDUN IT INC A	idancy scri B	eens C	CIL ITEM
NASA [ 3 /3 IOA [ 3 /3	] [ ]	[ ]	[ ]	[ ] *
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS:	(If differe	ent from N	ASA)	
[ 3 /3	] [ ]	[ ].	[ ] (2	[ ] ADD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicab	le) ADEQUATE INADEQUATE	[ ]
REMARKS: IOA FAILURE MODE AND "RESTRICTED NASA/RI DID NOT HOWEVER, THE REE 522) HAVE BEEN A IOA RECOMMENDS TO THE FAILURE A MODES AND ARE AI	FLOW".  APPEAR TO COVE DES NUMBERS E ADDED TO 03-3-2 CHAT "FAILS CLO MODES ON THIS E	ER THIS COUNTY OF THIS COUNTY OF THIS COUNTY OF THIS COUNTY OF THE SECOND THE SECOND OF THE SECOND O	UPLING ORIGING UPLING (MD4: R IOA ISSUE. RESTRICTED TO SE ARE CREDIT	NALLY. 21, 422, 521, FLOW" BE ADDED BLE FAILURE

ASSESSMI ASSESSMI NASA FMI	ENT ENT EA	D/ II #:	ATE: D:	1/01 OMS- 03-3	1/01/88 NASA DATA OMS-173 BASELINE 03-3-2001-2 NEW							[		
SUBSYSTIMDAC ID:	EM:			OMS 173				SY	STEM F	ILL/	VENT	PO	RT	
LEAD AND	ALY	ST	:	C.D.	PRU	ST								
ASSESSMI	ENT	:												
		F	LIGH				DANCY B		REENS C			CI:		
NASA IOA	[	3 3	/3 /3	]	[	]	[	]	]	]		[	]	*
COMPARE	[		/	]	[	]	[	]	C	]		[	]	
RECOMME	NDA	TI	ons:	()	f di	ffere	nt fr	om :	NASA)					
	. [	•	/	]	. [	]	[	]	[	]	(A		] DELE	
* CIL RI		NT:	ION	RATIO	NALE	: (If	appl	ica		DEQU DEQU	ATE ATE	[	]	
REMARKS IOA FAI: OPEN" AI NASA/RI HOWEVER 522) HA	LUR ND DI , T	"R D HE	ESTR NOT REF	RICTEI APPEZ DES	FLO AR TO NUMB	W". COVE ERS F	R THI	s c	OUPLIN COUPLI	G OR	IGIN MD42	ALL	Υ.	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-174 03-3-2001-1	NASA DATA: BASELINE [ ] NEW [ X ]
MDAC ID:		TEST PORT
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
CRITICAL FLIGH	ITY REDUNDANCY SCREENS	CIL ITEM
	NC A B	C
NASA [ 2 /1R IOA [ 2 /1R	] [F] [F] [ ] [NA] [	P ] [ ] * P ] [ X ]
COMPARE [ /	] [N] [N] [	] [N]
RECOMMENDATIONS:	(If different from NASA)	
[ 2 /1R	] [F] [F] [	P ] [ A ] (ADD/DELETE)
	RATIONALE: (If applicable) IN	ADEQUATE [ ] ADEQUATE [ ]
HOWEVER, THE REF 517) HAVE BEEN A 10A AGREES WITH NASA, 10A RECOMMENDS TO AS A FAILURE MODIAND IS ADDRESSED 10A ALSO RECOMMENDS OF ORBITER ENTRY LANDING WEIGHT CO	APPEAR TO COVER THIS COUPLI DES NUMBERS FOR THIS COUPL DDED TO 03-3-2001-1, PER IO NASA/RI FAILURE OF A SCREEN OF CAP SEAL AFTER CAP INST /RI FAILURE OF B SCREEN. HAT "POPPET FAILS OPEN (DUR E ON THIS FMEA. THIS IS A ON RCS QD COUPLING FMEAS. NDS THAT THE EFFECTS INCLUD MASS PROPERTIES CONSTRAINT ONSTRAINTS, AND POSSIBLE PR , FIRE, EXPLOSION, AND EXPO	ING (MD416, 417, 516, A ISSUE. BASED ON INABILITY TO ALLED. IOA ALSO ING FLIGHT) BE ADDED CREDIBLE FAILURE MODE E POSSIBLE VIOLATIONS S AND PROP TANK OP LEAKAGE RESULTING

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	: [ [ X	]									
MDAC ID: 175 ITEM: COUPLING-PROPELLANT, TANK TEST PORT											
LEAD ANALYST: C.D. PRUST											
ASSESSMENT:											
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C											
·											
NASA [ 3 /3 IOA [ 3 /3	] [	] [	] [	]	[	] *					
COMPARE [ /	] [	] [	] [	]	[	]					
RECOMMENDATIONS:	(If diff	ferent fro	om NASA)								
[ 3 /3	] [	] [	] [	] (A	[ DD/DE	] LETE)					
* CIL RETENTION	RATIONALE:	(If appli	cable) IN	ADEQUATE ADEQUATE	<b>[</b>	]					
AND "RESTRICTED NASA/RI DID NOT HOWEVER, THE REF 517) HAVE BEEN A IOA RECOMMENDS TO THE FAILURE M	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.										

	ASSESSMENT DATE: 1/01/88  ASSESSMENT ID: OMS-176  NASA FMEA #: 03-3-2001-2  NEW										
OMS 176 COUPLING-PROPELLANT, TANK TEST PORT											
LEAD ANALYST: C.D. PRUST											
	REDUNE	ANCY	SCRE	ENS							
	A	В		C			•				
] [	1	[	]	[	]	[	]	*			
] [	]	[	]	[	]	[	]				
(If d	ifferen	nt fr	om NA	SA)							
) [	]	[	]	[	] (A			TĒ)			
RATIONALI	E: (If	appl	icabl	AI	DEQUATE		]				
EMARKS: OA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO PEN" AND "RESTRICTED FLOW". ASA/RI DID NOT APPEAR TO COVER THIS COUPLING ORIGINALLY. OWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD416, 417, 516, 17) HAVE BEEN ADDED TO 03-3-2001-2, PER IOA ISSUE.											
	COUPLING C.D. PRO ITY ITY ITY IC I (If diameter) CATIONALI CATED FLOA APPEAR TO DES NUMI	176 COUPLING-PROPE C.D. PRUST  ITY REDUND	176 COUPLING-PROPELLANG C.D. PRUST  TY REDUNDANCY TO A B  [	COUPLING-PROPELLANT, TAKE C.D. PRUST  TY REDUNDANCY SCREET NC A B  [	COUPLING-PROPELLANT, TANK TO COUPLING-PROPELLANT, TANK TO C.D. PRUST  TY REDUNDANCY SCREENS  TO A B C  I [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [	COUPLING-PROPELIANT, TANK TEST PORT  C.D. PRUST  TY REDUNDANCY SCREENS  C A B C  [	TOUPLING-PROPELLANT, TANK TEST PORT  C.D. PRUST  TY REDUNDANCY SCREENS CIL  TO ITE  NC A B C     [ ] [ ] [ ] [ ] [ ]    [ ] [ ] [ ] [ ]  (If different from NASA)    [ ] [ ] [ ] [ ] [ ]  (ADD/DI  RATIONALE: (If applicable)  RATIONALE: (If applicable)  RATIONALE: (If applicable)  SON ANALYSIS SHEET SHOULD NOT INCLUDE "  INCTED FLOW".  APPEAR TO COVER THIS COUPLING ORIGINALLY DES NUMBERS FOR THIS COUPLING (MD416, 4)	COUPLING-PROPELIANT, TANK TEST PORT  C.D. PRUST  TY REDUNDANCY SCREENS CIL THEM NC A B C   [			

ASSESSME ASSESSME NASA FME	NT ID:	OMS-17									
SUBSYSTEMDAC ID:	M:	OMS 177 GAGING	PRC	DBE,	FORW	ARD C	OMPA	RTMENT			
LEAD ANA	LYST:	C.D. P	RUSI	ŗ							
ASSESSME	NT:										
	CRITICAI FLIGH		RE	EDUND	ANCY	SCRE	ENS		CII		
	HDW/FU		A		В		C		***	J1.1	
NASA IOA	[ 3 /3 [ 3 /3	]	[	]	[	]	[	]	[ [	] * ]	
COMPARE	[ /	]	[	]	[	]	[	]	[	] ·	
RECOMMEN	DATIONS:	: (If	diff	feren	t fr	om NA	SA)				
	[ /	]	[	]	[	]	[	] (		) DELETE)	
* CIL RE	TENTION	RATIONA	LE:	(If	appl	icabl	Α	DEQUATE		]	
REMARKS:							INA	DEQUATE	[	]	
NO DIFFE	RENCES.	IOA AN	ALY2	ZED F	ORWA	RD AN	D AF	T PROBE	S SE	PARATELY	

ASSESSME ASSESSME NASA FME	NT I		OMS-1	1/01/88 NASA DATA: OMS-178 BASELINE [ 03-3-3202-1 NEW [								]
SUBSYSTEMDAC ID:	M:		OMS 178 GAGING PROBE, FORWARD COMPARTMENT									
LEAD ANA	LYST	:	c.D. 1	PRUS	<u>r</u>							
ASSESSME	NT:									,		
•		ICAL LIGH	ITY	RI	EDUND	ANCY	SCRE	EENS			CIL	
		W/FU		A		В		С	-			••
NASA IOA	[ 3 [ 3	/3 /3	]	[	]	[	]	[	]		[	] * ]
COMPARE	[	/	]	[	]	[	]	[	]		[	]
RECOMMEN	DATI	ons:	(If	dif	feren	t fro	om NA	SA)				
	[	/	]	[	]	[	]	[	]	(AI	[ DD/D	] ELETE)
* CIL RE	TENT	ION 1	RATION	ALE:	(If	appl:	icabl	A:	DEQUAT DEQUAT	E	 [ [	]
REMARKS:	RENC	ES.	TOA AI	NALY2	ZED F	ORWAI	RD AN	ID AF	r prof	BES	SEP	ARATELY.

ASSESSMENT ASSESSMENT NASA FMEA #	ID:	OMS-17						ASA DATA BASELINE NEW		]	
SUBSYSTEM: MDAC ID: ITEM:		OMS 179 GAGING	PRO	BE, F	FORWA	RD CO	MPAI	RTMENT			
LEAD ANALYS	ST:	C.D. F	RUST	?							
ASSESSMENT:	:										
CRI	TICAL:	ITY r	RE	DUNDA	NCY	SCRE	ens		CIL		
H		NC	A		В		С			-	
NASA [ IOA [	3 /3	]	[	]	[	]	[	]	[	]	*
COMPARE [	n /n	1.	[	]	[	]	[	] .	[	]	
RECOMMENDAT	rions:	(If	diff	erent	fro	om NAS	SA)				
1	/	]	[	]	[	]	[	] (A	[ DD/D		ETE)
* CIL RETEN	NTION 1	RATIONA	ALE:	(If a	appli	cable	Al	DEQUATE DEQUATE		]	
REMARKS: NASA/RI DO "ERRATIC OF COVERED UNI INDICATION, TWO FAILURE PROBES SEPA	PERATION THE PER THE P	ON", IS E NASA, OF OUT S ARE T	S CON 'RI I 'PUT'	NSIDER FMEA V ' (03-	RED E VITH -3-32	3Y IO FAIL 202-1	A TO URE 1 )	BE ADEQ MODE "ER THE EFFE	UATE RONE CTS	LY OUS OF	THESE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-180		NASA DATA: BASELINE [ ] NEW [ ]							
	OMS 180 GAGING PROBI	E, FORWARD	COMPARTMEN	NT, FUEL						
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL FLIGH	ITY REDU	JNDANCY SCI	REENS	CIL ITEM						
HDW/FU		В	<b>C</b> itation is							
NASA [ / IOA [ 3 /3	] [ ]	[ ]	[ ]	[ ] *						
COMPARE [ N /N	] [ ]	[ ]	[. ]	[ ]						
RECOMMENDATIONS:	(If differ	cent from N	NASA)							
[ /	] [ ]	[ ]	[ ]	[ ] (ADD/DELETE)						
* CIL RETENTION	RATIONALE: (]	If applicak	ADECII	ATE [ ]						
REMARKS:				•						
NASA/RI DO NOT CO RECOMMENDS ADDING PROBE "ERRONEOUS IS NOT REQUIRED.	G THIS FAILUF INDICATION"	RE MODE AS FMEA (03-3	A CAUSE ON	ACTURE). IOA I THE FORWARD A SEPARATE FMEA						
FAILURE HISTORY (	OF PROBE INCI	LUDES THIS	FAILURE.	IOA ANALYZED						

ASSESSME ASSESSME NASA FME	NT ID		OMS-18	MS-181 BASELINE [ ] 3-3-3202-1 NEW [ X ]									
SUBSYSTE MDAC ID:			OMS 181 GAGING	PRO	OBE,	FORW	ARD C	OMPA	RTMENT				
LEAD ANA	LYST:		C.D. F	RUS	r								
ASSESSME	NT:												
	CRITI	CAL		R	EDUNE	ANCY	SCRE	ENS		CIL			
			NC	A		В		С		+ + + +			
NASA IOA	[ 3 [ 3	/3 /3	]	[	]	[ [	]	[	]	[ [	]	*	
COMPARE	[	/	]	[ .	]	[	]	[	]	[	]		
RECOMMEN	DATIC	NS:	(If	dif	ferer	nt fr	om ŅA	SA)					
	[	/	1	[	]	[	]	[	] (A	DD/D		TE)	
* CIL RE		ON I	RATIONA	ALE:	(If	appl	icabl	A	DEQUATE DEQUATE	[	]		
ON "ERRO	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.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-182	2-1				ASA DATA BASELINE NEW		]			
SUBSYSTEM: MDAC ID: ITEM:	OMS 182 GAGING P	ROBE,	AFT (	COMPAI	RTMEN						
LEAD ANALYST:	C.D. PRU	ST									
ASSESSMENT:							: =				
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM											
HDW/FU		A	В		С			•			
NASA [ 3 /3 IOA [ 3 /3	] [	]	[	]	[	]	[	]	*		
COMPARE [ /	·] [	]	[	]	[	]	[	]			
RECOMMENDATIONS:	(If di	fferen	t fr	om NAS	SA)						
[ /	] [	3	Ţ	]	[	] (A	[ DD/D1		TE)		
* CIL RETENTION	RATIONALE	: (If	appl	icable	ΑĽ	EQUATE		]			
REMARKS: NO DIFFERENCES. REGARDING THE IN AFTER LOSS OF OU	ABILITY T TPUT FROM	O DETE	CT F	AILURI	STAT	EMENT TO	o THI	NC	SCREEN		
AFT PROBES SEPAR	ATELY.										

ASSESSME ASSESSME NASA FME	NT I	[D:	OMS-1	1/01/88 NASA DATA: OMS-182A BASELINE [ ] 03-3-3202-4 NEW [ X ]									
SUBSYSTE MDAC ID:	M:		OMS 182 GAGIN	G PF	ROBE,	AFT	COMP	ARTMI	ENT	-			
LEAD ANA	LYS	r:	C.D.	PRUS	ST								
ASSESSME	NT:												
		FICAL		REDUN	JNDANCY SCREENS						u Mr		
		FLIGH DW/FU	NC	P	а в с						ITEM		
NASA IOA	[ 3	3 /3 3 /3	]	[ [	]	[	]	[	]		[	] * ]	
COMPARE	[	/	. ]	[	]	[	]	[	]		[	]	
RECOMMEN	DAT	ions:	(If	dif	ffere	nt fi	com N	ASA)					
	[	/	]		]	[	]	[	]	(A)	[ DD/[	] DELETE)	
* CIL RE	TENT	rion	RATION	IALE:	: (If	appl	licab	1	ADEQU ADEQU		[	]	
REMARKS: NO DIFFE	REN	CES.	IOA A	NAL	ZED	FORWA	ARD A	ND A	FT PR	OBES	SEE	PARATELY.	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		MS-183 BASELINE [ ]								
MDAC ID:	OMS 183 GAGING PROBE,	AFT COMPA	ARTMENT	e dan d						
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
	ITY REDUN	DANCY SCRI	EENS	CIL						
FLIGH HDW/FU		В	<b>C</b> . ,	ITEM						
NASA [ 3 /3 IOA [ 3 /3		[ ]	[ ]	[ ] *						
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]						
RECOMMENDATIONS:	(If differe	nt from NA	ASA)							
[ /	] [ ]	[ ]	[ ]	[ ] ADD/DELETE)						
* CIL RETENTION	RATIONALE: (If	applicabl	Le)	e 7						
REMARKS: NO DIFFERENCES.	IOA ANALYZED	FORWARD AL	ND AFT PROBES	SEPARATELY.						

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	A: E [ ] V [ X ]								
SUBSYSTEM: MDAC ID: ITEM:	OMS 183 GAGING PROE		(PARTMENT						
LEAD ANALYST:	C.D. PRUST			•					
ASSESSMENT:									
CRITICA FLIG	CIL ITEM								
	INC A	В	С						
NASA [ 3 /3 IOA [ 3 /3	] [ ]		[ ]	[ ] *					
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]					
RECOMMENDATIONS	: (If diffe	erent from	NASA)						
[ /	] [ ]	[ ]	[ ] (2	[ ] ADD/DELETE)					
* CIL RETENTION	RATIONALE: (	(If applica	able) 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.									

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/01/88 OMS-184 NONE			BASELINE NEW	[ ]	
SUBSYSTEM: MDAC ID: ITEM:	OMS 184 GAGING 1	PROBE, AF	COMPAR'	IMENT		
LEAD ANALYST:	C.D. PRI	UST				
ASSESSMENT:						
CRITICA FLIG	LITY HT	REDUNDANO	SCREE		CIL ITEM	
HDW/F	UNC	A	В	C		
NASA [ / IOA [ 3 /3	] [	] [	]	[ ]	[ ]	*
COMPARE [ N /N	] [	] [	]	[ ]	[ ]	
RECOMMENDATIONS	: (If d:	ifferent :	from NAS	A)		
[ /	] [	] [	1	[ ] <sup>*</sup>	[ ] DD/DEL	ETE)
* CIL RETENTION	RATIONAL	E: (If app	olicable	) ADEQUATE INADEQUATE	[ ]	
REMARKS: NASA/RI DO NOT "ERRATIC OPERAT COVERED BY THE INDICATION, LOS TWO FAILURE MOD TO EFFECTS REGA COMMUNICATION S ANALYZED FORWAR	ION", IS ( NASA/RI FI S OF OUTP( ES ARE THI RDING THE CREEN AFT)	CONSIDEREI MEA WITH TO THE CONTROL  SAME TO THE CONTROL  TO TH	D BY IOA THE FAIL -3202-1) IOA RECOI TO DET: FOUTPUT	TO BE ADEQUURE MODE "EI . THE EFFEC MMENDS ADDIN ECT A FAILUE FROM AFT PE	DATELY RRONEOU CTS OF NG STATE RE OF	US THESE FEMENT THE

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-185 NASA FMEA #: NONE											SELINE NEW	[	]				
SUBSYSTI MDAC ID ITEM:	:					18	5	G PR	OBE,	AFT (	COM	PART	MENT	, FUEL			
LEAD AND	AL	YS	T	:	(	c.	D. I	PRUS	r								
ASSESSM	EN'	Г:															
CRITICALITY REDUNDA FLIGHT								DANCY	ANCY SCREENS					CIL ITEM			
						С		A		В			С				
NASA IOA		[ [	3	/ /3		]		[	]	[	]	[	]		[	]	*
COMPARE		[	N	/N		]		[	]	[	]	[	]		[ .	]	
RECOMME	ND	ΑT	Ί	ONS	:		(If	dif	fere	nt fr	om !	NASA	)				
·		[		/		]		[	]	[	]	Ţ	]	(A		EL:	ETE)
* CIL R	ET]	EN	T.	ION	R	ΓA	'ION	ALE:	(If	appl	ica	ble) I	ADE(	QUATE QUATE	[	]	
REMARKS NASA/RI RECOMME: "ERRONE NOT REQ FAILURE ANALYZE	DO NDS OUS UI	S S RE IS	A I D	DDI NDI ORY	NG CA	TI F	HIS ON" PRO	FAI FME BE I	LURE A (0: NCLUI	MODE 3-3-3: DES T	AS 202 HIS	A C -1). FAI	AUSE A : LURE	ON TH SEPARA	E AI TE I	T ME	PROBE
ANALYZE	υ.	rU	X	MAK	U.	w	עו א	CI P	KODE	) OEF	uru.	لابلندد	•				

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	OMS-186	OMS-186 BASELINI 03-3-3202-1 NEV						]		
MDAC ID:	OMS 186 GAGING PI	ROBE, A	AFT C	OMPAR	TMEN	T	ezh i	<u>-</u>		
LEAD ANALYST:	C.D. PRUS	ST								
ASSESSMENT:	ASSESSMENT:									
CRITICALITY REDUNDANCY SCREENS FLIGHT								CIL ITEM		
	JNC A	A	В		C -		1111	•		
NASA [ 3 /3 IOA [ 3 /3	] [	]	[	]	[	]	[	] * ]		
COMPARE [ /	] [	]	τ	]	[	]	[	]		
RECOMMENDATIONS	: (If dia	fferent	fro	m NAS	A)					
[ /	] [	]	[	]	[	] (AI	[ DD/DE	] :LETE	)	
* CIL RETENTION	RATIONALE:	: (If a	appli		AD	EQUATE EQUATE	[	± 4 ] ]		
REMARKS: NO DIFFERENCES. "ERRONEOUS INDI FORWARD AND AFT	CATION, LOS	SS OF C	DUTPU	INTER	NAL EA.	LEAKAGE' IOA ANA	' AS ALYZE	CAUS:	E ON	

ASSESSMENT D ASSESSMENT I NASA FMEA #:	D:	OMS-18	37	·1				ASA DAT BASELIN NE	E (	[ [	]	
SUBSYSTEM: MDAC ID: ITEM:		OMS 187 TOTALI	ZER									
LEAD ANALYST	:	C.D. F	PRUSI	?								
ASSESSMENT:												
F	ICAL	ľ		DUNDA		SCREE				CIL ITEM	I	
HD	W/FUI	1C	A		В		С					
NASA [ 3 IOA [ 3	/3 /3	]	[	]	[	]	[	]			]	*
COMPARE [	/	]	[	]	[	]	[	]		[	]	
RECOMMENDATI	ons:	(If	diff	erent	fro	m NAS	SA)					
1	/	]	[	]	[	]	[	] (		[ D/DE		TE)
* CIL RETENT	ION I	RATIONA	ALE:	(If a	ppli	cable	AI	EQUATE		[	]	
REMARKS: NO DIFFERENC ADDRESSING L DETECT COMMU	oss (	OF LOW	PROF	QUAN	TITY	WARN						

ASSESSMI ASSESSMI NASA FMI	ENT	II	D:	ON						1	nasa i Basei		[	]
SUBSYSTI MDAC ID: ITEM:				OM 18 TC		IZE:	R			·				
LEAD ANA	ALYS	ST	:	c.	D. 3	PRU	ST							
ASSESSMI	ENT	:												
CRITICALITY REDUNDANCY SCRE								REENS			CIL			
	]	-		UNC			A	В		•	С			,-
NASA IOA	[	3	/ /3	]		[	]	[	]	[	]		[	] *
COMPARE	[	N	/N	[ ]		[	]	[	]	[	]		[	]
RECOMME	NDA	ΓI	ONS	:	(If	di	ffere	nt fr	om 1	NASA)	٠			
	[		7	]		[	]	[	]	[	]	(AI	[ DD/D	] ELETE)
* CIL RI	ETE	NT:	ION	ran	TION.	ALE	: (If	appl	ical		ADEQUA ADEQUA			]
REMARKS NASA/RI "ERRONEO COVERED OPERATIO EFFECTS WARNING	DO OUS BY ON"	I) T) () IC)	NDI HE 03- H A	CATI NASA 3-32 DDRI	ION" A/RI 284- ESS	, I FM 1). FAL	S CON: EA WI' IOA SE IN	SIDER TH TH RECO DICAT	ED : E F. MME: ION:	TH BY IO AILUR NDS A S OF	IS FA A TO I E MODI DDING	ILURI BE AI E "EI STAI	E MO EQU RAT EME	ATELY IC NTS TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	ASA DATA BASELINI NEV		x ]						
SUBSYSTEM: MDAC ID: ITEM:	OMS 189 TOTALIZER								
LEAD ANALYST:	C.D. PRUS	T							
ASSESSMENT:									
CRITICAL: FLIGH		EDUND	ANCY	SCRE	ENS		CI	L	
HDW/FU			В		C				
NASA [ 3 /3 IOA [ 3 /3	] [	]	[	]	[	]	[	]	*
COMPARE [ /	] [	]	[	]	.[	]	[	]	
RECOMMENDATIONS:	(If dif	feren	t fr	om NAS	SA)				
[ /	] [	]	[	]	[	] (4	[ ADD/	DELI	ETE)
* CIL RETENTION	RATIONALE:	(If	appl	icable	A	DEQUATE DEQUATE		]	
REMARKS: NO DIFFERENCES. ADDRESSING LOSS DETECT COMMUNICA		P QUA	NTIT	y wari					

ASSESSME ASSESSME NASA FME	NT	II	<b>)</b> :	1/01/8 OMS-19 03-3-2	90	-3			1	NASA DA' BASELII NI	NE		]	
SUBSYSTE MDAC ID: ITEM:				OMS 190 COMMUN	NICAT	rion s	CREI	EN				* 1 4	-	
LEAD ANA	LYS	T:	:	C.D. 1	PRUST	r								
ASSESSME	NT:													
	CRI		CAL LIGH	ITY .	RI	EDUNDA	MCA	SCREE	ens			CIL		
	Н			NC	A		В С					<b>.</b>	ra.	
NASA IOA	]	1 2	/1 /2	]	[	]	[	]	[	]		[ X [ X	]	*
COMPARE	[	N	/N	]	[	]	[	]	[	]		[	)	
RECOMMEN	DAT	'IC	ons:	(If	diff	erent	: fro	om NAS	SA)					
	[		/	]	[	]	[	]	[	]		[ D/D		ETE)
* CIL RE	TEN	Ţ	ON 1	RATIONA	ALE:	(If a	ippl:	icable	2	ADEQUATI ADEQUATI	Ē	[	]	
TAR MITT	sto	m	DTC	מו שחוות	CA /1	T 1/1	CD	TT 3.00	TC	TMTPNITT				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-191 03-3-20	06-3		NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID:	OMS 191	CATION SCR			
LEAD ANALYST:	C.D. PR	JST			
ASSESSMENT:				·	
CRITICAL FLIGH		REDUNDANC	Y SCREEN	S	CIL ITEM
	йС	A	В	C	
NASA [ 1 /1 IOA [ 3 /2R	] [	P ] [	F ] [	P ]	[ X ] * [ X ]
COMPARE [ N /N	] [	и ] [	и][	N ] .	[ ]
RECOMMENDATIONS:	(If d	ifferent f	rom NASA	)	
[ /	] [	] [	] [	] (A)	[ ] DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If app	licable) T	ADEQUATE NADEQUATE	[ ]
REMARKS: IOA WILL NOT DIS RECOMMENDS THAT (WHICH ONLY ALLO ALSO BE INCLUDED OF FAILURE TO BE	THE 3/2R WS SOME ON THIS	EFFECTS C HELIUM TO FMEA. IC	RIT ASSI F A LESS PASS INT A CONSID	GNMENT. HO SEVERE SC O THE AFT ERS THIS D	OWEVER, IOA REEN FAILURE COMPARTMENT) EGREE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				NASA DATA: BASELINE [ ] NEW [ X ]				
SUBSYSTEM: MDAC ID: ITEM:	OMS 192 GALLERY	LEGS						
LEAD ANALYST:	C.D. PRU	JST						
ASSESSMENT:								
CRITICAL		REDUNDAN	NCY SCREE	ens	CIL ITEM			
FLIGH HDW/FU		A	В	<b>C</b>	TIEM			
NASA [ 3 /2R IOA [ 3 /2R	] [	P ]   P ]	[ F ] [ F ]	[ P ] [ P ]	[ X ] * [ X ]			
COMPARE [ /	] [	] [	[ ]	[ ]	[ ]			
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)				
[ /	] [	] [	[ ]	[ ] (AI	[ DD/DELETE)			
* CIL RETENTION	RATIONALE	: (If ar	pplicable	e) ADEQUATE INADEQUATE	[ ]			
REMARKS: NO DIFFERENCES.	TOA RECO	MMENDS Z	ADDING A	STATEMENT TO	O THE EFFECTS			
REGARDING POSSIB RESULT OF THE LOS IN OTHER POD NOT	LE LOSS C SS OF ALI	FONE ON REDUNDA	MS ENGINE ANCY. EN	E OR RCS THRU IGINE AND TAN	JSTERS AS A			

	1/01/88 OMS-193 03-3-200	4-1			NASA DATA BASELINE NEW	
	OMS 193 COLLECTO	R MANIE	FOLD			
LEAD ANALYST:	C.D. PRU	ST			•	
ASSESSMENT:						
CRITICAL: FLIGH		REDUNDA	ANCY	SCREEN	S	CIL ITEM
HDW/FU	NC	A	В		С	
NASA [ 2 /2 IOA [ 3 /2R	] [	] P ]	[ [ <b>F</b>	] [	p ]	[ X ] *
COMPARE [ N /N	] [	N ]	[ и	] [	N ]	[ ]
RECOMMENDATIONS:	(If di	.fferent	fro	m NASA	.)	
. [ /	] [	]	[	] - [	]	[ ] ADD/DELETE)
* CIL RETENTION	RATIONALE	E: (If a	appli		ADEQUATE NADEQUATE	• •
REMARKS: IOA AGREES WITH I CRITICALITY. STI BYPASS GALLERY LI	RUCTURAL	REEVALU <i>I</i> FAILURE	ATION E OF	AND R	ATIONALE E MAY ALLOW	FOR 2/2 HELIUM TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-194	-1		nasa I Basel	DATA: LINE ( NEW ( )	_	
SUBSYSTEM: MDAC ID: ITEM: NTO	OMS 194 PROPELLAN	T LINES A	ND MEC	CHANICAL	FITTING	GS-MMH A	ND
LEAD ANALYST:	C.D. PRUS	T					
ASSESSMENT:						Mask of the Control	
CRITICAL FLIGH HDW/FU	T	EDUNDANCY E		C C	CII		
NASA [ 1 /1 IOA [ 1 /1	] [	] [	. ],		[ 2	K ] * K ]	
COMPARE [ /	] [	1 [	]	[ ]	[	J	
RECOMMENDATIONS:	(If dif	ferent fr	om NAS	SA)			
[ /	] [	] [	]	[ ]	[ (ADD/I	] DELETE)	
* CIL RETENTION				INADEQUA	ATE [	]	
REMARKS: NASA/RI ADDED "F THIS FMEA, PER I	AILED CLOS OA ISSUE.	ED ACMV R THE RETE	ELIEF NTION	DEVICE"	TO THE	CAUSES	ON
SHEET SHOULD ADD IOA RECOMMENDS A FIRE, EXPLOSION, RECOMMENDS THAT CAUSE ON THIS FM	DDING A ST. AND EXPOS BINDING/J	ATEMENT TURE OF EV	O THE	GROUND (	CREWS.	IOA ALS	0

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-194A 03-3-2102-1		NASA DATA: BASELINE [ ] NEW [ X ]				
	194	INES AND ME	CHANICAL FI	TTINGS-MMH AND			
LEAD ANALYST:	C.D. PRUST						
ASSESSMENT:							
FLIGH'				CIL ITEM			
HDW/FU	NC A	В	С				
NASA [ 1 /1 IOA [ 1 /1	] [ ]	[ ]	[ ]	[ X ] * [ X ]			
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]			
RECOMMENDATIONS:	(If differe	ent from NA	SA)				
[ /	] [ ]	[ ]	[ ]	[ ] ADD/DELETE)			
* CIL RETENTION	RATIONALE: (I	f applicabl	.e) ADEQUATE INADEQUATE				
REMARKS: NASA/RI ADDED "F. THIS FMEA, PER I	OA ISSUE. TH	E RETENTION	DEVICE" TO	THE CAUSES ON			
SHEET SHOULD ADDIOA RECOMMENDS A FIRE, EXPLOSION,	DDING A STATE	MENT TO THE					

ASSESSM ASSESSM NASA FM	ENT	I	D:	0MS- 03-3	L/88 -195 3-2601	-1			ľ	IASA BASE		[			
SUBSYST: MDAC ID ITEM:				OMS 195 GIM	BAL BE	LLOW	is		-					uest s	
LEAD AN	ALY	ST	:	C.D.	PRUS	ST									
ASSESSM	ENT	:													
		F	LIG	łT			idancy B					CI			
		ועמ	W/FU	JNC	A	1	Б		,						
NASA IOA	[	1	/1 /1				[					[ ]	x ]	*	
COMPARE	[		/	]	[	]	[	]	[	]		[	]		
RECOMME	NDA	TIC	ONS:	: (]	f dif	fere	ent fr	om N	ASA)						
	(		/	]	C	]	[	]	[	]			) DELI	ETE)	
* CIL R		NT:	ION	RATIO	NALE:	(If	appl	icab	1	DEQUADEQUA			]		
NASA/RI THIS FM SHEET S	AD EA,	Pl	ER ]	OA IS	SUE.	THE	RETE	OITN	F DEV	ICE"	TO T	THE THE	CAU IE (	JSES CIL	ON
IOA REC FIRE, E RECOMME	OMM XPL	ENI OS:	DS A	ADDING AND	A ST	ATEM	ENT TO	HT C	E EFI	ECTS UND	ABOU CREWS	JT I	POSS IO	SIBLE A ALS	E SO
CAUSE O					TNG/ U	Will	10 DH.	TIN	e bei	TOMO	ĐE	אטו	טטע	AU F	•

ASSESSME ASSESSME NASA FME	ENT	II	):	OMS-1					N	IASA I BASEI		[		
SUBSYSTI MDAC ID: ITEM:				OMS 196 GIMBA	L BE	LLOWS								
LEAD ANALYST: C.D. PRUST														
ASSESSMI	ENT	:												
CRITICALITY REDUNDANCY SCREENS CIL ITEM														
	1			NC	A		В		C	3		111	314	
NASA IOA	[	1	/1	]	[	]	[ [	]	[	]		[ }	]	*
COMPARE	[	N	/N	]	[	]	[	]	[	]		[ ]	1 ]	
RECOMME	NDA'	ΓΙ	ons:	(If	dif:	feren	t fr	om NAS	SA)					
·	[		/	]	[	]	[	].	[	]	(AI	[ ]\dc	] DELE	TE)
* CIL RI	ete)	NT:	ION :	RATION	ALE:	(If a	appl:	icable	I	ADEQUA ADEQUA		[		
REMARKS NASA/RI DEFLECT: AS A CAU	DO ION	).	IO.	A RECO	MMEN!	DS TH	AT TI	HIS F	AIL	JRE MO	WS AL	NGUI BE ]	LAR INCL	UDED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-197			-	NASA BASE			]
SUBSYSTEM: MDAC ID: ITEM:	OMS 197 GIMBAL I	BELLOWS	<b>.</b>		<b>=</b>		* ±	
LEAD ANALYST:	C.D. PRI	JST					7.5	
ASSESSMENT:								
CRITICAL FLIGH		REDUND	ANCY	SCREE	NS		CIL	
	ЙС	A	В		С			•
NASA [ / IOA [ 1 /1	] [	]	[	]	[ ]		[ x	] *
COMPARE [ N /N	] [	]	[	1	[ ]		[ ]	]
RECOMMENDATIONS:	(If d	ifferen	t fro	om NAS	A)			•
1 /	1 [	<u> </u>	[	3	[ ]		[ DD/DE	] ELETE)
* CIL RETENTION	RATIONAL	E: (If	appl		ADEQU INADEQU			]
REMARKS: NASA/RI DO NOT C NOW CONSIDERS TH	OVER THIS	S FAILU	RE MO	ODE (R	ESTRICT	ED FI	LOW).	IOA
BE QUESTIONABLE. MODE IN THE FMEA IT BE ADDRESSED.	IOA DO	ES NOT	REGAI	RD THE	ABSENC	E OF	THIS	FAILURE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-198 03-3-200	7-2		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:	OMS 198	OPELLANT '	rank isoi	ATION	
LEAD ANALYST:	C.D. PRU	ST			
ASSESSMENT:					•
CRITICAL: FLIGH		REDUNDANC	Y SCREENS	3	CIL ITEM
HDW/FU	NC .	A :	В	С	
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] [ ]	F ] [ P ] [	P ] P ]	[ X ] * [ X ]
COMPARE [ /	] [	] [ ]	и][и	1	[ ]
RECOMMENDATIONS:	(If di	fferent f	rom NASA)		
[ /	] [	] [	] [	] (A)	[ DD/DELETE)
* CIL RETENTION	RATIONALE	: (If app	·	ADEQUATE	
REMARKS: IOA CONSIDERS A DURING FLIGHT (P. NASA/RI B SCREEN FAILURE MODE). IOA RECOMMENDS A	ASS B SCR FAILURE SEE ASSES	EEN). HO (WHICH IS SMENT SHE	E TO BE F WEVER IOA BASED ON ET OMS-20	WILL NOT RESTRICT:	TECTABLE DISPUTE ED FLOW

VIOLATION OF THE PROP TANK LANDING WEIGHT CONSTRAINT.

ASSESSMENT ASSESSMENT NASA FMEA	ID:	1/01/88 OMS-199 03-3-200	7-1		NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTEM: MDAC ID: ITEM:		OMS 199 VALVE-PR	OPELLANT	TANK ISO	OLATION					
LEAD ANALY	ST:	C.D. PRU	ST							
ASSESSMENT	?:									
CR	RITICAL		REDUNDAN	CY SCREEN	1S	CIL ITEM				
	FLIGHT HDW/FU		A.	В	c	TTEM				
	2 /1R 3 /3		P ] [	NA] (	[ P ] [ ]	[ X ] *				
COMPARE [	N /N	] [ ]	и ] [	и ј	[и]	[ N ]				
RECOMMENDA	TIONS:	(If di	fferent :	from NASA	A)					
	. /	] . [	] [	] [	[ ] (AI	[ ] DD/DELETE)				
* CIL RETE	ENTION I	RATIONALE	: (If ap		ADEQUATE	[ ]				
		NASA/RI R	EEVALUAT:	ION AND I	RATIONALE RE	EGARDING 2/1R				

and the second of the second o

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	OMS-200			ASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 200 VALVE-F	ROPELLANT T	ANK ISOLA	TION	
LEAD ANALYST:	C.D. PR	UST			
ASSESSMENT:					
CRITICA FLIC	LITY	REDUNDANCY	SCREENS		CIL ITEM
	UNC	A F	3 0	:	
NASA [ / IOA [ 2 /:	] [ R ] [	P ] [ I	) [ F	]	[
COMPARE [ N /	] [	N ] [ 1	1 ] [ N	[ ]	[ N ]
RECOMMENDATIONS	: (If d	ifferent f	com NASA)		
. [ /	] [	] [	] [	] (Al	[ DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If app)		DEQUATE	[ ]
REMARKS: NASA/RI DO NOT PARTIALLY OPEN, BE ADDED TO 03 THESE ADDITION:	CLOSED).	IOA RECOMI	MODE (FAII MENDS THAT MEA/CIL IS	S MID-TRA THESE FA ADEQUATI	AVEL, AILURE MODES E WITHOUT

ASSESSMEN ASSESSMEN NASA FME	T	II		1/01/8 OMS-26 03-3-8	01	)7-	-1						ASA DATA BASELINI NEV	] 3		]	
SUBSYSTEM MDAC ID:	M:			OMS 201 VALVE	-PI	ROI	PELLA	ANT	T	NK I	so:	ĻA'	rion				
LEAD ANA	LYS	ST	:	c.p. :	PRU	ניצנ								•			
ASSESSME	NT:	:															
·	CRI		ICAL LIGH	ITY		RI	EDUNI	AN	CY	SCRE	EN	s			IL FEN	4	
	F	_		NC		A			В			С		_		-	
NASA IOA	[	2	/1R /3	]	[	P	]	[	N.	A]	[ [	P	]	[	X	]	*
COMPARE	[	N	/N	]	[	N	]	[	N	]	[	N	]	[	N	. ]	
RECOMMEN	D <b>A</b> 'I	ric	ONS:	(If	di	Ĺfí	erer	nt :	fro	om NA	SA	)					
	[		/	]	[		]	[		]	[		] (2	[ ADD,	/DI	] ELE	TE)
* CIL RE	re1	YT:	ION 1	RATION	ALI	Ξ:	(If	apj	pli	cabl	e)					,	
											I		DEQUATE DEQUATE			]	
REMARKS:	ES	W:	ITH I	NASA/R		REI	EVALU	JAT:	ION	I AND	R	AT:	IONALE I	OR	2/	/1R	PNP

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/01/88 OMS-202 03-3-210	1-1			ASA DAT <i>i</i> BASELINI NEV						
SUBSYSTEM: MDAC ID:	OMS 202 VALVE-PR			SOLA	TION						
LEAD ANALYST:	C.D. PRU	ST									
ASSESSMENT:											
		REDUNDANC	Y SCRE	ENS		CIL ITEM					
	CRITICALITY REDUNDANCY SCREENS FLIGHT HDW/FUNC A B C										
NASA [ 1 /1 IOA [ 1 /1	] [	] [	]	[	]	[ X ] * [ X ]					
COMPARE [ /	] [	] [	]	[	]	[ ]					
RECOMMENDATIONS	: (If di	fferent f	rom NA	SA)							
[ /	] [	] [	]	[	] (2	[ ] ADD/DELETE)					
* CIL RETENTION	RATIONALE	: (If app	licabl	e) A INA	DEQUATE	[ ]					
REMARKS: NASA/RI AGREED FMEA, AND TO AI SHEET, PER IOA RELIEF DEVICE" IOA RECOMMENDS FIRE, EXPLOSION	D CORRESPO ISSUE. NA TO THE CAU ADDING A S	NDING RET SA/RI ALS SES ON TH TATEMENT	ENTION O ADDE IS FME TO THE	RAT C "F CA, P CEFF	IONALE 'AILED C'ER IOA 'ECTS ABO	TO THE CIL LOSED ACMV ISSUE. OUT POSSIBLE					

ASSESSME ASSESSME NASA FME	ENT	ID:	ON	S-20	2A	-3				ASA DAT BASELIN NI			]	
SUBSYSTE MDAC ID:			ON 20 A0		VE									-
LEAD ANA	LYS	T:	c.	D. P	RUS	T			-					
ASSESSME	ENT:										-			
		TIC:	ALITY	?	R	EDUNI	DANCY	SCR	REENS		CI	L		
					A	•	В		С	= · · · · ÷ Ţ. ·		<b>—</b>		
NASA IOA	[	1 /: 1 /:	1 ] 1 ]		[	]	[	]	[	]	]	X X	] * ]	r
COMPARE	[	/	]		[	]	[	]	[	]	[		]	
RECOMMEN	IDAT	ION	s:	(If	dif	fere	nt fro	om N	IASA)					-
	(	/	]		[	]	[	]	[	]	[ ADD/	DE	] LET	!E)
* CIL RE	ETEN	TIO	N RAI	ANOI	LE:	(If	appli	icab	Al	DEQUATE DEQUATE	-		 ] ]	
REMARKS: IOA RECO AS A CAU ADDITION IOA ALSO POSSIBLE	OMME USE 1. D RE	ON '	THIS MENDS	FMEA ADD	, H ING	OWEV	ER FMI Patemi	ea i ent	RELII S ADE(	EF DEVI	CE" VITHO	UT EG2	TH	IIS

	ASSESSME ASSESSME NASA FME	2: 1 C	1/01/88 OMS-203 03-3-2007-2						NASA DATA: BASELINE [ ] NEW [ X ]													
SUBSYSTEM: MDAC ID:					MS 203	MS																
	LEAD ANA	LYS	T:	c	c.D.	PR	JS"	Г														
	ASSESSMENT:																					
		CRI	TICA				RI	EDU	ND	ANO	CY	SC	REEN	S			CIL ITEM					
		H	IDW/F				A			В			С									
	NASA IOA	[ [	2 /1 2 /1	LR ] LR ]		[	P P	]		]	F F	]	[	P P	]		]	X X	]	*		
	COMPARE	(	/	]		[		]		[		]	[		]		[		]			
	RECOMMEN	DAT	CIONS	5:	(I	f d	if	fer	en	t :	Ero	om 1	NASA	)								
		[	/	]	]	[		]		[		]	[		]	(Al	] DD,	/DI	] ELI	ETE	)	
	* CIL RE	TEN	MOIT	ı RA	ATIC	NAL:	Е:	(I	f	apj	<b>91</b> :	ica	ble) I	Al NA	DEQU.	ATE ATE	[		]			
	REMARKS: NASA/RI FLOW). MODES ON CHANGED FLOW, PE IOA RECO VIOLATIO	ORI NAS OS THE R	SA/R] S-3-2 E B S [OA ] ENDS	AC 2007 SCRI ESSU ADI	GREE 7-2 EEN JE. DING	D TO	O I IL: 03.	ADD S C -3-	LO: 20:	RE: SE! 07.	STI D) -2 T(	RIC , P TO	FAIL TED ER I "FA HE E	UR FL OA IL	E MOS OW" S ISS " FOS ECTS	DE (1 TO TI UE. R RE:	RES HE NZ STI	STI F! AS! RIC	AII A/I	LUR RI ED	E ALSO	)

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	<del>-</del> //	NASA DATA: BASELINE [ ] NEW [ ]											
SUBSYSTEM: MDAC ID: ITEM:	OMS 204 VALVE-PROPELLANT TANK ISOL	ATION											
LEAD ANALYST:	C.D. PRUST												
ASSESSMENT:													
CRITICAL FLIGH	ITY REDUNDANCY SCREENS	CIL ITEM											
HDW/FU		C											
NASA [ / IOA [ 3 /2R	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]	P ] [ ] *											
COMPARE [ N /N	] .[N] [N] [	и ] [ и											
RECOMMENDATIONS:	(If different from NASA)												
[ /	] [ ] [ ] [	] [ ] (ADD/DELETE)											
* CIL RETENTION	RATIONALE: (If applicable)	ADEQUATE [ ] ADEQUATE [ ]											
ALL PHASES OF FL ATTEMPTED. IOA NASA/RI DO NOT C FAILURE MODE NEE	ES THIS FAILURE AS A 3/3. IGHT. VALVES ARE VERIFIED 3/2R BASED ON VALVE IN GPC OVER THIS FAILURE MODE (DEL D NOT BE ADDED TO THE FMEA/ YED OPERATION" ARE COVERED	VALVES ARE OPEN DURING OPEN BEFORE BURN POSITION IS INCORRECT. AYED OPERATION). THIS CIL. THE WORST CASE											

3-2007-2).

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1,01,00	NASA DATA: BASELINE [ NEW [	]							
MDAC ID:	OMS 205 VALVE-PROPELLANT TANK ISOL	ATION								
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL: FLIGH	ITY REDUNDANCY SCREENS	CIL ITEM								
		C								
NASA [ / IOA [ 2 /1R	] [ ] [ ] [ ] [ P ] [ F ] [	P ] [ X	] *							
COMPARE [ N /N	] [N] [N] [	N ] [ N	]							
RECOMMENDATIONS:	(If different from NASA)									
[ /	] [ ] [ ] [	] [ (ADD/DE								
* CIL RETENTION	RATIONALE: (If applicable)	ADEQUATE [ 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.										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-206	NASA DAT BASELIN NE			
SUBSYSTEM: MDAC ID: ITEM: NTO	OMS 206 PROPELLANT LINES	AND MECHANICAL FI	TTINGS-MMH AND		
LEAD ANALYST:	C.D. PRUST				
ASSESSMENT:					
CRITICAL FLIGH HDW/FU		B C	CIL ITEM		
NASA [ / IOA [ 2 /1R	] [ ] [ ] [ P ] [	F ] [ P ]	[ ] * [ x ]		
COMPARE [ N /N	] [ N ] [	и] [и]	[ N ]		
RECOMMENDATIONS:	(If different i	from NASA)			
1	] [ ] [	] [ ]	[ ADD/DELETE)		
	RATIONALE: (If app	ADEQUATE INADEQUATE	į į		
REMARKS: IOA CAUSES ON AN	ALYSIS SHEET SHOUI	LD NOT INCLUDE "FI			
BLOCKAGE".					
		OW IN A SEGMENT OF			
RESULT IN 2/1R E	FFECTS HOWEVER TH	E CREDIBILITY OF	SUCH AN		
OCCURRENCE IS QU	ESTIONABLE. ANY C	CONTAMINATION WOUL	O FLOW TO		
		OA RECOMMENDS THA			
FAILURE BE ADDRE		CIL, BUT DOES NOT	REGARD THIS		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-207 03-3-2009-1	NASA DATA: BASELINE [ ] NEW [ X ]											
MDAC ID:	OMS 207 COUPLING - PROPEI												
LEAD ANALYST:	C.D. PRUST												
ASSESSMENT:													
FLIGH		CY SCREENS  B C	CIL ITEM										
			r V 1 +										
NASA [ 2 /1R IOA [ 2 /1R	] [F] [	F ] [ P ] NA] [ P ]	[ X ]										
COMPARE [ /	] [N][	и] [ ]	[ ]										
RECOMMENDATIONS: (If different from NASA)													
[ 2 /1R	] [F] [	F ] [ P ] (AI	[ A ] DD/DELETE)										
* CIL RETENTION	RATIONALE: (If app	plicable) ADEQUATE INADEQUATE	[ ]										
HOWEVER, THE REF 570) HAVE BEEN A IOA AGREES WITH VERIFY CONDITION AGREES WITH NASA IOA RECOMMENDS TAS A FAILURE MOD AND IS ADDRESSED IOA ALSO RECOMME ABOUT POSSIBLE C	DES NUMBERS FOR TO DDED TO 03-3-2009-NASA/RI FAILURE OF OF CAP SEAL AFTER /RI FAILURE OF B SHAT "POPPET FAILS ON THIS FMEA. TO ON RCS QD COUPLING NDS THAT A STATEME	HIS COUPLING ORIGINATIONS COUPLING (MD469-1, PER IOA ISSUE. F A SCREEN BASED ON R CAP INSTALLATION. SCREEN. OPEN (DURING FLIGHT THIS IS A CREDIBLE ING FMEAS. ENT BE ADDED TO THE XPLOSION, AND EXPOSI	ALLY. 9, 470, 569, INABILITY TO IOA ALSO T)" BE ADDED FAILURE MODE  EFFECTS										

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	0MS-208	3 3 009-3			NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM:	OMS 208 COUPLIN			POINT	DRAI	 :N						
LEAD ANALYST:	C.D. PF	C.D. PRUST										
ASSESSMENT:												
FLIG	HT	ITY REDUNDANG I NC A			B C			CIL	ſ			
NASA [ 3 /3 IOA [ 3 /3	] [	]	[	]	[	]		[	]	*		
COMPARE [ /	] [	]	ι	]	[	]		[	]			
RECOMMENDATIONS	: (If d	lifferer	it fr	om N	ASA)							
[ 3 /3	) [	]	[	. ]	[	1	(AD	[ D/DE		TE)		
* CIL RETENTION	RATIONAL	E: (If	appl	icab	A	DEQUA		[	]			
IOA FAILURE MOD AND "RESTRICTED NASA/RI DID NOT HOWEVER, THE RE	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 IOA RECOMMENDS TO THE FAILURE MODES AND ARE A	THAT "FAI MODES ON	LS CLOS	ED" EA.	AND THE	"REST SE AR	RICTE E CRE	D FL	OW"	BE	ADDED		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-209	MS-209 BASELINE [ ]											
SUBSYSTEM: MDAC ID: ITEM:	OMS 209 COUPLING												
LEAD ANALYST:	C.D. PRUS	ST											
ASSESSMENT:													
CRITICAL: FLIGHT		REDUNDANCY	SCREENS	NS CIL ITEM									
	NC A	A B		С	1144								
NASA [ 3 /3 IOA [ 3 /3	] [	] [	] [	]	[ ] *								
COMPARE [ /	] [	] [	] [	]	[ ]								
RECOMMENDATIONS:	(If dif	fferent fr	om NASA	)									
[ /	] [	] [	] [	] (A	[ ] DD/DELETE)								
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]													
REMARKS: IOA FAILURE MODES OPEN" AND "RESTRE NASA/RI DID NOT A HOWEVER, THE REF 570) HAVE BEEN A	ICTED FLOV APPEAR TO DES NUMBI	N". COVER THI ERS FOR TH	SHOULD S COUPL IS COUP	NOT INCLU ING ORIGIN	DE "FAILS TO ALLY.								

0MS-210 03-3-2009-1	NASA DATA: BASELINE [ ] NEW [ X ]												
210		RT											
C.D. PRUST													
ASSESSMENT:													
REDUNDANC	CY SCREENS	CIL ITEM											
	В С												
[ F ] [ [ P ] [	F ] [ P ] NA] [ P ]	[ X ] * [ X ]											
[и]	и] []	[ ]											
(If different f	from NASA)												
[F] [	F ] [ P ] (AI	[ A ] DD/DELETE)											
ATIONALE: (If app	olicable) ADEQUATE INADEQUATE												
SM, IT WAS AGREED COUPLINGS BASED SEAL AFTER CAP IN ASA/RI FAILURE OF THE PROPPET FAILS ON THIS FMEA. IT IS ADDING A STATE IN, FIRE, EXPLOSICE	I. HOWEVER, DURING THAT THE A SCREEN ON INABILITY TO VER ISTALLATION. B SCREEN. OPEN (DURING FLIGHT CHIS IS A CREDIBLE R IG FMEAS. EMENT TO THE EFFECTS	MEETING SHOULD BE RIFY  T) " BE ADDED FAILURE MODE S ABOUT											
	10 OUPLING-OMS/RCS .D. PRUST  Y REDUNDANC A  [F] [P] [ [N] [  (If different f  [F] [  TIONALE: (If app  PASSED A SCREEN M, IT WAS AGREEI COUPLINGS BASED EAL AFTER CAP IN SA/RI FAILURE OF T "POPPET FAILS ON THIS FMEA. T N RCS QD COUPLIN S ADDING A STATE	MS 10 OUPLING-OMS/RCS PROPELLANT FILL POR .D. PRUST  Y REDUNDANCY SCREENS A B C  [F] [F] [P] [NA] [P] [N ] [N ] []  (If different from NASA)  [F] [F] [P]  (AITIONALE: (If applicable)  PASSED A SCREEN. HOWEVER, DURING M, IT WAS AGREED THAT THE A SCREEN COUPLINGS BASED ON INABILITY TO VEREAL AFTER CAP INSTALLATION. SA/RI FAILURE OF B SCREEN. T "POPPET FAILS OPEN (DURING FLIGHT ON THIS FMEA. THIS IS A CREDIBLE IN RCS QD COUPLING FMEAS. S ADDING A STATEMENT TO THE EFFECTS, FIRE, EXPLOSION, AND EXPOSURE OF											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-211		NASA DATA: BASELINE [ ] NEW [ X ]									
SUBSYSTEM: MDAC ID: ITEM:	OMS 211 COUPLING-OMS	PRT										
LEAD ANALYST:	C.D. PRUST	C.D. PRUST										
ASSESSMENT:												
CRITICAL FLIGH	ITY REDUI	NDANCY SCR	EENS	CIL ITEM								
HDW/FU		В	С									
NASA [ 3 /3 IOA [ 3 /3	] [ ]	[ ]	[ ]	[ ] *								
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]								
RECOMMENDATIONS:	(If differe	ent from N	ASA)									
[ 3 /3	] [ ]	[ ]	[ ]	[ ] ADD/DELETE)								
* CIL RETENTION	RATIONALE: (I	f applicab	ADEQUATE									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-212	-2	NASA DATA: BASELINE [ ] NEW [ X ]										
SUBSYSTEM: MDAC ID: ITEM:	OMS 212 COUPLING-												
LEAD ANALYST:	C.D. PRUS	C.D. PRUST											
ASSESSMENT:													
CRITICAL FLIGH		EDUNDANC	Y SCREI	ens		CIL ITEM							
HDW/FU		. 1	В	C	<b>4</b> .	LEM							
NASA [ 3 /3 IOA [ 3 /3	] [	] [	]	[ ]	[	] *							
COMPARE [ /	] [	] [	]	[ ]	[	]							
RECOMMENDATIONS:	(If dif	ferent f	rom NAS	SA)									
[ /	] [	) [	1	[ ]	] ( <b>A</b> DD)	] /DELETE)							
* CIL RETENTION	RATIONALE:	(If app	licable	ADEC	UATE [	]							
REMARKS: TOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW". TO DIFFERENCES.													

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-213	NASA DATA: BASELINE [ ] NEW [ X ]										
MDAC ID:	OMS 213 COUPLING - PROPE											
LEAD ANALYST:	C.D. PRUST											
ASSESSMENT:												
CRITICAL: FLIGH	ITY REDUNDAN	ICY SCREENS	CIL ITEM									
HDW/FU		в с										
NASA [ 2 /1R IOA [ 2 /1R	] [F] [ ] [P]	F ] [ P ] NA] [ P ]	[ X ] * [ X ]									
COMPARE [ /	] [и] [	[и] [и]	[ ]									
RECOMMENDATIONS:	RECOMMENDATIONS: (If different from NASA)											
[ 2 /1R	] [F] [		[ A ] DD/DELETE)									
* CIL RETENTION	RATIONALE: (If ag	oplicable)										
		ADEQUATE INADEQUATE										
* 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.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:					:	1/01/ OMS-2 03-3-	88 14 2009	) <b>-</b> 3		NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYST	rem D:	1:				OMS 214				GROUI	MD-PU		र हुके रा	-	.*		
LEAD A	IAV	LYS	ST	:		c.D.	PRUS	T									
assessi	MEN	T:	;												4.		
FLIGHT				HT	ITY REDUNDANCY I NC A E					Y SCREENS  C Date to the second of the secon			ITEM				
NASI IOI	A A	[ [	3	/3 /3		]	[	]	[	]	[	]		[	]	*	
COMPARI	Ε	[		/		]	Ţ	]	[	3	[	]		[	]		
RECOMMI	ENE	)A']	rio	ons	:	(If	dif	fere	nt fr	om i	NASA)						
		נ	3	/3		]	[	]	[	]	[	]		[ DD/E		ETE)	
* CIL I		E	1 <b>T</b> :	ION	R	ATION	ALE:	(If	appl	ica	ble) IN	ADEQU ADEQU	ATE ATE	[	]	•	
REMARKS IOA FA: AND "RI NASA/R: HOWEVEI 562) HZ IOA REG	ILU EST I I R, AVE	TI TI IMI	O I HE BEI ENI	not RE En Ds	A F AD TH	PPEAR DES N DED T AT "F	TO UMBE O 03	COVE RS F -3-2 CLO	R THI OR TH 009-3 SED"	S C IS , P AND	OUPLING COUPLING ER ION "REST	NG OR ING ( NG ISS IRICT	IGINA MD461 UE. ED FI	LLY ., 4 LOW"	62, BE	561,	
TO THE														LE F	'AII	URE	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-215	OMS-215 BASELINE [ ]											
SUBSYSTEM: MDAC ID: ITEM:	OMS 215 COUPLING	G - PROPEI	LLANT GRO	UND-PURGE									
LEAD ANALYST:	C.D. PR	C.D. PRUST											
ASSESSMENT:													
CRITICAL FLIGH		REDUNDANG	CY SCREEN	rs	CIL ITEM								
	йС	A	В	С	11011								
NASA [ 3 /3 IOA [ 3 /3	] [	] [	] [	]	[ ] *								
COMPARE [ /	] [	] [	] [	]	[ ]								
RECOMMENDATIONS:	(If d	ifferent :	from NASA	۸)									
1	] [	] [	] [	] (A	[ ] .DD/DELETE)								
* CIL RETENTION	RATIONAL	E: (If app											
			. I	ADEQUATE NADEQUATE	[ ]								
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.													

ASSESSMI ASSESSMI NASA FMI			• · · · · · · · · · · · · · · · · · · ·	- 1 & CPE		NASA DATA: BASELINE [ ] NEW [ X ]								
SUBSYSTE MDAC ID:				OMS 216 CROSS	FEED	GIM	BAL JO	INIC						
LEAD ANA	ALYS	ST	:	C.D.	PRUS'	T					٠			
ASSESSMENT:														
			ITY REDUNE			DANCY	SCF	REENS			CII			
	FLIGH			INC	A		В		C			1.11	SM	
NASA IOA	[	1	/1 /1	]	[	]	[	]	[	]		[ ]	x ] * x ]	
COMPARE	[		/	]	(	]	[	]	ι	]			, J	. *
RECOMMEN	'ADI	ric	ons:	(If	dif	fere	nt fro	om N	IASA)					
	[		/	]	[	]	[	]	[	j	(AI		] DELET:	E)
* CIL RI		(T	ON	RATION	ALE:	(If	appli	cab	A	DEQU DEQU	ATE ATE	[	]	
NASA/RI	EMARKS: ASA/RI ADDED "FAILED CLOSED ACMV RELIEF DEVICE" TO THE CAUSES ON													
THIS FMI	ĒA,	PI	ER I	OA ISS	UE.				· · · · · · · · · · · · · · · · · · ·	· ·	10 2 102 13	. –		
FIRE, EX	(PL	os:	[ON,	AND E	XPOS	URE	of Eva	AN	ID GRO	JND	CREWS	a silia. Alimani	IOA A	ALSO
	RE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. IOA ALSO COMMENDS THAT "BINDING/JAMMING OF LINE BELLOWS" BE ADDED AS A													

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-217			NASA DATA BASELINE NEW		]					
MDAC ID:	OMS 217 CROSSFEE	D GIMBA	L JOINT								
LEAD ANALYST:	C.D. PRU	.D. PRUST									
ASSESSMENT:											
CRITICAI FLIGH	JTY m	REDUNDA	NCY SCRE	EENS	CIL	Ţ.					
	NC	A	В	С							
NASA [ / IOA [ 1 /1	] [	]									
COMPARE [ N /N	] [	]	[ ]	[ ]	[ 1	]					
RECOMMENDATIONS:	(If di	fferent	from NA	ASA)							
[ /	] [	]	[ ]	[ ] (A	[ DD/DE	] LETE)					
* CIL RETENTION	RATIONALE	E: (If a	pplicabl	Le) ADEQUATE INADEQUATE	[	]					
REMARKS: WASA/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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-218			ASA DATA: BASELINE NEW							
	218	GIMBAL JO									
LEAD ANALYST:	C.D. PRUS	.D. PRUST									
ASSESSMENT:											
CRITICAL: FLIGH		REDUNDANCY	SCREENS		CIL ITEM						
	NC A	В	С								
NASA [ / IOA [ 1 /1	] [	] [	] [	]	[						
COMPARE [ N /N	] [	] [	] [	]	[ N ]						
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)								
[ /	] [	) [	] [	, (AI	[ ] DD/DELETE)						
* CIL RETENTION	RATIONALE:	(If appl	A	DEQUATE DEQUATE							
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 DATE: ASSESSMENT ID: NASA FMEA #:	OMS-219											
	OMS 219 FLEXIBLE LIN	E ASSEMBLY										
LEAD ANALYST:	C.D. PRUST											
ASSESSMENT:	ASSESSMENT:											
CRITICAL FLIGH	ITY REDU	NDANCY SCRE	ens	CIL ITEM								
	NC A	В	С									
NASA [ 1 /1 IOA [ 1 /1	] [ ]	[ ]	[ ]	[ X ] * [ X ]								
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]								
RECOMMENDATIONS:	(If differ	ent from NA	SA)									
[ /	] [ ]	. [ ]	[ ] (A	[ DD/DELETE)								
* CIL RETENTION	RATIONALE: (I	f applicable										
			ADEQUATE INADEQUATE									
REMARKS: NASA/RI ADDED "F THIS FMEA, PER I		ACMV RELIEF	F DEVICE" TO THE CAUSES ON									
IOA RECOMMENDS A FIRE, EXPLOSION,	DDING A STATE											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-220				NASA DATA BASELINE NEW		]			
SUBSYSTEM: MDAC ID: ITEM:		E LINE	assei	MBLY						
LEAD ANALYST:	EAD ANALYST: C.D. PRUST									
ASSESSMENT:	Ē 11.	en en en en en en en en en en en en en e								
CRITICAL FLIGH		REDUND	ANCY	SCREE	ins	CII				
HDW/FU	NC	A	В		<b>C</b> *** * *		211			
NASA [ / IOA [ 1 /1	] [	]	]	]	[ ]	[ ]	] * K ]			
COMPARE [ N /N	] [	]	C	]	[ ]	[ ]	<b>1</b> ]			
RECOMMENDATIONS:	(If d	ifferen	t fro	om NAS	iA)					
( /	] [	]	C.	1	. (2	[ \DD/1	] DELETE)			
* CIL RETENTION	RATIONALI	E: (If	appl:	icable		Γ	1			
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 DATE: ASSESSMENT ID: NASA FMEA #:	OMS-221		DATA: ELINE [ ] NEW [ ]
SUBSYSTEM: MDAC ID: ITEM: FITTINGS	OMS 221 CROSSFEED PROPEI	LLANT LINES AND	MECHANICAL
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH	LITY REDUNDAN		CIL ITEM
HDW/FU	JNC A	ВС	
NASA [ / IOA [ 3 /2]	] [ ]   R ] [ P ]	[ ] [ ] [ F ] [ P ]	[ ] * [ x ]
COMPARE [ N /N	] [и]	[и] [и]	[ N ]
RECOMMENDATIONS	: (If different	from NASA)	
[ /	1. [ ]	[ ] [ ]	[ ] (ADD/DELETE)
	RATIONALE: (If ap	oplicable) ADEQU INADEQU	JATE [ ] JATE [ ]
BLOCKAGE".  NASA/RI DO NOT ( OBSTRUCTION OR I RESULT IN 3/2R I OCCURRENCE IS QU DOWNSTREAM FILTI FAILURE BE ADDRI	NALYSIS SHEET SHOWN COVER RESTRICTED IN CEFORMATION (CRIMIN EFFECTS, HOWEVER SUBSTIONABLE. ANY ER OR COMPONENT. ESSED ON THE FMEA, AS AN OPEN ISSUE.	FLOW IN A SEGMEN PING). SUCH AN THE CREDIBILITY CONTAMINATION V IOA RECOMMENDS	NT OF LINE DUE TO OCCURRENCE COULD OF SUCH AN WOULD FLOW TO THAT SUCH A

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-222		NASA DATA BASELINE NEW	
MDAC ID:	OMS 222 CROSSFEED PROP	ELLANT LI	NES AND MECHA	ANICAL
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
FLIGHT	TTY REDUND	ANCY SCRE B	ENS C	CIL ITEM
NASA [ / IOA [ 1 /1	] [ ]	[ ]	[ ]	[ x ] *
COMPARE [ N /N	] [ ]	[ ]	[ ]	[ N ]
RECOMMENDATIONS:	(If differen	t from NA	SA)	
[ /	] [ ]	[ ]		[ ] DD/DELETE)
* CIL RETENTION F	RATIONALE: (If	applicabl	e) ADEQUATE INADEQUATE	[ ]
REMARKS: IOA CAUSES ON AND BLOCKAGE".	ALYSIS SHEET SH	OULD NOT	INCLUDE "FILT	CER-12-12-12-12-12-12-12-12-12-12-12-12-12-
NASA/RI DO NOT CO OBSTRUCTION OR DE RESULT IN 1/1 EFF OCCURRENCE IS QUE DOWNSTREAM FILTER FAILURE BE ADDRESS	EFORMATION (CRI FECTS, HOWEVER ESTIONABLE. AN R OR COMPONENT. SSED ON THE FME	MPING) THE CREDI Y CONTAMI IOA REC A/CIL, BU	SUCH AN OCCUP BILITY OF SUC NATION WOULD OMMENDS THAT	RENCE COULD H AN FLOW TO SUCH A

NASA FMEA #:					1/01/88 OMS-223 03-3-2008-2									NASA DATA: BASELINE [ ] NEW [ X ]						
SUBSYSTI MDAC ID: ITEM:					23 'ALVE-CROSSFEED															
LEAD ANALYST: C.D. PRUST																				
ASSESSMI	ENT	:																		
CRITICAL FLIGH HDW/FU			T					y screens B c						CIL ITEM						
NASA IOA			/1R /2R			[	P P	]		[	P P	]		[	P ]		]		]	*
COMPARE	ε		/N	]		[		]		[		]		[	]		[		]	
RECOMME	NDA'	TI	ons:		(If	đi	if	fere	ent	f	rc	om 1	NAS	A)						
	[		/	]		. [		]		[		j		[	]	(A	[ DD/	/DI	] ELF	ETE)
* CIL R	ETE	NT:	ION 1	RAT	CION	ALI	Ξ:	(If	E a	pp	11	.ca				UATE UATE	_		]	

### 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.

ASSESSMENT DATE:	1/01/88		NASA DATA:							
ASSESSMENT ID:	OMS-224			E [ ]						
NASA FMEA #:	03-3-2008-1		NE	W [ X ]						
SUBSYSTEM: MDAC ID: ITEM:	OMS 224 VALVE-CROSSFE	EED								
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL		IDANCY SCRE	EENS	CIL ITEM						
FLIGHT HDW/FUN		В	С	TIEM						
NASA [ 3 /2R	] [P]	[ P ]	[ P ]	[ ] *						
IOA [ 3 /3	) [ ]	( )	[ ]	. L J						
COMPARE [ /N	] [ N ]	[ N ]	[ N ]	[ ]						
RECOMMENDATIONS:	(If differe	ent from NA	SA)							
[ /	] [ ]	[ ]	[ ]	[ ] ADD/DELETE)						
* CIL RETENTION I	RATIONALE: (If	applicabl	.e) ADEQUATE INADEQUATE	[ ]						
	OA AGREES WITH NASA/RI REEVALUATION AND RATIONALE REGARDING 3/2R									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-225	NASA DATA: BASELINE [ ] NEW [ ]									
MDAC ID:	OMS 225 VALVE-CROSSFEED										
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:	ASSESSMENT:										
CRITICAL FLIGH	ITY REDUNDANCY SCREENS	CIL ITEM									
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NASA [ / IOA [ 3 /2R	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]	p ] [ ] *									
COMPARE [ N /N	] [ n ] [ n ] [	и] []									
RECOMMENDATIONS:	(If different from NASA)	)									
[ /	] [ ] [ ] [	] · [ ] (ADD/DELETE)									
* CIL RETENTION	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [ ] INADEQUATE [ ]										
RECOMMENDS THAT HOWEVER FMEA/CIL											

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LEAD AN	ALY	ST	:	C.	D. I	PRU	rzi	?												
ASSESSM	ENT	:																		
		F	LIGH	T					IDAN			REEN					L EM			
	]	HDV	/FU	NC			A			В			C							
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COMPARE	[		/N	)		[	N	]	[	N	]	. [	N	J		[	2.	]		
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-227 03-3-210	01-1	NASA DATA: BASELINE [ ] NEW [ X ]								
SUBSYSTEM: MDAC ID:	OMS 227 VALVE-CI										
LEAD ANALYST:	C.D. PRI										
ASSESSMENT:											
CRITICAL FLIGH	ZTY	REDUNI	ANCY	SCREI	ENS			CI:			
	NC	A	В		С						
NASA [ 1 /1 IOA [ 1 /1	] [	]						[	X	]	*
COMPARE [ /	] [	]	[	]	[	]		[		]	
RECOMMENDATIONS:	(If d	ifferen	nt fr	om NAS	SA)						
[ /	] [	]	[	]	[	] (		[ D/1			TE)
* CIL RETENTION	RATIONAL	E: (If	appl	icabl	A	DEQUATE DEQUATE	E	[		]	
REMARKS: NASA/RI AGREED T FMEA, AND TO ADD SHEET, PER IOA I RELIEF DEVICE" T IOA RECOMMENDS A FIRE, EXPLOSION,	CORRESPONSION CORRESPONSION NO. 120 CM CANDING ST.	ONDING ASA/RI USES ON ATEMENT	RETE ALSO THIS S TO	NTION ADDE  S FME  THE	THE RAT D "F A, P EFFE	ITEM I IONALE AILED C ER IOA CTS ABO	TIC TIC CLC IS OUT	T SE SU	ON HE D	C AC	IL MV

ASSESSME ASSESSME NASA FME	NT I NT I A #	DATE: ID: :	1/01 OMS- 03-3	/88 227 <b>A</b> -200	8-3			ì	NASA DA BASELI N		[	]	
SUBSYSTE MDAC ID: ITEM:	M:		OMS 227 AC V				٠						
LEAD ANA	LYS	r:	C.D.	PRU	ST								
ASSESSME	NT:												
		rical Fligh	ITY	•	REDUN	DANC	SCR	REENS			CII	_	
			ЙС	•	A	F	3	C	<b>3</b>		111	111	
NASA IOA	[ ]	1 /1 1 /1	]	[	]	[	]	[	]		[ }	K ]	*
COMPARE	[	/	]	[	]	[	]	[	]		[	]	
RECOMMEN	DAT	cons:	(I	f di	ffere	nt fi	om N	(ASA)					
	[	/	1	[	]	[	]	[	]		[ D/I	] ELĒ	TE)
* CIL RE	TENT	rion :	RATIO	NALE	: (If	appl	.icab	. A	DEQUAT	'E	[	]	•
REMARKS:	-							INA	DEQUAT	E	Ĺ	]	
IOA RECO AS A CAU ADDITION	SE (												
IOA ALSO POSSIBLE													

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-228 03-3-20	08-2		NASA DATA BASELIN NE	
SUBSYSTEM: MDAC ID:	OMS 228 VALVE-C				
LEAD ANALYST:	C.D. PR	UST			
ASSESSMENT:					
CRITICAI FLIGH		REDUNDA	ANCY SCRE	ENS	CIL ITEM
HDW/FC		A	В	C	
NASA [ 3 /1F IOA [ 3 /2F	? ] [ ? ] [	P ] P ]	[ P ] [ F ]	[ P ] [ P ]	[ x ] *
COMPARE [ /N	] [	]	[ N ]	[ ]	[ и ]
RECOMMENDATIONS	(If d	ifferent	from NA	SA)	
[ /	]. [	]	[ ]	[ ]	[ ] ADD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	applicabl	e) ADEQUATE INADEQUATE	[ ]
REMARKS: NASA/RI ORIGINAL FLOW). NASA/RI MODES ON 03-3-20 IOA AGREES WITH IOA B SCREEN FAL FOR OMS XFEED OF OPERATION. OMS XFEED VALVE.	AGREED T 008-2 (FA NASA/RI LURE WAS PS. HOWE	O ADD "F ILS CLOS RATIONAL BASED C VER, OMS	RESTRICTE SED), PER LE FOR 3/ ON THE US S XFEED I	D FLOW" TO IOA ISSUE. 1R PPP CRIT E OF BOTH X S A CONTING	THE FAILURE ASSIGNMENT FEED VALVES ENCY

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-229			NASA DATA BASELINE NEW	: [ ] [ ]
MDAC TD:	OMS 229 VALVE-C	ROSSFEE	D	1 11.	ustra int
LEAD ANALYST:	C.D. PRI	UST			
ASSESSMENT:				to a contract with	
CRITICAL FLIGH		REDUNDA	ANCY SCREE	ens	CIL ITEM
	NC	A	В	С	11511
NASA [ / IOA [ 3 /2R	] [	<b>P</b> . ]	[ p ]	[ ] [ P ]	[ ] *
COMPARE [ N /N	] [	N ]	[ N ]	[и]	[ ]
RECOMMENDATIONS:	(If d	ifferen	t from NAS	SA)	•
·[ /	] [	]	[ ]	[ ] (A)	[ ] DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	applicable	ADEQUATE INADEQUATE	
REMARKS: NASA/RI DID NOT THIS FAILURE MOD EFFECTS OF "DELA FMEA (03-3-2008-	E NEED NO YED OPERA 2).	OT BE AI ATION" A	DDED TO TH	DELAYED OPE E FMEA/CIL. D BY THE "FA	RATION). WORST CASE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-230	NASA DATA: BASELINE [ ] NEW [ ]	
SUBSYSTEM: MDAC ID: ITEM:	OMS 230 VALVE-CROSSFEED	-	
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
CRITICAL FLIGH	ITY REDUNDANCY	SCREENS CIL ITEM	
	NC A E		
NASA [ / IOA [ 3 /1F	[ ] [ ] [ E	[ ] [ ] * * [ X ] *	
COMPARE [ N /N	] [N] [N	1] [N] [N]	
RECOMMENDATIONS:	(If different fi	com NASA)	
[ /	] [ ] [	] [ ] [ ] (ADD/DELETE)	
* CIL RETENTION	RATIONALE: (If appl	licable) ADEQUATE [ ] INADEQUATE [ ]	
FAILS TO RELIEVE IS LISTED AS A C EXTERNAL LEAKAGE IOA RECOMMENDS T ON A SEPARATE FM	C) ON A SEPARATE FMI CAUSE ON CROSSFEED IN CHARAS. CHAT THIS FAILURE BI MEA TO ENSURE THAT	MODE (INTERNAL RELIEF VALVE EA. HOWEVER, THIS FAILURE MODE PROP LINE AND GIMBAL BELLOWS E ADDRESSED AS A FAILURE MODE IT GETS THE PROPER AMOUNT OF E RECOMMENDATION TO BE AN OPEN	

ASSESSMENT ID: NASA FMEA #:	E: 1/01/88 OMS-231 03-3-200	01-1	N	NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	231		POINT BLEED		
LEAD ANALYST:	C.D. PR	UST			
ASSESSMENT:					
FLI	SHT		CY SCREENS		CIL ITEM
•	FUNC				
NASA [ 2 / IOA [ 2 /	IR ] [ IR ] [	F ] [ P ] [	F ] [ F NA]	, ] , ]	[ X ] *
COMPARE [ /	] [	и ] [	и][	1	[ ]
RECOMMENDATION	5: (If d	ifferent i	from NASA)		
[ 2 /	LR ] [	F ] [	F ] [ F	(AD	[ A ] D/DELETE)
* CIL RETENTION REMARKS:	N RATIONALI	E: (If apr	olicable) A INA	DEQUATE	
NASA/RI DID NO HOWEVER, THE RIBEEN ADDED TO IOA AGREES WITH NAI IOA RECOMMENDS AS A FAILURE MO AND IS ADDRESSIOA ALSO RECOMIOF ORBITER ENTILANDING WEIGHT IN CONTAMINATIO CREWS.	EF DES NUMI	BERS FOR TO THE PERSON TO THE EFFECT OF THE PERSON THE EFFECT OF THE PERSON THE EFFECT OF THE PERSON THE PERSON THE PERSON THE PERSON TO THE PERSON TO THE PERSON THE	THIS COUPLI A ISSUE. F A SCREEN CAP INSTA SCREEN. OPEN (DURI THIS IS A C IG FMEAS. CTS INCLUDE CONSTRAINTS	BASED ON LLED. IO REDIBLE FOR PROPERTY OF LEAKAGE	, 668) HAVE  INABILITY TO A ALSO  "BE ADDED AILURE MODE  VIOLATIONS TANK RESULTING

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-232 03-3-2001-	-3		NASA DATA BASELINE NEW		]
SUBSYSTEM: MDAC ID: ITEM:	OMS 232 COUPLING -		ED .			
LEAD ANALYST:	C.D. PRUST	r				
ASSESSMENT:						
CRITICAL FLIGH		EDUNDANCY	SCREENS	S	CIL ITEM	
	NC A	В		<b>C</b>		
NASA [ 3 /3 IOA [ 3 /3	] [	] [	] [	]	[ [	] *
COMPARE [ /	] [	] [	] [	1	[	)
RECOMMENDATIONS:	(If diff	ferent fr	om NASA	)		
[ 3 /3	] [	] [	] [	] (A	[ DD/DE	] LETE)
* CIL RETENTION	RATIONALE:	(If appl	icable)		_	_
			I	ADEQUATE NADEQUATE	[	]
REMARKS: IOA FAILURE MODE		SIS SHEET	SHOULD	INCLUDE "	FAILS	CLOSED"
AND "RESTRICTED NASA/RI DID NOT HOWEVER, THE REF	APPEAR TO C	RS FOR TH	IS COUP	ING ORIGIN LING (MD66	ALLY. 7, 66	8) HAVE
BEEN ADDED TO 03 IOA RECOMMENDS T	HAT "FAILS	CLOSED"	AND "RE			
TO THE FAILURE M MODES AND ARE AD				ARE CREDIB FMEAS.	LE FA	TTOKE

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	OMS-233				ASA BASE		[	_		
SUBSYSTEM: MDAC ID: ITEM:	OMS 233 COUPLIN	g - HIG	H-PC	TNI	BLEED					
LEAD ANALYST:	C.D. PR	UST								
ASSESSMENT:										
CRITICA FLIG	LITY	REDUNE	ANCY	SCR	EENS			CII		
		A	E	3	С			***	J11	
NASA [ 3 /3 IOA [ 3 /3	] [	]	[	]	[ [	]		[ [	.] .]	*
COMPARE [ /	] [	1	[	]	[	]		[	]	
RECOMMENDATIONS	: (If d	ifferen	t fr	om N	ASA)					
[ /	) (	]	ĺ	]	[	)	(AI		] DELE	ETE)
* CIL RETENTION	RATIONAL	E: (If	appl	icab	A	DEQUA DEQUA		[	]	
REMARKS: IOA FAILURE MOD OPEN" AND "REST	RICTED FLA	ÖW".					11,5		£**	LS TO
NASA/RI DID NOT HOWEVER, THE RE	F DES NUM	BERS FO	R TH	IS C	OUPLI					HAVE

una una professione de la caractería

ASSESSMEI NASA FME	NT ID A #:	TE:	OMS-23 03-3-2	84 200	)9-	-1						BASEL		[	x	]		
SUBSYSTEM MDAC ID: ITEM:	M:		OMS 234 COUPLI															
LEAD ANA	LYST:		C.D. I	PRU	JST	נ												
ASSESSME	NT:																	
		CALI	[TY		RI	EDUND	ANO	CY	SCR	EENS	3				IL PEM			
			NC		A			В			С							
NASA IOA	[ 2 [ 2	/1R /1R	]	]	F P	]	[	F NA	]	]	P P	]		[	X	]	*	
COMPARE	[	/	]	[	N	]	[	N	]	[		]		[		]		
RECOMMEN	DATIO	NS:	(If	đ:	if	feren	it :	fro	om N	ASA)	)							
	[ 2	/1R	]	[	F	1	[	F	]	[	P	]			A /DE		ETE)	
* CIL RE	TENTI	ON 1	RATION	AL	E:	(If	apı	pl:	icab	le)				_		_		
										I	AI IAI	DEQUA	TE TE	[		]		-
REMARKS: NASA/RI HOWEVER, 686) HAV IOA AGRE VERIFY C AGREES W IOA RECO AS A FAI AND IS A IOA ALSO ABOUT PO AND GROU	THE E BEE ES WI ONDIT ITH N MMEND LURE DDRES RECO	REF IN A ITH I ION IASA, IS TI MODI SED IMMEI	DES NO DDED TO NASA/RI OF CAI /RI FAI HAT "PO E ON TO ON RCS NDS THA ORROSIO	UMI O I I I I I I I I I I I I I I I I I I	BEI 03. FA: SEZ URI PE' S I QD	RS FO -3-20 ILURE AL AF E OF I FAI FMEA. COUF STAT FIRE,	OR (1)	THI F I R (SCI OI THI NG ENT	IS COMPENS OF THE PENSON OF TH	OUPI R IC REEN INST (DUI S A AS.	LII DA I I CAI CI DEI	NG (M ISSU BASEI LLATI NG FI REDIE	ID673 IE. ON ON. IGHT BLE I	II I) ' FA:	67 NAE IOA ILU FFE	311 SE JRE	LITY ALSO ADDE MOD	TO ED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-235 03-3-2009-	-3	NASA DATA:  BASELINE [ ]  NEW [ X ]							
SUBSYSTEM:	OMS 235	CROSSFEED DRA	IN-							
LEAD ANALYST:										
ASSESSMENT:										
CRITICAL FLIGH		DUNDANCY SCR	EENS	CIL ITEM						
HDW/FU		В	<b>C</b> 1995 1							
NASA [ 3 /3 IOA [ 3 /3	] [		[ ]	[ ].*						
COMPARE [ /	] [	] [ ]	[ ]	[ ]						
RECOMMENDATIONS:	(If diff	erent from N	ASA)							
[ 3 /3	] [	1 [ 1	[ ] (	[ ] ADD/DELETE)						
* CIL RETENTION		(If applicab)	le) ADEQUATE INADEQUATE	[ ]						
REMARKS: IOA FAILURE MODE	S <u>ON ANALY</u> S	SIS SHEET SHOW	ULD INCLUDE	"FAILS CLOSED"						
AND "RESTRICTED NASA/RI DID NOT	APPEAR TO C	COVER THIS CO	UPLING ORIGI	NALLY.						
686) HAVE BEEN A	OWEVER, THE REF DES NUMBERS FOR THIS COUPLING (MD673, 674, 679, 86) HAVE BEEN ADDED TO 03-3-2009-3, PER IOA ISSUE.									
IOA RECOMMENDS T TO THE FAILURE M MODES AND ARE AD	HAT "FAILS ODES ON THI	CLOSED" AND 'S FMEA. THE	"RESTRICTED SE ARE CREDI	FLOW" BE ADDED BLE FAILURE						

ASSESSME ASSESSME NASA FME	NT NT A	D. I:	ATE: D:	1/ OM: 03	/01/88 MS-236 3-3-2009-2							DATA ELINE NEW	[		
SUBSYSTE MDAC ID:	M:			OM: 23	S 6			SFEED	DR	AIN					
LEAD ANA	LY	ST	:	c.	D. P	RU	ST								
ASSESSME	ASSESSMENT:														
	CR						REDUN	DANCY	sc	REENS	5		CI	L EM	
	FLIGHT HDW/FUNC						A	В			C				
NASA IOA	[	3 3	/3 /3	]		]	]	] ].	]	[	]		[	]	*
COMPARE	[		/	]		[	]	[	]	[	]	-	[	]	
RECOMMEN	IDA'	ΤI	ons:		(If	di	ffere	nt fro	om	NASA)					
•	[		/	]		[	]	[	]	[	]	(A	[ .DD/	DELI	ETE)
* CIL RE		NT	ION	RAT	IONA	LΕ	: (If	appl	ica		ADEQ IADEQ	UATE UATE	[	]	
REMARKS: IOA FAII OPEN" AN NASA/RI HOWEVER, 686) HAV	UR ID DI T	"R D HE	ESTF NOT REF	RICT APP DE	ED F EAR S NU	LO TO MB	W". COVE ERS F	R THIS	s c	COUPLI	NG O	RIGIN	ALI	JΥ.	

ASSESSMEN ASSESSMEN NASA FMEA	T I	D:	OMS-2					N	NASA D BASEL		[	]	
SUBSYSTEM MDAC ID: ITEM: NTO			OMS 237 PROPI	ELLAN	T LII	NES A	AND M	IECHAN	NICAL	FITT	INGS	5- <b>MM</b> H	AND
LEAD ANAL	YST	:	C.D.	PRUS	T								
ASSESSMEN	T:												
C	F	ICAL LIGH W/FU	$\mathbf{T}$	R		DANCY E		EENS			CIL ITEN		
NASA IOA	[ 3	/3	]	].	]	[	]	[	]		[	]*	
COMPARE	[ и	/N	]	[	]	[	]	[	]		[	]	
RECOMMEND	ATI	ons:	(I:	f dif	fere	nt fr	om N	IASA)					
	[	/	]	[	]		]	[	]	(AD	[ D/DI	] ELETE)	
* CIL RET								INZ	ADEQUA ADEQUA	TE	[	]	
REMARKS: IOA CAUSE BLOCKAGE"	s o	N AN	ALYSIS	S SHE	ET S	HOULI	TON C	' INCI	LUDE "	FILT			
NASA/RI DOBSTRUCTI RESULT IN OCCURRENCE DOWNSTREA FAILURE E RECOMMEND	ON ON ON ON ON ON ON ON ON ON ON ON ON O	OR D 3 EF S QU ILTE DDRE	EFORMA FECTS ESTION R OR ( SSED (	ATION , HOW NABLE COMPO ON TH	(CR EVER A NENT E FM	IMPIN THE NY CO . IO EA/CI	IG). CRED ONTAM OA RE	SUCH IBILI INATI COMMI	i an o TTY of Con wo Ends t	CCUR SUC ULD HAT	RENC H AN FLOV SUCH	CE COU V TO V A	JLD

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-238 NONE	NASA DAT BASELIN NE						
SUBSYSTEM: MDAC ID: ITEM: NTO	OMS 238 PROPELLANT LINE	S AND MECHANICAL FI	TTINGS-MMH AND					
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
CRITICAL: FLIGH HDW/FU		NCY SCREENS B C	CIL ITEM					
NASA [ / IOA [ 2 /1R	] [ ] ] ]	[ ] [ ] [ F ] [ P ]	[ x ] *					
COMPARE [ N /N	] [N]	[ N ] [ N ]	[ N ]					
RECOMMENDATIONS:	(If different	from NASA)						
[ /	] [ ]	[ ] [ ]	[ ] ADD/DELETE)					
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ] INADEQUATE [ ]								
	ALYSIS SHEET SHO	OULD NOT INCLUDE "FI	LTER					
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 ADDRE	SSED ON THE FMEA	/CIL, BUT DOES NOT	REGARD THIS					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-239 03-3-2601-1		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:				
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL: FLIGHT HDW/FUI	ITY REDUND F NC A	ANCY SCRE		CIL ITEM
NASA [ 1 /1 IOA [ 1 /1	] [ ]		-	[ X ] *
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS:	(If differen	t from NA	SA)	
[ /	] [.]	[ ]	[ ] (A)	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicable	e) ADEQUATE INADEQUATE	[ ]
REMARKS: NASA/RI AGREED TO CAUSES ON THIS FI THE CIL SHEET SHO IOA RECOMMENDS AI FIRE, EXPLOSION, RECOMMENDS THAT CAUSE ON THIS FM	MEA, PER IOA IS OULD ADDRESS TH DDING A STATEME AND EXPOSURE O "BINDING/JAMMIN	SUE. THE IS NEW CA' NT TO THE F EVA AND G OF LINE	RETENTION RAUSE. EFFECTS ABOUTED CREWS BELLOWS" BE	ATIONALE ON UT POSSIBLE S. IOA ALSO

	1/01/88 OMS-240 NONE		1	NASA DATA: BASELINE NEW	
MDAC ID:	OMS 240 GIMBAL BE	LLOWS			
LEAD ANALYST:	C.D. PRUS	T			
ASSESSMENT:					
	ITY R	EDUNDANCY		CIL ITEM	
FLIGH HDW/FU		В	•	С	TIEM
NASA [ / IOA [ 1 /1	] [	] [	] [	]	[ ] * [ x ]
COMPARE [ N /N	] [	] [	] [	]	[и]
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)		
. [ /	] [	] [	] [	] (AI	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appli		ADEQUATE ADEQUATE	
REMARKS: NASA/RI DO NOT CO DEFLECTION). IO ON LINE AND BELL	A RECOMMEN	DS ADDING	DE (NO	BELLOWS AN	IGULAR

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-241			NASA DATA BASELINE NEW					
MDAC ID:	OMS 241 GIMBAL	BELLOWS							
LEAD ANALYST:	C.D. PRI	JST							
ASSESSMENT:	ASSESSMENT:								
CRITICAL FLIGH		REDUNDA	NCY SCREE	NS	CIL ITEM				
	NC	<b>A</b>	В	C	IIEM				
NASA [ / IOA [ 2 /1R	] [	p ]	[	[ ] [ P ]	[ x ] *				
COMPARE [ N /N	] [	и ]	[ N ]	[и]	[ N ]				
RECOMMENDATIONS:	(If d	ifferent	from NAS	A)					
[ /	] [	1	[ ]	[ ] (A)	[ ] DD/DELETE)				
* CIL RETENTION	RATIONAL	E: (If a		) ADEQUATE INADEQUATE					
REMARKS: NASA/RI DO NOT CONSIDERS THE BE QUESTIONABLE. MODE IN THE FMEA IT BE ADDRESSED.	E CREDIB	ILITY OF ES NOT F	E MODE (RICT) RESTRICT	ESTRICTED F ED FLOW IN A ABSENCE OF	LOW). IOA A BELLOWS TO THIS FAILUR				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			1/01/88 OMS-242 03-3-2601-1			]	NASA 1 BASE1		[		]						
SUBSYSTEM:			OM:														
LEAD ANALYST: C.D. PRUST																	
ASSESSM	ASSESSMENT:																
	CR		ICAL LIGH			R	EDU	NDA	NC	SCF	REENS				IL TEN		
				NC A B			•	C									
NASA IOA	]	1 1	/1 /1	]		[	]		[	]	[	]		[	X X	]	*
COMPARE	[		/	].		[	]		[	]	[	]		[		]	
RECOMME	NDA	TI	ons:		(If	dif	fer	ent	fı	com 1	NASA)						
	[		/	]		[ .	]		[	]	[	]	(A			] ELE	ETE)
	* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ] INADEQUATE [ ]																

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-243		NASA DATA: BASELINE NEW					
	OMS 243 GIMBAL BELL	.ows						
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
		OUNDANCY SCREE	CIL ITEM					
FLIGH HDW/FUI	NC A	В	С	IIEM				
NASA [ / IOA [ 1 /1	] [ ]	[ ]		[ x ] *				
COMPARE [ N /N	] [ ]	[ ]	[ ]	[ N ]				
RECOMMENDATIONS:	(If diffe	erent from NAS	SA)					
[ /	] [ ]	[ ]	[ ] (AI	[ ] DD/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 DA ASSESSMENT II NASA FMEA #:	: OMS-2			NASA DATA BASELINE NEW				
SUBSYSTEM: MDAC ID: ITEM:	OMS 244 GIMBA	L BELLOWS						
LEAD ANALYST:	C.D.	PRUST						
ASSESSMENT:								
	CALITY IGHT	REDUNDAN	ICY SCREEN	rs	CIL ITEM			
	/FUNC	A	В	С	11211			
NASA [ IOA [2	/ ] /1R ]	[ ] [ [ P ] [	[ ] [ [ <b>F</b> ] [	p ]	[			
COMPARE [ N	/N ]	[ N ]	[и]	N ]	[ N ]			
RECOMMENDATIO	NS: (If	different	from NASA					
Į.	/ ]	[ ] [		[ ] (A	[ ] .DD/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 DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-245 03-3-2602-1		NASA DATA BASELINE NEW	
	OMS 245 ALIGNMENT BE	LLOWS		
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL: FLIGH	ITY REDU	INDANCY SCREI	ens	CIL ITEM
	NC A	В	C	11111
NASA [ 1 /1 IOA [ 1 /1	] [ NA] [ ]	[ NA] [ ]	[ NA] [ _]	[ X ] * [ X ]
COMPARE [ /	] [ N ]	[ N ]	[ N ]	[ ]
RECOMMENDATIONS:	(If differ	ent from NAS	SA)	
[ /	1 . [ 1	[ ]	[ ] (A	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE: (1	If applicable	ADEQUATE INADEQUATE	
REMARKS: NASA/RI AGREED TO CAUSES ON THIS FI THE CIL SHEET SHO IOA RECOMMENDS AN FIRE, EXPLOSION,	MEA, PER IOA OULD ADDRESS DDING A STATE AND EXPOSURE	ISSUE. THE THIS NEW CAU EMENT TO THE OF EVA AND	RETENTION RUSE. EFFECTS ABOUND CREW	ATIONALE ON UT POSSIBLE S. IOA ALSO
RECOMMENDS THAT CAUSE ON THIS FM. REDUNDANCY SCREEN	EA.			ADDED AS A

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-246		ì	VASA DATA BASELINE NEW				
	OMS 246 ALIGNMENT	r BELLOWS			•			
LEAD ANALYST:	C.D. PRUS	ST						
ASSESSMENT:								
CRITICAL: FLIGH		REDUNDANCY	SCREENS		CIL ITEM			
	NC A	A B	(	2	11111			
NASA [ / IOA [ 1 /1	] [	] [	] [	]	[			
COMPARE [ N /N	] [	] [	] [	]	[ N ]			
RECOMMENDATIONS:	(If dif	fferent fr	om NASA)		·			
. 1	] [	] [	] [	] (A)	[ ] DD/DELETE)			
* CIL RETENTION	RATIONALE:	: (If appl						
			IN	ADEQUATE ADEQUATE				
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.								

SUBSYSTEM: OMS MDAC ID: 247 ITEM: ALIGNMENT BELLOWS  LEAD ANALYST: C.D. PRUST  ASSESSMENT:  CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C  NASA [ / ] [ ] [ ] [ ] [ ] * IOA [ 2 /1R ] [ P ] [ F ] [ P ] [ X ]  COMPARE [ N /N ] [ N ] [ N ] [ N ] [ N ]  RECOMMENDATIONS: (If different from NASA)  [ / ] [ ] [ ] [ ] [ ] [ ]  * CIL RETENTION RATIONALE: (If applicable)  * CIL RETENTION RATIONALE: (If applicable)  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 DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE [ ] NEW [ ]
ASSESSMENT:  CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C  NASA [ / ] [ ] [ ] [ ] [ ] * IOA [ 2 /1R ] [ P ] [ F ] [ P ] [ X ]  COMPARE [ N /N ] [ N ] [ N ] [ N ] [ N ]  RECOMMENDATIONS: (If different from NASA)  [ / ] [ ] [ ] [ ] [ ] [ ]  * CIL RETENTION RATIONALE: (If applicable)  * CIL RETENTION RATIONALE: (If applicable)  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	MDAC ID:	247	
CRITICALITY REDUNDANCY SCREENS CIL ITEM  HDW/FUNC A B C  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)  * CIL RETENTION RATIONALE: (If applicable)  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	LEAD ANALYST:	C.D. PRUST	
FLIGHT HDW/FUNC A B C  NASA [ / ] [ ] [ ] [ ] * IOA [ 2 /1R ] [ P ] [ F ] [ P ] [ X ]  COMPARE [ N /N ] [ N ] [ N ] [ N ] [ N ]  RECOMMENDATIONS: (If different from NASA)  [ / ] [ ] [ ] [ ] [ ] [ ]  * CIL RETENTION RATIONALE: (If applicable)  * CIL RETENTION RATIONALE: (If applicable)  * CIL RETENTION RATIONALE: (If applicable)  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	ASSESSMENT:		
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)  * CIL RETENTION RATIONALE: (If applicable)  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			
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			<b>C</b>
RECOMMENDATIONS: (If different from NASA)  [ / ] [ ] [ ] [ ] [ ] (ADD/DELETE)  * CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ] INADEQUATE [ ]  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	NASA [ / IOA [ 2 /1R	] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [	P ] [ X ]
[ / ] [ ] [ ] [ ] (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	COMPARE [ N /N	] [и] [и] [	и ] [и]
* 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	RECOMMENDATIONS:	(If different from NASA)	•
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	[ /	1 [, 1 [ 1 ] [	] [ ] (ADD/DELETE)
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		RATIONALE: (If applicable)	ADEQUATE [ ]
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	NASA/RI DO NOT CO	OVER THIS FAILURE MODE (RES	TRICTED FLOW). IOA
	NOW CONSIDERS THE BE QUESTIONABLE. MODE IN THE FMEA,	E CREDIBILITY OF RESTRICTED IOA DOES NOT REGARD THE A	FLOW IN A BELLOWS TO BSENCE OF THIS FAILURE

ASSESSME	NT ID:	1/01/88 OMS-248 03-3-4002-2					NASA DATA: BASELINE [ ] NEW [ X ]				
SUBSYSTE MDAC ID:		OMS 248 ENGINE	INL	ET FI	LTER	R AND	ORII	FICE			
LEAD ANA	LYST:	C.D. P	RUST								
ASSESSME	NT:										
	FLIGH	T		DUNDA		SCREENS				CIL ITEM	
	HDW/FU	NC	A		В		С				
NASA IOA	[ 3 /3 [ 2 /1R	].	[ [ P	]	[ [ F	]	[ [ P	]	]	x ]	*
COMPARE	[ N /N	]	[ И	]	[ N	]	[ N	]	[	N ]	
RECOMMEN	DATIONS:	(If	diff	erent	fro	om NAS	SA)				
	[ 1 /1	]	[	]	[	]	[	] (	[ ADD/		
* CIL RE	TENTION	RATIONA	LE:	(If a	ppli	icable	A	DEQUATE DEQUATE		]	
REMARKS: IOA NOW A CATAST ORIFICES BURN-THR IOA RECO PLACED O	ROPHIC E OR COOL OUGH. MMENDS T	NGINE F. ING CHA HAT THI	AILU NNEI	RE. S COU	CONT	RESULI	A 1/1 ATION	SINCE OF EN COMBUS	IT IGINE STION	CH	JECTOR AMBER

	1/01/88 OMS-249 03-3-4002-	-1	NASA DATA: BASELINE NEW	-				
MDAC ID:	OMS 249 ENGINE INI	LET FILTER AND	ORIFICE					
LEAD ANALYST:	C.D. PRUST	r						
ASSESSMENT:	ASSESSMENT:							
CRITICAL: FLIGH		EDUNDANCY SCREE	ins	CIL ITEM				
HDW/FU		В	С					
NASA [ 2 /1R IOA [ 2 /1R	] [ P ] [ P	] [ P ] ] [ F ]	[ P ] [ P ]	[ X ] *				
COMPARE [ /	] [	]. [ N ]	[ ]	[ ]				
RECOMMENDATIONS:	(If diff	ferent from NAS	SA)					
[ /	] [	] [ ]	[ ] (AI	[ ] OD/DELETE)				
* CIL RETENTION	RATIONALE:	(If applicable	e) ADEQUATE INADEQUATE					
REMARKS: IOA AGREES WITH	NASA/RI RAT	TIONALE FOR PAS	SAGE OF B SO	CREEN.				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-250 03-3-4601-	-1		NASA DATA BASELINE NEW	: [ x ]						
SUBSYSTEM: MDAC ID: ITEM:	OMS 250 BELLOWS-TY										
LEAD ANALYST:	C.D. PRUST	r									
ASSESSMENT:											
CRITICAL: FLIGHT		EDUNDANCY	SCREEN	is	CIL ITEM						
HDW/FUI		В	1	С							
NASA [ 1 /1 IOA [ 1 /1	] [	] [	] [	]	[ X ] *						
COMPARE [ /	] [	] [	] [	]	[ ]						
RECOMMENDATIONS:	(If dif:	ferent fr	om NASA	<b>(</b> )							
[ /	] [	] [	] [	[ ] (A)	[ DD/DELETE)						
* CIL RETENTION	RATIONALE:	ATIONALE: (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.											

ASSESSM ASSESSM NASA FM	ENT	I	D:	OM							NASA I BASEI		[		]	
SUBSYST: MDAC ID ITEM:				OM 25 BE	1	<b>1</b> S-7	rvc g	IMBAL					-			
LEAD AN	ALY	ST	:	c.	D. I	PRUS	ST									
ASSESSM	ENT	:						•								
	CR		ICAL LIGH		•	I	REDUN	DANCY	SCI	REENS	}		C]	L EN	ī.	
	]		W/FU			7	<b>A</b> ,	В			C		1.	Lii	1	
NASA IOA	[	1	/1	]		[	]	[	]	]	]		[	x	]	*
COMPARE	[	N	/N	]		[	]	[ .	]	[	]		[	N	]	
RECOMME	NDA'	ΓI	ons:		(If	di	ffere	nt fr	om 1	NASA)						
	[		/	]		[	]	[	]	[	]	(AI			] ELE	ETE)
* CIL R		NT:	ION	RAT	'ION <i>E</i>	ALE:	: (If	appl	ical	-	ADEQU <i>I</i>				]	
REMARKS NASA/RI DEFLECT FAILURE LEAKAGE THE PRO WHICH L	DO ION MO FM POS	) ( DE EA: ED	ON A AS S. IOA	SE A C A S CA	PARA AUSE EPAR USE	ATE E ON RATE IS	FMEA N ALL E FME ALRE	. IO PROP A IS ADY A	A RI LII NOT DDRI	ECOMM NE AN REQU ESSED	ENDS A D BELI IRED. ON FI	addin Lows Mea (	IG EX	TF CTF	IIS	IAL

ASSESSMEN ASSESSMEN NASA FME	NT I	D:	OMS-	MS-252								ASA DAT BASELIN NI		[		]	
SUBSYSTEM MDAC ID:			OMS 252 BELL	52 ELLOWS-TVC GIMBAL													
LEAD ANA	LYST	:	C.D.	PRU	JST	r									•		
ASSESSME	NT:																
CRITICALITY FLIGHT					RI	EDUN	IDANC	Y:	SCI	REENS	3			CIL ITEM			
			NC		A			В			С			•		•	
NASA IOA	[ [ 2	/ /1R	]	]	P	]	[	F	]	[ [	P	]		[	x	]	*
COMPARE	[ N	/N	]	(	N	]	[	N	]	[	N	1		[	N	]	
RECOMMEN	DATI	ons:	(I:	f d:	Ĺfí	fere	ent f	r	om l	NASA)	)						
	[	/	]	ĺ		]	Ţ		]	. [	•	]			/D		ETE)
* CIL RE	TENT	ION 1	RATIO	NALI	Ξ:	(11	f app	1:	ical	•		DEQUATI		[		]	
REMARKS: NASA/RI I NOW CONSI BE QUESTI MODE IN I IT BE ADI	IDER IONA THE	S THI BLE. FMEA	E CRE	DIB:	[L] ES	YTI CON	OF R	ES	STR:	ICTEI THE 2	ABS	FLOW IN	N A	TI	BÉ! HIS	LLA S 1	OWS TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-253 03-3-4507-1	NASA DATI BASELINI NE	A: E [ ] W [ X ]					
SUBSYSTEM: MDAC ID: ITEM:	253	UPLING - HIGH-POINT BLEED TEST P						
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
FLIGH	$\mathbf{T}$	REDUNDANCY SCREENS						
HDW/FU	NC A	B C						
NASA [ 2 /1R IOA [ 2 /1R	] [ F ] [ ] [ P ]	F ] [ P ] NA] [ P ]	[ X ] *					
COMPARE [ /	] [N][	и] []	[ ]					
RECOMMENDATIONS:	(If different f	rom NASA)						
[ 2 /1R	] [F] [	F ] [ P ]	[ A ] ADD/DELETE)					
+ CTT DETENTION	PATTONALE: (If and	licable)						
- CID RETENTION	RATIONALE: (If app	ADEQUATE INADEQUATE						
REMARKS:	WAGA OF BATTION OF	A CODERN PACED OF	N TNINGTITMU MA					
VERIFY CONDITION	NASA/RI FAILURE OF OF CAP SEAL AFTER	CAP INSTALLATION	. IOA ALSO					
ACDEES WITH NASA	/PT FATLIRE OF B S	CREEN						
IOA RECOMMENDS T	HAT "POPPET FAILS	OPEN (DURING FLIGH	HT)" BE ADDED					
AND IS ADDRESSED	AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON RCS QD COUPLING FMEAS.							
IOA ALSO RECOMME	NDS ADDING A STATE	MENT TO THE EFFECT	TS ABOUT					
POSSIBLE FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS DUE TO PROP LEAKAGE.								

ASSESSMENT DAT ASSESSMENT ID: NASA FMEA #:	01/0 05			NASA DAT BASELIN NE						
SUBSYSTEM: MDAC ID: ITEM:	OMS 254 COUPLI	NG - HIG	H-POINT	BLEED TEST F	PORT					
LEAD ANALYST:	C.D. P	RUST								
ASSESSMENT:										
CRITIC FLI	ALITY GHT	REDUND	ANCY SCE	REENS	CIL ITEM					
	FUNC	A	В	С						
NASA [ 3 / IOA [ 3 /	3 ] 3 ]	[ ]	[ ]	[ ]	[ ] *					
COMPARE [ /	]	[ ]	[ ]	[ ]	[ ]					
RECOMMENDATION	s: (If	differen	t from N	IASA)						
[ 3 /	3 ]	[ ]	[ ]	[ ] (	[ ] ADD/DELETE)					
* CIL RETENTIO	N RATIONA	LE: (If	applicak	ole) ADEQUATE INADEQUATE						
REMARKS: IOA FAILURE MO AND "RESTRICTE		ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED"								
IOA RECOMMENDS TO THE FAILURE	THAT "FA	THAT "FAILS CLOSED" AND "RESTRICTED FLOW" BE ADDED MODES ON THIS FMEA. THESE ARE CREDIBLE FAILURE DDRESSED ON RCS QD COUPLING FMEAS.								

ASSESSME ASSESSME NASA FME	NT I	D:	1/01/ OMS-2 03-3-	55	-2			NASA DATA: BASELINE [ ] NEW [ X ]						
SUBSYSTE MDAC ID:			OMS 255 COUPI	,ING	- HI(	GH-PC	INT	BLEEC	TEST	r po	RT			
LEAD ANA	LYST	<b>:</b>	C.D.	PRUS	T									
ASSESSME	NT:													
				R	EDUN	DANCY	SCR	REENS				CIL		
		LIGH W/FU	NC	C A B					C					
NASA IOA	[ 3 [ 3	/3 /3	]	[	]	[	]	[	]		[	]	*	
COMPARE	[	/	]	(	]	[	]	[	]		[	]		
RECOMMEN	DATI	ons:	(If	dif	fere	nt fr	om N	ASA)	,					
	[	/	]	[	]	.[	]	[	)	(A	[ DD/I		ETE)	
* CIL RE	TENT	ION	RATION	TIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]										
REMARKS:	URE					SHEET	SHO	ULD N	OT II	ICLU	DE '	'FA]	ILS TO	
OPEN" AN			ICTED	ED FLOW".										

and the second of the second o

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-256			NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 256 VALVE - 1	BIPROPELL	ANT VALV	E	
LEAD ANALYST:	C.D. PRU	ST			
ASSESSMENT:					
FLIGH'			Y SCREEN B	s c	CIL ITEM
	NC .		_	-	
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] [ ]	P ] [ P ] [	P ] P ]	[ X ] *
COMPARE [ /	] [	] [	] [	1	[ ]
RECOMMENDATIONS:	(If di	fferent f	rom NASA	.)	
[ /	] [	] [	] [	] (A)	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE	: (If app		ADEQUATE NADEQUATE	[ ]
REMARKS: IOA FAILURE MODE "RESTRICTED FLOW BY THE ENGINE IN (03-3-4001-3). NO DIFFERENCES. IOA RECOMMENDS T FMEA BE SEPARATE INTO THE FAILURE	". THE E LET FILTE HAT THE S D ONTO IN	FFECTS OF R (03-3-4 UBASSEMBL DIVIDUAL	"RESTRI 002-1), Y COMPON FMEAS TO	AND THE BI	ARE COVERED PROP VLV ASSY

ASSESSMI ASSESSMI NASA FMI	ENT	I	D:	OÌ	01/88 IS-257 I-3-4001-1									ASA DATA BASELINI NEV	Ē [		]	
SUBSYSTEMDAC ID:				01 25 V	7 LVE - BIPROPELLAN						ŊT V	ALVE	E					
LEAD ANA	ALYS	ST	:	c.	D.	PR	JS'	r										
ASSESSMI	ENT:	:																
	CRI		ICAI LIGH		Z.					CY	Y SCREENS					CIL ITEM		
	F	HDI	W/FU	INC			A			В			С					
NASA IOA	[	2 2	/1F /1F	? ] ? ]		[	P P	]	[	P P	]	[	P P	]	[	X X	]	*
COMPARE	Ţ		/	]		[		]	[		]	[		]	[		]	
RECOMMEN	NDAT	ri(	ons:		(If	d:	if	ferer	nt f	fro	om Na	ASA)						·
•	[		/	]		[		]	[		]	[		] (2		/DI		TE)
* CIL RI	ETEN	<b>1</b> T	ION	RAT	CION	ALI	Ε:	(If	app	<b>1</b> 1	lcab:	·		DEQUATE DEQUATE			]	
REMARKS: NO DIFFI INCLUDED PROVIDE ASSEMBLY	EREN O ON BET	T'T	THIS ER I	NS]	IEA GHT	BE Il	SI	EPARA THE	TEI E FA	) (	NTO LURES	IND S PC	)IV	VIDUAL E	ME V T	AS HE	TC	
IOA RECO																		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-258 03-3-4001-3		NASA DATA BASELINE NEW						
SUBSYSTEM: MDAC ID:	OMS 258 VALVE - BIPROPE	E							
LEAD ANALYST:	C.D. PRUST	.D. PRUST							
ASSESSMENT:									
FLIGH'	ITY REDUNDAI T NC A	NCY SCREEN	s c	CIL ITEM					
		_	·	( V ) *					
IOA [ 2 /1R	] [ P ] ] [ P ]	[ P ] [	P ]	[ X ] * [ X ]					
COMPARE [ /	] [ ]	[и] [	]	[ ]					
RECOMMENDATIONS:	(If different	from NASA	)						
. [ /	] [ ].	ו וֹנ	] (A	[ ] DD/DELETE)					
* CIL RETENTION	RATIONALE: (If a		ADEQUATE NADEQUATE						
REMARKS: NASA/RI ORIGINAL TRAVEL) FOR THE FAILURE MODE ON IOA ACCEPTS NASA	BIPROPELLANT VALV	VE. NASA/	URE MODE ( RI NOW COV	FAILS MID- ERS THIS					
IOA RECOMMENDS T	HAT THE SUBASSEM D ONTO INDIVIDUA	T THE SUBASSEMBLY COMPONENTS INCLUDED ON THIS ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT POSSIBLE IN THE ASSEMBLY.							

ASSESSMENT DASSESSMENT II NASA FMEA #:	ATE: 1/01/8 D: OMS-25 03-3-4	38 59 1001-6	: [		
SUBSYSTEM: MDAC ID: ITEM:	OMS 259	- BIPROP			
LEAD ANALYST	: C.D. I	PRUST			
ASSESSMENT:					
F)	ICALITY LIGHT				CIL ITEM
HDI	W/FUNC	A	В	<b>C</b>	
NASA [ 2 IOA [ 2	/1R ] /1R ]	[ P ] [ P ]	[ F ] [ F ]	[ P ] [ P ]	[ X ] * [ X ]
COMPARE [	/ 1	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIO	ONS: (If	differen	t from NA	SA)	•
ſ	/ ]	[ ].	[ ]	[ ] (A	[ ] DD/DELETE)
* CIL RETENT	ION RATIONA	ALE: (If	applicable	e) ADEQUATE INADEQUATE	
MODE. HOWEVE ISSUE. LEAK IOA RECOMMENT EXPOSURE OF IOA RECOMMENT	ER, NASA/RI AGE PAST UI DS ADDING A EVA AND GRO DS THAT THI RATED ONTO	CHANGED PSTREAM BA A STATEMEN DUND CREW E SUBASSEN INDIVIDUA	B SCREEN ALL VALVE VT TO THE B TO PROPI MBLY COMPO	TO "FAIL", IS UNDETECT EFFECTS ABO ELLANTS. ONENTS INCLU TO PROVIDE B	ABLE. UT POSSIBLE

ASSESSMENT NASA FMEA	r DATE: r ID: #:	0MS-260 03-3-2	8 0 101-1	L				ASA DATA BASELINE NEW	. [		]	
SUBSYSTEM: MDAC ID: ITEM:	:	OMS 260	DMS									
LEAD ANALY	ST:	C.D. P	RUST									
ASSESSMENT	r:									٠		
CI	RITICAL FLIGH	ITY T	REI	OUNDA	NCY				C: I:	IL PEM		
		NC	A		В		С					
NASA IOA	$\begin{bmatrix} 1 / 1 \\ 1 / 1 \end{bmatrix}$	]		] ]	[	]	[	]	[	X	]	*
COMPARE	[ /	]	[ ]	)	[	]	[	]	[		]	
RECOMMENDA	ATIONS:	(If	diff	erent	fro	m NAS	A)					
1	[ /	]	[	]	[	]	[	] (A			] ELE	TE)
* CIL RETI	ENTION :	RATIONA:	LE:	(If a	ppli	.cable	e) AI INAI	DEQUATE DEQUATE	[		]	
REMARKS: NASA/RI AG FMEA, AND SHEET, PEI RELIEF DEV IOA RECOMI FIRE, EXPI	TO ADD R IOA I VICE" TO MENDS A	CORREST SSUE. THE CARDING ST	POND: NASA, AUSE: TATE!	ING R /RI A S ON MENTS	ETEN LSO THIS TO	TION ADDED FMEA THE	RATI FF PE FFE	IONALE T AILED CI ER IOA I CTS ABOU	OS OS SSI T	THE ED UE.	E C	MV

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	0MS-261 03-3-4001-3	BASELINE [ ] NEW [ X ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 261 VALVE - BIPROPELLA	NT VALVE
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
FLIGHT	ITY REDUNDANCY F NC A B	ITEM
NASA [ 2 /1R IOA [ 2 /1R	] [ P ] [ F ]	[ P ] [ X ] * [ P ] [ X ]
COMPARE [ /	] [] [ N	] [] []
RECOMMENDATIONS:	(If different fr	om NASA)
[ /	] [ ] [	] [ ] [ ] (ADD/DELETE)
* CIL RETENTION I	RATIONALE: (If appl	icable)  ADEQUATE [ ]  INADEQUATE [ ]
OPERATION). NASA, IOA ACCEPTS NASA, LISTED AS A CAUSI HOWEVER THE SSM S THE 1/1 EFFECTS OF IOA RECOMMENDS TO FMEA BE SEPARATED	A/RI NOW COVERS THI /RI FAILURE OF B SC E ON 1/1 FMEAS (03- STATES THAT THIS FA ON THESE FMEAS. HAT THE SUBASSEMBLY	IS FAILURE MODE (DELAYED S FAILURE MODE ON 03-3-4001-3. REEN. THIS FAILURE MODE IS 3-4004-1 AND 03-3-4004-2), ILURE MODE IS NOT A CAUSE FOR COMPONENTS INCLUDED ON THIS MEAS TO PROVIDE BETTER INSIGHT SSEMBLY.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-262		BASELINE NEW	
MDAC ID:	OMS 262 VALVE - BIPRO	P CAVITY P	RESSURE RELI	EF
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
FLIGH'	ITY REDUN T NC A	DANCY SCRE B	ENS C	CIL ITEM
·			-	
NASA [ / IOA [ 2 /1R	] [ P ]	[ ] [ <b>F</b> ]	[ ] [ P ]	[ X ] *
COMPARE [ N /N	] [N]	[ N ]	[ N ]	[ ]
RECOMMENDATIONS:	(If differe	nt from NA	SA)	
[ 1 /1	] [ ]	[ ]	[ ]	[ A ] ADD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicabl	e) ADEQUATE INADEQUATE	[ ]
REMARKS: IOA NOW CLASSIFI CLOSED) AS A 1/1 THE BIPROP VALVE THIS ITEM AND FA CAUSE ON 03-3-40 ITEM AND FAILURE ATTENTION.	SINCE IT COUL HOUSING AND L ILURE MODE ARE 01-6. IOA REC	D RESULT I EAKAGE OF CURRENTLY OMMENDS A	MODE (RELIE N STRUCTURAL PROPELLANTS. ONLY ADDRES NEW 1/1 FMEA	F VALVE FAILS FAILURE OF SSED AS A FOR THIS

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/01/88 OMS-263 NONE			BASELINE	:						
SUBSYSTEM: MDAC ID: ITEM:		BIPROP CAV	ITY PRESS	URE RELIE	<b>E</b> F						
LEAD ANALYST:	C.D. PRU	ST	·								
ASSESSMENT:											
CRITICA FLIG	LITY	REDUNDANCY	SCREENS		CIL ITEM						
HDW/F	UNC	A I	3 0		11111						
NASA [ / IOA [ 3 /3	] [	] [			[ X ] *						
COMPARE [ N /N	] [	] [	] [	]	[ N ]						
RECOMMENDATIONS	: (If di	fferent fi	rom NASA)								
[ 2 /1	R] [	P] [1	7] [P	(ĀI	[ A ] DD/DELETE)						
* CIL RETENTION	RATIONALE	: (If app)			· · · · · · · · · · · · · · · · · · ·						
DEMI DVC.			INA	DEQUATE DEQUATE	į						
REMARKS: IOA NOW CLASSIF OPEN) AS A 2/1R VALVE TO BE RED ITEM AND FAILUR 03-3-4001-6. I AND FAILURE MOD	PFP. IOA UNDANT TO E MODE ARE OA RECOMME	DID NOT ( RELIEF VAI CURRENTL) NDS A NEW	AILURE MOD CONSIDER D LVE IN ORI ADDRESSE 2/1R PFP	E (RELIEI OWNSTREAN GINAL ANA D ONLY AS FMEA FOR	F VALVE FAILS M BIPROP ALYSIS. THIS S A CAUSE ON THIS ITEM						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-264 03-3-400	)1-6	NASA DATA: BASELINE NEW						
SUBSYSTEM: MDAC ID: ITEM:	264		VITY PRESS	SURE RELIE	EF				
LEAD ANALYST:	C.D. PRU	JST							
ASSESSMENT:									
FLIGH	т		Y SCREENS		CIL ITEM				
HDW/FU	NC	A	В	2					
NASA [ 2 /1R IOA [ 3 /3	] [	P ] [	F ] [ F	) ]	[ X ] *				
COMPARE [ N /N	] [	N ] [	и] [и	1 ]	[ N ]				
RECOMMENDATIONS:	(If di	ifferent f	rom NASA)						
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* CIL RETENTION	RATIONALE	E: (If app	olicable) A INA	ADEQUATE ADEQUATE	[ ]				
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.									
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ASSESSMI ASSESSMI NASA FMI	ENT	I	D:	OMS-	265				1	VASA I BASEI		r		]	-
SUBSYSTI MDAC ID ITEM:				265	Е - В	IPRO	P CAV	ITY	PRESS	SURE I	RELIE	EF			
LEAD ANALYST: C.D. PRUST															
ASSESSMI	ENT	:													
		ICAL LIGH	ITY REDUNDANCY SCR				REENS			CIL ITEM					
	1	HDI	W/FU	NC	A		В		(	3					
NASA IOA	]	1	/1	]	[	]	[ [	]	[	]		[	X X	]	*
COMPARE	[	N	/N	]	[	]	[	]	(	]		[		]	
RECOMME	NDA'	TI(	SMC:	(I	f dif	fere	nt fr	om 1	NASA)						
	[	1	/1	1	[	]	Į.	]	(	1 .	(AI	[ /Q/	A DE	] LE	TE)
* CIL R	ETE	NT:	ION	RATIO	NALE:	(If	appl	ical	ble) ! IN!	ADEQUA	ATE ATE	[		]	
REMARKS NASA/RI LEAKAGE THAT TH COVERED	DO OF	N T VA	OT C HIS LVE	VALVE HOUSI	HOUS NG BE	ING (	ON TH	E FI	E, RUI MEA/CI E OTHI	PTURE,	, OR IOA R LVE H	EX REC	TE OM SI	RN ME NG	inds S

ASSESSMI ASSESSMI NASA FMI	ENT	I		OM	IS-26							ELINE NEW	[	]	
SUBSYSTI MDAC ID ITEM:				OM 26 VA	6	<b>-</b> в	IPRO	P CAV	ITY	PRE	SSURE	RELI	EF		
LEAD AN	ALY	ST	:	c.	D. 1	PRUS	T .								
ASSESSM	ENT	:													
CRITICALITY FLIGHT HDW/FUNC						REDUNDANCY SCREENS  A B C						CIL ITEM			
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NASA IOA	[	3	/3	]		[	]	[	]	[	]		[	]	*
COMPARE	[	N	/N	]		[	]	Ţ	]	[	]		[	]	
RECOMME	NDA	TI	ons:		(If	dif	fere	nt fr	om 1	NASA	)				
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* CIL R		NT	ION	RAT	CION	ALE:	(If	appl	ica			UATE UATE	-	]	
REMARKS NASA/RI NORMAL COVERED OMS-263	DO PSI BY	(D)	. Т	HE	PRO	POSE	D IO	A FAI	LUR	E MO	DE IS	ADEQ	UATI	ELY	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-267 03-3-4507-1	/01/88 NASA DATA: MS-267 BASELINE [ ] 3-3-4507-1 NEW [ X ]						
SUBSYSTEM:	OMS 267	OP VALVE DRAIN/PURGE	TEST PORT					
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
CRITICAL: FLIGHT	CIL ITEM							
HDW/FU	NC A	B C						
NASA [ 2 /1R IOA [ 2 /1R	] [ F ] ] [ P ]	[F] [P] [NA] [P]	[ X ] * [ X ]					
COMPARE [ /	] [ N ]	[и] [и]	[ ]					
RECOMMENDATIONS:	(If different	from NASA)						
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* CIL RETENTION I	RATIONALE: (If a	oplicable)						
	· · · · · · · · · · · · · · · · · · ·	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.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		3	NASA DATA BASELINE NEW						
	OMS 268 COUPLING -	BIPROP VALVE	E DRAIN/PURGE	TEST PORT					
LEAD ANALYST:	C.D. PRUST								
ASSESSMENT:									
FLIGHT	נ	DUNDANCY SCRE		CIL ITEM					
HDW/FU	IC A	В	C						
NASA [ 3 /3 IOA [ 3 /3	] [	] [ ]	[ ]	[ ] *					
COMPARE [ /	] [	] [ ]	[ ]	[ ]					
RECOMMENDATIONS:	(If diff	erent from NA	ASA)						
[ 3 /3	] . [	] [ ]	[ ] (A	[ ] DD/DELETE)					
* CIL RETENTION I	RATIONALE:	(If applicab)	le) 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.									

ASSESSMI ASSESSMI NASA FMI	ID:	/88 269 <del>-</del> 450			r	BASELINE NEW	[	x ]				
SUBSYSTI MDAC ID: ITEM:	ID: 269								AIN/PURGE	TI	EST POR	T ·
LEAD ANALYST: C.D. PRUST												
ASSESSMI	ENT:											
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM												
			NC	2	A	E	3	C	C		LLM	
NASA IOA	[ :	3 /3 3 /3	]	[	]	[	]	[	]	[	] * ]	
COMPARE	[	/	1	[	]	[	]	[	]	[	]	
RECOMMEN	NDAT:	ions:	(I	f di	ffere	ent fi	om N	IASA)				
	[	/	3 .	[	1	[	- <b>j</b>	ĵ	`] (A		] 'DELETE	)
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]												
OPEN" AN	IOA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO OPEN" AND "RESTRICTED FLOW". NO DIFFERENCES.											

							01/88 5-270 -3-40	03-1			BASE		E		]		
	SUBSYSTEM: OMS MDAC ID: 270 ITEM: OME ALIGNMENT BELLOWS  LEAD ANALYST: C.D. PRUST																
	LEAD	ANA	LYS	ST	:	c.I	o. PRI	UST									
	ASSE	ESSME	NT	:													
CRITICAL FLIGH HDW/FU						T				ANCY SCREENS B C				CIL ITEM			
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	N	IASA IOA	[	1	/1	]	[	]	[	]	(	]		[	X X	]	^
	COMF	PARE	[		/	]	[	]	[	]	[	]		[		]	
	RECC	MMEN	DA!	TI(	ons:	(	(If d	iffere	ent fro	om N	ASA)						
			[		/	1	[	]	[	]	[	]	(Al		/DE		ETE)
	* CI	IL RE	TE	NT:	ION	RAT	IONAL	E: (I	f appl:	icab	P	DEQUA		•		]	
	IOA	NDING	MM	ENI AM	DS I	HAT OF	"FAI LINE	LED CI	LOSED A	ACMV E AD	RELI DED A	EF D	EVICI USES	E" O1	AA E v	CHI	[S
	IOA POSS	ALSC	: C	OR	ROSI	ON,	FIRE	, EXP	ATEMEN' LOSION L' LEAK	, AN	O THE D EXE	E EFF	ECTS E OF	E	JOE VA	JT Al	4D

ASSESSME ASSESSME NASA FME					NZ I	ASA DATA: BASELINE NEW	: [ [	]				
SUBSYSTE MDAC ID: ITEM:			OMS 271 OME AI	LIGNN	MENT	BELL	ows					
LEAD ANA	LYST	:	c.D. I	RUST	נ							
ASSESSME	ENT:											
		ICAL: LIGH:	ITY	RI	EDUND	ANCY	SCREE	ens		CIL	ī	
			NC	Ä		В		С	19	LIE		
NASA IOA	[ [ 3	/ /3	]	[	]	[	]	[	]	[	] *	
COMPARE	[ N	/N	1	[	1	[	]	[	]	[	]	
RECOMMEN	DATI	ons:	(If	difi	feren	t fr	om NAS	SA)				
	[		]	[	]	[	1.	[	] (Al	[ DD/DE	] :LETE)	
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]												
REMARKS: NASA/RI DEFLECTI ON LINE	DO NO	IO	A RECOM	MENI	DS AD	DING AS.	ODE (1 THIS	FAII	ELLOWS AI LURE MODI	ngula E As	A CAUSI	3

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-272	NASA DATA: BASELINE [ ] NEW [ ]							
	OMS 272 OME ALIGNMENT BELLOWS								
LEAD ANALYST:	C.D. PRUST								
ASSESSMENT:									
CRITICAL FLIGH	EENS CIL ITEM								
	NC A B	С							
NASA [ / IOA [ 2 /1R	] [ ] [ ] ] [ P ] [ F ]	[ ] [ ] * [ P ] [ X ]							
COMPARE [ N /N	] [N] [N]	[ N ]							
RECOMMENDATIONS:	(If different from NA	· ASA)							
[ \	] [ ] [ ]	[ ] [ ] (ADD/DELETE)							
* CIL RETENTION REMARKS:	RATIONALE: (If applicab)	le) ADEQUATE [ ] INADEQUATE [ ]							
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 DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-273 03-3-4507-1	N	VASA DATA: BASELINE [ NEW [ ]	x ]					
SUBSYSTEM: MDAC ID:	OMS		IN PORT						
LEAD ANALYST:	C.D. PRUST								
ASSESSMENT:									
CRITICAL FLIGH	ITY REDUNDA T		ITI						
HDW/FU	NC A	В							
NASA [ 2 /1R IOA [ 2 /1R	] [ F ] ] [ P ]	[ F ] [ F [ F ]	?] [3	x ] * x ]					
COMPARE [ /	] [N]	[и]	] [	]					
RECOMMENDATIONS:	(If different	from NASA)							
[ 2 /1R	] [F]	[F] [F		A ] DELETE)					
* CIL RETENTION	DATTONATE: /Tf a	nnlicable							
	RATIONALE: (II a	2	DEQUATE [	]					
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.									

ASSESSM	ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:					MS-2	74	-3			NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTEMDAC ID					2		ING -	- BIP	PROP	VALV	E DRA	AIN POR	T			
LEAD AN	AL:	YS	т:	:	С	.D.	PRUS	r			-					
ASSESSM	EN'	r:														
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C																
		Н	DV	V/FU	NC		A		F	3	C	3				
NASA IOA		[	3 3	/3 /3	]		[	]	[	]	]	]		[	]	*
COMPARE		[		/	]		[	1	[	]	[	]		[	]	
RECOMME	ND	ΑT	ΊC	ons:		(If	dif	ferer	nt fi	om N	ASA)					
		[	3	/3	]		[	]	[	]	[	]	(AI	[ DD/DI	] ELE	CTE)
* CIL R	ET:	EN	י <b>י</b> ני	ION	RA	TION.	ALE:	(If	app]	licab	2	ADEQUAT ADEQUAT		[	]	
REMARKS IOA FAI AND "RE IOA REC TO THE MODES A	LU ST OM FA	RI ME II	C' NI UI	red Ds i re M	FL HA IOD	OW". T "F ES O	AILS N TH	CLOS	SED"	AND THE	"RES" SE AI	TRICTED	FI	LOW"	BE	ADDED

ASSESSMENT D ASSESSMENT I NASA FMEA #:	D:	1/01/8 OMS-27 03-3-4	75	-2		NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM:		OMS 275 COUPL	ING ·	- BIPI	ROP '	VALVE	DRA	IN PORT					
LEAD ANALYST	:	c.D. I	PRUS	r									
ASSESSMENT:				•							-		
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
	W/FU		A		В		С		111	214			
NASA [ 3 IOA [ 3	/3 /3	]	[	]	[	]	[	]	[	]	*		
COMPARE [	/	]	[	]	[	]	[	]	[	]			
RECOMMENDATI	ons:	(If	dif:	ferent	: fr	om NA	SA)						
. [	/	]	[	]	[	]	[	] (A	[ DD/I	] DELE	TE)		
* CIL RETENT	ION I	RATIONA	ALE:	(If a	appl	icabl	Al	DEQUATE DEQUATE	[	]			
REMARKS: IOA FAILURE OPEN" AND "R NO DIFFERENCE	ESTR				HEET	SHOU	LD NO	OT INCLU	DE "	'FAI	LS	то	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-276	NASA DAT BASELIN NE	E [ ] W [ ]
SUBSYSTEM: MDAC ID: ITEM: NTO	OMS 276 PROPELLANT LINES A	ND MECHANICAL FI	TTINGS-MMH ANI
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH'			CIL I <b>TEM</b>
HDW/FU	NC A B	S C	
NASA [ / IOA [ 2 /1R	] [ ] [ F	] [ P ]	[ x ] *
COMPARE [ N /N	ј [и] [и	[и]	[ N ]
RECOMMENDATIONS:	(If different fr	om NASA)	
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* CIL RETENTION :	RATIONALE: (If appl	.icable) ADEQUATE INADEQUATE	
IOA CAUSES ON AN BLOCKAGE".  NASA/RI DO NOT COBSTRUCTION OR DORESULT IN 2/1R EOCCURRENCE IS QUE DOWNSTREAM FILTE	ALYSIS SHEET SHOULD OVER RESTRICTED FLOEFORMATION (CRIMPIN FFECTS, HOWEVER THE ESTIONABLE. ANY COR OR COMPONENT. ICLUSTED ON THE FMEA/CIS AN OPEN ISSUE.	OW IN A SEGMENT OF CREDIBILITY OF DOTAMINATION WOULD RECOMMENDS THE	OF LINE DUE TO CURRENCE COULD SUCH AN LD FLOW TO AT SUCH A

ASSESSMENT DATE: 1/01/88

NASA DATA:

ASSESSMENT ID: NASA FMEA #:		BAS	NEW [ X ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 277	ENGINE TRICKLE PU	JRGE PORT
LEAD ANALYST:			
ASSESSMENT:		·	
CRITICAL	ITY REDUI	NDANCY SCREENS	CIL ITEM
FLIGH HDW/FU	NC A	ВС	TIEM
NASA [ 2 /1R IOA [ 2 /1R	] [ F ] ] [ P ]	[ F ] [ P ] [ NA]	[ X ] * [ X ]
COMPARE [ /	] [N]	[ N ] · [ ]	[ ]
RECOMMENDATIONS:	(If differe	ent from NASA)	
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IOA AGREES WITH	OF CAP SEAL A	AFTER CAP INSTALLA	SED ON INABILITY TO TION. IOA ALSO
IOA RECOMMENDS T	HAT "POPPET FA E ON THIS FMEA	AILS OPEN (DURING A. THIS IS A CRED	FLIGHT)" BE ADDED DIBLE FAILURE MODE
IOA ALSO RECOMMEN	NDS ADDING A S KPLOSION, AND	STATEMENT TO THE E EXPOSURE OF EVA A	FFECTS ABOUT IND GROUND CREWS

ASSESSMENT DA ASSESSMENT II NASA FMEA #:	D: OMS-2				NASA DATA BASELINE NEW		]						
SUBSYSTEM: MDAC ID: ITEM:	OMS 278 COUPI	LING-OMS	ENGINE	TRICK	LE PURGE P	ORT							
LEAD ANALYST	c.D.	PRUST											
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
FLIGHT ITEM HDW/FUNC A B C													
NASA [ 3 IOA [ 3	/3 ] /3 ]	[ ]	[	] [	]	[	] *						
COMPARE [	/ ]	[ ]	[	] [	]	[	]						
RECOMMENDATIO	ONS: (II	f differe	nt fro	m NASA	)								
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AND "RESTRIC" IOA RECOMMENTO THE FAILU	INADEQUATE [ ]												

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SUBSYSTI MDAC ID: ITEM:			OMS 279 COUP	LING-	-oms	ENGIN	IE TR	RICKL	E PUR	GE P	ORT	1	
LEAD ANA	ALYS	T:	C.D.	PRUS	ST								
ASSESSME	ENT:												
			ITY	I	REDUN	DANCY	SCR	EENS			CI	L EM	
		FLIGH DW/FU		2	A	F	3	ı	С		11	CM	
NASA IOA	[	3 /3 3 /3	]	( [	]	[	]	[	]		[	]	*
COMPARE	[	/	]	[	]	[	]	[	]		[	3	
RECOMMEN	TADI	ions:	(I	f di	ffere	nt fr	com N	ASA)					
	[	/	]	[	]	[	]	[	]	(A)	[ DD/	DELE	TE)
* CIL RI	ETEN	TION	RATIO	NALE:	: (If	appl	icab		ADEQU ADEQU			]	
REMARKS: 10A FAII 0PEN" AN NO DIFFI	LURE ND "	RESTR				SHEET	SHO	ULD	NOT I	NCLU	DE	"FAI	LS TO

ASSESSME ASSESSME NASA FME	ENT I		OMS-		-1			N	IASA DAT BASELII NI		x	]	
SUBSYSTE MDAC ID:			OMS 280 PLAT	ELET	INJE	CTOR	ASSE	MBLY					
LEAD ANA	LYST	:	C.D.	PRUS	r								
ASSESSME	ENT:												
		ICAL	ITY	R	EDUN	IDANCY	SCR	EENS			IL TEI	٧r	
		W/FU						(	_		-		
NASA IOA	[ 1 [ 1	/1	]	[ [	]	[	]	[	]	[	X	]	*
COMPARE	[	1	]	[	]	[	]	[	]	[		]	
RECOMMEN	NDATI	ons:	(I	f dif	fere	ent fr	om N	ASA)					
	[	/	]	[	]	[	]	[	]	] Id <b>A</b> )		] ELE	TE)
* CIL RI	:		RATIC	NALE:	(If	appl	icab	7	ADEQUATI ADEQUATI			]	
1.0 Dill													

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SUBSYSTE MDAC ID: ITEM:			OMS 281 PLATE	LET ]	[NJEC	TOR	ASSEMI		513 § 13		•		177
LEAD ANA	LYS	T:	C.D.	PRUST	ני								
ASSESSME	NT:												
		TICAL FLIGH		RI	EDUND	ANCY	SCRE	ENS			CIL		
		DW/FU		A		В		(	C TA	•		•	
NASA IOA	[	1 /1 1 /1	]	[	]	[	]	[	]		( [ x	]	*
COMPARE	[	/	]	[	]	[	1	[	]		[ И	]	47
RECOMMEN	DAT:	ions:	(If	dif	feren	t fr	om NAS	SA)					
	[	/	]	[	]	[	]	[	]	ΑDI	[ D/D]	] ELE	ETE)
* CIL RE	TEN'	TION	RATION.	ALE:	(If	appl	icable	1	ADEQUATE ADEQUATE		[	]	
REMARKS:		CES.							~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	1	•	,	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-282	BA	ASELINE [ ] NEW [ X ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 282 PLATELET INJECT	TOR ASSEMBLY	
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH	ITY REDUNDA T NC A	ANCY SCREENS B C	CIL
NASA [ 1 /1 IOA [ 2 /1R	] [ ] ] [ P ]	[ ] [ P	[ X ] * [ X ]
COMPARE [ N /N	] [ N ]	[ N ]	[ ]
RECOMMENDATIONS:	(If differen	t from NASA)	
[ /	] [ ]		[ ] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If	AD1	EQUATE [ ] EQUATE [ ]
BURN-THROUGH. N	ASA/RI CHANGED	"BLOCKAGE OF E	COULD LEAD TO ENGINE NGINE INLET FILTER" " AS A CAUSE, PER

ASSESSMI ASSESSMI NASA FMI	ENT I	D:	1/01 OMS- 03-3	283	-2			<b>.</b>	BASEI	INE NEW	[	[ ]	
SUBSYSTI MDAC ID: ITEM:			OMS 283 COMB	USTIO:	N CH	IAMBER	<b>.</b>						
LEAD ANA	ALYST	<b>!:</b>	C.D.	PRUS	T								
ASSESSMI	ENT:												
		'ICAL	ITY	R	EDUN	IDANCY	SCR	EENS			CIL		
			NC	A		E	1	C					
NASA IOA	[ 1 [ 1	/1	]	[	]	[	]	[	]		[ X [ X	]	*
COMPARE	[	/	]	[	]	[	]	[	]		[	]	
RECOMMEN	ITADI	ons:	(I	f dif	fere	ent fr	om N	ASA)					
	[	/	]	[	]	[	]	[	]	·(AI	[ D/DC	ELF	TE)
* CIL RE	ETENT	ION	RATIO	NALE:	(If	appl	icab	A	DEQUA		[	]	
REMARKS: NO DIFFI INCLUDE	ERENC												

ASSESSME ASSESSME NASA FME	NT ID:	OMS-				N	ASA D BASEL		[	x	]	
SUBSYSTE MDAC ID:	M:	OMS 284 COMBI	USTION C	HAMBER								
LEAD ANA			_									
ASSESSMENT:												
			REDU	NDANCY	SCR	EENS			C]	IL EM	r	
FLIGHT HDW/FUNC A B C											•	
NASA IOA	[ 1 /1	L ] L ]	[ ]	[	]	[	]		[ [	x	]	*
COMPARE	[ /	]	[ ]	[	]	[	]		[	N	]	
RECOMMEN	DATIONS	S: (I	f differ	ent fr	om N	ASA)						
	[ /	]	[ . ]	[	]	[	]	(A		/DE		ETE)
* CIL RE	TENTIO	N RATIO	NALE: (I	f appl	icab	le)			_			
							ADEQUA ADEQUA		[		]	
REMARKS: NO DIFFE INCLUDE	RENCES	. IOA P VALVE	RECOMMEN IMPROPE	DS THA	T TH	E CAU	JSES C	N T	HIS RAV	S E VEI	ME '''.	EA

ASSESSME ASSESSME NASA FME	TNE	I		OMS	01/88 5-285 -3-4006	-1			ŀ		DATA LINE NEW	[	X	]	
SUBSYSTE MDAC ID:				OMS 285 NO2		TENS	SION			* 1 *					
LEAD ANA	LYS	ST	:	c.r	. PRUS	T									
ASSESSME	INT	:								٠					
	CR		ICAL LIGH	ITY	F	EDUN	IDANC	SCR	EENS			CI	L EM	r	
	I		W/FU		A		F	3	C	}			ши	•	
NASA IOA	[	1	/1 /1	]	[	]	[	]	[	]		[	X	]	*
COMPARE	[		/	]	ſ	]	ĺ	]	[	]		[		]	
RECOMMEN	IDA:	ric	ons:	(	If dif	fere	ent fr	com N	(ASA)					_ <del>.</del> .	
	[		/		[	]	[	]	[	]	(A)		DE		TE)
* CIL RE	:					(If	appl	icab	7		ATE ATE	[		]	
NO DIFFE	RE	NCI	EŚ.												

ASSESSMENT DATE: 1/01/88

NASA DATA:

ASSESSMI NASA FMI	ENT ID: OMS-285A EA #: 03-3-4005-1							,	BASE	LINE NEW			
SUBSYSTIMDAC ID	EM:		OMS 285 NOZZLI										
LEAD AN	ALYS'	r:	C.D. 1	PRUS	T								
ASSESSMENT:													
CRITICALITY REDUNDANCY S FLIGHT							SCF	REENS				L EM	
			NC	A		Е	3	C					-
NASA IOA	[	1 /1 1 /1	]	[	]	[	]	[	]		[	X	] *
COMPARE	[	/	]	[	]	[	]	[	]		[		]
RECOMME	NDAT:	ions:	(If	dif	feren	t fr	om N	VASA)					
	. [	/	]	Ċ	]	[	]	[	]	(Al			] ELETE)
* CIL R		TION	RATION	ALE:	(If	appl	.icak	ole) A INA	DEQU. DEQU.	ATE ATE	]		]
NO DIFF	EREN LYZE: AS	D COM A NOZ	BUSTIO ZLE FA	N CH ILUR	AMBEF	R-TO- IASA/	-NOZZ 'RI A	ZLE EX ANALYZ	TENS ED I	ION 1 T AS	FL/A	CC	GE OMBUSTION

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-286 NASA FMEA #: 03-3-4006-1									DATA ELINE NEW			
SUBSYSTE MDAC ID: ITEM:	M:		OMS 286 NOZ	ZLE EX	rens	ION						
LEAD ANA	LYS'	T:	C.D	. PRUS'	r							
ASSESSME	NT:											
		TICAI FLIGH		R	EDUN	IDANCY	SCR	EENS		CIL		
	H	DW/FU	INC	A		E	3	C	***			
NASA IOA	[ ;	1 /1 2 /1F	]	[ [ P	]	[ [ E	, ]	[ ] [ P ]	-	X ]	: ] <b>*</b>	
COMPARE	[ ]	и /и	]	[ N	]	[ ]	ı j	[ N ]		[	]	
RECOMMEN	DAT:	ions:	(	If dif	fere	nt fr	om N	ASA)				
	[	1.	]	[	]	[	]	[ ]		[ DD/D	] ELET	E)
* CIL RE	TEN	rion	RATI	ONALE:	(If	appl	icab.		UATE UATE		]	-
TAX ACDE	TO 1	at mu	MACA	ADT OD'	TMTA	AT TIME	,					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1	NASA DATA: BASELINE NEW						
MDAC ID:			т					
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
FITGH	ITY REDUNDAN T			CIL ITEM				
HDW/FU	NC A	В	С					
NASA [ 3 /1R IOA [ 3 /1R	] [F] [ ] [P] [	F ] [ P ] [	P ] P ]	[ X ] * [ ]				
COMPARE [ /	] [ N ] [	и ] [	]	[ N ]				
RECOMMENDATIONS:	(If different	from NASA)						
[ 3 /1R	] [F] [	F ] [	P ] (AI	[ A ] DD/DELETE)				
* CIL RETENTION	RATIONALE: (If ap	plicable) IN	ADEQUATE ADEQUATE	[ ]				
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.								

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-288 NASA FMEA #: 03-3-4502-3						1		DATA: LINE NEW	[	]			
SUBSYSTE MDAC ID:			OMS 288 COUPI	LING-	GN2	TANK	FIL	L/VENT	?			-	
LEAD ANA	LYS'	T:	C.D.	PRUS	T								
ASSESSME	ASSESSMENT:												
	•	TICAL FLIGH DW/FU		R A		DANCY		REENS			CIL		
VI 43								r	1		r	7	*
NASA IOA	[	3 /3 3 /3	]	[	]	[	]	[	]		[	]	•
COMPARE	[	/	]	[	3	[	]	[	1		[	]	
RECOMMEN	IDAT:	ions:	(II	dif	fere	nt fr	om l	NASA)		-			
	[	3 /3	]	[	]	ſ	1	[	]	(A[	[ DD/D	ELE	TE)
* CIL RE	TEN'	TION	RATION	IALE:	(If	appl	.ical	7	DEQU.		[	]	
IOA FAII	INADEQUATE [ ]  REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS CLOSED" AND "RESTRICTED FLOW".												
IOA RECO	MME	NDS T URE M	HAT "I	AILS ON TH	IS F	MEA.	THE	ESE AF	RE CR	EDIBI			
MODES AN	IU A	KE AL	いなでつりょ	אס חי	べしろ	ט ע	OO PI	TIAG I	HEMO	•		-	

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-289 03-3-4502	-2		NASA DATI BASELINI NEV	
SUBSYSTEM: MDAC ID: ITEM:	OMS 289 COUPLING-	GN2 TANK	FILL/V	ENT	
LEAD ANALYST:	C.D. PRUS	T			
ASSESSMENT:					
CRITICA	CIL ITEM				
FLIG HDW/F		, I	3	С	TICH
NASA [ 3 /3 IOA [ 3 /3	] [.	] [	]	[ ]	[ ] *
COMPARE [ /	] [	] [	]	[ ]	[ ]
RECOMMENDATIONS	: (If dif	ferent f	com NAS	A)	
[ /	] [	] [	]	[ ] (2	[ ] ADD/DELETE)
* CIL RETENTION	RATIONALE:	(If app		) ADEQUATE INADEQUATE	_
REMARKS: IOA FAILURE MOD OPEN" AND "REST NO DIFFERENCES.			r shoul	D NOT INCL	UDE "FAILS TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-290 03-3-451								
SUBSYSTEM: MDAC ID: ITEM:	OMS 290 GN2 PRES								
LEAD ANALYST:	C.D. PRU	ST							
ASSESSMENT:									
	ITY	REDUNDANC	Y SCREE	ns	CIL ITEM				
FLIGH HDW/FU		A	В	С	IIEM				
NASA [ 2 /1R IOA [ 3 /1R	] [	P ] [ P ] [	P ] F ]	[ P ] [ P ]	[ X ] * [ X ]				
COMPARE [ N /	] [	] [	и ]	[ ]	[ ]				
RECOMMENDATIONS:	(If di	fferent f	rom NAS	A)					
[ /	] [	] [	3	[ ] (AI	[ DD/DELETE)				
* CIL RETENTION	RATIONALE	: (If app	licable		,				
				ADEQUATE INADEQUATE	-				
REMARKS: IOA ACCEPTS NASA INDIVIDUAL LINE	/RI 2/1R SEGMENTS	PPP, 1/1 SEPARATEL	ABORT A	SSIGNMENT. IGINAL ANALY	IOA ANALYZED				
NASA/RI FMEA INC	LUDES ALL	GN2 LINE	SEGMEN	TS. IOA CON	SIDERS				

ASSESSME	ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-291 NASA FMEA #: NONE								ASA I BASEI		r	]		
SUBSYSTE MDAC ID:				OMS 291 GN2	PRESS	URE	LINES	ANI	месн	ANIC	AL F	ITTI	NGS	<b>3</b>
LEAD ANA	LY	ST	:	C.D	. PRUS	T								
ASSESSMI	ENT	:												
CRITICALITY FLIGHT				R	EDUN	IDANCY	SCI	REENS			CII			
	]	_			A	<u>.</u>	В		C					
NASA IOA	[	3	/	]	[ [	]	[	]	[ [	]		[	]	*
COMPARE	[	N	/N	]	[	]	[	]	[	]		[	]	
RECOMME	IDA'	TI	ONS:	: (	If dif	fere	ent fr	om 1	NASA)					
	[		/	]	[	]	[	]	[	]	(A)	[ DD/I	] DELI	ETE)
* CIL RI	ETE:	NT	ION	RATI	ONALE:	(If	appl	ical	ole)			_	_	
										DEQUA		[	]	
IOA CAUS BLOCKAGI NASA/RI OBSTRUC RESULT OCCURRED DOWNSTRU FAILURE	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.													

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-292 NASA FMEA #: 03-3-4511-2									ASA DA' BASELI N	NE	[ [ x	]	
SUBSYSTE MDAC ID:			OMS 292 VALVE	-GŅ2	TANK	FILI	L/VEN	r					
LEAD ANA	LYSI	r:	C.D.	PRUS	т								
ASSESSME	ASSESSMENT:												
CRITICALITY REDUNDANCY SCRE							SCRE	ENS			CIL ITEM	· 1	
	_	W/FU									Lim	·	
NASA IOA	[ 3	3 /3	]	[	]	[	]	[	]		[ [	] <b>*</b>	
COMPARE	(	/	]	[	]	(	]	[	]		[	]	
RECOMMEN	(DAT	cons:	(If	dif	ferent	fro	om NA	SA)					
	[	/	]	[	]	[	]	[	] .		[ D/DE	] LETE	)
* CIL RE	ETENT	rion 1	RATION	ALE:	(If a	appl:	icable	Δ1	DEQUATI DEQUÁTI	E R	[	]	
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.													

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-293 03-3-45	10-1		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:	OMS 293	N2 TANK F			-
LEAD ANALYST:	C.D. PR	UST			
ASSESSMENT:					
CRITICAL: FLIGH		REDUNDAN	CY SCREEN	S	CIL ITEM
HDW/FU		A	В	С	do 40 348 5
NASA [ 2 /1R IOA [ 3 /1R	] [	P ] [ P ] [	P ] [ P ] [	P ] P ]	[ X ] * [ ]
COMPARE [ N /	] [	] [	] [	]	[ N ]
RECOMMENDATIONS:	(If d	ifferent	from NASA	)	
[ /	] [	. 1 [	] [	] (A	[ DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If ap		ADEQUATE NADEQUATE	[ ]
REMARKS: IOA ACCEPTS NASA NASA/RI ORIGINAL FAILURE, RUPTURE BODY TO THE ITEM RETENTION RATION	LY DID N , EXTERN LIST ON	OT COVER AL LEAKAG THIS FME	ABORT AS THIS FAIL E) BUT AG	SIGNMENT. URE MODE ( REED TO AD ADD CORRE	STRUCTURAL D THIS VALVE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		1-1	BASELINE [ ] NEW [ X ]						
MDAC ID:	OMS 294 VALVE-GN2	2 TANK FI	LL/VENT						
LEAD ANALYST:	C.D. PRUS	ST							
ASSESSMENT:									
FLIGHT				s C	CIL ITEM				
HDW/FU	IC I	4	В	C	· (4) (4) (4) (4) (4) (4) (4) (4) (4) (4)				
NASA [ 3 /1R IOA [ 3 /1R	] [ ]	? ] [	F ] [ P ] [	P ] P ]	[ X ] * [ ]				
COMPARE [ /	] [	] [	и][	]	[ N ]				
RECOMMENDATIONS:	(If di	fferent f	rom NASA	)					
[ /	j (	] [	] [	] (AI	[ ] OD/DELETE)				
* CIL RETENTION I	RATIONALE:	(If app	licable)	ADEQUATE NADEQUATE	[ ]				
REMARKS: IOA AGREES WITH N IOA RECOMMENDS TH EFFECTS BE REVISH FILL/VENT COUPLIN THERE ARE NO ADDI	HAT THE RE ED. IOA O NG SEAL AN	EDUNDANCY CONSIDERS ND CAP, A	STRING THE STR CCUMULATO	LISTED UNDI ING TO INCI OR, AND OTH	ER THE "E" LUDE ONLY THE HER ENGINE.				

ASSESSMEN ASSESSMEN NASA FMEA				ASA DATA BASELINE NEV					
SUBSYSTEM MDAC ID: ITEM:		OMS 295 TANK-G	N2 STOR	AGE					
LEAD ANAI	LYST:	C.D. P	RUST						
ASSESSMEN	NT:			•					
C	IDANCY SCREENS				CIL				
	FLIGH' HDW/FU		A	В		C	!		
NASA IO <b>A</b>	[ 1 /1 [ 1 /1	]	[ ]	.[	]	[	]	[ X ]	] *
COMPARE	[ /	]	[ ]	[	]	[	]	[	]
RECOMMENI	DATIONS:	(If	differe	nt fr	om N	ASA)			
	[ /	]	[ ]	[	] .	[	] (2	[ ADD/D	] ELETE)
* CIL RET	TENTION :	RATIONA	LE: (If	appl	icab	A	DEQUATE		]
REMARKS: NO DIFFEI IOA CONSI ADDRESSEI	IDERS SH			POSS	IBLE	EFFE	CT WHICE	н ѕно	ULD BE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				NASA DATA: BASELINÉ [ ] NEW [ X ]					
SUBSYSTEM: MDAC ID:				N. 97					
LEAD ANALYST:	C.D. PRU	JST							
ASSESSMENT:									
CRITICALI FLIGHT		REDUNDA	NCY SCREE	ENS	CIL ITEM				
HDW/FUN		A	В	C	222.				
NASA [ 1 /1 IOA [ 3 /1R	] [	P ]	[ P]	[ ] [ P ]	[ X ] * [ ]				
COMPARE [ N /N	] [	N ]	[ N ]	[ N ]	[ N ]				
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)					
[ /	] [	1 .	[ ]	[ ] (A	[ ] DD/DELETE)				
* CIL RETENTION F	RATIONALE	: (If a	pplicable	ADEQUATE	[ ]				
REMARKS: IOA ACCEPTS NASA/ VEHICLE DAMAGE EF EFFECTS. IOA REC ALSO BE INCLUDED	FFECTS (1 COMMENDS	./1), AN THAT TH	D EXTERNA	DIFFERENTIA' AL LEAKAGE (	TED BETWEEN 3/1R)				

NASA DATA:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			NASA DATA: BASELINE NEW					
SUBSYSTEM: MDAC ID:	OMS 297	ACK ASSEMBLY H	OUSING					
LEAD ANALYST: C.D. PRUST								
ASSESSMENT:								
FLIGH'	r	INDANCY SCREEN	S	CIL ITEM				
HDW/FU	NC A	В	С					
NASA [ 2 /1R IOA [ 3 /1R	] [ P ] ] [ P ]	[ P ] [ [ P ] [	_	[ X ] *				
COMPARE [ N /	] [ ]	[ ] [	]	[ N ]				
RECOMMENDATIONS:	(If differ	ent from NASA	)					
. 1	] [ ]	[ ] [	] (AI	[ ] DD/DELETE)				
* CIL RETENTION	RATIONALE: (I		ADEQUATE NADEQUATE	[ ]				
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.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-298			[ ]	
	OMS 298 PNEUMATIO	C PACK HO	USING ASS	SEMBLY	
LEAD ANALYST:	C.D. PRUS	ST			
ASSESSMENT:					
FLIGHT	ITY F				CIL ITEM
HDW/FUI	NC A		В	C	
NASA [ / IOA [ 2 /1R	] [ F	] [	] [ F] [	P ]	[ x ] *
COMPARE [ N /N	] [ ]	[ ]	4 ] [	N ]	[ N ]
RECOMMENDATIONS:	(If dif	ferent f	rom NASA)	)	
[ /	] [	] [	] [	] (AD	[ ] D/DELETE)
* CIL RETENTION I	RATIONALE:	(If app	licable) TN	ADEQUATE NADEQUATE	,
REMARKS: IOA CAUSES ON AND BLOCKAGE".	ALYSIS SHE	ET SHOUL			
NASA/RI DO NOT CO	VER RESTR	RICTED FLO	OW IN A S	SEGMENT OF	LINE DUE TO
OBSTRUCTION OR DI	FORMATION	(CRIMPI	NG). SUC	CH AN OCCUR	RENCE COULD
RESULT IN 2/1R EN OCCURRENCE IS QUE	STECTS, HU	NEVER TH	E CREDIBI	ILITY OF SO	FLOW TO
DOWNSTREAM FILTER					
FAILURE BE ADDRES	SSED ON TH	E FMEA/C			
RECOMMENDATION AS	AN OPEN	ISSUE.			

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	OMS-299	3-2		SA DATA: BASELINE [ NEW [				
SUBSYSTEM: MDAC ID: ITEM:	OMS 299 VALVE-GN:	2 PRESSURE	ISOLATION	ı				
LEAD ANALYST:	C.D. PRU	ST						
ASSESSMENT:								
CRITICA FLIG		REDUNDANCY	SCREENS		CIL TEM			
HDW/F		A B	С					
NASA [ 3 /1 IOA [ 3 /1	R ] [ ]	P ] [ P P ] [ P	] [ P ] [ P	] [	x ] *			
COMPARE [ /	] [	] [	] [	] [	]			
RECOMMENDATIONS	: (If di	fferent fr	om NASA)					
. [ /	] [	] [	] [		] )/DELETE)			
* CIL RETENTION	RATIONALE	: (If appl	ΑI	EQUATE [	]			
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.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-300		NASA DATA: BASELINE NEW	
	OMS 300 VALVE-GN2 P	RESSURE ISOLA	rion	
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
		UNDANCY SCREE	NS	CIL ITEM
FLIGH HDW/FU		В	С	11111
NASA [ 3 /1R IOA [ 3 /1R	] [ P ]	[ F ]	[ P ] [ P ]	[ ] *
COMPARE [ /	] [ ]	[ N ]	[ ]	[ ]
RECOMMENDATIONS:	(If diffe	rent from NAS	A)	
[ /	] [ ]	[ ]	[ ] (AI	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE: (		) ADEQUATE INADEQUATE	[ ]
REMARKS: NASA/RI FAILS B LEAKAGE" FAILURE "FAILS OPEN" MOD	MODE ISSUE.	(SEE ASSESS	MENT SHEET C	OMS-301).

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-301	SA DATA: ASELINE [ NEW [ ]	x ]					
MDAC ID:	OMS 301 VALVE-GN2							
LEAD ANALYST:								
ASSESSMENT:								
CRITICALI FLIGHT HDW/FUN			SCREENS C	CII ITI				
NASA [ 3 /1R IOA [ 3 /1R	] [ P ]	] [ F ]	] [ P ]	] [	] *			
COMPARE [ /	] [	] [ N	] [	] [	]			
RECOMMENDATIONS:	(If diff	ferent fro	om NASA)					
. [ /	] [	] [ -	] [ ]	] [ (ADD/1	] DELETE)			
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ] INADEQUATE [ ] REMARKS: IOA NOW FAILS B SCREEN.								
NASA/RI ORIGINALI "FAIL" FOR THE "I LEAKAGE IS UNDET! AFTER EVERY BURN	INTERNAL LE ECTABLE DUF	EAKAGE" FA	LILURE MODI	E, PER IOA	ISSUE.			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-302 03-3-4510-1	NASA DATA: BASELINE NEW			
	OMS 302 VALVE-GN2 PRESSUE	RE ISOLATION			
LEAD ANALYST:	C.D. PRUST				
ASSESSMENT:					
CRITICAL: FLIGHT	TTY REDUNDANC		CIL ITEM		
HDW/FUI	NC A	<b>B C </b>			
NASA [ 2 /1R IOA [ 3 /1R	] [ P ] [ ] [ P ] [	P ] [ P ] P ] [ P ]	[ X ] * [ ]		
COMPARE [ N /	] [ ] [	] [ ]	[ N ]		
RECOMMENDATIONS:	(If different i	from NASA)			
[ /	] [ ] [	] [ ] (AD	[ ] D/DELETE)		
* CIL RETENTION 1	RATIONALE: (If app	olicable) ADEQUATE INADEQUATE	[ ]		
NASA/RI ORIGINALI FAILURE, RUPTURE BODY TO THE ITEM	LY DID NOT COVER T , EXTERNAL LEAKAGE LIST ON THIS FMEA	ABORT ASSIGNMENT. THIS FAILURE MODE (SE), BUT AGREED TO ADA, AND TO ADD CORRESET, PER IOA ISSUE.	TRUCTURAL D THIS VALVE		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-303	SA DATA: BASELINE [ ] NEW [ X ]					
	OMS 303 VALVE-GN2 PRES	MS 03 VALVE-GN2 PRESSURE ISOLATION					
LEAD ANALYST:	C.D. PRUST						
ASSESSMENT:							
FI.TGH	ITY REDUND. F		CIL ITEM				
HDW/FU	NC A	в с					
NASA [ 3 /1R IOA [ 2 /1R	] [ P ] ] [ P ]	[ P ] [ P ] [ P	] [ X ] * ] [ X ]				
COMPARE [ N /	] [ ]	[ N ]	] [ ]				
RECOMMENDATIONS:	(If differen	t from NASA)					
[ 2 /1R	] [ P ]	[F] [P	[ ] (ADD/DELETE)				
* CIL RETENTION	RATIONALE: (If	applicable)	NEOTIME ( )				
_		INAI	DEQUATE [ ]				
FLOW), BUT ADDED RECOMMENDS THAT PFP, 1/1 ABORT A THE INABILITY TO UNTIL THE ACCUMU MAKE THE EFFECTS PFP, 1/1 ABORT). THIS SINGLE FAIL "FAILED CLOSED" CAN BE SAVED (3/	* 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.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-304			DATA: ELINE [ ] NEW [ ]					
SUBSYSTEM: MDAC ID: ITEM:	304	N2 PRESSURE	ISOLATION						
LEAD ANALYST:	C.D. PR	UST							
ASSESSMENT:									
CRITICAL: FLIGH	I <b>T</b> Y	REDUNDANCY	SCREENS	CIL I <b>TEM</b>					
	NC	A B	C	11111					
				[ ] *					
COMPARE [ N /N	] [	] [	] [ ]	[ ]					
RECOMMENDATIONS:	(If d	ifferent fro	om NASA)						
[ /	] [	<b>]</b>	1 [ ]	[ ] (ADD/DELETE)					
* CIL RETENTION	RATIONAL	E: (If appl	1 0001	13/00 / 1					
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.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	NASA DATA BASELINE NEW								
SUBSYSTEM:	OMS	OMS 305 GN2 PRESSURE REGULATOR							
LEAD ANALYST:	LEAD ANALYST: C.D. PRUST								
ASSESSMENT:									
CRITICAL FLIGH		REDUNDANG	Y SCREENS	5	CIL ITEM				
	NC	A	В	С	11411				
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] [ P ] [	F ] [	P ] P ]	[ X ] *				
COMPARE [ /	] [	] [	] [	]	[ ]				
RECOMMENDATIONS:	(If d	ifferent	rom NASA	)					
. [ /	] [	] [	] [	] (A	[ ] DD/DELETE)				
* CIL RETENTION	RATIONAL	E: (If ap)	olicable) I	ADEQUATE NADEQUATE	[ ]				
REMARKS: NASA/RI ORIGINAL AS A 3/1R PPP. PER IOA ISSUE. (INHIBIT PURGE) RESULT IN LOSS OF IN INABILITY TO	HOWEVER, CREW MAY DURING S F ONE EN	NASA/RI NOT HAVE HORT OMS GINE. FA	JPGRADED ' TIME FOR BURN. FI LURE DUR	TO 2/1R PF CORRECTIV RST FAILUR ING TAL AB	P, 1/1 ABORT E ACTION E COULD ORT RESULTS				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-306 03-3-450	)5 <b>-</b> 1	NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTEM: MDAC ID: ITEM:	OMS 306 GN2 PRES	SURE REG	ULATOR			-		
LEAD ANALYST:	C.D. PRU	ST						
ASSESSMENT:							75	
CRITICALI		REDUNDAN	CY SCREE	NS		CIL	•	
FLIGHT HDW/FUN		A	В	С	-	ITEM		
NASA [ 3 /1R IOA [ 3 /1R	] [	P ] [	P ] P ]	[ P ] [ P ]		[	] *	
COMPARE [ /	] [	] [	]	[ ]		[	]	
RECOMMENDATIONS:	(If di	fferent	from NAS	A)				
[ /	] [	) [	1	[ ]	(AD	[ DD/DE	] LETE)	
* CIL RETENTION F	RATIONALE	: (If ap	plicable		<u> </u>		2	
				ADEQ INADEQ	UATE UATE	[	]	
REMARKS: NO DIFFERENCES.	ران المنافر المنافرة المنافرة المنافرة المنافرة المنافرة المنافرة المنافرة المنافرة المنافرة المنافرة المنافرة الم					**************************************	region of your	
NOT 1/1 DURING TA	L ABORT	SINCE 40	O PSI LE ES THAT	FT IN	STORAG	E TA	NK AND	
ACCUMULATOR. INF PERFORM A START-E							O	
en en en en en en en en en en en en en e					÷ ,	- 2		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-307 03-3-4510-1	/88							
SUBSYSTEM: MDAC ID:	OMS 307 GN2 PRESSURE								
LEAD ANALYST:	ALYST: C.D. PRUST								
ASSESSMENT:									
CRITICAL: FLIGH		DANCY SCREENS	CIL ITEM						
HDW/FU		В С							
NASA [ 2 /1R IOA [ 3 /1R	] [ P ] ] [ P ]	[ P ] [ P ] [ P ] [ P ]	[ X ] *						
COMPARE [ N /	] [ ]	[ ] [ ]	[ N ]						
RECOMMENDATIONS:	(If differe	ent from NASA)							
. [ /	] [ ]	[ ] [ ]	[ ] ADD/DELETE)						
* CIL RETENTION	RATIONALE: (If	applicable) ADEQUATE INADEQUATE							
NASA/RI ORIGINAL FAILURE, RUPTURE BODY TO THE ITEM	LY DID NOT COV , EXTERNAL LEA LIST ON THIS	1/1 ABORT ASSIGNMENT. VER THIS FAILURE MODE ( AKAGE), BUT AGREED TO A FMEA, AND TO ADD CORRI L SHEET, PER IOA ISSUE.	(STRUCTURAL ADD THIS VALVE ESPONDING						

ASSESSMI ASSESSMI NASA FMI	ENT	I	D:	1/0 OMS 03-	01/8 5-30 -3-4	38 08 150	)5-	-2								SASEI		[	X	]		
SUBSYSTE MDAC ID:	EM:			308	3				•				)R			:··					-	
LEAD ANA	LY	ST	:	C.I	C.D. PRUST																	
ASSESSMI	ENT	:																				
	CR	IŢ	ICAL:	ΙΤΥ			RI	EDU:	NDA	NC	ΣY	SC	CREE	NS	3			CI		,		
- 10	1	r HD	LIGH' W/FU	NC L			A				В				C			11	CM			
NASA IOA	[	2	/1R /1R	]		[	P P	]		[ [	F P	]		[	P P	]		[	X X	]	*	
COMPARE	[		/	]		[		]		[	N	]		[		]		[		]		
RECOMMEN	IDA'	ΓI	ons:	ļ	(If	di	lfi	fer	ent	f	îro	m	NAS	A)	).		<u>4</u> _2	-				
	[		/	]		[		]		[		]		[		]		[ /dc			TE)	
* CIL RI		NT	ION 1	RAT	[ON?	ALE	E:	(I	f a	pp	1:	Ļca	able		ΑI	EQUA EQUA				]		
REMARKS:	FA	ΙĿ	SBS	SCRI	EEN.	·					5.1.	T-83.										<u> </u>
NASA/RI 3/1R PPI	٥.	H	OWEV	ER.	NAS	SAZ	'RI	T U	PGR.	AΓ	EI	r c	O 2	11	LR	PPP.	1/1	LΑ	BO	RT	PE	R
IOA ISSU PURGE) I	JE.	(	CREW	MA	y no	TC	HZ	\VE	TI	ΜE		POF	≀ co	RI	REC	TIVE	: AC	CIO	N	(I	NHI	BIT
OF ONE	ENG	IN.	E. 1	FAII	LURE		)UI	RIN	G T	ΑĮ	2 ر	\BC	RT	RI	ESU	LTS	IN	CNA	ΒI	LÏ	TY	TO
COMPLETI	$\mathbf{z} \cdot \mathbf{A}$	LL	NEC	ESSZ	<b>ARY</b>	ΕN	IG]	LNE	ST	ΑF	(TS	s A	MD	P	JRO	ES.						

ASSESSMEN ASSESSMEN NASA FME	NT	I	<b>):</b>	OM	01/88 NASA DATA:  S-309 BASELINE [  -3-4505-2 NEW [ X														
SUBSYSTEM MDAC ID: ITEM:	M:			OM 3 C GN		RES	ssu	JRE I	REC	SUL	ATO	)R							
LEAD ANA	LYS	T:	1	c.	D. I	R	JSI	?											
ASSESSME	NT:																		
	CRI		CAL LIGH		?		RE	EDUNI	DAI	1CY	s	CREEN	IS				IL TEN	4	
	H		/FU										-						
NASA IOA	[	2 2	/1R /1R	]		[	P P	]		[ F	' ] ' ]	[	P	]		[	X X	]	*
COMPARE	[		/	]		[		]		[	]	[	•	]		[		]	
RECOMMEN	DAT	'IC	ons:		(If	đ:	ifi	fere	nt	fr	om.	NASA	١)						
	[		/	]		[		]		[	]	į		]	(A	.DD,	/DI	] ELE	TE)
* CIL RE	TEN	T	ON	RAT	rion?	<b>\L</b> ]	Ξ:	(If	a	ppl	ica		A		JATE JATE			]	
REMARKS:	ORI	rg:	TNAT.	T.Y	CLAS	SS	F	TED '	тн	ıs	FA:	ILURI	E M	ODE	(RES	TR	IC:	red	FLO

(WC 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.

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-310 NASA FMEA #: 03-3-4510-1						-1	NASA DATA: BASELINE [ ] NEW [ X ]									
SUBSYSTEM MDAC ID:			OMS 310 GN2 P	RE	sst	JRE I	LINI	ES	AN	D M	Œ	CHA	NICAL I	FITT	(I)	īGS
LEAD ANA	LYST	:	C.D.	PR	JSI	C										
ASSESSME	NT:															
(		ICAL:	ITY r		RI	EDUNI	OANC	CY	SC	REE	:NS	5		CI II	L CEM	ſ
			NC		A			В				С				-
NASA IOA	[ 2 [ 3	/1R /1R	]	[	P P	]	]	P P	]	•	]	P P	]			
COMPARE	[ N	/	]			]	[		]		[		]	[	N	1
RECOMMEN	DATI	ons:	(If	d:	if1	erer	nt 1	fro	om I	NAS	A)					
	[	/	]	(		]	[		]		[		] (2	ZDD/	'DE	] CLETE)
* CIL RE	PENT	ION 1	RATION	ALI	Ξ:	(If	app	11	[ca]	ble	e) IN	AI IAI	EQUATE EQUATE	] [ ]		]
REMARKS: IOA ACCE INDIVIDU FMEA INC THIS SEGI	AL L LUDE	INE S S AL	SEGMEN L GN2	TS LII	SI VE	EPARA SEGN	TEI	ĽΥ	IN	r a Or	SS	II IN	NMENT.	IC LYSI	DA [S.	ANALYZEI NASA

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-311		NASA DATA BASELINE NEW									
SUBSYSTEM: MDAC ID: ITEM:	OMS 311 GN2 PRESSURE	LINES AND	MECHANICAL F	'ITTINGS								
LEAD ANALYST:	C.D. PRUST											
ASSESSMENT:												
CRITICAL FLIGH	ITY REDUN	DANCY SCRE	EENS	CIL ITEM								
	NC A	В	С									
NASA [ / IOA [ 3 /3	] [ ]	[ ]	[ ]	[ ] *								
COMPARE [ N /N	] [ ]	[ ]	[ ]	[ ]								
RECOMMENDATIONS:	(If differe	nt from NA	ASA)									
[ /	] [ ]	[ ]		[ ] ADD/DELETE)								
* CIL RETENTION	RATIONALE: (If	applicabl	le) ADEQUATE INADEQUATE	[ ]								
REMARKS: IOA CAUSES ON AN BLOCKAGE". NASA/RI DO NOT COBSTRUCTION OR DESTRUCTION OR DESTRUCTION OR DESTRUCTION OR DESTRUCTION OR DESTRUCTION OF DOWNSTREAM FILTE FAILURE BE ADDRESSED OF THE RECOMMENDATION AS	COVER RESTRICTE DEFORMATION (CR PFECTS, HOWEVER JESTIONABLE. A ER OR COMPONENT ESSED ON THE FM	D FLOW IN IMPING). THE CREDING CONTAMINATION RECORDER TO THE EA/CIL, BUT THE E	INCLUDE "FII  A SEGMENT OF SUCH AN OCCU IBILITY OF SU INATION WOULL COMMENDS THAT	TTER  F LINE DUE TO  JRRENCE COULD  JCH AN  D FLOW TO  F SUCH A								

ASSESSMEN ASSESSMEN NASA FMEA	T DATE: T ID: #:	1/01/88 OMS-312 03-3-45	3 2 506-1		NASA DAT BASELIN NI	ra: ve [ ] ew [ x ]
SUBSYSTEM MDAC ID: ITEM:	:	OMS			TEST PORT	
LEAD ANAL	YST:	C.D. PI	RUST			
ASSESSMEN	T:					
C	RITICAI FLIGH		REDUND	ANCY SCRE	ENS	CIL ITEM
		INC	A	В	<b>C</b> : :	
NASA IOA	[ 3 /1F [ 3 /1F	t ] (	F ] P ]	[ F ] [ P ]	[ P ] [ P ]	[ X ] *
COMPARE	[ /	] [	[ N ]	[ и ]	[ ]	[ N ]
RECOMMEND	ATIONS:	(If d	lifferen	t from NA	SA)	
	[ 3 /1F	2] [	[ F ]	[ F ]	[· P ]	[ A ] (ADD/DELETE)
* CIL RET	ENTION	RATIONAL	LE: (If	applicabl	e) ADEQUATI INADEQUATI	[ ] [ ]
VERIFY CO AGREES WI IOA RECOM	NDITION TH NASA MENDS T URE MOI	OF CAP ARI FAII THAT "POI DE ON THI	SEALS A LURE OF PPET FAI IS FMEA.	FTER CAP B SCREEN. LS OPEN ( THIS IS	DURING FLIC A CREDIBLE	ON INABILITY TO ON. IOA ALSO SHT)" BE ADDED E FAILURE MODE

ASSESSMENT DATASSESSMENT ID:	E: 1/01/88 OMS-313 03-3-45		NASA DATA: BASELINE [ ] NEW [ X ]									
SUBSYSTEM: MDAC ID: ITEM:	OMS 313 COUPLIN	G, GN2	REGU	LATOR	TEST	PORT						
LEAD ANALYST:	C.D. PR	UST										
ASSESSMENT:												
CRITIC FLI	GHT	REDUNI		SCREE			CIL ITE					
HDW/	FUNC	A	В		С							
NASA [ 3 / IOA [ 3 /	3 ] [ 3 ] [	]	[	]	[	]	[	] * ]				
COMPARE [ /	] [	]	. [	]	[	1	[	]	•			
RECOMMENDATION	s: (If d	ifferen	nt fr	om NAS	SA)							
[ 3 /	3 ] [	]	[	]	[	] (A)	[ DD/D1	] ELETE)				
* CIL RETENTIO	N RATIONAL	E: (If	appl	icable	AD	EQUATE	-	]				
REMARKS: IOA FAILURE MO AND "RESTRICTE		LYSIS S	SHEET	SHOUI				s clos	ED"			
IOA RECOMMENDS TO THE FAILURE	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.											
TOPED WIT WITH			~									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-314 03-3-4506	-2	NASA DATA: BASELINE [ ] NEW [ X ]									
SUBSYSTEM: MDAC ID: ITEM:	OMS 314 COUPLING,	14 OUPLING, GN2 REGULATOR TEST PORT										
LEAD ANALYST:	C.D. PRUS	r										
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM												
HDW/FU		В		С	TIEM							
NASA [ 3 /3 IOA [ 3 /3	] [	] [	] [	]		<b>*</b>						
COMPARE [ /	] [	] [	] [	]	( )	l						
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)									
[ /	] [	] [	] [	] (AI	( DD/DEI	LETE)						
* CIL RETENTION	* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]											
	OA FAILURE MODES ON ANALYSIS SHEET SHOULD NOT INCLUDE "FAILS TO PEN" AND "RESTRICTED FLOW".											

ASSESSMENT ASSESSMENT NASA FMEA	1/01/88 OMS-315 03-3-45011-2								SA DATA: ASELINE NEW		]			
SUBSYSTEM: MDAC ID: ITEM:		315	315 VALVE-GN2 PRESSURE RELIEF											
LEAD ANALY	ST:	C.D. F	RUST	?										
ASSESSMENT:														
	FLIGH'	ITY T NC			M	CY B		NS	c C		CIL			
NASA [ IOA [					]	NA P	]	]	P P	]	[	]	*	
COMPARE [	/	]	[	]	[	N	]	[		]	[	]		
RECOMMENDA	TIONS:	(If	diff	erent	= :	fro	m NAS	SA)	)					
Į.	/	. 1	[	]	[		]	[		] (A)	[ DD/D			
* CIL RETE	NTION	RATION	LE:	(If a	ap)	pli	cable	e) IN	AD VAD	EQUATE EQUATE	[	]		
REMARKS: IOA NOW CL NASA/RI OR A 3/3, BAS COULD WITH 3/1R PNP B DETERMINAT	RIGINAL SED ON ISTAND BASED O	LY CLAS TEST DA HIGH PA	SIFI ATA V RESSU	TED TH WHICH JRE.	HIS SI H	S I HOV OWI	FAILUF VED TH EVER,	CAI NA	r d Asa	OWNSTRE. /RI UPG	AM L RADE	D C	S RIT	то

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-316 03-3-45013	1-1	NASA DATA BASELINE NEW							
SUBSYSTEM: MDAC ID:	OMS 316	PRESSURE REL	IEF							
LEAD ANALYST:	C.D. PRUST	r								
ASSESSMENT:										
CRITICAL FLIGH		EDUNDANCY SCR	EENS	CIL ITEM						
HDW/FU	NC A	<b>B</b>	С							
NASA [ 3 /1R IOA [ 3 /1R	] [ P	] [ P ]	[ P ] [ P ]	[ X ] * [ ]						
COMPARE [ /	] [	] [ ]	[ ]	[ N ]						
RECOMMENDATIONS:	(If diff	ferent from N	ASA)							
\ 1	] [	] [ ]	[ ] (A)	[ ] DD/DELETE)						
* CIL RETENTION	RATIONALE:	(If applicab)	le) 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 HOWEVER, IOA ACC			NMENT.							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	NASA DATA BASELINE NEW											
MDAC ID:	OMS 317 VALVE-G	N2 PRES	SURE	RELIEF								
LEAD ANALYST:	C.D. PR	UST										
ASSESSMENT:												
CRITICAL FLIGH	CIL ITEM											
	NC	A	В		С							
NASA [ 3 /1R IOA [ 3 /1R	] [	P ] P ]	[ P	] [	P ] P ]	[ X ] * [ X ]						
COMPARE [ /	] [	]	[	] [	] .	[ ]						
RECOMMENDATIONS:	(If d	lifferen	t fro	om NASA								
[ /	] [	]		] [	] (A							
REMARKS: NASA/RI ORIGINAL LEAKAGE) AS ABOR CRIT 1, PER IOA	(ADD/DELETE)  * CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]											
ABORT.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 OMS-318 03-3-4501	1-1	NASA DATA: BASELINE [ ] NEW [ X ]							
MDAC ID:	318	PRESSURE								
LEAD ANALYST:	C.D. PRUS	ST								
ASSESSMENT:										
FLIGHT		REDUNDANCY B	SCREENS C		CIL ITEM					
NASA [ 3 /1R IOA [ 3 /1R	] [ P	P ] [ P	] [ P	]	[ X ] *					
COMPARE [ /	] . [	] [	] [	]	[ ]					
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)							
[ /	] [	] [	] [	] (AI	[ DD/DELETE)					
* CIL RETENTION I	RATIONALE:	(If appli	Al	DEQUATE DEQUATE						
REMARKS: NASA/RI ORIGINALI OUTPUT) AS AN ABO ABORT CRIT 1, PEI TO COMPLETE ALL I ABORT.	ORT CRIT 1 R IOA ISSU	. HOWEVER	THIS FAIR R, NASA/R RE COULD 1	LURE MODE I UPGRADE RESULT IN	E (LOW ED TO AN I INABILITY					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			NASA DATA: BASELINE [ ] NEW [ X ]								
SUBSYSTEM: MDAC ID: ITEM:	OMS 319 CHECK VALVE-	-GN2	_								
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:											
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM											
HDW/FU	NC A	В	С								
NASA [ 2 /1R IOA [ 2 /1R	] [ P ] ] [ P ]	[ F ] [ [ F ] [	P ] P ]	[ X ] *							
COMPARE [ /	] [ ]	[ ] [	]	[ ]							
RECOMMENDATIONS:	(If differ	rent from NASA	)								
[ /	] [ ]	[ ] [	] (A)	[ ] DD/DELETE)							
* CIL RETENTION	RATIONALE: (		ADEQUATE NADEQUATE	[ ]							
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	EQUIRED DURING A TAL ABORT.										

ASSESSMEI ASSESSMEI NASA FME	TY	ID:	1/01/8 OMS-32 03-3-4	-1		NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTEM MDAC ID:	М:		OMS 320 CHECK	VAL	VE-GN	2	-		To the second se		
LEAD ANA	LYST	r:	C.D. 1	PRUS	r						
ASSESSME	T:										
·		rical: Fligh		R	EDUND	ANCY	SCREI	ENS		CIL	
		OW/FU		A		В			C Managara		
NASA IOA	[ 3	3 /1R 3 /1R	]	[ P	]	[ F [ F	]	[	P ] P ]	[ .x	] *
COMPARE	C	/	1	[	]	[	]	[	]	[	]
RECOMMENI	CTAC	cons:	(If	dif	feren	t fr	om NAS	SA)			
	[	/	]	[	] .	[	]	(	] (A)	[ DD/DI	] ELETE)
* CIL RE	rent	rion 1	RATION	ALE:	(If	appl:	icable		ADEQUATE		]
REMARKS:	) FN(	TEC						TN.	ADEQUATE	L	J

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-321 NASA FMEA #: 03-3-4551-1													DA' ELI N		[	x	]				
SUBSYSTE MDAC ID:	M:			OM 32 CH		V	AL7	7E-	GN2	:											
LEAD ANA	LYS	ST	:	c.	D. I	PR	JS'	ľ													
ASSESSME	NT:	:																			
	CR:		ICAL LIGH				RI	EDU	NDA	NC	Y	SCR	REEN	S					L LEN	Л	
	I		W/FU				A				В			С						•	
NASA IOA			/1R /1R			]	P P	]		[	F F	]	[	P P	]			[	X X	]	*
COMPARE	[		/	]		[		]		[		1	[		]			[		]	
RECOMMEN	DA!	ric	ons:		(If	d.	if	fer	ent	: <b>f</b>	r	om N	IASA	)							
•	[		,	]		[		]		[		]	ξ		]		(A)		/DI		ETE)
* CIL RE	TE	NT:	ION	RAT	'ION	AL.	Е:	(I	f a	ıpp	1:	icak				TAU TAU		[		]	
REMARKS:	REI	NC	ES.																	•	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-322 03-3-4552-1	NASA DATA: BASELINE [ ] NEW [ X ]								
	OMS 322 GN2 ACCUMUL									
LEAD ANALYST:	EAD ANALYST: C.D. PRUST									
ASSESSMENT:										
CRITICAL FLIGH		UNDANCY SCREENS	5	CIL ITEM						
	NC A	В	<b>C</b> "E	1154						
NASA [ 2 /1R IOA [ 1 /1	[ P ]	[ P ] [ [ ] [	P ]	[ X ] * [ X ]						
COMPARE [ N /N	] [ N ]	[ 14 ]	<b>N</b> ]	[ ]						
RECOMMENDATIONS:	(If diffe	rent from NASA)	ı	·						
[ 1 /1	] [ ]	[ ] [	] (A)	[ ] DD/DELETE)						
* CIL RETENTION	RATIONALE: (		ADEQUATE JADEQUATE	[ ]						
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.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-323	NASA DATA BASELINE NEW								
MDAC ID:	OMS 323 GN2 ACCUMULATOR									
LEAD ANALYST:										
ASSESSMENT:										
CRITICAL	CIL ITEM									
FLIGH HDW/FU		ВС	IIDM							
NASA [ 2 /1R IOA [ 2 /1R	] [P] [ ] [P] [	P ] [ P ] P ] [ P ]	[ X ] * [ X ]							
COMPARE [ /	] [ ] [	] [ ] .	[ ]							
RECOMMENDATIONS:	(If different	from NASA)								
. [ /	] [ ] [	] [ ] (A	[ ] DD/DELETE)							
	RATIONALE: (If ap	plicable) ADEQUATE INADEQUATE								
REMARKS: NO DIFFERENCES FOR EXTERNAL LEAKAGE FAILURE MODE. SEE ASSESSMENT SHEET OMS-322.										

ASSESSMENT ASSESSMENT NASA FMEA	r ID:	1/01/88 OMS-324 03-3-45			NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM:		OMS 324 GN2 PRE	SSURE	LINES	AND M	ECHANICAL I	FITTINGS					
LEAD ANALY	YST:	C.D. PF	UST		-							
ASSESSMENT	r:											
CI	RITICALI FLIGHT HDW/FUN	C	REDUÑ A	IDANCY B	SCREE	C EMPERE .	CIL ITEM					
NASA	2 /1R 2 /1R	] [	P ] P ]	[ P	]	[ P ] [ P ]	[ X ] * [ X ]					
COMPARE	. /	] [	]	[	].	[ ]	[ ]					
RECOMMEND!	ATIONS:	(If d	iffere	ent fro	om NAS	A)						
	. /	] [	]	[	]	[ ]	[ LDD/DELETE)					
* CIL RETE		RATIONAL				) ADEQUATE INADEQUATE						

NASA DATA:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-325 NONE	NASA DATA: BASELINE [ ] NEW [ ]
MDAC ID:	OMS 325 GN2 PRESSURE LINES AND	MECHANICAL FITTINGS
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
CRITICAL FLIGH	ITY REDUNDANCY SCRE	EENS CIL ITEM
HDW/FU		С
NASA [ / IOA [ 2 /1R	] [ ] [ ] ] [ F ]	[ ] [ ] * [ P ] [ X ]
COMPARE [ N /N	] [N] [N]	[ N ] [ N ]
RECOMMENDATIONS:	(If different from NA	ASA)
[ /	] [ ] [ ]	[ ] [ ] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applicabl	le) ADEQUATE [ ] INADEQUATE [ ]
BLOCKAGE".  NASA/RI DO NOT C OBSTRUCTION OR D RESULT IN 2/1R E OCCURRENCE IS QU DOWNSTREAM FILTE	EFORMATION (CRIMPING). FFECTS, HOWEVER THE CREI ESTIONABLE. ANY CONTAMI R OR COMPONENT. IOA REG SSED ON THE FMEA/CIL, BU	INCLUDE "FILTER  A SEGMENT OF LINE DUE TO SUCH AN OCCURRENCE COULD DIBILITY OF SUCH AN INATION WOULD FLOW TO COMMENDS THAT SUCH A

asse: Asse: Nasa	SSMI	ENT	I	D:		OMS	-3:	26		-2									ELI ELI	INE						
SUBS' MDAC ITEM	ID:					OMS 326 VAL		-El	NG]	INE	CON	T	RC	)L											-	
LEAD	ANA	ALYS	ST	:		c.D	. ]	PRI	US:	ľ																
ASSE	SSMI	ENT	:																							
			F	LIC	HT				RI A		NDAN		Y	SC	REE	NS	c				C: I'	IL TEN	4			
N.	ASA IOA	[	2 2	/1 /1	LR LR	]		[	P P	]	[	•	P P	]		[	P P	]			[	X X	]	*		
COMP	ARE	[		/		]		[		]	[	•		]		[		]			[		]			
RECOI	MMEN	NDA:	ΓI	SNC	3:	(	Ιf	d.	ifi	ere	ent	f	rc	m	NAS.	A)	) .									
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NO DI IOA I MECHI IOA I FMEA INTO	IFFI RECO ANIO RECO BE	EREI OMMI CALI OMMI SEI	ENI LY ENI PAI	DS LI DS RAI	A NK TH	SEP ED ' AT ' ON'	ARI TO THI TO	ATI TI E S	E I HE SUI ND]	MEZ BII BASS VII	PROF SEME DUAI	R S BL	VA Y FM	CO EA	ES. MPO S T	NI O	ENT PF	's	INC	LU	DEI	0 0	N	TH		łТ

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				OMS-327							NASA DATA: BASELINE [ ] NEW [ X ]									
SUBSYSTE MDAC ID:				OMS 327 VAI	,	EN	ΙGΙ	NE CC	ГИ	RC	)L									
LEAD ANA	LYS	ST:	:	c.E	). P	RU	ST	,												
ASSESSME	ENT	:																		
		FI	LIGH'	r				DUNDA	NC	EY B	sc	REE	NS	C				IL PEM	<u>r</u>	
			/FU																	
NASA IOA	[	2 2	/1R /1R	]		[	P P	]	[	P P	]	i	[ [	P P	]		[	X	]	*
COMPARE	(	-	/	]		[		]	[		]		[	-	]		[		]	
RECOMMEN	IDA!	ric	ons:	(	(If	di	ff	erent	: 1	fro	om	NAS	A)							
	[		/	]		[		1	[		]		[		]	(AD	į D)	/DE	] LE	TE)
* CIL RI		NT:	ION	RATI	ONA	LE	E:	(If a	pp	<b>,1</b> :	ica				EQUAT EQUAT		[		]	
NO DIFFI IOA RECO FMEA BE INTO THI IOA RECO MECHANIO IOA ALSO	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.																			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-328	NASA DATA BASELINE NEW									
SUBSYSTEM: MDAC ID: ITEM:	OMS 328 VALVE-ENGINE CONT										
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:											
CRITICAL: FLIGHT HDW/FUI	T	SCREENS  B C	CIL ITEM								
•	] [ P ] [ ] [ P ] [	P ] [ P ] P ] [ P ]	[ X ] * [ X ]								
COMPARE [ /	] [ ] [	. ] [ ]	[ ]								
RECOMMENDATIONS:	(If different f	From NASA)									
[ /	1 [ ] [		[ ] DD/DELETE)								
* CIL RETENTION I	RATIONALE: (If app	olicable) ADEQUATE INADEQUATE									
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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-329 03-3-4510	)-1		A DATA: SELINE [ ] NEW [ X ]
SUBSYSTEM: MDAC ID:	OMS 329	INE CONTRO	<b>DL</b>	
LEAD ANALYST:	C.D. PRUS	ST		
ASSESSMENT:				
FLIGH	r	REDUNDANCY B		CIL ITEM
HDW/FU		_		
NASA [ 2 /1R IOA [ 2 /1R	] [ F	P ] [ P	] [ P ]	[ X ] * [ X ]
COMPARE [ /	]. [	] [	] [ ]	[ ]
RECOMMENDATIONS:	(If dif	fferent fro	om NASA)	
[ /	] [	] [	] [ ]	(ADD/DELETE)
* CIL RETENTION	RATIONALE:	: (If appli		QUATE [ ]
REMARKS: NASA/RI AGREED T FMEA, AND TO ADD SHEET, PER IOA I	CORRESPON	S VALVE BOI NDING RETEN	OY TO THE I	TEM LIST ON THIS

ASSESSMENT ID: NASA FMEA #:	OMS-330		1	BASELINE NEW	
	OMS 330 VALVE-ENG	INE CONTR	OL		
LEAD ANALYST:	C.D. PRUST	T			
ASSESSMENT:					
CRITICAL: FLIGH	ITY RI	EDUNDANCY			CIL ITEM
	NC A	В	C	<b>3</b>	
NASA [ / IOA [ 2 /1R	] [ P	] [ ] [ P	] [ 1	P ]	[ X ] * [ X ]
COMPARE [ N /N	] [ N	] [ N	] [1	<b>v</b> ]	[ ]
RECOMMENDATIONS:	(If. dif	ferent fr	om NASA)		
[ 2 /1R	] [ P	] [ P	] [ ]	P ] (AI	[ A ] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appl	icable) ! IN!	ADEQUATE ADEQUATE	
REMARKS: NASA/RI DO NOT CO		ICTED FLO	W OF THE	CONTROL V	VALVE AS A
FAILURE MODE ON A 03-3-4001-2 DOES	INCLUDE "C	CONTAMINA	rion" ani	"PLUGGEI	OPENING
ORIFICE" AS CAUS! 1/1 ABORT FMEA B	É GENERATEI	D FOR THI	S ITEM AN	ND FAILURE	E MODE. IOA
CONSIDERS RESTRIC	CTED FLOW T	TO BE A C	REDIBLE E	FAILURE MO	DE FOR
MECHANICALLY LINI	KED TO THE	BIPROP V	ALVES ANI	SHOULD N	OT BE
				,	•

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-331	NASA DATA: BASELINE [ ] NEW [ X ]									
SUBSYSTEM: MDAC ID: ITEM:	OMS 331 VALVE-ENGINE CONT	TROL									
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:											
FLIGH	ITY REDUNDANO		CIL ITEM								
HDW/FU	NC A	ВС									
NASA [ 2 /1R IOA [ 2 /1R	[ P ] [ ] [ P ] [	F ] [ P ] P ] [ P ]	[ X ] *								
COMPARE [ /	] [ ] [	и][]	[ ]								
RECOMMENDATIONS:	(If different i	from NASA)									
[ /		] [ ] (Ar	[ ] DD/DELETE)								
* CIL RETENTION	RATIONALE: (If app	plicable) 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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		1	NASA DATA: BASELINE NEW						
SUBSYSTEM: MDAC ID: ITEM:	OMS 332 ORIFICE-1	ENGINE CONTROL VAL	VE INLET						
LEAD ANALYST:	ANALYST: C.D. PRUST								
ASSESSMENT:									
		REDUNDANCY SCREENS		CIL ITEM					
FLIGH HDW/FU	NC A	A B	<b>c</b>	IIIM					
NASA [ / IOA [ 2 /1R	] [ ]	P ] [ P ] [ 1	P ]	[ x ] *					
COMPARE [ N /N	] [1	иј [и] [1	N ]	[ N ]					
RECOMMENDATIONS:	(If di	fferent from NASA)							
[ /	] [	] [ ] [	] (AD	[ ] D/DELETE)					
* CIL RETENTION	RATIONALE		ADEQUATE ADEQUATE						
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.									

or some of a local exercises of the contract o

NASA DATA:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-333			NASA DATA: BASELINE NEW		]
SUBSYSTEM: MDAC ID: ITEM:	333	-ENGINE	CONTROL V	ALVE VENT		
LEAD ANALYST:	C.D. PRO	JST				
ASSESSMENT:						
CRITICAL FLIGH		REDUNDA	NCY SCREE	NS	CIL ITEN	
	NC	A	В	С	1111	•
NASA [ / IOA [ 2 /1R	] [	P ]	[ ] [ P ]	[ ] [ P ]	[ x	] *
COMPARE [ N /N	] [	<b>N</b> ]	[ N ]	[и]	[ N	]
RECOMMENDATIONS:	(If d	ifferent	from NAS	A)		
[ /	] [	]	[ ]	[ ] . (A)	[ DD/D1	] ELETE)
* CIL RETENTION	RATIONAL	E: (If a		) ADEQUATE INADEQUATE	[	]
REMARKS: THIS ITEM AND FA COVERED ON 03-3- FOR FAILED OPEN COMPONENT LEVEL	4001-1, N	WHICH LI VALVE.	RICTED FL STS "FAIL AN ADDITI	OW) ARE ADEC	QUATI AS A	ELY CAUSE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-334	NASA DATA: BASELINE [ ] NEW [ ]
MDAC ID:	OMS 334 CHECK VALVE-ENGINE CON	TROL VALVE VENT
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		grant that a
CRITICAL: FLIGH	ITY REDUNDANCY SCR	EENS CIL ITEM
	NC A B	C Harding .
	] [ ] [ ] ] [ P ] [ P ]	
COMPARE [ N /N	] [N] [N]	[ N ] [ N ]
RECOMMENDATIONS:	(If different from N	ASA)
. [ \	] [ ] [ ]	[ ] [ ] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applicab	le) ADEQUATE [ ] INADEQUATE [ ]
ON $03-3-4001-1$ ,	WHICH LISTS "FAILS TO V ROL VALVE. A SEPARATE	D) ARE ADEQUATELY COVERED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-335 NONE	BASELINE NEW	[ ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 335 CHECK VALVE-ENGIN	E CONTROL VALVE VE	NT
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
CRITICALI FLIGHT		Y SCREENS	CIL ITEM
HDW/FU		В С	
NASA [ / IOA [ 2 /1R	] [ ] [ ] [ P ] [	F ] [ P ]	[ x ] *
COMPARE [ N /N	] [и][	и] [и]	[ N ]
RECOMMENDATIONS:	(If different f	rom NASA)	
t /	] [ ] [	] [ ] (A	[ ] DD/DELETE)
	RATIONALE: (If app	licable) ADEQUATE INADEQUATE	-
ADDED AS A CAUSE	HAT THIS ITEM AND ON FMEA 03-3-4001 VEL IS UNNECESSARY	FAILURE MODE (FAIL -2. AN ADDITIONAL	S OPEN) BE FMEA AT THE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-336		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 336 CHECK VALVE-E	ENGINE C <u>ON</u> I	ROL VALVE VE	NT
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
	ITY REDUN	NDANCY SCRE	ENS	CIL ITEM
FLIGHT HDW/FUI		В	C	IIEM
NASA [ / IOA [ 2 /1R	] [ P ]	[	[ ] [ P ]	[ x ] *
COMPARE [ N /N	] [и]	[ N ]	[ N ]	[ N ]
RECOMMENDATIONS:	(If differe	ent from NA	.SA)	
[ /	j [ ]	[ ]	[ ] (A)	[ ] DD/DELETE)
* CIL RETENTION H	RATIONALE: (I	applicabl	e) ADEQUATE INADEQUATE	[ ]
REMARKS: IOA RECOMMENDS THE SUB-COMPONENT	JSE ON FMEA 03	3-3-4001-2.		

1/01/88 OMS-337 03-3-4001-2		BASELINE	[ x ]
OMS 337 PNEUMATIC AC	CTUATOR		
C.D. PRUST			
	UNDANCY SCREENS		CIL ITEM
NC A	В	С	
] [ P ] ] [ P ]	[ P ] [ P ]	P ] P ]	[ X ] * [ X ]
] [ ]	[ ] [	1	[ ]
(If differ	rent from NASA)	•	
] [ ]	[ ] [	] (AD	[ ] D/DELETE)
RATIONALE: ()	If applicable)		
O ONTO INDIV	IDUAL FMEAS TO	NTS INCLUI PROVIDE BE	DED ON THIS TTER INSIGHT
	OMS-337 03-3-4001-2  OMS 337 PNEUMATIC AG C.D. PRUST  TY RED TO A  [ P ] [ P ] [ P ] [ If diffe: ] [ ]  RATIONALE: (:  HAT THE SUBAL D ONTO INDIV	OMS-337 03-3-4001-2  OMS 337 PNEUMATIC ACTUATOR  C.D. PRUST  TY REDUNDANCY SCREENS TO A B  [ P ] [ P ] [ P ]  [ I P ] [ P ] [ P ]  [ If different from NASA)  ] [ ] [ ] [  RATIONALE: (If applicable)  IN	OMS-337 O3-3-4001-2  OMS 337 PNEUMATIC ACTUATOR  C.D. PRUST  TY REDUNDANCY SCREENS CONC A B C

ASSESSMI ASSESSMI NASA FMI	ENT	II	<b>):</b>	OMS	-33	8	)1-	-1							DATA ELINE NEW	[	x	]	and in .	
SUBSYSTI MDAC ID: ITEM:				OMS 338 PNE		T	c	ACT	UATO	OR										
LEAD ANA	ALYS	T:	:	c.D	. F	RI	JSI	?												
ASSESSMI	ENT:															~ <sub>1</sub> -1				•
		-	ICAL LIGH				RE	DUN	DANG	CY	SC	REEN	S				IL TEN	,		
			V/FU				A			В			С			_	T 101	•		
NASA IOA				]		[	P P	]	[ [	P P	]	[	P P	]		[	X X	]	*	
COMPARE	[		/	]		[		]	[		]	[		]		(		J		
RECOMMEN	TAC	ΊC	ons:	(	Ιf	đi	ff	ere	nt 1	fro	m	NASA	)							
•	[		/	]		[		]	[		]	[		]	(Al		/DI		ETE)	
* CIL RI	ETEN	T)	ON	RATI	ONA	LE	Ε:	(If	app	<b>)</b> 1i	ica	•	A		UATE UATE	[		]		
REMARKS:	_															٠		•		
NO DIFFI IOA RECO FMEA BE INTO THI	OMME SEP E FA	NI AI	OS T RATE LURE	D ON S PO	TO SSI	IN BI	IDI E	VID	UAL THE	FN AS	IEA SSE	S TO	. P	ROV	IDE BI	ET'	ΓEF	? ]	INSIC	
IOA ALSO POSSIBLE																		ĬRI	DING	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 OMS-339 03-3-4001-	3	NASA BASE	DATA: LINE [ ] NEW [ X ]
MDAC ID:	OMS 339 PNEUMATIC			•
LEAD ANALYST:	C.D. PRUST	•		
ASSESSMENT:				
CRITICAL FLIGH	ITY RE	DUNDANCY	SCREENS	CIL ITEM
	NC A	В	С	
NASA [ 2 /1R IOA [ 2 /1R	] [ P	] [ F ] [ P	] [ P ] ] [ P ]	[ X ] * [ X ]
COMPARE [ /	] [	] [ N	] [ ]	[ ]
RECOMMENDATIONS:	(If diff	erent fro	m NASA)	
[ /	] [	נ	] [ ]	[ ] (ADD/DELETE)
* CIL RETENTION	RATIONALE:	(If appli	cable) ADEQU INADEQU	ATE [ ] ATE [ ]
REMARKS: NASA/RI ORIGINAL TRAVEL) AS A 3/3 1/1 ABORT, PER I SCREEN. IOA RECOMMENDS T FMEA BE SEPARATE INTO THE FAILURE THIS FAILURE MOD	. HOWEVER, OA ISSUE. HAT THE SUE D ONTO INDI S POSSIBLE	NASA/RI IOA ACCEP BASSEMBLY IVIDUAL FM IN THE AS	HAS UPGRADED TS NASA/RI F COMPONENTS I EAS TO PROVI	TO A 2/1R PFP, AILURE OF B  NCLUDED ON THIS DE BETTER INSIGHT

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-340 03-3-4001-	2	NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID:										
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
FLIGH	ITY RE				CIL ITEM					
HDW/FU	NC A	В	С	1491 g. 18 g. A. 11 11 11						
NASA [ 2 /1R IOA [ 3 /1R	] [ P	] [ P ] [ F	] [ P ] [ P	]	[ X ] * [ X ]					
COMPARE [ N /	] [	) [ N	] [	]	[ ]					
RECOMMENDATIONS:	(If diff	erent fro	om NASA)							
	] [	] [	] [		[ ] D/DELETE)					
* CIL RETENTION	PATTONALE:	(If appli	cable)							
		(11 appl	7.0	EQUATE EQUATE	[ ]					
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 SEPARATE	O ONTO INDI	VIDUAL FM	EAS TO PR							

ASSESSMENT ASSESSMENT NASA FMEA	r I	D:	;	OMS	01/8 5-34 -3-4	1	)1-	·5								DATA ELINE NEW	[			
SUBSYSTEM MDAC ID:	:			OMS 342 PNI		T	c	AC	TUA	\T(	)R									
LEAD ANALY	YSI	r:		C.I	). F	RI	JSI	?												
ASSESSMEN'	T:																			
· C1			CALI EGHT				RE	DU	NDA	ИV	CY	SC	REEN	S				EL LEN	1	
	HI	) WC	/FUN	IC			A				В			С						
NASA IOA	[ 2	2 / 1 /	/1R /1	]		[	P	]		[	P	]	[	P	]		[	X X	]	*
COMPARE	[ ]	V 18	/N	]		[	N	]	-	[	N	]	[	N	]		[		]	٠
RECOMMEND	AT.	101	NS:		(If	đ:	ifí	er	ent	t :	fro	om :	NASA	)						
	[	/	/	)		[		]		[		]	[		]	(2		/DI		TE)
* CIL RET	EN'	ric	ON E	RAT'	IONA	L	Ξ:	(I	f a	apj	<b>91</b> :	ica				UATE UATE			]	
REMARKS: IOA ORIGI	NA]	LL	Y II	DEN'	TIF	E	D S	SHR	API	NE:	[ ]	EFF	ECTS	0	F A	CTUAT				URE

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.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-342		NASA DATA: BASELINE NEW	[ ]							
MDAC ID:	OMS 342 PNEUMATIC ACTUATO	OR .									
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:				<u>.</u>							
FLIGH'			C 4	CIL ITEM							
				r 1 4							
NASA [ / IOA [ 3 /1R	] [ P ] [	NA] [	Ρj	[ ] *							
COMPARE [ N /N	] [ N ] [	N ] [	n ]	[ ]							
RECOMMENDATIONS:	(If different i	from NASA)									
[ 3 /1R	] [P] [	F ] [	P ] (AÏ	[ A ] DD/DELETE)							
* CIL RETENTION	RATIONALE: (If app	olicable)									
REMARKS:	SCREEN.	IN	ADEQUATE ADEQUATE	[ ]							
NASA/RI DO NOT CO DUE TO SEAL FAIL ACTUATOR SEALS CO	OVER THIS FAILURE URES). LEAKAGE OF OULD RESULT IN MIX	MODE (PRO F PROP PAS KING OF HY	P LEAKAGE T BALL VAI PERGOLIC F	OR MIXING EVE SEALS AND PROPS IN							
ACTUATOR CAVITIES CORROSION, FIRE, IOA RECOMMENDS TO PAST SEALS INTO	ACTUATOR CAVITIES OR LEAKAGE INTO THE POD CAUSING POSSIBLE CORROSION, FIRE, EXPLOSION, AND EXPOSURE OF EVA AND GROUND CREWS. TO RECOMMENDS THAT A 3/1R PFP FMEA BE ADDED FOR PROP LEAKAGE PAST SEALS INTO THE ACTUATOR CAVITIES. SEAL FAILURES NOT										
DETECTABLE DURING	G FLIGHT (FAIL B S	SCREEN).									

ASSESSMENT ASSESSMENT NASA FMEA #	ID:	1/01/8 OMS-34 03-3-4	13	<b>-</b> 5			,	NASA DA BASELI N	NE	[ x	]	
SUBSYSTEM: MDAC ID: ITEM:		OMS 343 PNEUMA	ATIC	ACTU	JATOR							
LEAD ANALYS	T:	C.D. I	PRUS'	Г								
ASSESSMENT:												
	TICAL FLIGH		RI	EDUNE	DANCY	SCREE	NS			CIL	4	
	DW/FU		A		В		1	С			-	
	2 /1R 2 /1R	]	[ P	]	[ P [ P	]	[	P ] P ]		[ X	] <b>*</b>	
COMPARE [	/	]	[	]	[	]	[	]		[	]	
RECOMMENDAT	'IONS:	(If	dif	ferer	nt fro	om NAS	A)					
	/	1	[	]	[	]	[	1	(Al	[ [D\DC	] ELET	Έ)
* CIL RETEN	TION	RATION	ALE:	(If	appli	icable		ADEQUAT ADEQUAT		[	]	
REMARKS: NO DIFFEREN	ICES.					-		Xou.	• ••	ι	J	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-344 03-3-400	01-3		NASA DATA BASELINE NEW	: [ ] [ ]
SUBSYSTEM:				PR La	
LEAD ANALYST:	C.D. PRI	JST			
ASSESSMENT:					
CRITICAL: FLIGH	ITY r	REDUNDA	ANCY SCREEN	S	CIL ITEM
HDW/FUI		A	В	С	11111
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] P ]	[ F ] [ [ P ] [	P ] P ]	[ X ] * [ X ]
COMPARE [ /	] [	]	[ N ] [	]	[ ]
RECOMMENDATIONS:	(If di	fferent	from NASA	)	
1	] [	1	[ ] [		[ ] DD/DELETE)
* CIL RETENTION	RATIONALE	E: (If a			
			I	ADEQUATE NADEQUATE	[ ]
REMARKS: NASA/RI ORIGINALI OPERATION). HOW 3-4001-3. IOA AG IOA RECOMMENDS TI FMEA BE SEPARATEI	EVER, NAS CCEPTS NA HAT THE S	SA/RI HA ASA/RI F SUBASSEM	AS ADDED THE VAILURE OF THE BLY COMPONE	IS FAILURE B SCREEN. ENTS INCLUI	MODE TO 03- DED ON THIS
THEA BE SEPARATED					TIEK INSIGHI

ASSESSMI ASSESSMI NASA FMI	II	):	OMS-345 BASELINE [								]		
SUBSYSTI MDAC ID: ITEM:				OMS 345 COUPLI	ING,	VENT	PORT	r actu	JATOI	R SHAFT	SEAL		
LEAD AND	AD ANALYST: C.D. PRUST												
ASSESSMENT:													
CRITICALI FLIGHT HDW/FUN			${f T}$							CIL ITE			
			NC A			В		С					
NASA IOA	[	3	/3	]	[ [	]	[	]	[	]	[ [	]	*
COMPARE	[	N	/N	]	[	),	[	]	[	]	[	]	
RECOMME	NDA:	ric	ons:	(If	dif	feren	t fr	om NAS	SA)				
	[	3	/3	]	[	3	ι.	]	[	] (A	[ DD/DI		TE)
* CIL R	ETEI	NT:	ION	RATION	ALE:	(If	appl	icable	e)				
						•			Al INA	DEQUATE DEQUATE	[	]	
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.													

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-346 NASA FMEA #: NONE									ASA DATA BASELINE NEW					
SUBSYSTEM MDAC ID:	<b>:</b>		OMS 346 COUPL	ING,	VENT	POR	T ACT	UATO!	R SHAFT	SEAL				
LEAD ANAL	YST	:	C.D.	PRUS	T									
ASSESSMENT:														
C		ICAL LIGH	ITY	R	EDUND	ANCY	SCRE	ENS		CIL ITEM				
	NC	A		В				TTE	M					
NASA IOA	[ 3	/3	]	[	]	[	]	[	]	[	]	*		
COMPARE	[ N	/N	]	[	]	[	]	[	]	[	]			
RECOMMEND	ATI	ons:	(If	dif	feren	t fr	om NA	SA)						
	[ 3	/3	1	[	]	[	1	[	] (A	[ .DD/D	] ELE	TE)		
* CIL RET	ENT	ION	RATION	ALE:	(If	appl	icabl	•	DEQUATE DEQUATE	[	]			
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														

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-347 NONE			NASA DATA: BASELINE [ ] NEW [ ]									
SUBSYSTEM: MDAC ID: ITEM:	OMS 347 COUPLING,	VEN'	r por	T AC	TUATO	OR SHAF	T SEAL						
LEAD ANALYST:	C.D. PRUS	T											
ASSESSMENT:	ASSESSMENT:												
CRITICAL FLIGH	ITY F	EDUN	DANCY	SCR	EENS		CIL ITEM						
	NC A		В		C	3							
NASA [ / IOA [ 3 /3	] [	]	[	]	[		[						
COMPARE [ N /N	] [	]	[	]	[	]	[	]					
RECOMMENDATIONS:	(If dif	fere	nt fr	om N	ASA)								
[ 3 /3	] [	1	[	-]	[	]	[ (ADD/D	] ELETE)					
* CIL RETENTION	RATIONALE:	(If	appl	icab	le) INZ	ADEQUAT ADEQUAT	E [	]					
REMARKS: THESE FAILURES ( COUPLINGS (CP001 APPEAR TO BE ADD IOA RECOMMENDS T ADDRESSED ON THE EFFECT.	, CP002, C RESSED ON THAT THESE	POOS THE FAIL	, CP0 FMEA/ URE F	O6, CIL. OR A	CPOOT	7, CP00 NGINE T	8) DO EST PO	NOT RTS BE					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-348		NASA DATA: BASELINE [ ] NEW [ X ]									
MDAC ID:	OMS 348 PINION GEA	AR AND DRI	EVE ASSEME	BLY								
LEAD ANALYST:												
ASSESSMENT:												
CRITICAL: FLIGHT	ITY RI	EDUNDANCY	SCREENS		CIL ITEM							
	NC A	_ B	C	· · · · · · · · · · · · · · · · · · ·	LIEPI							
NASA [ 2 /1R IOA [ 2 /1R	] [ P	] [ P ] [ P	] [ P ] [ P	] [	x ] *							
COMPARE [ /	] [	] [	] [	] [	1							
RECOMMENDATIONS:	(If diff	ferent fro	om NASA)									
. [ /	] [	] [	] [		] D/DELETE)							
* CIL RETENTION 1	RATIONALE:	(If appli	AD	EQUATE [	]							
REMARKS: NO DIFFERENCES W	בידגים שייד	CIASED" E										
IOA RECOMMENDS TI FMEA BE SEPARATEI INTO THE FAILURES	HAT THE SUI O ONTO INDI	BASSEMBLY IVIDUAL FM	COMPONENT IEAS TO PR	S INCLUDE								
The Company of the Co	*. **. **. **. **.		A N.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-348A		NASA DATA: BASELINE NEW								
SUBSYSTEM: MDAC ID: ITEM:	OMS 348 PINION GEAR	R AND DRIVE ASSI	EMBLY								
LEAD ANALYST:											
ASSESSMENT:											
CRITICAL FLIGH		OUNDANCY SCREENS	5	CIL ITEM							
HDW/FU		В	С								
NASA [ 2 /1R IOA [ 2 /1R	[ P ]	[ P ] [ [ P ] [	P ] P ]	[ X ] *							
COMPARE [ /	] [ ]		]	[ ]							
RECOMMENDATIONS:	(If diffe	erent from NASA	)								
[ /	] [ ]	[ ] [	[ ]A)	[ DD/DELETE)							
* CIL RETENTION	RATIONALE: (		ADEQUATE NADEQUATE	[ ]							
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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-349	N	IASA DATA: BASELINE NEW				
	OMS 349 PINION GEAR AN	D DRIVE ASSEM	IBLY				
LEAD ANALYST:							
ASSESSMENT:							
FLIGH'		ANCY SCREENS	CY SCREENS CIL ITEM				
HDW/FUI	NC A	В	Professional Control				
NASA [ 2 /1R IOA [ 2 /1R	] [ P ] ] [ P ]	[ P ] [ F ]	· ]	[ X ] *			
COMPARE [ /	] [ ]	[ ] [	]	[ ]			
RECOMMENDATIONS:	(If differen	t from NASA)		·			
. [ /	1 [ ]	[ ] [		[ ] D/DELETE)			
* CIL RETENTION 1	RATIONALE: (If	A	DEQUATE				
REMARKS: NO DIFFERENCES. NASA/RI LIST BROWN OF GEAR DRIVE AS: STRUCTURAL FAILUM IOA RECOMMENDS TO FMEA BE SEPARATEM INTO THE FAILURES	KEN GEARS, TEET SEMBLY ON 03-3- RE FMEA IS UNNE HAT THE SUBASSE D ONTO INDIVIDU	H, OR SHAFT A 4001-2. A SE CESSARY. MBLY COMPONEN AL FMEAS TO F	AS CAUSE F PARATE GE	OR FAILURE AR ASSEMBLY DED ON THIS			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-350		1	NASA DATA: BASELINE NEW							
SUBSYSTEM: MDAC ID: ITEM:	350	URE LINE	S AND MEC	HANICAL FI	ITTINGS						
LEAD ANALYST:	C.D. PRUS	T									
ASSESSMENT:											
FLIGH	ITY R			C	CIL ITEM						
			_		{ ] *						
NASA [ / IOA [ 3 /2R	. ] [ P	] [	P ] [	P ]	[ ] *						
COMPARE [ N /N	] [ N	] [	и] [	N ]	[ ]						
RECOMMENDATIONS:	(If dif	ferent f	rom NASA)								
[ /	] [	] [	] [	] (AI	[ ] . DD/DELETE)						
* CIL RETENTION	RATIONALE:	(If app	licable) IN	ADEQUATE ADEQUATE							
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.											

ASSESSMENT ID NASA FMEA #:	OMS-351		BASELINE [ ] NEW [ X ]					
SUBSYSTEM: MDAC ID: ITEM:	OMS 351 VALVE-GN	2 PURGE		* *** (				
LEAD ANALYST:	C.D. PRU	ST						
ASSESSMENT:								
	CALITY IGHT	REDUNDAN	CY SCREEN	rs	CIL ITEM			
		A	<b>B</b>	C				
NASA [ 3 , IOA [ 3 ,	/3 ] [ /2R ] [	] [ P ] [	P ] [	P ]	[ X ] * [ ]			
COMPARE [	'N ] [	и] [	и ј	и ј	[ N ]			
RECOMMENDATION	Ns: (If di	fferent :	from NASA	<u>.,</u>				
[ /	' ] [	] [	] [	] (Al	[ ] DD/DELETE)			
* CIL RETENTION	ON RATIONALE	: (If app		ADEQUATE NADEQUATE	[ ]			
REMARKS: IOA AGREES WIT CRITICALITY. CREDIBLE.	TH NASA/RI R TWO DUAL-EN	ATIONALE GINE OMS	REGARDIN BURNS WI	IG 3/3, 1/1 THIN 10 MI	ABORT NUTES IS NON-			
	- 1000 第4分の1000 第4分の1000 第4分の10000 - 1000		e jar veigner		7 · · · · · · · · · · · · · · · · · · ·			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-352		NASA DATA BASELINE NEW							
SUBSYSTEM: MDAC ID: ITEM:	OMS 352 VALVE-GN2 PURG	GE								
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:	·									
CRITICAL		DANCY SCREE	NS	CIL ITEM						
FLIGH HDW/FU		В	С	1154						
NASA [ 3 /1R IOA [ 3 /1R	[ P ] [ P ]	[ F ] [ P ]	[ P ] [ P ]	[ X ] * [ ]						
COMPARE [ /	] [ ]	[и]	[ ]	[и]						
RECOMMENDATIONS:	(If differe	nt from NAS	A)							
[ /	] [ ]	[ ]		[ .DD/DELETE)						
* CIL RETENTION	RATIONALE: (If	applicable	e) 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										

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-353 NASA FMEA #: 03-3-4508						-1							DATA LINE NEW	[	] [ ]	
SUBSYSTEM MDAC ID: ITEM:	:		OMS 353 VALVE													
LEAD ANALYST: C.D. PRUS						r										
ASSESSMEN'	T:															
C		CAL:	ITY		REDUNDANCY SCREENS				5			CIL ITEM				
	NC			В			С				12.2					
NASA IOA	[ 3 [ 3	/1R /1R	]	[	P P	]	[	F	]	[	P P	]		K ]	[ ]	*
COMPARE	[	/	]	[		]	(		]	[		]		[	]	
RECOMMEND	ATIC	ons:	(If	d:	if	fere	nt	fr	om NA	SA	)					
	נ	/	]	[		]	[		]	`[		]	(A)	[ DD/E		ETE)
* CIL RET	ENT	ION I	RATION	\LI	Ξ:	(If	aŗ	pl	icabl		A	DEQU DEQU	ATE	[	]	
NO DIFFER																

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-354 03-3-4510	)-1	NASA DATA: BASELINE [ ] NEW [ X ]							
MDAC ID:	OMS 354 VALVE-GN2	PURGE								
LEAD ANALYST:	C.D. PRUS	ST								
ASSESSMENT:										
FLIGH	ITY R T NC A		Y SCREEN	rs C	CIL ITEM					
NASA [ 2 /1R IOA [ 3 /2R	] [ F	? ] [	P ] [	P ] P ]	[ X ] *					
COMPARE [ N /N	] [	] [	] [	]	[и]					
RECOMMENDATIONS:										
[ /	] [ `	] [	] [	(A	[ DD/DELETE)					
* CIL RETENTION	RATIONALE:	: (If app	olicable) I	ADEQUATE NADEQUATE	[ ]					
REMARKS: IOA FAILURE MODE "(DOWNSTREAM OF IOA AGREES WITH CRITICALITY ASSI NASA/RI ORIGINAL LEAKAGE) FOR THI VALVE BODY TO TH CORRESPONDING RE ISSUE. A FAILURE OF THE RESULT IN PROP I	FIRST VALVENASA/RI RAGNMENT. LY DID NOT S ITEM. AS ITEM LISTENTION RAGE HOUSING A	VE)". ATIONALE I COVER I HOWEVER, ST ON THI ATIONALE	FOR 2/1F THIS FAII NASA/RI S FMEA, TO THE C	R PPP, 1/1 LURE MODE ( AGREED TO AND TO ADD CIL SHEET,	ABORT EXTERNAL ADD THIS PER IOA					

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-355 NASA FMEA #: 03-3-4508							-2							DATA: LINE NEW	[		]		
SUBSYSTI MDAC ID: ITEM:				OM 35 VA	355 VALVE-GN2 PURGE														
LEAD AN	ALYS	ST	:	c.	C.D. PRUST														
ASSESSMI	ENT	•																	
CRITICALITY FLIGHT HDW/FUNC												ITEM							
	J	HDI	W/FC	INC		A			В			С							
NĀSA IOA	[ [	3 3	/3 /2F	} }	[ [	P	]	]	P	]	<b>.</b> [	P	]		[	X	] *	<b>t</b>	
COMPARE	[		/N	]	[	N	]	[	N	]	[	N	]		[	N	].		
RECOMME	NDA'	ric	ONS:	:	(If d	if	fer	ent	fr	om	NASA	.)							
	. [		/	j	[		]	[		]	[		]	(AI	[ DD/		] LEI	ľE)	
* CIL RI	ETEI	NT:	ION	RAT	IONAL	E:	(I	f ap	pl:	Lca		A	DEOU	ATE ATE	٢		1		
REMARKS NASA/RI FLOW). ON THIS IOA AGRI ASSIGNM	DII HOT FMI EES	WEY EA W	VER, • ITH	NAS.	SA/RI A/RI	Ai RA'	DDE	D RE	STI	RIC	FAIL TED	URI FL	e mo	DE (F	RES	TR LU	ICI RE	MOD	Ε

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-356			NASA DATA: BASELINE NEW						
MDAC ID:	OMS 356 VALVE-G									
LEAD ANALYST:	C.D. PR	UST								
ASSESSMENT:										
CRITICAI FLIGH		REDUNDA	NCY SCRE	ens	CIL ITEM					
	NC	A	В	С						
NASA [ / IOA [ 3 /2F	] [	p ]	[		[ ]	*				
COMPARE [ N /N	] [	и ј	[ N ]	[и]	[ ]					
RECOMMENDATIONS:	(If d	iffereņ	from NA	SA)						
[ /	] [	]	[ ]	[ ] (A)	[ ] DD/DEL	ETE)				
* CIL RETENTION	RATIONAL	E: (If a	applicabl	e) ADEQUATE INADEQUATE	[ ]					
REMARKS: NASA/RI DID NOT THIS FAILURE MOI CASE EFFECTS OF CLOSED" FMEA (03	E NEED N DELAYED"	OT BE A	ODED TO T	(DELAYED OPE HE FMEA/CIL.	RATION THE	WORST				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-357	: [ x ]									
SUBSYSTEM: MDAC ID: ITEM:	OMS 357 CHECK VA	ALVE-GN2	2 PURGE								
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:											
CRITICALI FLIGHT		REDUNDA	ANCY SCRE	EENS	CIL ITEM						
	ic	A	В	С							
NASA [ 3 /3 IOA [ 3 /2R	] [	p ]	[	[ ] [ P ]	[ X ] * [ ]						
COMPARE [ /N	] [	N ]	[ N ]	[и]	[ N ]						
RECOMMENDATIONS:	(If di	fferent	from NA	ASA)							
( /	] [	]	[ ]	[ ] (A)	[ ] DD/DELETE)						
* CIL RETENTION F	RATIONALE	E: (If a	applicabl	e) ADEQUATE INADEQUATE	[ ]						
REMARKS: IOA AGREES WITH MASSIGNMENT. NASA FMEA (03-3-4508-2	A/RI ADDE	D CHECK	K VALVE I	/3, 1/1 ABORT	CRITICALITY E ASSEMBLY						
•					al d						

ASSESSMENT DA ASSESSMENT II NASA FMEA #:	o: OMS-358	3		BASELII	-						
SUBSYSTEM: MDAC ID: ITEM:	OMS 358 CHECK V	VALVE-GI	12 PURGE								
LEAD ANALYST	C.D. PI	.D. PRUST									
ASSESSMENT:											
	ICALITY LIGHT	REDUNI	DANCY SCR	EENS	CIL ITEM						
	W/FUNC	A	В	С							
NASA [ 3 IOA [ 3	/1R ] /1R ]	[ P ] [ P ]	[ F ] [ F ]	[ P ] [ P ]	[ X ] * [ X ]						
COMPARE [	/ ]	[ ]	[ ]	[ ]	[ ]						
RECOMMENDATIO	ONS: (If	differe	nt from N	ASA)							
[	/ ]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)						
* CIL RETENT	ION RATIONA	LE: (If	applicab	ole) ADEQUAT INADEQUAT	E [ ]						
REMARKS: NO DIFFERENCE ASSEMBLY FME	ES. NASA/R A (03-3-450	I ADDED 8-1) DU	CHECK VA	LVE TO PURG							

ASSESSMENT ASSESSMENT NASA FMEA	r II	<b>)</b> :	OMS-35	59	3 <b>-1</b>				NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:			OMS 359 CHECK	VAI	VE-GI	12 PU	RGE		77.3	
LEAD ANALY	YST:	:	C.D. F	PRUS	T					
ASSESSMENT	r:									
CI	FI	LIGHT		F		DANCY B		ENS	<b>C</b>	CIL ITEM
NASA	[ 3	/1R /1R	]	[ F	) ]	[F [F	]	[	P ] P ]	[ X ] *
COMPARE	[	/	]	[.	]	[	]	[	]	[ . ]
RECOMMENDA	ATIC	ons:	(If	dif	fere	nt fr	om NAS	SA)		
	<b>[</b>	/	]	[	]	[	]	[	] (A	[ ] DD/DELETE)
* CIL RETI	ENTI	ON F	RATIONA	LE:	(If	appl:	icable	•	ADEQUATE ADEQUATE	[ ]
REMARKS: NO DIFFERI ASSEMBLY I										VALVE -

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-360	: [ x ] [ x ]									
	360	-GN2 PURGI									
LEAD ANALYST:	C.D. PRI	PRUST									
ASSESSMENT:											
CRITICAL FLIGH		REDUNDANG	CY SCREENS	5	CIL ITEM						
HDW/FU		A	В	С							
NASA [ 3 /3 IOA [ 3 /2R	] [	P ] [	P ] [	P ]	[ X ] * [ ]						
COMPARE [ /N	] [	и ] [	и ] [	N ]	[ N ]						
RECOMMENDATIONS:	(If d	ifferent :	from NASA	)							
[ /	] [	] [	] [	] . (A	[ ] DD/DELETE)						
* CIL RETENTION	RATIONAL	E: (If ap)		ADEQUATE NADEQUATE	[ ]						
REMARKS:					-						
IOA AGREES WITH ASSIGNMENT. NAS (03-3-4508-2) DU	A/RI ADD	ED ORIFIC	E TO PURG	1/1 ABORT E VALVE AS	CRITICALITY SEMBLY FMEA						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-361 03-3-456	1/01/88 NASA DATA: OMS-361 BASELINE 03-3-4508-2 NEW							
MDAC ID:	OMS 361 GN2 PURG	GE VALVES							
LEAD ANALYST:	C.D. PRI	UST .							
ASSESSMENT:									
CRITICAL FLIGH		REDUNDANC	Y SCREENS		CIL ITEM				
	NC	A	В	2	112				
NASA [ 3 /3 IOA [ 3 /2R	] [	<b>P</b> ] [	P ] [ F	, ]	[ X ] * [ ]				
COMPARE [ /N	] [	и ] [	и][и	1 ]	[ N ]				
RECOMMENDATIONS:	(If d	ifferent f	rom NASA)						
· [ /	] [	1 [	] . [	] (AI	[ ] DD/DELETE)				
* CIL RETENTION	RATIONALI	E: (If app	_	ADEQUATE ADEQUATE	[ ]				
REMARKS: NASA/RI ORIGINAL MODE (EXTERNAL L THE PURGE VALVE IOA AGREES WITH ASSIGNMENT.	EAKAGE). FMEAs (0:	HOWEVER, 3-3-4508).	HIS ITEM ( NASA/RI A	(CP010) AN	ND FAILURE TEST PORT TO				

ASSESSMENT ASSESSMENT NASA FMEA	ID:	1/01/88 OMS-362 03-3-64	2				SA DATA ASELINE NEW	[	x	]	
SUBSYSTEM: MDAC ID: ITEM:		OMS 362 GIMBAL	RING								
LEAD ANALY	ST:	C.D. P	RUST								
ASSESSMENT	r:										
CF	RITICAL: FLIGH		REDUNE	ANCY	SCREE	ns		CI IT	L EM		
	HDW/FU		A	В		C					
NASA [ IOA [	1 /1 1 /1	]	[ ]	[	]	[	]	[ [	X X	) * ]	
COMPARE [	[ /	1	[ ] .	[	]	[	]	(		]	
RECOMMENDA	ATIONS:	(If	differen	nt fro	om NAS	SA)					
I	[ /	]	[ ]	[	]	[	] (A	[ DD/	'DÉ	] LETE	
* CIL RETERMENT * CIL RETERMEN		RATIONA	LE: (If	appl:	icable	ΑI	DEQUATE DEQUATE	[		]	

ASSESSMENT ASSESSMENT NASA FMEA	r II	<b>)</b> :	OMS	DMS-363 BASELINE									[		]			
SUBSYSTEM: MDAC ID: ITEM:			OMS 363 BEZ	3	1G-	-G]	[MBAL	R	INC	3								
LEAD ANALY	ST:		C.I	). I	PRU	JST	ŗ											
ASSESSMENT	<b>!</b> :																	
CF		CALI				RI	EDUND	AN	CY	SC	REENS	3			C]	L	ſ	
		/FUN				A			В			С						
NASA [	2 2	/1R /1R	]		[	P P	]	[	P P	]	[	P P	]		[	X X	]	*
COMPARE [		/	]	٠	[		]	[		]	[		]		[		]	
RECOMMENDA	TIC	NS:	(	(If	d:	iff	eren	ŧ	fro	om 1	NASA)	<u>)</u>						
[	2	/1R	]		[	P	]	[	P	]	Ĺ	P	]	(AI		DE		TE)
* CIL RETE	ENTI	ON F	CTAS	ONA	LI	Ξ:	(If	ap)	pli	cal	•		DEQUA'				]	
REMARKS: IOA RECOMM 2/1R PPP, MAINTAIN V WITH ONE E NEEDED TO	1/1 EHI ENGI	ABC CLE NE I	CON CON	. I NTRO LED	HI L OU	E I DU JT	NCREZ IRING OF PO	AS:	ED AL	RC:	S ACT	IV.	TWO	REQU -ENG	JIR SIN	ED E	T OM	O S OPS

ASSESSME ASSESSME NASA FME	NT I		1/01 OMS- 03-3	364									]	
SUBSYSTE MDAC ID:	м:		OMS 364 GIME	BAL RI	NG M	OUNTI	NG P	AD						
LEAD ANA	LYST	:	c.D.	PRUS	T									
ASSESSME	NT:													
	CRIT			R	EDUN	DANCY	SCR	EENS				IL TEM	r	
		LIGH W/FU		A		В		(	2				•	
NASA IOA	[ 1	/1 /1	]	[	]	]	]	] [	]		[	X X	]	*
COMPARE	[	/	]	[	]	[	]	[	]		[		]	
RECOMMEN	DATI	ons:	(1	f dif	fere	ent fr	om N	ASA)	-					
	Ţ	1	]	ι	]	[	]	[	]	(A	DD,	/DF	] ELI	ETE ]
* CIL RE		NOI	RATI(	NALE:	(If	appl	icab	7	ADEQUA ADEQUA		[		]	
NO DIFFE		ES.												

ASSESSME ASSESSME NASA FME	NT	ID:	OMS-3	1/01/88 DMS-365 D3-3-6401-1						NASA DATA: BASELINE [ ] NEW [ X ]						
SUBSYSTE MDAC ID: ITEM:	M:		OMS 365 MOTOR	k-GI	[ <b>M</b> ]	BAL :	DRI	[VE								
LEAD ANA	LYS'	T:	C.D.	PRU	JS:	r										
ASSESSME	NT:															
		TICAL: FLIGH			RI	EDUN	DAN	ICY	SCRE	ENS	;			CIL		
		DW/FU			A			В			С					
NASA IOA		3 /1R 3 /1R		[	P P	]	[	P P	]	[	P P	]		[	]	*
COMPARE	ſ	/	]	[		]	[	•	]	[		]		[	]	
RECOMMEN	DAT:	ions:	(If	di	f	fere	nt	fr	om NA	SA)						
	(	/	]	[		]	[	•	]	[		]	(Al	[ D/D		TE)
* CIL RE	TEN'	TION	RATION	ALE	E :	(If	aŗ	pl:	icabl	-		EQUA EQUA		[	]	
REMARKS:	REN	CES.								ΤIN	AL	ÆŲUA	. I E	ι	1	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-366	NASA DA' BASELII N									
SUBSYSTEM: MDAC ID: ITEM:	OMS 366 MOTOR-GIMBAL DRIV										
LEAD ANALYST:	C.D. PRUST		•								
ASSESSMENT:											
CRITICAL FLIGH HDW/FU	T	CY SCREENS  B C	CIL ITEM								
NASA [ / IOA [ 3 /1R	] [ ] [ ] [ P ] [	P ] [ P ]	[ ] *								
COMPARE [ N /N	] [ N ] [	и] [и]	[ ]								
RECOMMENDATIONS:	(If different i	from NASA)									
[ 3 /1R	] [P] [	P ] [ P ]	[ ] (ADD/DELETE)								
* CIL RETENTION	RATIONALE: (If app	plicable) ADEQUAT INADEQUAT									
OPERATION). IOA RECOMMENDS T THAT "MOTOR SYNC FAILURE HISTORY	OVER THIS FAILURE INTO ARMATURE ROTATION OF THIS ITEM INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AGREED WITH THE INCLUMENTALIES AND AGREED WITH THE IN	MODE BE ADDED TO TION" BE ADDED AS UDES THIS FAILURE	03-3-6401-1 AND A CAUSE. THE								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-367			NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 367 ACME SC	REW/NUT T	UBE		
LEAD ANALYST:	C.D. PR	UST	ma.	. 7	
ASSESSMENT:					e e
CRITICAL: FLIGH		REDUNDAN	CY SCREEN	1S	CIL ITEM
	NC	A	В	С	
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] [ P ] [	P ] [ P ]	[ P ] [ P ]	[ X ] * [ X ]
COMPARE [ /	] [	] [	] [	. 1	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NASA	A)	·
[ 2 /1R	] [	P ] [	P ] [	[ P ] (A	[ DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If ap	plicable)		
			1	ADEQUATE NADEQUATE	
REMARKS: IOA RECOMMENDS TI	HAT THIS	ITEM AND	FAILURE	MODE BE UP	GRADED TO A
2/1R PPP, 1/1 ABO	ORT. TH	E INCREAS	ED RCS AC	CTIVITY REQ	UIRED TO
MAINTAIN VEHICLE WITH ONE ENGINE					
NEEDED TO COMPLET	TE THE A	BORT.		tops of the contract of	。 1944年 - 西北村大東東海市
03-3-6402-2 COVE					
THIS FMEA BE SEPTINSIGHT INTO THE	ARATED O	NTO INDIV	IDUAL FME	EAS TO PROV	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-368 03-3-64				: [ x ]			
SUBSYSTEM: MDAC ID: ITEM:	OMS 368 ACME SC							
LEAD ANALYST:	C.D. PR	UST						
ASSESSMENT:								
		REDUNDA	NCY SCREEN	īs	CIL ITEM			
FLIG HDW/F	INC	A	В	C	TIEM			
NASA [ 1 /1 IOA [ 2 /1	] [	p ]	[ ]   [ P ]	P ]	[ X ] * [ X ]			
COMPARE [ N /N	] [	и ј	[ N ]	[ N ]	[ ]			
RECOMMENDATIONS	: (If d	ifferent	from NAS	7)				
[ /	] [	1	[ ]	[ ] (A)	[ ] 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								
IOA RECOMMENDS SEPARATED ONTO	THAT THE INDIVIDUA	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.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-369	NASA DATA: BASELINE NEW	[ j			
SUBSYSTEM: MDAC ID: ITEM:	OMS 369 REDUCTION GEAR					
LEAD ANALYST:	C.D. PRUST					
ASSESSMENT:			· · · · · · · · · · · · · · · · · · ·			
CRITICAL FLIGH		EENS	CIL ITEM			
HDW/FU	<del>-</del>	С	112			
NASA [ / IOA [ 3 /1R	] [ ] [ ] [ ] ]	[ ] [ P ]	[ ] *			
COMPARE [ N /N	] [N] [N]	[ N ]	[ ]			
RECOMMENDATIONS:	(If different from N	ASA)				
[ 3 /1R	] [P] [P]		[ ] DD/DELETE)			
* CIL RETENTION	RATIONALE: (If applicab	le) 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.						

	1/01/88 OMS-370 NONE			NASA DATA BASELINE NEW		
MDAC ID:	OMS 370 REDUCTION	ON GEAR				
LEAD ANALYST:	C.D. PR	UST				
ASSESSMENT:						
CRITICAL FLIGH		REDUND	ANCY SCREI	ens	CIL	
HDW/FU		A	В	С	112.	•
NASA [ / IOA [ 3 /1R	] [	P ]	[ P ]	[ P ]	[	] <b>*</b>
COMPARE [ N /N	] [	N ]	[ N ]	[ N ]	C	]
RECOMMENDATIONS:	(If d	ifferen	t from NAS	SA)		
[ 3 /1R	] [	P ]	[ P ]	[ P ] (A	[ ADD/DI	] ELETE)
* CIL RETENTION	RATIONAL	E: (If	applicablo	e) ADEQUATE INADEQUATE		]
REMARKS: NASA/RI DO NOT COVER THIS ITEM OR FAILURE MODE (STRUCTURAL						
FAILURE). IOA RECOMMENDS T THE FMEA/CIL. T COMPONENT WHOSE	HE REDUC	TION GE	AR IS A M	OVING, LOAD-	-BEAR	ING

ASSESSMEN ASSESSMEN NASA FME	NT ]	ID:	1/01/3 OMS-3 03-3-	71	-1			NASA DATA BASELINE NEW	
SUBSYSTEM MDAC ID: ITEM:	M:		OMS 371 ANTIB	ACK :	DEVIC	E			
LEAD ANA	LYSI	r:	C.D.	PRUS'	T				
ASSESSME	NT:								
•		rical: Fligh	ITY F	R	EDUNE	ANCY	SCRE	ENS	CIL ITEM
	HI	OW/FU	NC	A		В		С	
NASA IOA	[ 3	3 /1R 3 /1R	]	[ P	]	[ P	]	[ P ] [ P ]	[ ] *
COMPARE	[	/	]	[	]	[	]	[ 1	[ ]
RECOMMEN	DATI	ons:	(If	dif	feren	t fr	om NA	SA)	·
	[	/	]	[	]	[	]	[  ] (A	[ ] DD/DELETE)
* CIL RE	rent	I MOLT	RATION	ALE:	(If	appl	icabl	e) ADEQUATE INADEQUATE	• •
REMARKS:	RENC	es.	i gila di sejanan		e e v	44.	n e jog		. ,

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-372	NASA DATA: BASELINE [ ] NEW [ ]				
MDAC ID:	OMS 372 ANTIBACK DEVICE					
LEAD ANALYST:	C.D. PRUST					
ASSESSMENT:						
CRITICAL FLIGH HDW/FU		NS CIL ITEM C				
	] [ ] [ ] ] [ P ] [ P ]	[ ] [ ] * [ P ] [ ]				
COMPARE [ N /N	] [N] [N]	[ א ]				
RECOMMENDATIONS:	(If different from NAS	A)				
[ 3 /1R	[P] [P]	[P] [] (ADD/DELETE)				
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]						
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.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-373 NONE			NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 373 ANTIBACK	C DEVICE			
LEAD ANALYST:	C.D. PRU	JST			
ASSESSMENT:					
FLIGH'	ľ		CY SCREENS		CIL ITEM
HDW/FUI	NC	A	В	С	
NASA [ / IOA [ 2 /1R	] [	P ] [	P ] [	] P ]	[ x ] *
COMPARE [ N /N	] [	N ] [	и ] [	n ]	[ N ]
RECOMMENDATIONS:	(If di	.fferent	from NASA)		
[ 2 /1R	] [	P ] [	P ] [	P ] (AD	[ A ] DD/DELETE)
* CIL RETENTION I	RATIONALE	: (If ap			
			IN	ADEQUATE ADEQUATE	[ ]
REMARKS: NASA/RI DO NOT CO	NIED MUTC	י ביאדווים	MODE (CTD	ተረጥነነው እስ ጉ	TTIIDE\
IOA RECOMMENDS TI	HAT THIS	FAILURE 1	MODE BE AD	DRESSED ON	THE
FMEA/CIL WITH A					
OF THE ANTI-BACK AND STOP ROTATION	OF THE	UNUSED C	HANNET CAU	SES LOSS C	F THE
ACTUATOR AND LOSS	S OF TVC	FOR ONE	ENGINE. T	HE INCREAS	ED 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					POSTITON
THE SSM AGREED THE FAILURE MODE ON (	HAT "STRU	CTURAL F	AILURE" SH	OULD BE AD	
		•		•	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-374	BASELINE [ ] NEW [ ]
	OMS 374 BEARING-GIMBAL THRUST DRI	VE
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
	ITY REDUNDANCY SCREEN	S CIL ITEM
FLIGHT HDW/FUI	NC A B	C
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)
	RATIONALE: (If applicable)	ADEQUATE [ ] NADEQUATE [ ]
IOA RECOMMENDS TO FMEA/CIL WITH A FAILURE OF THIS BINDING OF THE GOVERNMENT ON ECH.	OVER THIS FAILURE MODE (ST HAT THIS FAILURE MODE BE A 2/1R PPP, 1/1 ABORT CRITIC BEARING COULD CAUSE LOSS O IMBAL DRIVE OR LOSS OF MES ANNEL. THE INCREASED RCS CONTROL DURING TAL POST-M	DDRESSED ON THE ALITY. A STRUCTURAL OF THE ACTUATOR DUE TO HING BETWEEN THE GIMBAL ACTIVITY REQUIRED TO

WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP

NEEDED TO COMPLETE THE ABORT.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-375	В	ASELINE [ ] NEW [ X ]
MDAC ID:	OMS 375 BEARING-GIMBAL	THRUST DRIVE	
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
CRITICALI FLIGHT	· · · · ·	ANCY SCREENS	CIL ITEM
HDW/FUN		в с	11111
NASA [ 3 /1R IOA [ 3 /1R	] [ P ] ] [ P ]	[ P ] [ P [ P ] [ P	] [ ] *
COMPARE [ /	] [ ]	[ ] [	] [ ]
RECOMMENDATIONS:	(If different	from NASA)	
, i t /	] [ ]	[ ] [-	[ ] (ADD/DELETE)
* CIL RETENTION R	RATIONALE: (If a	AD:	EQUATE [ ] EQUATE [ ]
REMARKS: THE FUNCTIONAL DE ACCOUNT FOR THE S ARE THRUST BEARIN	SECONDARY DRIVE	QUANTITY NEED 'GEAR BEARINGS	TO BE CORRECTED TO , WHICH THE SSM SAYS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-376	)2-2	OMS-376			
SUBSYSTEM: MDAC ID: ITEM:	OMS 376 BEARING-					
LEAD ANALYST:	C.D. PRU	JST				
ASSESSMENT:						
CRITICAL FLIGH		REDUNDANG	CY SCREEN	S	CIL ITEM	
HDW/FU	NC	A	В	С		
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] [ P ] [	P ] [ P ] [	P ] P ]	[ X ] * [ X ]	
COMPARE [ /	] [	] [	] [	1	[ ]	
RECOMMENDATIONS:	(If di	ifferent :	from NASA	)		
[ 2 /1R	] [	P ] [	P ] [	P ] (A	[ ] DD/DELETE)	
* CIL RETENTION	<b>ΡΑ</b> ΨΤΛΝΑΤ.Ε	e (Tfan	olicable)			
	IMI I VIME	i (ii apı		ADEQUATE NADEQUATE		
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.  O3-3-6402-2 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.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-377			A DATA: SELINE [ ] NEW [ X ]		
MDAC	OMS 377 BEARING-S	SPHERICAL F	ROD END			
LEAD ANALYST:	C.D. PRUS	C.D. PRUST				
ASSESSMENT:			-			
CRITICAL FLIGH HDW/FU	T	REDUNDANCY B	SCREENS C	CIL ITEM		
NASA [ 1 /1 IOA [ 2 /1R	] [ P	] [p	] [ ]	[ X ] * [ X ]		
COMPARE [ N /N	] [ N	и ] [и	] [ N ]	[ ]		
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)			
[ ./	J [	] [	] [ ]	[ ] (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 T	HAT THE SU NDIVIDUAL	BASSEMBLY FMEAS TO F	ROVIDE BET	ON THIS FMEA BE TER INSIGHT INTO		

ID:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-378 03-3-6406-1	A DATA: SELINE [ ] NEW [ X ]	
SUBSYSTEM: MDAC ID:	OMS 378 MECHANICAL STOP-		
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
CRITICAL FLIGH	ITY REDUNDAN T		CIL ITEM
HDW/FU	NC A	в с	
NASA [ 3 /3 IOA [ 2 /1R	] [ NA] [ : ] [ P ] [	NA] [NA] P] [P]	[ x ] *
COMPARE [ N /N	] [N]	[ N ]	[ N ]
RECOMMENDATIONS:	(If different	from NASA)	
[ 2 /1R	[P] [P]	P ] [ P ]	(ADD/DELETE)
* CIL RETENTION	RATIONALE: (If ag	pplicable)	
		ADE INADE	QUATE [ ] QUATE [ ]
OF A REVIEW WITH FAILURE MODE BE	THE VENDOR. 10A	DED FROM 2/1R A RECOMMENDS I	TO 3/3 AS A RESULT THAT THIS ITEM AND FORT AND PLACED ON
FAILURE COULD BE	ONCERN THAT THE WO BINDING OR JAMMI ORRECT TVC RESULTI	ING OF THE GIM	BAL OUTPUT DRIVE
ENGINE. THE INC CONTROL DURING T FAILED OUT OF PO	REASED RCS ACTIVINAL POST-MECO TWO-	TY REQUIRED TENGINE OMS OF	O MAINTAIN VEHICLE PS WITH ONE ENGINE EDED TO COMPLETE
THE ABORT. REDUNDANCY SCREE	NS SHOULD BE BLAN	NK PER NSTS 22	206.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-379 03-3-64	02-2		NASA DAT BASELIN NE	A: E [ ] W [ X ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 379 BEARING	-NUT TUB	E/OUTPUT	SHAFT	
LEAD ANALYST:	C.D. PRI	UST			
ASSESSMENT:					
CRITICAL: FLIGHT					CIL ITEM
nDW/ FO	NC	A	Б	C	
NASA [ 2 /1R IOA [ 3 /1R	] [	P ] P ]	[ P ] [ P ]	[ P ] [ P ]	[ ] *
COMPARE [ N /	] [	]	1	[ ]	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)	
[ 2 /1R	] [	P ]	P]	·[ P ]	[ ADD/DELETE)
* CIL RETENTION I	RATTONALI	E: (Tf ai	onlicabl	e)	
		( w <sub>1</sub>	<b>P</b> =	ADEQUATE INADEQUATE	
REMARKS: IOA RECOMMENDS A	2/10 001	D 1/1 1	מחש דרום	BINDING / TX	MMING OF THESE
BEARINGS, WHICH	ALLOW THI	E DRIVE	SHAFT TO	ROTATE WIT	HIN THE
SURROUNDING TUBU	LAR HOUS	ING. TH	INCREA	SED RCS ACT	IVITY REQUIRED
TO MAINTAIN VEHIC	CLE CONTI	ROL DURII	NG TAL P	OST-MECO TW	O-ENGINE OMS
OPS WITH ONE ENGINE FAILED OUT OF POSITION MAY CONSUME RCS PROP NEEDED TO COMPLETE THE ABORT.					
MUTE THEM AND EXTITED MODE (RINDING/TAMMING) ADE ADDADENTIV					
INCLUDED ON 03-3-6402-2, WHICH COVERS THE "GIMBAL OUTPUT DRIVE ASSEMBLY".					
IOA RECOMMENDS TI	HAT THE	COMPONENT	rs inclu	DED ON THIS	FMEA BE
SEPARATED ONTO INDIVIDUAL FMEAS TO PROVIDE BETTER INSIGHT INTO THE FAILURES POSSIBLE IN THE ASSEMBLY.					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-380		nasa i Basei	NEW [ ]
MDAC TD:	OMS 380 BEARING-N	UT TUBE/OU	TPUT SHAFT	
LEAD ANALYST:	C.D. PRUS	T		
ASSESSMENT:				
CRITICAL: FLIGHT		EDUNDANCY	SCREENS	CIL ITEM
HDW/FUI	-	В	С	
NASA [ / IOA [ 3 /1R	] [ ] [ P	[ P	] [ p ]	[ ] *
COMPARE [ N /N	] [ N	и] [и	] [ N ]	[ ]
RECOMMENDATIONS:	(If dif	ferent fro	m NASA)	
[ /	] [	] [	] [ ]	[ ] (ADD/DELETE)
* CIL RETENTION	RATIONALE:	(If appli	Cable) ADEQUA	ATE [ ] ATE [ ]
REMARKS: IOA RECOMMENDS TO (BETWEEN THE DRIVADDED AS A CAUSE BINDING JAMMING)	VE SHAFT A ON 03-3-6	ND THE SUR 3402-2 (GIM	URE" OF THESI ROUNDING TUBU BAL OUTPUT DI OULD CAUSE BIR	E BEARINGS JLAR HOUSING) F RIVE ASSEMBLY,

BEARINGS, AND LOSS OF THE ACTUATOR. SEE ASSESSMENT SHEET OMS-

379.

ASSESSME ASSESSME NASA FME	NT I	D:	1/01/8 OMS-38 03-3-6	31	:-1				ASA DATA BASELINE NEW	[	x	]	
SUBSYSTE MDAC ID: ITEM:	M:		OMS 381 OUTPUT	с зн	IAFT								
LEAD ANA	LYST	:	c.D. I	PRUS	T								
ASSESSME	NT:												
		ICAL:		R	EDUND	ANCY	SCRE	ENS		C	L E	,	
	-	LIGH' W/FU		A		В		С	2	11	LEI	1	
NASA IOA	[ 1 [ 1	/1 /1	]	[	]	[	]	[	]	[	X X	]	*
COMPARE	[	/	]	[	]	[	]	[	]	[		]	
RECOMMEN	DATI	ons:	(If	dif	feren	t fro	om NA	SA)					
	[	/	]	[	]	C	]	[	] (AI	[ DD/	/DI	] ELE	ETE)
* CIL RE	TENT	ION 1	RATIONA	ALE:	(If	appl	icabl	Al	DEQUATE DEQUATE	[		]	
REVISED IOA RECO	THE MMEN SEPA	EFFE DS TI RATE	CTS PER HAT THI D ONTO	R IO E SU IND	A ISS BASSE IVIDU	UE. MBLY AL FI	COMPO	ONEN' IO PI	ASSEMBLY' TS INCLUI ROVIDE BI	ŒΙ	) (	N	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-382 03-3-64071	1-1		ASA DATA: BASELINE NEW	: [ x	]
SUBSYSTEM: MDAC ID: ITEM:	OMS 382 GIMBAL ACT	TUATOR COI	NTROLLER			
LEAD ANALYST:	C.D. PRUST	r				
ASSESSMENT:						
CRITICAL: FLIGHT HDW/FUI	r	EDUNDANCY B	SCREENS		CIL	ſ
NASA [ 3 /1R IOA [ 3 /1R	] [ P	] [ P	] [ P		[	] <b>*</b>
COMPARE [ /	] [	] [	] [	]	[	]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)	٠		
[ /	] [	] [	] [	] (A)	[ DD/DE	] ELETE
* CIL RETENTION DE REMARKS:	RATIONALE:	(If appl	A	DEQUATE DEQUATE	[	]

NO DIFFERENCES.

ASSESSME ASSESSME NASA FME	NT ]	D:	OMS-		71-1					DATA ELINE NEW	-	]
SUBSYSTE MDAC ID:			OMS 383 GIME	BAL A	CTUA!	FOR CO	NTRO	LLER				
LEAD ANA	LYSI	r:	C.D.	PRUS	ST					- -		
ASSESSME	NT:											
-		TICAL		1	REDUI	NDANCY	SCR	EENS			CII	•
	н	W/FU	NC	1	A	В		C				
NASA IOA	[ 3	3 /1R 3 /1R	]	[ ]	e ]	[ P [ P	]	[ P	]		[	] <b>*</b> ]
COMPARE	[	/	]	C	]	[	3	C	]		[	]
RECOMMEN	DATI	ons:	(I	f di	ffere	ent fr	om N	ASA)				
•	[	/	]	[	]	[	]	[	]	(A		] DELETE)
* CIL RE	TENI	TION 1	RATIC	NALE:	: (I:	f appl	icab	A		JATE JATE	[	]
NO DIFFE	RENC	ES.								P		

ASSESSMENT DATE:	1/01/88								A DATA				
ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-2000 NONE	אנס	<b>C</b>					BA	SELINI NEV		[	]	
	OMS 20001 GN2 FIL	ref	₹.										
LEAD ANALYST:	C.D. PRI	JSI	י										
ASSESSMENT:													
CRITICAL FLIGH		RE	EDUNDA	NC.	Y	SCREE	NS				CIL ITEM		
	ис	A		1	В			С				_	
NASA [ / IOA [ 2 /1R	] [	F	]	[ ]	P	]	[	P ]			[	]	*
COMPARE [ N /N	] [	N	]	[ ]	N	]	[	N ]			[	]	
RECOMMENDATIONS:	(If d	if1	ferent	<b>:</b> f:	ro	m NAS	A)						
[ /	] [		]	[		]	[	]	(2		[ DD/DE		
* CIL RETENTION	RATIONAL	Е:	(If a	app	li	cable		ADE	QUATE QUATE	-	[	]	
REMARKS: IOA DID NOT COVE NASA/RI DELETED IOA ISSUE. THE ADEQUATELY COVER	THE FMEA GN2 FILT	FO ER	OR THI	SU:	GN BA	2 FII SSEME	IE LTE SLY	ORI	GINAL (03-3-4 (MPONE)	4 5 N 7	NALY 504-2 C ANI	YS: 2) D :	PEF IS

ASSESSMENT ASSESSMENT NASA FMEA #	DATE: ID: :	1/01/8 OMS-20 NONE	38 0002X	<b>C</b>				ASA DATA BASELINE NEW	[	]
SUBSYSTEM: MDAC ID: ITEM: ATTACHMENT		OMS 20002 GIMBAI	L RIN	IG BE	ARING	G, GI	MBAL	RING/MO	UNTI	NG PAD
LEAD ANALYS	T:	C.D. I	PRUST							
ASSESSMENT:										
	FLIGH!	ITY I NC		DUND	ANCY B	SCRE	<b>ENS</b> C		CIL	
NASA [ IOA [	1 /1	]	[	]	[	]	[	]	[ x	] *
COMPARE [	n /n	]	[ N	]	[ N	]	[ N	]	[ N	]
RECOMMENDAT	ions:	(If	diff	eren	t fro	om NA	SA)			
Ċ	1 /1	1	[	]	[	]	[	] (A	[ A DD/DI	]· ELETE)
* CIL RETEN			ALE:	(If	appl:	icabl	A	DEQUATE DEQUATE		]
REMARKS: IOA DID NOT GIMBAL RING CURRENTLY A THIS BEARIN IOA RECOMME FAILURE MOD IN DISATTAC RING AND VE POSSIBLE VE	ANAL BEAR DDRESS G IS ( NDS TI E. A HMENT HICLE	YZE THI ING) IN S THIS COVERED HAT A N STRUCT BETWEN , RESU	THE FAIL ON NEW 1 TURAL EN TH	ORIC URE 1 03-3- /1 FI FAI FAI IE ENC	GINAI MODE -6409 MEA I LURE GINE LOSS	ON TO O-1). BE GET OF TO AND OF E	LYSI: HE FI NERA' HIS : GIMB: NGIN:	S. NASA MEA/CIL TED FOR BEARING AL RING E RESTRA	/RI I (BINI THIS COULI OR GI	OO NOT DING OF ITEM AND RESULT IMBAL

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-20003X 03-3-4001-3	NASA DATA: BASELINE [ ] NEW [ X ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 20003 PINION GEAR AND DRIVE AS	SSEMBLY
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
CRITICAL FLIGH	ITY REDUNDANCY SCREET	ENS CIL ITEM
	NC A B	С
NASA [ 2 /1R IOA [ 2 /1R	[P] [F] [P] [P]	[ P ] [ X ] * [ X ]
COMPARE [ /	] [ ] [ N ]	[ · ] [ ]
RECOMMENDATIONS:	(If different from NAS	SA)
[ /	] [ ] [ ]	[ ] [ ] (ADD/DELETE)
	RATIONALE: (If applicable	e) ADEQUATE [ ] INADEQUATE [ ]
OPERATION). HOW 03-3-4001-3. IO IOA RECOMMENDS T FMEA BE SEPARATE	LY DID NOT COVER THIS FAR EVER, NASA/RI NOW ADDRESS A ACCEPTS NASA/RI FAILURI HAT THE SUBASSEMBLY COMPO D ONTO INDIVIDUAL FMEAS TO S POSSIBLE IN THE ASSEMBI	S THIS FAILURE MODE ON E OF B SCREEN. ONENTS INCLUDED ON THIS TO PROVIDE BETTER INSIGHT

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-2000	)4X )9-4		NASA DATA BASELINE NEW		
MDAC ID:	OMS 20004 VALVE -	PRESSUR	E RELIEF	ASSEMBLY		-
LEAD ANALYST:	C.D. PR	JST				
ASSESSMENT:		·				
		REDUNDA	NCY SCREE	ns	CIL ITEM	
FLIGH HDW/FU		A	В	<b>C</b>	TIEM	
NASA [ 3 /1R IOA [ 3 /1R	] [	P ] P ]	[ NA] [ NA]	[ P ] [ P ]	[ ]	*
COMPARE [ /	] [	1	[ • ]	[ ]	[ ]	
RECOMMENDATIONS:	(If di	ifferent	from NAS	A)		
[ /	] [	]	[ ]	[ ] (A)	[ ]	ETE)
* CIL RETENTION	RATIONALI	E: (If a	pplicable	) ADEQUATE INADEQUATE	[ ]	
REMARKS: IOA AND NASA/RI ( (RESTRICTED FLOW MODE TO 03-3-100	). HOWEY	TER, NAS.	A/RI AGRE	THIS FAILUR ED TO ADD T	E MODE HIS FA	ILURE

NASA DATA:

ASSESSMEN ASSESSMEN NASA FME	NT ID:	1/01/88 OMS-200 NONE	05X				DATA: ELINE [ NEW [	]
SUBSYSTEM MDAC ID:	M:	OMS 20005 VALVE -	BIPROP	CAVI	TY PR	ĘSSURE	RELIEF	
LEAD ANA	LYST:	C.D. PR	UST					
ASSESSME	NT:							
•	CRITICAL FLIGH		REDUND	ANCY	SCREE	NS	CI	L EM
	HDW/FU		A	В		С		
NASA IOA	[ / /1	] [	]	[	]	[ ]	[	] * ]
COMPARE	[ N /N	] [	]	[	]	[ ]	[	]
RECOMMEN	DATIONS:	(If d	ifferen	t fro	om NAS	A)		
	[ 1 /1	] [	1	[.	]	[ ]		A ] DELETE)
* CIL RE	TENTION	RATIONAL	E: (If	appli			UATE [ UATE [	]
REMARKS:	NOT COVE	R THIS F	AILURE	MODE	(REST	RICTED	FLOW) I	N 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.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	0MS-20006X 03-3-4001-3		BASELINE NEW	
MDAC ID:	OMS 20006 PINION GEAR & 1	DRIVE ASSE	MBLY	
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
FT.TCH'	TY REDUNDATE OF THE PROPERTY O			CIL ITEM
NASA [ 2 /1R IOA [ 2 /1R	] [ P ] ] [ P ]	[ F ] [ P ]	[ P ] [ P ]	[ X ] *
COMPARE [ /	] [ ]	[ и ]	[ ]	[ ]
RECOMMENDATIONS:	(If different	t from NAS	A)	
[ /	1 [ ]	[ ]	[ ] (A)	[ DD/DELETE)
* CIL RETENTION	RATIONALE: (If a		ADEQUATE	
REMARKS: NASA/RI ORIGINAL TRAVEL). HOWEVE 4001-3. IOA ACC IOA RECOMMENDS TO FMEA BE SEPARATE INTO THE FAILURE	EPTS NASA/RI FAT HAT THE SUBASSEN D ONTO INDIVIDUA S POSSIBLE IN TH	R THIS FAI ADDRESS TH ILURE OF B MBLY COMPO AL FMEAS T HE ASSEMBL	LURE MODE (1 IS FAILURE M S SCREEN. NENTS INCLUI O PROVIDE BE	FAILS MID- MODE ON 03-3- DED ON THIS
and the second of the second o				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-2000 03-3-640	7X <b>4-</b> 1	_	SA DATA: ASELINE [ NEW [ }			
MDAC ID:	OMS 20007 BEARING	- SECONDARY	DRIVE GE	AR			
LEAD ANALYST:	C.D. PRU	ST					
ASSESSMENT:							
CRITICAL FLIGH		REDUNDANCY	SCREENS	CII			
	NC .	A B	С	111			
NASA [ 3 /1R IOA [ 3 /1R	] [	P ] [ P P ]	] [ P ] [ P	] [	] *		
COMPARE [ /	] [	] [	] [	] [	]		
RECOMMENDATIONS:	(If di	fferent fro	om NASA)				
[ /	] [	] [	] [	] [ (ADD/I	] DELETE)		
* CIL RETENTION	RATIONALE	: (If appli	מג	EQUATE [ EQUATE [	]		
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 WERN  THRUST BEARINGS, HOWEVER THE SSM STATES THAT THESE ARE THRUST  BEARINGS AND ARE COVERED BY 03-3-6404-1.							

NASA DATA:

ASSESSMENT DATE: 1/01/88

ASSESSMENT ID: NASA FMEA #:		BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 20008 BEARING - SECONDA	ARY DRIVE GEAR	
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
61.173H	ITY REDUNDANC T NC A		CIL ITEM
HDW/FU	NC A	ВС	
NASA [ / IOA [ 2 /1R	] [ ] [ ] [ P ] [	P ] [ ]	[ x ] *
COMPARE [ N /N	] [ N ] [	и] [и]	[ N ]
RECOMMENDATIONS:	(If different f	rom NASA)	
[ 2 /1R	] [P] [	P ] [ P ] · (AI	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE: (If app	olicable)	
		ADEQUATE INADEQUATE	[ ]
RECOMMENDS THAT FMEA/CIL WITH A THESE BEARINGS CO OF TVC FOR THE A REQUIRED TO MAIN ENGINE OMS OPS W RCS PROP NEEDED THE SSM STATES T	THIS ITEM AND FAIL 2/1R PPP, 1/1 ABOR OULD CAUSE BINDING FFECTED ENGINE. TAIN VEHICLE CONTRITH ONE ENGINE FAITO COMPLETE THE AB	MODE (STRUCTURAL FACURE MODE BE ADDRESS RT CRIT. STRUCTURAL ROF THE GIMBAL DRIV ROL DURING TAL POST- LED OUT OF POSITION BORT. ROL CITHER SIDE OF	AILURE). IOA SED ON THE L FAILURE OF VE AND LOSS CTIVITY -MECO TWO- N MAY CONSUME

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-20009X 03-3-6402-2	NASA DATA: BASELINE [ ] NEW [ X ]								
SUBSYSTEM: MDAC ID:	OMS 20009	MARY AND SECONDARY								
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL FLIGH	CIL ITEM									
	NC A	ВС								
NASA [ 2 /1R IOA [ 2 /1R	] [ P ] [ ] [ P ]	P ] [ P ] P ] [ P ]	[ X ] *							
COMPARE [ /	] [ ] [	] [ ]	[ ]							
RECOMMENDATIONS:	(If different	from NASA)								
[ 2 /1R	] [P] [	P ] [ P ] (A	[ ] DD/DELETE)							
* CIL RETENTION	RATIONALE: (If ap	plicable)								
		ADEQUATE INADEQUATE	[ ]							
DRIVE GEARS) IS ASSEMBLY, BINDIN IOA RECOMMENDS T FMEA BE SEPARATE INTO THE FAILURE IOA ALSO RECOMME 2/1R PPP, 1/1 AB MAINTAIN VEHICLE	COVERED BY 03-3-6 G/JAMMING). HAT THE SUBASSEMB DONTO INDIVIDUAL MODES POSSIBLE INDS THAT THIS FAIRORT. THE INCREAS CONTROL DURING TEALLED OUT OF POS	MODE (STRUCTURAL FA 402-2 (GIMBAL OUTPU LY COMPONENTS INCLU FMEAS TO PROVIDE B N THE ASSEMBLY. LURE MODE BE CLASSI ED RCS ACTIVITY REQ AL POST-MECO TWO-EN ITION MAY CONSUME R	T DRIVE DED ON THIS ETTER INSIGHT FIED AS A UIRED TO GINE OMS OPS							

ASSESSME ASSESSME NASA FME	ENT	ID:	OMS-	L/88 -20010 3-6402			NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTE MDAC ID: ITEM: HARDWARE	}		OMS 2001 ENGI	.0 INE/AC	TUAT	FOR AN	D A	CTUATOR,	/VEHICI	LE ATT.	ACH			
LEAD ANA	LYS	T:	C.D.	PRUS'	r									
ASSESSME	ENT:													
		TICAL FLIGH	ITY T	R	EDUI	IDANCY	sc	REENS		CIL ITEM				
	H	DW/FU	NC	A		В		C						
NASA IOA	]	1 /1 1 /1	]	[	]	[ [	]	[	] ]	[ X ]	] <b>*</b> ]			
COMPARE	[	/	]	[	]	Γ	]	[ ]	]	[	]			
RECOMMEN	DAT	ions:	(I	fdif	fere	ent fro	mc	NASA)						
·	[	/	]	[	]	[	]	[ ]		[ .DD/DE	•			
* CIL RE	TEN'	TION	RATIO	NALE:	(If	appl	ica	ADI	EQUATE EQUATE	-	]			
IOA RECO	INADEQUATE [ ] REMARKS: COA RECOMMENDS THAT "IMPROPER ASSEMBLY" BE ADDED AS A CAUSE ON THIS FMEA/CIL. COA ALSO RECOMMENDS THAT THE SUBASSEMBLY COMPONENTS INCLUDED ON													
THIS FME INSIGHT	A B	E SEP	ARATE	D ONTO	) IN	DIVID	JAL	FMEAS 7	O PROV	IDE BE				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-2001 03-3-640	11X 02-2	NASA DATA: BASELINE [ ] NEW [ X ]								
SUBSYSTEM: MDAC ID:	OMS 20011			LE ATTACHME	NT						
LEAD ANALYST:	C.D. PR	JST									
ASSESSMENT:											
FLIGH	·m	REDUNDAN		:NS	CIL ITEM						
HDW/FU	NC	A	В	С							
NASA [ 2 /1R IOA [ 2 /1R	] [	P ] [ P ]	P ] P ]	[ P ] [ P ]	[ X ] *						
COMPARE [ /	] [	] [	]	[ ]	[ ]						
RECOMMENDATIONS:	(If d	ifferent	from NAS	;A)							
[ 2 /1R	. [	P ] [	P ]		[ ] DD/DELETE)						
* CIL RETENTION	RATIONAL	E: (If ap	plicable	ADEQUATE	[ ]						
REMARKS: IOA RECOMMENDS T 1/1 ABORT. THE VEHICLE CONTROL ENGINE FAILED OU COMPLETE THE ABO IOA ALSO RECOMME THIS FMEA BE SEE INSIGHT INTO THE	INCREASE DURING TO TOF POS PAT. ENDS THAT PARATED OF	D RCS ACT AL POST-M ITION MAY THE SUBA NTO INDIV	TIVITY RESECTION  CONSUME  ASSEMBLY  VIDUAL FR	EQUIRED TO MA -ENGINE OMS OF ERCS PROP NO COMPONENTS MEAS TO PROV	AINTAIN OPS WITH ONE EEDED TO INCLUDED ON IDE BETTER						

ASSESSMENT ASSESSMENT NASA FMEA	ID:	OMS-200	12X			FA: NE [ ] EW [ X ]		
SUBSYSTEM: MDAC ID: ITEM:		OMS 20012 GN2 PRES	SSURE R	EGULA	TOR AN	D PRESSUI	RE RELIEF VALV	E
LEAD ANALYS	ST:	C.D. PR	JST					
ASSESSMENT	\$				·			
CR	ITICALI FLIGHT	TY	REDUND	ANCY	SCREEN	s	CIL ITEM	
I	HDW/FUN		A	В		C	2221	
NASA [ IOA [	2 /1R 2 /1R	] [	P ] P ]	[ P	] [	P ] P ]	[ X ] * [ X ]	
COMPARE [	/	] [	]	[	] [	]	[ ]	
RECOMMENDAT	rions:	(If d	ifferen	t fro	m NASA	)		
ſ	1.	] [	]	[	] [		[ (ADD/DELETE)	
* CIL RETER	NTION F	RATIONALI	E: (If a	appli	.cable)	ADEQUATI		
DEWA DVC -					I	NADEQUATI		
REMARKS: IOA DID NOT (SIMULTANEO NO DIFFEREN	OUS REG							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-20013 03-3-1004			NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 20013 HELIUM PE	RESSURE	REGULATO	R ASSEMBLY	
LEAD ANALYST:	C.D. PRUS	ST			
ASSESSMENT:					
CRITICAL: FLIGH HDW/FU	Т	REDUNDAN A	NCY SCREE	ens C	CIL ITEM
·			_		r <b>v</b> 1 •
NASA [ 3 /2R IOA [ 3 /2R	] [1	P ]	[ F ] [ F ]	[ P ]	[ X ] * [ X ]
COMPARE [ /	] [	]	[ ]	[ ]	[ ]
RECOMMENDATIONS:	(If di	fferent	from NAS	BA)	
[ /	] [	]	( )	[ ] (A	[ ] DD/DELETE
* CIL RETENTION :	RATIONALE	: (If a	pplicable	ADEQUATE	[ ]

NO DIFFERENCES.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-2001	4X	NASA DATA: BASELINE NEW										
MDAC TD:	OMS 20014 VALVE -	PROPELLANT TANK IS	SOLATION	•									
LEAD ANALYST:	C.D. PRU	ST											
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CI FLIGHT IT													
		A B	<b>c</b>	1101									
NASA [ / IOA [ 3 /1R	] [	] [ ] [ P ] [ NA] [		[ ] *									
COMPARE [ N /N	] [	и ] [и] [	N ]	[ ]									
RECOMMENDATIONS:	(If di	fferent from NASA	)										
[ 3 /1R	] [	P ] [NA] [	P ] (AD	[ DD/DELETE)									
* CIL RETENTION	RATIONALE	: (If applicable)	ADEQUATE NADEQUATE	[ ]									
CLOSED). IOA RE THIS FAILURE MOD OVERPRESSURIZATI PREVIOUS FAILURE	COMMENDS E. FAILU ON AND RU IS REQUI LISTED AS	FAILURE MODE (REITHAT A 3/1R PNP FIRE OF PARALLEL DEVELOE OF DOWNSTREARED BEFORE THE VAILA CAUSE ON PROP 1 ON RCS FMEAS.	MEA BE GENE VICES COULD AM PROP LIN LVES WILL B	RATED FOR RESULT IN ES. A E CLOSED.									

ASSESSMENT DAT ASSESSMENT ID: NASA FMEA #:	E: 1/01/88 OMS-200 NONE	15X		NASA DATA: BASELINE NEW		]
SUBSYSTEM: MDAC ID: ITEM:	OMS 20015 VALVE -	CROSSFE	ED			
LEAD ANALYST:	C.D. PR	UST				
ASSESSMENT:						
CRITIC FLI	CIL					
HDW/	FUNC	A	В	С		-
NASA [ / IOA [ 3 /	] [ 1R ] [	p ]	[ ] [AN]	[ P ]	[	] * ]
COMPARE [ N /	N ] [	N ]	[ N ]	[ N ]	[	]
RECOMMENDATION	s: (If d	ifferent	from NAS	A)		
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* CIL RETENTIO	N RATIONAL	E: (If a		) ADEQUATE INADEQUATE	[	]
REMARKS: NASA/RI DO NOT CLOSED). IOA THIS ITEM AND COULD RESULT I LINES. FAILURE IS LIS 3-2102-1), ANI	RECOMMENDS FAILURE MO N OVERPRES TED AS A C	THAT A DE. FAI SURIZATI AUSE ON	E MODE (R 3/1R PNP LURE OF A ON AND RU	ELIEF DEVIC FMEA BE GEN LL REDUNDAN PTURE OF CR	E FAI ERATI I DEV OSSFI	ILS ED FOR VICES EED

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LEAD AN	ALYS	T	:	W.	<b>A.</b> F	ΙΑŪ	JFI	LER											
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REMARKS		ICI	ES.			· .		=						÷					

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SUBSYSTI MDAC ID: ITEM:			OM 38 CO	5	LLE	ER,	REMO	TE	РО	WER						
LEAD AND	ALYS	T:	W.	А. Н	AUF	LEI	2									
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		TICA FLIC IDW/E		,	F		JNDAN	CY B	sc	REENS		CIL ITEM	ſ			
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	ASSESSME	ENT:	;																	
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	* CIL RI	:			RAT	'ION	AL	E:	(I:	f ag	ppl	ica		Al NA	DEQI DEQI	JATE JATE	]		]	

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SUBSYSTE MDAC ID:			OMS 389 CONTE	OLLE	R, F	REMOTE	POWI	ER			-	
LEAD ANA	LYST	!:	W.A.	HAUF	LER							
ASSESSME	NT:											
		'ICAL 'LIGH'	ITY T	R	EDUN	NDANCY	SCRI	EENS		CII ITE		
	HD	W/FU	NC	A	•	В		C	2			
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RECOMMEN	DATI	ons:	(II	dif	fere	ent fro	om NZ	ASA)				
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* CIL RE		ION	RATION	IALE:	(II	f appl:	icab]	P	ADEQUATI ADEQUATI	•	]	
NO DIFFE		ES.										

ASSESSME ASSESSME NASA FME	NT II			90	76-1	L	NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTE MDAC ID:			OMS 390 CONTR	OLLI	ER,	REMOTE	POW		oru			
LEAD ANA	LYST	:	W.A.	HAUI	LEF	₹						
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM												
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NASA IOA	[ 3 [ 3	/1R /1R	]	[ ]	? ] ? ]	[ P	]	[ P [ P	]	[	] * ]	
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RECOMMEN	DATI	ONS:	(If	di	fer	ent fr	om N	IASA)				
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* CIL RE REMARKS:			RATION	ALE:	(1	f appl	icab	AI	DEQUATE DEQUATE		]	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 391 CONTROLLER, REMOTE	POWER	
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:			
CRITICAL FLIGH	T		CIL ITEM
HDW/FU	NC A B	C	
NASA [ 3 /1R IOA [ 3 /1R	[ P ] [ P ]	[ P ] [ P ]	[ ] *
COMPARE [ /	] [ ] [	] [ ]	[ ]
RECOMMENDATIONS:	(If different fr	om NASA)	
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* CIL RETENTION  REMARKS: NO DIFFERENCES.	RATIONALE: (If appl	icable) ADEQUATE INADEQUATE	

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-392 NASA FMEA #: 05-6L-2176-1													A DAT SELIN NE		x	]	
SUBSYSTEM: OMS MDAC ID: 392 ITEM: CONTROLLER,  LEAD ANALYST: W.A. HAUFLER								REM(	OTE	POW	ÆR						
LEAD AN	ALYS	ST	:	W.A.	HAU	JF1	LER										
ASSESSMI	ENT:	:												-			
	CR		ICAL: LIGH			RI	EDUN	IADI	NCY	SCF	REENS	3		C	IL TEN	4	
	I	HDV	/FU	NC		A			В			C					
NASA IOA	[	3 3	/1R /1R	]	[	P P	]		[ P	]	[ [	P ] P ]		[		]	*
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REMARKS	-	NCI	ES.									<b></b>			-	•	

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	OMS-393	76-2		NASA DATA: BASELINE [ ] NEW [ X ]						
SUBSYSTEM: MDAC ID: ITEM:	OMS 393 CONTROLL	OTE POWE	R							
LEAD ANALYST:	W.A. HAU	FLER								
ASSESSMENT:										
CRITICA: FLIG		REDUNDA	NCY SCRE	ENS	CIL ITEN	1				
HDW/F		A	В	С						
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COMPARE [ /	] [	]	[ ]	[ ]	[	]				
RECOMMENDATIONS	: (If di	fferent	from NA	SA)						
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* CIL RETENTION REMARKS:	RATIONALE	: (If a	applicabl	e) ADEQUATE INADEQUATE	[	]				
NO DIFFERENCES.										

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SUBSYST MDAC ID ITEM:			OMS 394 CONTRO	OLLEI	R, REM	оте	POWE	R				
LEAD AN	'ALYS'	r:	W.A. H	IAUF	LER							
ASSESSM	ENT:											
		rical: FLIGHT	CTY r	RI	EDUNDA	NCY	SCRE	ens		CIL	r	
		DW/FUI		A	¥±	В		C				
NASA IOA	[	3 /1R 3 /1R	]	[ P [ P	]	[ P	]	[ P	]	[	] *	
COMPARE	C	/	]	[	]	[	]	[	]	[	]	
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REMARKS NO DIFF		CES.									•	

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SUBSYSTEM: MDAC ID: ITEM:	OMS 395 CONTRO	OLLER, RE	MOTE POWI	ER					
LEAD ANALYST:	W.A. H	HAUFLER							
ASSESSMENT:									
	CALITY IGHT	REDUND	ANCY SCRI	EENS	CIL ITEM				
HDW,	/FUNC	A	В	С					
NASA [ 3 ,	/1R ] /1R ]	[ P ] [ P ]	[ P ] [ P ]	[ P ] [ P ]	[ ] *				
COMPARE [	/ ]	[ ]	[ ]	[ ]	[ ]				
RECOMMENDATIO	NS: (If	differen	t from N	ASA)					
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***	SUBSYSTEM: OMS MDAC ID: 396 ITEM: CONTROLLER, REMOTE POWER LEAD ANALYST: W.A. HAUFLER										
LEAD ANA	LYST	:	W.A. I	HAUF	LER					-	
ASSESSMEN	T:										÷
C		'ICAL'	ITY	R	EDUND	ANCY	SCRE	ENS		CII	
	_	W/FU		A		В			<b>c</b>	***	
NASA IOA	[ 3	/1R /1R	]	[ P	]	[ P	]	[	P ] P ]	[	] * ]
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REMARKS:	RENC	ES.	-								

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SUBSYSTE MDAC ID:			OMS 397 CONTR	OLLE	R, R	EMOTE	POWE	R"				
LEAD ANA	LYSI	<b>:</b> :	W.A.	HAUF:	LER							
ASSESSME	ENT:											
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		W/FU		A		В			C		13.5	
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COMPARE	[	/	]	[	]	[	]	[	]	[	]	
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SUBSYSTEM MDAC ID:	EMOTE	POWE	R"										
LEAD ANAI	LYSI	r:	W.A. 1	HAUF	LER	•							
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REMARKS:	) ENC	rec						TIM	DEGORT.	Ľ	L	1	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-399			NASA DATA BASELINE NEW								
SUBSYSTEM: MDAC ID: ITEM:	OMS 399 CONTROL	LER, REMO	OTE POWER"									
LEAD ANALYST:	W.A. HA	UFLER										
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C												
NASA [ 3 /1R IOA [ 3 /1R	[ x ] *											
COMPARE [ /	] [	] [	[ N ] [	]	[ N ]							
RECOMMENDATIONS:	(If d	ifferent	from NASA	7)								
[ 3 /1R	] [	P ]	[ <b>F</b> ] [		[ A ] DD/DELETE)							
* CIL RETENTION	RATIONAL	E: (If ap	-	ADEQUATE								
REMARKS: IOA RECOMMENDS F DETECTABLE UNTIL BUT THIS CAUSES ABOUT THE FAILUR OPEN, TO AVOID S DETECTED BUT DET	THE ASS VALVE TO E, THEY TICKING	OCIATED S BE STUCK MIGHT NOT THE VALVE	EEN. THIS SWITCH IS K OPEN. I T HAVE THE	FAILURE I PUT IN OPE	S NOT N POSITION, HAD KNOWN ITCH INTO							

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-400 NASA FMEA #: 05-6L-2251-1													DAT ELIN NE	E	[	x	]			
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LEAD AN	ALY	ST	:	W.A	۱. F	ΙΑΙ	JF	LER												
ASSESSMI	ENT	:																		
	CR		ICAL				RI	EDUI	NDA	NCY	sci	REEN	s				CI			
	1		LIGH' W/FU				A			E	3		С		<u>-</u>		T.T	'EM		
NASA IOA	[	3 3	/1R /1R	]		[	P P	]		( F	) ]	[	P P	]			[ [		]	*
COMPARE	[		/	]		[		]		[	]	[		]			[		]	
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	[		/	]		[		].			]	[		]	(	ΑD	[ D/	DE	] LE	TE)
* CIL RI	:			RATI	ONA	LI	E:	(11	f aj	ppl	ical	-			UATE UATE		[		]	
NO DIFFE	LKE	NC.	25.																	

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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-401 05-6L-2251	1-2	*	ASA DATA: BASELINE NEW	[	]
SUBSYSTEM: MDAC ID: ITEM:	OMS 401 DIODE					
LEAD ANALYST:	W.A. HAUF	LER				
ASSESSMENT:						
CRITICAL FLIGH		EDUNDANCY	SCREENS		CIL	=
HDW/FU		В	С			
NASA [ 3 /1R IOA [ 3 /1R		] [ F ] [ P	] [ P ] [ P	]	[ X	* [
COMPARE [ /	] [ N	] [ N	] [	]	[ N	]
RECOMMENDATIONS:	(If dif:	ferent fr	om NASA)			
	] [	] [	] [	] (A)	[ DD/D	] ELETE
* CIL RETENTION REMARKS: IOA AGREES WITH			A	DEQUATE DEQUATE	[	]

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SUBSYSTE MDAC ID:				OMS 402 DIO	D <b>E</b>	-												
LEAD ANA	LY:	ST	:	W.A	. HA	UF:	LER											
ASSESSME	NT	:																
	CR:			ITY		R	EDU	NDA	йС	<i>t</i> :	SCRI	EENS	3			CII		
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SUBSYSTI MDAC ID: ITEM:			OMS 403 DIODE					•									
LEAD AN	ALYST	?:	W.A.	HA	U <b>F</b> I	LER											
ASSESSMI	ENT:																
		ICAL			RI	EDUNI	)AAC	CY	SCR	EENS	3			CI I'I	L CEM	•	
		W/FU			A			В			С						
NASA IOA		/1R /1R	]	[	F P	]	[	F P	]	[	P P	]		[	X	]	*
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IOA AGREES WITH THIS NASA FMEA.

ASSESSME ASSESSME NASA FME	ENT	II		O	'01/ IS-4 5-6L	04	25:	1-1							DAT ELIN NE	$\mathbf{E}$	[ 3	, ] , ]	
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	CR	_	ICAL LIGH		ľ		R	EDUI	NDA	NCY	SCF	REEN	S				CII		
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-409 05-6L-225	51-2		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 409 DIODE				
LEAD ANALYST:	W.A. HAUI	FLER			
ASSESSMENT:					
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SUBSYSTE MDAC ID:		OMS 411 DIODE				
LEAD ANA	LYST:	W.A. HAU	JFLER			
ASSESSME	NT:					
	CRITICAL FLIGH HDW/FU	T	REDUNI	DANCY SCREI	ens C	CIL ITEM
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IOA AGREES WITH THIS NASA FMEA.

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LEAD ANALYS	ST:	W.A. H	AUFI	ER								
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LEAD ANALYST:	W.A. HA	UFLER			
ASSESSMENT:					
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SUBSYSTEM: MDAC ID: ITEM:	OMS 417 DIODE				
LEAD ANALYST:	W.A. HAUF	LER			
ASSESSMENT:					
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LEAD ANA	LYST:		W.A. 1	HAU	FI	LER											
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SUBSYSTEM: MDAC ID: ITEM:	OMS 424 FUSE,	1 <b>A</b>				
LEAD ANALYST:	W.A. H	AUFLER				
ASSESSMENT:						
CRITIC FLI		REDUN	DANCY SC	REENS	CIL	
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RECOMMENDATION	5: (If	differe	nt from	NASA)		
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* CIL RETENTIO REMARKS: NO DIFFERENCES	e e Yeu add	LE: (If	applica	ble) ADEQUA INADEQUA		<b>)</b>

ASSESSMI	ENT DATE: ENT ID: EA #:	OMS-425			BASELIN		
SUBSYSTI MDAC ID ITEM:		OMS 425 FUSE, 1	A				
LEAD AND	ALYST:	W.A. HA	UFLER				
ASSESSM	ENT:						
	CRITICAI FLIGH		REDUNI	DANCY SCRE	EENS	CIL ITEM	
	HDW/FU		A	В	С	11111	
NASA IOA	[ 3 /1F [ 3 /1F	? ] [ ? ] [	P ] P ]	[ P ] [ P ]	[ P ] [ P ]	[ ]	*
COMPARE	[ / ,	] [	]	[ ]	[ ].	[ ]	
RECOMME	NDATIONS:	(If d	ifferer	nt from NA	ASA)		
	[ /	] [	]	[ ]	[ ]	[ ] (ADD/DEL	
REMARKS	•	RATIONAL	E: (If	applicabl	le) ADEQUATI INADEQUATI		

ASSESSME ASSESSME NASA FME	ידעי	TI	):	OMS	-426				nasa Base	DATA LINE NEW	[	]		
SUBSYSTE MDAC ID:				OMS 426 RES		1.2	2K 2W					-		
LEAD ANA	LYS	ST:	:	W.A	. HAUF	LER								
ASSESSME	NT	:												
	CR:		ICAI LIGI		R	EDUN	IDANCY	SCR	EENS			CI:		
	1				, <b>A</b>		В			C				
NASA IOA	[ [	3 3	/3 /3	]	[	]				-		[	]	*
COMPARE	[		/	]	[	]	ſ	] .	[	]		[	]	
RECOMMEN	DA'	ric	ONS:	: (	If dif	fere	ent fr	om N	ASA)					
	[		/	]	[	]	[	]	[	]	(A		j DELI	ETE )
* CIL RE				RATI	ONALE:	(Ii	f appl	icab		ADEQU ADEQU		[	]	****

ASSESSMI	ENT ID: EA #:	OMS-4	27			r	BASELINI NEV		· ]	
SUBSYSTEMDAC ID:		OMS 427 RESIS	TOR,	1.2	K 2W					
LEAD ANA	ALYST:	W.A.	HAUF	LER						
ASSESSMI	ENT:									
	CRITICAL FLIGH		R	EDUN	DANCY	SCR	EENS		CII	
	HDW/FU		A		В		c	2	111	311
NASA IOA	[ 3 /3 [ 3 /3	]	[	]	[	]	[	]	[	] *
COMPARE	[ /	]	[	]	[	]	[	]	[	]
RECOMMEN	NDATIONS:	(If	dif	fere	nt fr	om N	ASA)			
	[ /	1	[	]	[	]	[	] (2		] DELETE
REMARKS:		RATION	ALE:	(If	appl	icab	7	ADEQUATE ADEQUATE		]
NO DIFFI	ERENCES.									

ASSESSMEN' ASSESSMEN' NASA FMEA	T II			28	5-1				NASA DA' BASELII N	NE	[ [ x	]	
SUBSYSTEM MDAC ID: ITEM:	:		OMS 428 RESIS	ror,	5.1F	<b>1/4</b>	W				2 <sup>2</sup>		
LEAD ANAL	YST	:	W.A. 1	HAUFI	LER								
ASSESSMEN	T:												
CRITICALITY REDUNDANCY SCREENS CIL ITEM													
		W/FU		A		В	7 <del>.</del> .		<b>C</b>	:		1	
NASA IOA	[ 3 [ 3	/3 /3	]	[	]	[	]	[	]		[	] * ]	
COMPARE	[	/	]	[	]	[	]	[	]		[	]	
RECOMMEND	ATI	ons:	(If	dif	ferer	nt fr	om NA	SA)					
	[	/	].	[	]	[	]	[	. 1	(AI	[ D/D	] ELET:	E)
* CIL RET REMARKS: NO DIFFER		-	RATION.	ALE:	(If	appl	icabl		ADEQUAT IADEQUAT		[	]	

ASSESSME ASSESSME NASA FME	NT II	<b>):</b>		29	6-1			r	BASELII N		x ]	
SUBSYSTE MDAC ID:	M:		OMS 429 RESIS	TOR,	5.1	K 1/41	N .					
LEAD ANA	LYST	:	W.A.	HAUF	LER							
ASSESSME	NT:											
	CRIT	ICAL LIGH		R	EDUN	DANCY	SCRI	EENS		CI	L EM	
				A		В		(	3		LM	
NASA IOA	[ 3 [ 3	HDW/FUNC [ 3 /3 ] [ 3 /3 ]			]	[	]	[ [	]	[ [	]	*
COMPARE	[	/	1	[	]	[	]	[	]	[	]	
RECOMMEN	DATI	ons:	(If	dif	fere	nt fr	om Ni	ASA)				
	[	/	]	[	]		]	[	]	[ (ADD/	) DELE	ETE)
* CIL RE	TENT:	ION	RATION	ALE:	(If	appl	icab:	1	ADEQUAT ADEQUAT	_	]	
REMARKS:		ES.			•							

ASSESSMENT ASSESSMENT NASA FMEA	ID:	1/01/8 0MS-43 05-6L-	0	5-1				ASA DA BASELI N	NE		]	
SUBSYSTEM: MDAC ID: ITEM:		OMS 430 RESIST	OR,	5.1K	1/4	W						
LEAD ANALY	ST:	W.A. H	AUFI	LER								
ASSESSMENT	:											
CR	ITICAL		RI	EDUND	ANCY	SCRE	ENS			CIL		
. 1	HDW/FUI		A	ž.	В		C	** \$ ± 1		ITE	M	
NASA [ IOA [	3 /3 3 /3	]	) [	]	[	]	[	]		[	] *	<b>k</b>
COMPARE [	/	1	[	]	[	]	[	]		[	]	
RECOMMENDA!	rions:	(If	difí	erent	t fr	om NAS	SA)					
[	/	]	[	]	[	]	[	J		[ D/D	-	ľE)
* CIL RETER		RATIONA	LE:	(If a	appl:	icable	Al	DEQUAT DEQUAT	E E	[	]	

ASSESSME ASSESSME NASA FME	ID:	oms-			Г	BASEL		[	x ]				
SUBSYSTE MDAC ID: ITEM:			OMS 431 RESI	STOR,	5.1	.K 1/41	ñ						
LEAD ANA	LYS	T:	W.A.	HAUF	LER								
ASSESSME	NT:												
		TICAL FLIGH		R	EDUN	IDANCY	SCR	EENS			CI	L EM	
		DW/FU		A		В		(	2		11	ЦП	
NASA IOA	[	3 /3 3 /3	]	]	]	[	]	[	]		[	]	*
COMPARE	[	/	]	[	]	[	]	[	]		[	]	
RECOMMEN	DAT	IONS:	(I	f dif	fere	ent fr	om N	ASA)					
	[	/	1.	ľ	]	[	]	C	]	(A	[ DD/	DEL.	ETE)
* CIL RE		TION	RATIO	NALE:	(Ii	appl	icab	1	ADEQUA ADEQUA		[	]	
REMARKS:		CES.											

ASSESSME ASSESSME NASA FME	NT	ID:	OMS-				Ņ	IASA DA BASEL] N	NE		-		
SUBSYSTE MDAC ID:			OMS 432 RESI	STOR,	1.2	K 2W		-					
LEAD ANA	LYS	T:	W.A.	HAUF	LER								
ASSESSME	ENT:												
		TICAL		R	EDUN	IDANCY	SCR	EENS			CII		
		FLIGH DW/FU		A		В		C	;		111	21/1	
NASA IOA	[	3 /3 3 /3	]	[	]	] [	]	[	]		[	] * ]	
COMPARE	[	/	]	[	]	[	)	[	]		[	]	
RECOMMEN	IDAT	'IONS:	(I	f dif:	fere	ent fr	om N	ASA)					
	1	/	]	[	]	[	]	[	]	(Al		] DELET	'E)
* CIL RE		TION	RATIO	NALE:	(If	appl	icab	P	DEQUAT		[	]	
NO DIFFE		CES.										- 200	

ASSESSMI NASA FMI	ENT	II	):	OMS-	433				BASE	LINE	[	x ]		
SUBSYST				OMS 433 RESI	STOR,	1.2	2K 2W					٠		
LEAD AN	ALYS	ST:	:	W.A.	HAUF	LER								
ASSESSM	ENT:	:												
	CR		[CAI LIGH	LITY	RI	EDUI	NDANC'	Y SCR	EENS			CI	L EM	
	1				A		1	В	(	C				
NASA IOA	]	HDW/FUNC [ 3 /3 ] [ 3 /3 ]			[ [	]	[	]	] [	]		[ [	]	*
COMPARE	[		/	1	ſ	]	[	]	[	]		[	]	
RECOMME	NDA'	ric	ONS:	: (1	f dif:	fere	ent f	rom N	IASA)					
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* CIL R		T	ION	RATIO	ONALE:	(I	f app	licab	1	ADEQU ADEQU		[	]	
REMARKS NO DIFF	-	NCI	ES.											

REPORT DATE 2/26/88

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ASSESSME ASSESSME NASA FME	ENT	II	D:	OMS	-434	5-1					DATA LINE NEW	[		
SUBSYSTE MDAC ID:				OMS 434 RES		5.1	.K 1/4	W		٠				
LEAD ANA	ALYS	T	:	W.A	. HAUFI	ER								
ASSESSME	ENT:	:											•	
	CRI		ICAL LIGH		RE	EDUN	IDANCY	SCR	EENS			CI	L EM	
	F			NC	A		В	ı	C	1 1		11	LM	
NASA IOA	]	3	/3 /3	]	[	]	[	]	[	]		[	]	*
COMPARE	[		/	]	C	]	[	)	[	]		[	]	•
RECOMMEN	radv	CIC	ONS:	(	If diff	ere	ent fr	om N	(ASA)					
	ָנ		/	]	[	]	[	1	[	]	(A	[ DD/	DEL	ETE)
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ASSESSMENT ASSESSMENT NASA FMEA	ID:	1/01/8 OMS-43 05-6L-	5	5-1				ASA DAT BASELIN NE			]
SUBSYSTEM: MDAC ID: ITEM:		OMS 435 RESIST	or,	5.1K	1/4	₹					
LEAD ANALY	ST:	W.A. H	AUFI	LER					-		
ASSESSMENT	:										
CR	ITICAL FLIGH	ITY	RI	EDUND	ANCY	SCRE	ens			IL TEN	vr
1	HDW/FU		A		В		С		_		•
NASA [ IOA [	3 /3 3 /3	]	[	]	[	]	[	]	]		]. *
COMPARE [	/	]	[	]	[	]	[	]	[		]
RECOMMENDA'	TIONS:	(If	difi	feren	t fro	om NAS	SA)				
[	/	]	[	]	[	]	ָּר (	1. (	ADI	)/DI	] ELETE
* CIL RETERMARKS:		RATIONA	LE:	(If a	appl:	icable	Al	DEQUATE DEQUATE			]

ASSESS ASSESS NASA F	MEN'	T I	D:		36	5-1			N	ASA DATA BASELINE NEW		]
SUBSYS MDAC I ITEM:		:		OMS 436 RESIST	ror,	5.1K	1/40	<b>J</b>				
LEAD A	NAL	YST	:	W.A.	HAUFI	LER						
ASSESS	MEN'	T:										
	C		ICAL	ITY	RI	EDUNDA	NCA	SCREI	ens		CIL	
			W/FU		A		В		C		LIEP	1
NAS.	A A	[ 3	/3 /3	]	[	]	[	]	] [	]	[	] *
COMPAR	E	[	/	]	[	]	[	]	[	]	[	]
RECOMM	END	ATIC	ONS:	(If	diff	erent	fro	om NAS	SA)			
		[	/	]	[	]	[ .	]	[		[ DD/DE	] ELETE)
* CIL	RET!	ENT	ION 1	RATIONA	ALE:	(If a	ippli	icable	A	DEQUATE DEQUATE	_	]
REMARK NO DIF		ENCI	ES.	-								

ASSESSMI ASSESSMI NASA FMI	ENT I	D:				N	IASA I BASEI		[	x ]			
SUBSYSTI MDAC ID: ITEM:			OMS 437 RESI	ISTOR,	5.1	K 1/41	N						
LEAD ANA	LYST	<b>!:</b>	W.A	. HAUFI	LER								
ASSESSMI	ENT:												
		ICAI	ITY	RI	EDUN	DANCY	SCR	EENS			CI	L EM	
	_	W/FU		A		В		C	3		11	Eri	
NASA IOA	[ 3 [ 3	/3	]	[	]	[ [	]	[	]		]	]	*
COMPARE	[	/	]	[	]	[ .	]	[	]		[	]	
RECOMME	ITADI	ONS:	(	If dif	fere	nt fr	om N	ASA)					
	[	/	]	Ţ	3	ָנ	]	[	]	(A	[ DD/	DELI	ETE
* CIL RI	:		RATI(	ONALE:	(If	appl	icab	1	ADEQU <i>I</i> ADEQU <i>I</i>		[	]	

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	OMS-438	NASA DATA BASELINE NEW								
SUBSYSTEM: MDAC ID: ITEM: A	OMS 438 SWITCH TOGGLE,	LT/RT OMS HE PRESS V	APOR ISOL VLV							
LEAD ANALYST:	W.A. HAUFLER									
ASSESSMENT:										
CRITICA: FLIG	LITY REDUNDA	ANCY SCREENS	CIL ITEM							
	INC A	ВС								
NASA [ / IOA [ 3 /1	[ ] [ P ]	[ ] [ ] [ P ]	[ ] *							
COMPARE [ N /N	] [ N ]	[ N ] [ N ]	[ ]							
RECOMMENDATIONS	(If different	t from NASA)								
[ 3 /1	R] [P]	[ P ] [ P ] (A	[ ] .DD/DELETE)							
* CIL RETENTION	RATIONALE: (If a	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.										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-439	-2	NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM: A	OMS 439 SWITCH TOGO	GLE, LT/RT OMS	HE PRESS V	APOR ISOL VLV						
LEAD ANALYST:	W.A. HAUFLI	ER								
ASSESSMENT:										
CRITICAL FLIGH HDW/FU	T	DUNDANCY SCREE B	e <b>ns</b> C	CIL ITEM						
NASA [ 2 /1R IOA [ 2 /1R	[ P ]	] . [ P ]	[ P ] [ P ]	[ X ] *						
COMPARE [ /	] [	] [ ]	[ ]	[ ]						
RECOMMENDATIONS:	(If diffe	erent from NAS	SA)							
[ /	] [	] [ ]	[ ] (A	[ ] DD/DELETE)						
* CIL RETENTION REMARKS:			a) ADEQUATE INADEQUATE							
IOA AGREES WITH	THIS NASA F	MEA.								

ASSESSMENT ASSESSMENT NASA FMEA	NASA DATA: BASELINE [ ] NEW [ X ]										
SUBSYSTEM: MDAC ID: ITEM: A		OMS 440 SWITCH	TOG	GLE,	LT/R	RT OMS	з не	PRESS	VAPO	OR I	SOL VL
LEAD ANALY	ST:	W.A. H	AUFI	ER							
ASSESSMENT	<b>:</b> :										
CF	RITICALI FLIGHT HDW/FUN	?	RE A	DUNDA	NCY B	SCREE	e <b>ns</b> C		C]	L EM	·
NASA [	3 /1R 2 /1R	] .	[ P	]				]	[	x ]	*
COMPARE [	N /	]	[	]	[	1	[	]	[	N ]	
RECOMMENDA	ATIONS:	(If	diff	erent	fro	m NAS	SA)				
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* CIL RETERMARKS:				•	ppli	.cable	AL	EQUATI EQUATI		]	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	•	NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM: B	OMS 441 SWITCH TOGGLE,	LT/RT OMS HE	PRESS VAPOR ISOL VLV						
LEAD ANALYST: W.A. HAUFLER									
ASSESSMENT:									
CRITICAL FLIGH HDW/FU		B C	CIL ITEM						
NASA [ 2 /1R IOA [ 2 /1R	[ P ]	[ P ] [ P [ P	[ X ] * [ X ]						
COMPARE [ /	] [ ]	[ ] [	] [ ]						
RECOMMENDATIONS:	(If differen	nt from NASA)							
[ /	] [ ]	[ ] [	] [ ] (ADD/DELETE)						
* CIL RETENTION  REMARKS: IOA AGREES WITH	·	AD	DEQUATE [ ] DEQUATE [ ]						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-442	NASA DATA BASELINE NEW	: [ ] [ ]								
SUBSYSTEM: MDAC ID: ITEM: B	OMS 442 SWITCH TOGGLE, I	LT/RT OMS HE PRESS V	APOR ISOL VLV								
LEAD ANALYST:	W.A. HAUFLER										
ASSESSMENT:											
FLICH	ITY REDUNDAN T NC A	NCY SCREENS B C	CIL ITEM								
	] [ <u>]</u> ]	[ ] [ ] [ P ] [ P ]	[ ] *								
COMPARE [ N /N	] [N]	[и] [и]	[ ]								
RECOMMENDATIONS:	(If different	from NASA)	•								
[ 3 /1R	] [P]	[P] [P] (A	[ ] .DD/DELETE)								
	RATIONALE: (If ap	oplicable) 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.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-443 05-6L-2026-1	NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM: B	OMS 443 SWITCH TOGGLE,	LT/RT OMS HE	PRESS VA	APOR ISOL VLV					
LEAD ANALYST:	W.A. HAUFLER								
ASSESSMENT:									
CRITICAL FLIGH	r	ANCY SCREENS		CIL ITEM					
HDW/FU	NC A	в с							
NASA [ 3 /1R IOA [ 2 /1R	] [ P ] ] [ P ]	[ P ] [ P	]	[ X ] *					
COMPARE [ N /	] [ ]	[ ]	]	[ N ]					
RECOMMENDATIONS:	(If differen	t from NASA)							
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* CIL RETENTION	RATIONALE: (If	A	DEQUATE DEQUATE	[ ]					

REMARKS: IOA AGREES WITH THIS NASA FMEA.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	SESSMENT DATE: 1/01/88 SESSMENT ID: OMS-444 SA FMEA #: 05-6L-2153-1									
SUBSYSTEM:	OMS 444 METER, OMS PRESSURE	N2/HE TANK								
LEAD ANALYST: W.A. HAUFLER										
ASSESSMENT:										
CRITICAL: FLIGHT	CREENS CIL ITEM									
HDW/FUI		C								
NASA [ 3 /3 IOA [ 3 /2R	] [ p ] [ p ]	[ ] [ ] * [ P ] [ ]								
COMPARE [ /N	] [и] [й]	[ 1] [ 1]								
RECOMMENDATIONS:	(If different from	NASA)								
[ 3 /2R	] [P] [P]	[P] [] (ADD/DELETE)								
* CIL RETENTION	RATIONALE: (If application									
Name of the state	÷ .	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.										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:									
SUBSYSTEM: MDAC ID:	OMS 445	ESSURE, HE TANK	NO.1						
LEAD ANALYST:									
ASSESSMENT:									
CRITICAL FLIGH		EDUNDANCY SCREE	NS	CIL ITEM					
	NC A	В	C	11211					
NASA [ 3 /3 IOA [ 3 /2R	] [ ] [ P	] [ ] ] [ P ]	[ ] [ P ]	[ ] *					
COMPARE [ /N	) [ N	] [ N ]	[и]	[ ]					
RECOMMENDATIONS:	(If diff	ferent from NAS	A)	٠					
[ 3 /2R	] [ P	[ P ]	[ P ] (AI	[ ] DD/DELETE)					
* CIL RETENTION	RATIONALE:			r 1					
	tenal ledgen		ADEQUATE INADEQUATE						
REMARKS: LOSS OF ALL REDU TANK DURING ASCE NOT BE ENOUGH TI SEE FLIGHT RULE	NT REQUIRIN ME TO VERIF	NG AN ATO BE CA	LLED, SINCE	THE HELIUM THERE MAY					

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-446 NASA FMEA #: 03-3-186							01-	-1								ASA DATA BASELINE NEW		]	
SUBSYSTE MDAC ID: ITEM:	M:			OMS 446 SENSOR PRESSURE, HE TANK NO.2									-						
LEAD ANALYST: W.A. HAUFLER																			
ASSESSMENT:																			
CRITICALITY REDUNDANCY SCREENS FLIGHT									CIL										
	I		V/FUI				A					В			С		110	•	
NASA IOA	[	3 3	/3 /2R	]		]	P	]			[	P	]	[	P	]	[	]	*
COMPARE	[		/N	]		[	N	]			[	N	]	[	N	]	[	]	
RECOMMEN	IDA?	ric	ons:		(If	d:	ifi	feı	cer	nt	1	rc?	om NA	ASA)	)	•			
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* CIL RE	TEI	NT)	ON 1	RAT	ION	\LI	Ξ:	()	Ιf	a	ÞĘ	1	cabl	·	IA I <b>A</b> V	DEQUATE DEQUATE	[	]	
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.																			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-447 03-3-18	8 NASA DATA: 7 BASELINE [ ] 802-1 NEW [ X ]									
MDAC ID:	OMS 447 SENSOR										
LEAD ANALYST: W.A. HAUFLER											
ASSESSMENT:											
CRITICAL FLIGH		REDUNDA	NCY SCRE	ENS	CIL ITEM						
HDW/FU		A	В	С	111511						
NASA [ 3 /3 IOA [ 3 /2R	] [	p ]	[ ] [ P ]	[ P ]	*						
COMPARE [ /N	] [	N ]	[ N ]	[ N ]	[ ]						
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)							
[ 3 /2R	ן נ	Pj	[ P ]	[ P ] (A	[ DD/DELETE)						
* CIL RETENTION	RATIONAL	E: (If a	pplicabl		r 1						
			•	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.											

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-448 NASA FMEA #: 03-3-1802-									_ N		DATA LINE NEW	[	) x ]	
SUBSYSTI MDAC ID: ITEM:					}	EMP,	OX/HE	TES	T POF	RT FI	TTIN	G T	EMP	1, &
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LEAD ANALYST:	W.A. HAUFLER													
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IOA'S RECOMMENDED CRITICALITY OF 3/IR 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.

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FAILED DIODE IS NOT DETECTABLE INFLIGHT.

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SUBSYSTE MDAC ID:			OMS 450 DIODE														
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SUBSYSTEM: MDAC ID: ITEM:	OMS 450 DIODE		
LEAD ANALYST:	W.A. HAUFLER	Ł	
ASSESSMENT:			
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* CIL RETENTION REMARKS:	RATIONALE: (I	f applicable) ADEQUATE INADEQUATE	[ ]
IOA RECOMMENDS CRITICALITY THU UNRELATED FAILU INTERPRETATION COULD CAUSE CON THE SIGNAL THRO WHEN THE VALVES SCENARIO WITH A IRRELEVANT. A I COMPONENTS AND WHEN THE VALVE FAILURE DOES NO FAILURE. FURTH POWER BY AN ELE MOTOR AT NO MOR MOTOR AND ACTUA	S REDUCED, SIN RE" WHICH IS E OF NSTS 22206. TINUOUS POWER UGH THIS ITEM REACH FULL CINOTHER FAILURE ELLOWS RUPTURE VALVE MOTOR TO CONTIT SIGNIFICANTI ERMORE, THE VACTRICAL THERM E THAN 352 F, TION MECHANISM APPLICATION."	FAILURE SHOULD NOT BE CONSTITUTES A "MEYOND THE SCOPE OF ICAL NASA IS RIGHT THAT I ON THE ASSOCIATED VALVE WOULD INHIBIT CLOSING LOSED OR OPEN. HOWEVER CONSISTING OF BELLOWS ANYTIME EXPOSING ELECTROPHICAL OF THE BELLOWS INDUSTY ON AND HOT. IT IS SERIOUS INDUSTY ON AND HOT. IT IS SERIOUS INDUSTY ON AND HOT. IT IS SERIOUS INDUSTY ON AND HOT. IT IS SERIOUS INDUSTY ON AND HOT. IT IS SERIOUS INDUSTY ON AND HOT. IT IS SERIOUS INDUSTY ON AND HOT. IT IS SERIOUS INDUSTY OF THE BELLOWS ARE PROTECTED FROM AND, ACCORDING TO THE IS SHALL NOT FAIL AS A RESE AC MOTOR VALVE SERIOUS.	ULTIPLE  'S  HIS FAILURE E(S), SINCE OR OPENING NASA'S RUPTURE IS TRICAL NOT JUST HAT IS, THIS LLOWS RUPTURE M CONTINUOUS N THE VALVE SPECS, "THE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 OMS-450F 05-6L-225	66-1	NASA D BASEL	
MDAC ID:	OMS 450 DIODE			
LEAD ANALYST:	W.A. HAUF	LER		
ASSESSMENT:				
CRITICAL FLIGH		REDUNDANCY	SCREENS	CIL ITEM
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* CIL RETENTION	RATIONALE:	(If appli	ADEOUA	TE 1
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IOA RECOMMENDS T CRITICALITY THUS UNRELATED FAILUR INTERPRETATION O COULD CAUSE CONT	REDUCED, E" WHICH I F NSTS 222	SINCE IT OF SERVING TO SERVING THE SERVING TO SERVING THE SERVING TO SERVING THE SERVING TO SERVING THE	CONSTITUTES A THE SCOPE OF I IS RIGHT THAT	"MULTIPLE OA'S THIS FAILURE
THE SIGNAL THROU				

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.

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REPORT DATE 2/26/88

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

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

FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS

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

ASSESSMI NASA FMI	ENT	II	D:	OMS-4: 05-6L	51	53	3-2						BASELIN NE		-		]	
SUBSYSTI MDAC ID: ITEM:				OMS 451 DIODE														
LEAD ANA	ALYS	ST:	:	W.A.	HAU	FI	LER											
ASSESSMI	ENT	:												-				
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NASA IOA	]	3 2	/1R /1R	]	[	P F	]	[ [	P P	]	[	P P	]		[ :	X	] * ]	
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REMARKS		W:	ITH '	THIS N	AS?	A 1	FMEA.	•						i tyr	-			

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MDAC ID:	OMS 451 DIODE				
LEAD ANALYST:	W.A. HA	UFLER			
ASSESSMENT:					
CRITICAL FLIGH		REDUNDAN	CY SCREENS	3	CIL ITEM
	NC	A	В	С	11211
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COMPARE [ /	] [	N ] [	] [	]	[ ]
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IOA RECOMMENDS R LAST AVAILABLE N NASA CIL LIST BU TO A NON-CIL, AN	ASA CRIT T IS NOT	ICALITY, . IOA AS	THIS FMEA SUMES THA!	SHOULD BE I NASA DOWI	IN THE NEW NGRADED 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.

ASSESSMI ASSESSMI NASA FMI	ENT	II		OM	S-45	11		B-2						ASA DATA BASELINE NEW				
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FLIGHT																		
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COMPARE	[	N	/N	]		[	N	]	[	N	]	[	N	]	[	N	]	
RECOMMEN	NDA'	rI	ons:		(If	d:	if1	erer	nt	fr	om NA	\SA	)					
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REMARKS IOA AGRI	-	W	ITH '	rhi	s na	S	A I	MEA.	<b>.</b>									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-451C 05-6L-225	56B-2		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:					
LEAD ANALYST:	W.A. HAU	FLER			
ASSESSMENT:					
FLIGH	ITY I T NC I		CY SCREE	ens C	CIL ITEM
NASA [ 3 /1R IOA [ 2 /1R	[]	P ] [ F ] [	F ] P ]	[ P ] [ P ]	[ X ] * [ X ]
COMPARE [ N /	] [ ]	N ] [	N ]	[ ]	[ ]
RECOMMENDATIONS:	(If di	fferent :	from NAS	SA)	
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* CIL RETENTION	RATIONALE	: (If ap)	plicable	ADEQUATE	
REMARKS:  10A RECOMMENDS T CRITICALITY THUS UNRELATED FAILUR INTERPRETATION O COULD CAUSE CONT THE SIGNAL THROU WHEN THE VALVES	REDUCED, E" WHICH F NSTS 22 INUOUS POUGH THIS I' REACH FUL	SINCE IT IS BEYON 206. NAS WER ON TI TEM WOUL L CLOSED	I CONSTI D THE SC SA IS RI HE ASSOC D INHIBI OR OPEN	TUTES A "MUCOPE OF IOA' GHT THAT TH CIATED VALVE T CLOSING O I. HOWEVER,	ILTIPLE S IS FAILURE S(S), SINCE OR OPENING NASA'S
SCENARIO WITH AN	OTHER FAI	LURE CONS	SISTING TIME EXF	OF BELLOWS POSING ELECT	RUPTURE IS RICAL

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

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

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-452 05-6L-2253-	1	BASELINE	A DATA: SELINE [ ] NEW [ X ]							
	OMS 452 DIODE										
LEAD ANALYST:	W.A. HAUFLE	R									
ASSESSMENT:	SSESSMENT:										
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM											
HDW/FU		В	C	TTEM							
NASA [ 2 /1R IOA [ 3 /1R	] [ P ]	[ P ]   [ P ]	[ P ] [ P ]	[ X ] * [ X ]							
COMPARE [ N /	] [N]	[ ]	. 1	[ ]							
RECOMMENDATIONS:	(If diffe	rent from NASA	<b>A</b> )								
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* CIL RETENTION REMARKS: IOA AGREES WITH	- To	1	ADEQUATE (NADEQUATE								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			A-1					ASA DATA BASELINE NEW	[		]	
	OMS 452 DIODE											
LEAD ANALYST:	W.A. HA	UFL	ER									
ASSESSMENT:												
CRITICAL FLIGH	ITY	RE	DUNDA	NCY	SCRE	ENS	5		CI TT	L EM	4	
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NASA [ 2 /1R IOA [ 3 /1R	] [	P F	]	[ P	]	]	P P	]	[	X X	]	*
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REMARKS: IOA'S RECOMMENDE	D CRITIC	ALI	TY OF	3/	1R IS	DI	RI	VEN BY O	MS	H2	ARI	WAF

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.

ASSESSMENT DA ASSESSMENT II NASA FMEA #:	• •	52B		NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM:	OMS 452 DIODE										
LEAD ANALYST:	. W.A. I	HAUFLER									
ASSESSMENT:											
	CALITY LIGHT	REDUND	ANCY	SCREEN	s	CIL ITEM					
	/FUNC	A	В		C						
NASA [ 3 IOA [ 3	/1R ] /1R ]	[ P ] [ F ]	[ P [ P	] [	P ] P ]	[ X ] *					
COMPARE [	/ 1	[ N ]	[	] [	]	[ N ]					
RECOMMENDATIO	ons: (If	differen	t fro	m NASA	)						
Ţ	/ j	[ ]	(	] [	] (A)	[ ] DD/DELETE)					
* CIL RETENTI	ON RATION	ALE: (If	appli		ADEQUATE NADEQUATE						
REMARKS:	rmu mute Ni	ACA EMEA									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-452C	NASA DATA: BASELINE [ ] NEW [ X ]							
	OMS 452 DIODE								
LEAD ANALYST:	W.A. HAUFLER								
ASSESSMENT:									
CRITICAL FLIGH	ITY REDUNDAN	ICY SCREENS	CIL ITEM						
HDW/FU	NC A	ВС							
NASA [ 3 /1R IOA [ 3 /1R	[P] [F] [F]	[P] [P] [P] [P]	[						
COMPARE [ /	] [и] [	. 1 [ ]	[и]						
RECOMMENDATIONS:	(If different	from NASA)							
[ 3 /1R	[P] [		[ A ] DD/DELETE)						
* CIL RETENTION	RATIONALE: (If ag	oplicable) ADEQUATE INADEQUATE							
POSITIONS ARE NO "CLOSE" RELAYS W CLOSE BECAUSE OF	T READILY ACCESSI HICH DO NOT OPEN	EEN SINCE THE MCA ST BLE BY THE CREW. T AND "OPEN" RELAYS W ODE ARE NOT DETECTA	ATUS OF RELAY HEREFORE, HICH DO NOT						

ASSESSMEN ASSESSMEN NASA FMEA						3D-1			NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM MDAC ID: ITEM:			OMS 452 DIODE	452 DIODE												
LEAD ANAI	YST	:	W.A. :	HAI	JFI	LER										
ASSESSMENT:											_					
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM																
		W/FUI		A			В			С		1111	•			
NASA IOA	[ 3 [ 3	/2R /1R	]	[	P F	]	[	P P	]	[	P P	]	[ x	] *		
COMPARE	[	/N	]	[	N	1	נ		]	[		]	[ N	]		
RECOMMEND	ATI	ons:	(If	<b>d</b> :	ifí	ferent	= 1	fro	om N	ASA)						
	[ 3	/1R	]	[	P	]	[	P	]	[	P		[ DD/DE	] ELETE)		
* CIL RET	ENT	ION I	RATION	ΑĻ	E:	(If a	p	pl:	cab		ΑI	DEQUATE	r	]		
REMARKS:										IN	IAI	DEQUATE DEQUATE	Ì	j		
IOA'S CRITICALITY OF 3/1R IS DRIVEN BY OMS HARDWARE FME 2007-1, SINCE THIS FAILURE CAUSES TANK ISOL VALVE TO FA									FMEA FAII	03-3- L OPEN.						

ASSESSMENT DATE: 1/01/88

NASA DATA:

ASSESSME NASA FME	NT ID: A #:	OMS-452 05-6L-2	E 255-1	BASELINE [ ] NEW [ X ]							
SUBSYSTE MDAC ID:		OMS 452 DIODE									
LEAD ANA	ALYST:	W.A. HA	UFLER								
ASSESSME	ENT:										
	CRITICAL		REDUNDA	ANCY SCRE	EENS	CIL ITEM					
	FLIGH HDW/FU	NC	A	В	С	IIEM					
NASA IOA	[ 3 /1R [ 3 /1R	[ ]	P ] F ]	[ F ] [ P ]	[ P ] [ P ]	[ X ] * [ X ]					
COMPARE	[ /	] [	и ]	[ N ]	[ ]	.[ ]					
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* CIL RI		RATIONAL	E: (If	applicabl	le) ADEQUAT INADEQUAT						
CRITICAL UNRELATI INTERPRI COULD CA THE SIGN WHEN THE SCENARIO IRRELEVA COMPONED WHEN THE FAILURE FAILURE POWER BY MOTOR AL	LITY THUS ED FAILUR ETATION OF AUSE CONTO NAL THROUGH E VALVES O WITH AN ANT. A BE NTS AND V E VALVE N DOES NOT . FURTHEY Y AN ELECT I NO MORE ND ACTUAT	REDUCED RE" WHICH OF NSTS 2 TINUOUS F JICH THIS REACH FU JOTHER FA ELLOWS RU JALVE MOT MOTOR IS T SIGNIFI ERMORE, T ETRICAL T ETHAN 35 TION MECH	O, SINCE I IS BEY 22206. POWER ON ITEM WO JLL CLOS AILURE C JPTURE A FOR TO P CONTINU CANTLY THE VALV THERMAL 52 F, AN HANISM S	IT CONSTOND THE SOULD INHIBED OR OPPOSIBLE ON CONTRIBUTES ARE PROPERTY OF THE SHUTOFF TO ACCORDANCE OF THE CONTRIBUTES ARE PROPERTY OF THE CONTRIBUTES AND PROPERTY OF THE CONTRIBUTES ARE PROPERTY OF THE CONTRIBUTES AND PRO	TITUTES A "SCOPE OF IO RIGHT THAT OCIATED VALUED IN HOWEVE OF BELLOW KPOSING ELE IS SERIOU AND HOT. TE TO THE BROTECTED FROM TH	A'S THIS FAILURE VE(S), SINCE OR OPENING R, NASA'S S RUPTURE IS CTRICAL S, NOT JUST THAT IS, THIS ELLOWS RUPTURE OM CONTINUOUS IN THE VALVE SPECS, "THE					

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-452F 05-6L-2256-1	NASA DATA: BASELINE [ ] NEW [ X ]									
SUBSYSTEM: MDAC ID: ITEM:	MDAC ID: 452 ITEM: DIODE										
LEAD ANALYST:											
ASSESSMENT:											
CRITICAL FLIGH HDW/FU		CIL ITEM C									
NASA [ 2 /1R IOA [ 3 /1R	[ P ] [ F ] [ E ] [ P ] [	P ] [ X ] * P ] [ X ]									
COMPARE [ N /	] [N] [N] [	. ] [ ]									
RECOMMENDATIONS:	(If different from NASA)										
[3 /3	] [ ] [ ] [	] [ D ] (ADD/DELETE)									
* CIL RETENTION REMARKS:	RATIONALE: (If applicable)	ADEQUATE [ ] IADEQUATE [ ]									
IOA RECOMMENDS TO CRITICALITY THUS UNRELATED FAILUR INTERPRETATION OF COULD CAUSE CONTOUR THE SIGNAL THROUGHEN THE VALVES SCENARIO WITH AN IRRELEVANT. A BE COMPONENTS AND WHEN THE VALVE MEAILURE DOES NOT FAILURE. FURTHE POWER BY AN ELECTION.	HAT BELLOWS FAILURE SHOULD REDUCED, SINCE IT CONSTITUTED WHICH IS BEYOND THE SCOFF NSTS 22206. NASA IS RIGHT INCOME POWER ON THE ASSOCIATION OF THE THE WOULD INHIBIT REACH FULL CLOSED OR OPEN. OTHER FAILURE CONSISTING OF LLOWS RUPTURE ANYTIME EXPOSE ALVE MOTOR TO PROPELLANT IS OTOR IS CONTINUOUSLY ON AND SIGNIFICANTLY CONTRIBUTE TRANCE, THE VALVES ARE PROTECTED THAN 352 F, AND, ACCORDING THAN 352 F, AND, ACCORDING TON MECHANISM SHALL NOT FAILURE TO THE THAN 352 F, AND, ACCORDING TON MECHANISM SHALL NOT FAILURE TO THE THAN 352 F, AND, ACCORDING TON MECHANISM SHALL NOT FAILURE TO THE THAN 352 F, AND, ACCORDING THE THAN 352 F, AND, ACCORDING THAN 352 F, AND, ACCOR	TTES A "MULTIPLE DE OF IOA'S IT THAT THIS FAILURE ATED VALVE(S), SINCE CLOSING OR OPENING HOWEVER, NASA'S BELLOWS RUPTURE IS SING ELECTRICAL SERIOUS, NOT JUST O HOT. THAT IS, THIS O THE BELLOWS RUPTURE CCTED FROM CONTINUOUS CE WITHIN THE VALVE S TO THE SPECS, "THE									

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430

ASSESSME ASSESSME NASA FME	ENT D ENT I EA #:	ATE: D:	1/01/8 OMS-4! 05-6L	88 52G -225	6 <b>A-1</b>			NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTE MDAC ID:	EM:		OMS 452 DIODE										
LEAD ANA	LYST	:	W.A. 1	HAUF	FLER								
ASSESSMI	ENT:												
			ITY	F	REDUNE	DANCY	SCR	REENS			IL FEM		
		LIGH W/FU	NC I	P		В			С		LLM		
NASA IOA	[ 3 [ 3	/1R /1R	]	[ E	? ] ? ]	[ F [ P	]	]	P ] P ]	[	X ] * X ]		
COMPARE	[	/	]	[ ]	1]	[ N	]	[	]	[	. ]		
RECOMMEN			(If					-	]		D ] /DELETE)		
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IOA RECO CRITICAL UNRELATI INTERPRI COULD CA THE SIGN WHEN THE SCENARIO IRRELEVA COMPONED WHEN THE FAILURE FAILURE	OMMEN LITY ED FA ETATI AUSE NAL T E VAI ANT. ANTS A E VAI DOES	THUS CON O CONT CHROU VES CH AN A BE AND V LVE M NOT URTHE	REDUC E" WHI F NSTS INUOUS GH THI REACH OTHER LLOWS ALVE M OTOR I SIGNI RMORE,	ED, CH 1 222 POV S 11 FULI FALI RUPT OTOI S CO FICE THI	SINCE SINCE	E IT ( YOND ! NASA N THE DULD : SED OI CONSI: ANYTIP PROPE: JOUSL YES A	CONSTHE IS ASSINHI R OF STIME HE LLAM Y OF RIBU RE I	STITU SCOP RIGH FOCIA BIT PEN. NG OF EXPOS NT IS N AND JTE T PROTE	TES A TE OF THAT TED VA CLOSIN HOWEV BELLA SING EN SERIC HOT. TO THE	"MULT IOA'S I THIS ALVE(S NG OR VER, N. DWS RU LECTRI DUS, N THAT BELLO FROM C	FAILURE ), SINCE OPENING ASA'S PTURE IS CAL		

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

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

ASSESSME	SSESSMENT DATE: 1/01/88 SSESSMENT ID: OMS-453 ASA FMEA #: 05-6L-2253-2															[		<b>]</b>		
SUBSYSTE MDAC ID: ITEM:				OM 45 DI																
LEAD ANA	LY	ST	:	W.	A. F	IAI	JF	LEF	2											
ASSESSME	NT	:																		
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		HD	W/FUI	NC			A				Б			C		-				
NASA IOA	]	3 2	/1R /1R	]		[	P F	]		[	P P	]	· [	P P	]	-		[	x	] * ]
COMPARE	[	N	/	]		[	N	]		[		]	[		]			[	N	]
RECOMMEN	DA!	ri(	ons:		(If	d:	if	fer	en	t	fr		NASA	)						
	[		<b>/</b>	]		[		)		[	•	]	[		]		(Al	[ \QC	'DI	] ELETE)
* CIL RE	TE	NT:	ION 1	RAT	'IONA	L	Ē:	(1	f	ap	pl:	ica		A NA	DEQ DEQ	TAU TAU	E E	[		]
REMARKS:	ES	W	ITH !	<b>THI</b>	S NA	S	A 1	FME	EA.											

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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-453A 05-6L-2253A-2	) }	NASA DATA: BASELINE [ ] NEW [ X ]						
SUBSYSTEM: MDAC ID:	OMS								
LEAD ANALYST:	W.A. HAUFLER								
ASSESSMENT:									
CRITICAL FLIGH		NDANCY SCREENS		CIL ITEM					
	NC A	в	С	11EM					
NASA [ 2 /1R IOA [ 2 /1R	] [ P ] ] [ F ]	[P] [1 [P] [1	P ] P ]	[ X ] *					
COMPARE [ /	]. [ N ]	[ ] [	]	[ ]					
RECOMMENDATIONS:	(If differe	ent from NASA)							
[ 3 /3	] [ ]	[ ]		[ D ] DD/DELETE)					
* CIL RETENTION	RATIONALE: (If		ADEQUATE ADEQUATE	[ ]					
REMARKS: IOA RECOMMENDS R LAST AVAILABLE N NASA CIL LIST BU TO A NON-CIL, AN FAILURE HAS NO E (MDM) IS BEHIND PROTECTED INTERN	ASA CRITICALIT T IS NOT. IOF D IOA TENTATIV FFECT, SINCE O THE "GPC CLOSE	FMEA FROM THE OF TY, THIS FMEA SEA ASSUMES THAT VELY CONCURS. ONLY A MULTIPLIE DIODES, AND	CIL. ACCO SHOULD BE NASA DOWN IOA BELII EXER-DEMUI	ORDING TO THE IN THE NEW NGRADED THIS EVES THIS LTIPLEXER					

ASSESS ASSESS NASA F	MEN	T	II		OI	L/01/88 DMS-453B D5-6L-2253B-2								-			DAT ELIN NE	E	[	X	]	
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ASSESS	MEN	T:																				
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				JIGH I/FU				A				В			С			÷	IT	EM	L	
NAS IO	A A	[ [	3 2	/3 /1F	] ? ]		[	F	]		[ [ :	P	]	ָן נ	P	]			[	X	]	*
COMPAR	E	[	N	/N	]		[	N	)		[ ]	N	]	[	N	]			[	N	]	
RECOMM	END	ΑT	'IC	ns:	;	(If	d:	ifí	fere	ent	f	rc	om N	ASA)								
		[		/	]		[.		]		[		]	[		]	(	ΑĽ	[ DD/	DE	] LE	TE)
* CIL		EN	ניבי	ON	RAT	CION	AL	Ξ:	<b>(</b> I:	f ap	gg	li	cab	•			JATE JATE		[		]	
REMARK IOA AG		S	W]	TH	THI	s n	ASZ	A I	FME	À.				*:.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 OMS-453C 05-6L-2256B-2	NASA DATA: BASELINE NEW	=									
MDAC ID:	OMS 453 DIODE											
LEAD ANALYST:	W.A. HAUFLER											
ASSESSMENT:												
CRITICAI FLIGH	ITY REDUND	ANCY SCREENS	CIL ITEM									
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NASA [ 3 /1F IOA [ 2 /1F	R ] [ P ] R ] [ F ]	[ F ] [ P ] [ P ] [ P ]	[ X ] * [ X ]									
COMPARE [ N /	] [N]	[и] [и]	[ ]									
RECOMMENDATIONS:	·		r D 1									
[ 3 /3	] [ ]	[ ] [ ] (AI	[ D ] DD/DELETE)									
* CIL RETENTION REMARKS:	RATIONALE: (If	applicable) ADEQUATE INADEQUATE										
IOA RECOMMENDS OF CRITICALITY THUS UNRELATED FAILURE INTERPRETATION OF COULD CAUSE CONTOURS THE SIGNAL THROUGH THE VALVES SCENARIO WITH AN IRRELEVANT. A BUTTON WHEN THE VALVE INTERPRETATION OF TAILURE DOES NOT FAILURE. FURTHING POWER BY AN ELECTION OF TAILURE AND MORE	REDUCED, SINCE RE" WHICH IS BEY OF NSTS 22206. FINUOUS POWER ON JGH THIS ITEM WO REACH FULL CLOSS RUPTURE AVALVE MOTOR IS CONTINUT SIGNIFICANTLY ERMORE, THE VALVETTICAL THERMAL ETHAN 352 F, AN	LURE SHOULD NOT BE CONTITUTES A "MULTOND THE SCOPE OF IOA'S NASA IS RIGHT THAT THE THE ASSOCIATED VALVE OULD INHIBIT CLOSING OF BELLOWS INTIME EXPOSING ELECTION OF BELLOWS INTIME EXPOSING ELECTION OF THE SERIOUS, TO THE BELLOWS AND HOT. THE CONTRIBUTE TO THE BELLOWS ARE PROTECTED FROM SHUTOFF DEVICE WITHIN NO, ACCORDING TO THE SERIOLS, SHALL NOT FAIL AS A RESERVANT.	LTIPLE S IS FAILURE (S), SINCE R OPENING NASA'S RUPTURE IS RICAL NOT JUST AT IS, THIS LOWS RUPTURE CONTINUOUS THE VALVE PECS, "THE									

PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-454 05-6L-22	257-1		NASA DATA BASELINE NEW	: [ x ]
SUBSYSTEM: MDAC ID: ITEM:					
LEAD ANALYST:	W.A. HAU	JFLER			
ASSESSMENT:					
FT.TCH	T)			ens	1 TEM
HDW/FU	NC	A	В	C	4-4-
NASA [ 3 /1R IOA [ 3 /2R	] [	P ] F ]	[ P ] [ P ]	[ P ] [ P ]	[ x ] *
COMPARE [ /N	] [	и ]	[ ]	[ ]	[ N ]
RECOMMENDATIONS:	(If di	ifferent	from NAS	SA)	
[ 3 /2R	] [	P ]	[ F ]	[ P ]	[ A ] DD/DELETE)
* CIL RETENTION	RATIONALI	E: (If a	ipplicable	e) ADEQUATE INADEQUATE	f i
REMARKS: IOA'S RECOMMENDE HARDWARE FMEA 03 CROSSFEED VALVE SCREEN SINCE THE ACCESSIBLE BY TH OPEN AND "OPEN" OPEN DIODE ARE N DETECTABLE INFLI	TO FAIL ( MCA STATE E CREW. RELAYS WI OT DETECT	CLOSED. TUS OF F THEREFO HICH DO	IOA RECO RELAY POST RE, "CLOS NOT CLOST	OMMENDS FAIL ITIONS ARE N SE" RELAYS W E BECAUSE OF	OT READILY HICH DO NOT A FAILED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-4542 05-6L-22			NASA DATA BASELINE NEW	
	OMS 454 DIODE				
LEAD ANALYST:	W.A. HAU	UFLER			
ASSESSMENT:					·
CRITICAL FLIGH		REDUNDA	ANCY SCREI	ens	CIL ITEM
HDW/FU	NC	A	В	C	
NASA [ 2 /1R IOA [ 3 /2R	] [	P ] F ]	[ P ] [ P ]	[ P ] [ P ]	[ X ] * [ X ]
COMPARE [ N /N	] [	N ]	[ ]	[ ]	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)	
[ 3 /2R	] [	P ] .	[ P ]	[ P ] (A	[ D ] .DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	applicable	e) ADEQUATE INADEQUATE	
REMARKS: TOA'S RECOMMENDE	D CRITIC	ALITY O	F 3/2R IS	DRIVEN BY C	MS HARDWAR

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.

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-454 05-6L-2	В			: " [ x ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 454 DIODE				
LEAD ANALYST:	W.A. HA	UFLER			
ASSESSMENT:				·	
CRITICA FLIG	LITY	REDUND	ANCY SCREI	ens	CIL ITEM
HDW/F		A	В	C	112
NASA [ 3 /11 IOA [ 3 /21	[ ]	P ] F ]	[ P ] [ P ]	[ P ]	[ x ]
COMPARE [ /N	] [	N ]	[ ]	[ ]	[ N ]
RECOMMENDATIONS	(If d	ifferent	t from NAS	SA)	
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* CIL RETENTION  REMARKS: IOA AGREES WITH		·	applicable	e) ADEQUATE INADEQUATE	[ ]
TOW WOKEES WITH	THIE HWO	A FREA.			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-454C 05-6L-2257C-1		NASA DATA: BASELINE NEW	
MDAC ID:	OMS 454 DIODE			
LEAD ANALYST:	W.A. HAUFLER			
ASSESSMENT:				
CRITICAL: FLIGHT		ANCY SCREENS		CIL ITEM
HDW/FU	NC A	В	С	
NASA [ 3 /1R IOA [ 3 /2R	] [ P ] ] [ F ]	[ P ] [	P ] P ]	[ x ] *
COMPARE [ /N	] [N]	[ ] [	]	[ N ]
RECOMMENDATIONS:	(If different	t from NASA)		
[ 3 /1R	] [ P ]	[ F ] [	P ] (Al	[ A ] DD/DELETE)
* CIL RETENTION	RATIONALE: (If a		ADEQUATE ADEQUATE	
REMARKS: IOA RECOMMENDS F. POSITIONS ARE NO "CLOSE" RELAYS W. CLOSE BECAUSE OF FAILED DIODE IS	T READILY ACCES: HICH DO NOT OPE A FAILED OPEN	SIBLE BY THE N AND "OPEN" DIODE ARE NO	CREW. TI	HEREFORE, HICH DO NOT

ASSESSMENT DATE: 1/01/8 ASSESSMENT ID: OMS-45 NASA FMEA #: 05-6L-								7D-	1					9.1	WALLEST WHILE I'V	DATA LINE NEW	[	x	]	
SUBSYSTEM MDAC ID:	M:			45	MS 54 IODE															
LEAD ANALYST: W.A. HAUFLER										-										
ASSESSME	NT:	:																		
•	CRI		ICAL		č		RI	EDU	NDA	/N(	CY	sc	REENS	3				CL CEN	£.	
FLIGH HDW/FU						A B			В	С				7	L	•				
NASA IOA	[	3	/2R /2R	]		[	P F	]		[	P P	]	] [	P P	]		]	x	].	*
COMPARE	[		/	]		[	N	]		[		]	[		]		[	N	]	
RECOMMEN	DAT	ΓI	ons:		(If	<b>d</b> :	if	fer	ent	= :	fro	om :	nasa)	)						
	[		/	]		[		3		Ţ	•	]	[		]	(A)		/DI		TE)
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ INADEQUATE [ REMARKS:											]									
IOA AGRE	DA AGREES WITH THIS NASA FMEA.																			

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-454 NASA FMEA #: 05-6L-2						4 E		3-1							DATA LINE NEW	[	x	]	
SUBSYSTEM: OMS MDAC ID: 454 ITEM: DIODE																			
LEAD ANALYST: W.					А. Н	ΑU	JFI	LER											
	ASSESSMI	ENT:				·													
CRITICALITY FLIGHT						REDUNDANCY SCREE						EENS	5		CIL ITEM				
		W/FU							ВС										
	NASA IOA		/1R /2R			]	P F	]	]	F P	]	[ [	P P	]		[	X	]	*
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		Ţ	/	]		[		]	[		]	[		]	( <i>1</i> A	,DD	/DI	ETI ]	ETE)
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	REMARKS	:										-46-				·		J	

IOA AGREES WITH THIS NASA FMEA.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-454F 05-6L-2259-1	NASA DAT BASELIN NE								
SUBSYSTEM: MDAC ID: ITEM:	OMS 454 DIODE									
LEAD ANALYST:	W.A. HAUFLER									
ASSESSMENT:										
FLIGH			CIL ITEM							
		[F] [P]	[X]*							
IOA [ 3 /2F	j į Fj	[ F ] [ P ] [ P ] [ P ]	į x j							
COMPARE [ /N	] [N]	[ N ] [ ]	[ ]							
RECOMMENDATIONS:	(If differe	ent from NASA)								
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* CIL RETENTION	RATIONALE: (If	ADEQUATE								
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NASA DATA:

ASSESSMENT DATE: 1/01/88

ASSESSMENT ID: NASA FMEA #:	OMS-454 05-6L-2	G 260-1	ВА	SELINE [ ] NEW [ X ]				
SUBSYSTEM: MDAC ID: ITEM:	OMS 454 DIODE							
LEAD ANALYST:	W.A. HA	UFLER						
ASSESSMENT:								
CRITIC FLI		TTY REDUNDANCY SCREENS						
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NASA [ 2 / IOA [ 3 /	1R ] [ 2R ] [	P ] [ ] F ]	F] [P]	[ X ] * [ X ]				
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SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

ASSESSMENT ID: NASA FMEA #:	OMS-454 05-6L-2	H 260A-1		BASELI N	
SUBSYSTEM: MDAC ID: ITEM:	OMS 454 DIODE				
LEAD ANALYST:	W.A. HA	UFLER			
ASSESSMENT:					
	CALITY	REDUND			CIL ITEM
HDW/	FUNC	A	В	C · P	
NASA [ 3 / IOA [ 3 /	'1R ] [ '2R ] [	P ] F ]	[ F ] [ P ]	[ P ] [ P ]	[ X ] * [ X ]
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RECOMMENDATION	s: (If d	ifferen	t from N	ASA)	
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UNRELATED FAIR	OF NSTS 2	2206.	NASA IS 1	RIGHT THAT	THIS FAILURE
COULD CAUSE CO					
WHEN THE VALVE SCENARIO WITH	ES REACH FU	LL CLOS	ED OR OP	EN. HOWEVE	R, NASA'S
IRRELEVANT. A	BELLOWS RU	PTURE A	NYTIME E	XPOSING ELE	CTRICAL
COMPONENTS AND WHEN THE VALVE					
FAILURE DOES N	OT SIGNIFI	CANTLY	CONTRIBU'	re to the b	ELLOWS RUPTURE
FAILURE. FURT	THERMORE, T LECTRICAL T	HE VALV HERMAL	ES ARE PI SHUTOFF I	ROTECTED FRO DEVICE WITH	OM CONTINUOUS IN THE VALVE
MOTOR AT NO MO	ORE THAN 35	2 F, AN	D, ACCORI	DING TO THE	SPECS, "THE
MOTOR AND ACTU PROLONGED POWE					RESULT OF SPEC MC284-043(
CECT 2 1 2 1					<del>-</del> <del></del>

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	<del>.</del>	_	BASELIN NE			
SUBSYSTEM: MDAC ID: ITEM:	OMS 454 DIODE					
LEAD ANALYST:	W.A. HAU	JFLER				
ASSESSMENT:						
CRITICAL FLIGH		REDUNDANCY	SCREENS	CIL ITEM		
HDW/FU		A B	C	****		
NASA [ 3 /1R IOA [ 3 /2R	] [	P ] [ F F ]	[ P ]	[ X ] * [ X ]		
COMPARE [ /N	] [	N ] [ N		[ ]		
RECOMMENDATIONS:	•	ifferent fr	] [ ]	[ D ] ADD/DELETE)		
* CIL RETENTION REMARKS:	RATIONALE	E: (If appl	•			
IOA RECOMMENDS TO CRITICALITY THUS UNRELATED FAILUR INTERPRETATION OF COULD CAUSE CONTOURS THE SIGNAL THROUGH WHEN THE VALVES SCENARIO WITH AN IRRELEVANT. A BE COMPONENTS AND WHEN THE VALVE METAILURE DOES NOT FAILURE. FURTHE POWER BY AN ELECTION OF THE P	REDUCED, E" WHICH F NSTS 22 INUOUS PO GH THIS I REACH FUL OTHER FAI LLOWS RUP ALVE MOTO OTOR IS C SIGNIFIC ERMORE, TH TRICAL TH THAN 352 ION MECHA APPLICATI	SINCE IT IS BEYOND 2206. NASA OWER ON THE ITEM WOULD LL CLOSED OF ILURE CONSI PTURE ANYTI OR TO PROPE CONTINUOUSI CANTLY CONTINUOUSI HE VALVES A HERMAL SHUT 2 F, AND, A ANISM SHALI ION." SEE	CONSTITUTES A "M THE SCOPE OF IOA IS RIGHT THAT TO A IS RIGHT THAT TO A ASSOCIATED VALV INHIBIT CLOSING OR OPEN. HOWEVER STING OF BELLOWS EXTING OF BELLOWS THE EXPOSING ELECT CLIANT IS SERIOUS AND HOT. TO TRIBUTE TO THE BE ARE PROTECTED FROM TO THE BELLOWS TO T	ULTIPLE 'S HIS FAILURE E(S), SINCE OR OPENING , NASA'S RUPTURE IS TRICAL , NOT JUST HAT IS, THIS LLOWS RUPTURE M CONTINUOUS N THE VALVE SPECS, "THE		

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-45! NASA FMEA #: 05-6L-2						5	157	7-2								DAT LIN NE				]		
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LEAD A	NALY	ST	:	W.A	. н	ΑÜ	FI	ER														
ASSESS	MENT	:																				
	CRITICALITY FLIGHT HDW/FUNC						REDUNDANCY SCREE					REENS	ENS					L EM				
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COMPAR	E [	•	/N	1		[	N	]		[		]	[		1,			[	N	]		
RECOMM	END#	TI	ons:	(	(If	di	fí	fer	ent	: :	fr	om 1	NASA)	): ;								
	(	3	/2R	j		[	P	]		[	P	]	[	P	1	(	 (AD	[ D/	/DE	] ELE	ETE	;)
* CIL	RETI	ENT	ION	RATI	ONA	LF	E:	(I	fa	ıpı	<b>p1</b> :	ical		ΑI	DEQU	JATE JATE	Ξ.			]		
REMARK IOA'S FMEA 0 TO FAI	RECO 3-3- L CI	0MM -20 LOS	ENDE 08-2 ED.	D CF	INCE	נ	H	IS :	FA]	L	URI	E C	IS DI	RIY	VEN CHE	BY CRC	OM	ıs	Œ	7 (	WA /AL	νE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-455A 05-6L-22	57 <b>A-</b> 2		NASA DATA: BASELINE NEW								
SUBSYSTEM: MDAC ID:	OMS 455 DIODE											
LEAD ANALYST:	W.A. HAU	FLER										
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM												
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NASA [ 2 /1R IOA [ 3 /2R	] [	P ] [ F ] [	P ] [ P ] [	P ] P ]	[ X ] *							
COMPARE [ N /N	] [	и ] [	] [	]	[ ]							
RECOMMENDATIONS:	(If di	.fferent f	rom NASA)									
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* CIL RETENTION	RATIONALE	E: (If app		ADEQUATE ADEQUATE	[ ]							
REMARKS: IOA RECOMMENDS R	EMOVING T	THIS FMEA	FROM THE	CIL. ACC	ORDING TO THE							
LAST AVAILABLE N NASA CIL LIST BU TO A NON-CIL, AN FAILURE HAS NO E (MDM) IS BEHIND	OA RECOMMENDS REMOVING THIS FMEA FROM THE CIL. ACCORDING TO THE AST AVAILABLE NASA CRITICALITY, THIS FMEA SHOULD BE IN THE NEW ASA CIL LIST BUT IS NOT. IOA ASSUMES THAT NASA DOWNGRADED THIS O 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 INTERN	ALLY FROM	1 REVERSE	CURRENT.									

	1/01/88 OMS-4551 05-6L-22		NASA DATA: BASELINE [ ] NEW [ X ]						
MDAC ID:	OMS 455 DIODE								
LEAD ANALYST:	W.A. HAU	JFLER							
ASSESSMENT:					en and second				
CRITICAL		REDUNDAN	ICY SCREE	ens	CIL ITEM				
FLIGH HDW/FU		A	В	С	1164				
NASA [ 3 /3 IOA [ 3 /2R	] [	F ]	<b>P</b> ]	[ ] [ P ]	[ x ] *				
COMPARE [ /N	] [	и ] [	[ N ]	[и]	[ N ]				
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)					
[ / - ]	] [	] [	. 1	[ ] (A)	[ ] DD/DELETE)				
* CIL RETENTION 1	RATIONALI	E: (If ag	oplicable	ADEQUATE INADEQUATE					
REMARKS: IOA AGREES WITH	THIS NAS	A FMEA.	1 - <u>Tari</u> fingerya kida <b>s</b> Karamanan		-				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-456 05-6L-2257-1	1/88 NASA DATA: -456 BASELINE [ ] 6L-2257-1 NEW [ X ]							
PODO TO TEM.	OMS 456 DIODE								
LEAD ANALYST:	W.A. HAUFLER								
ASSESSMENT:									
CRITICAL FLIGH	ITY REDUNE	ANCY SCREENS	CIL ITEM						
	NC A	ВС							
NASA [ 3 /1F IOA [ 3 /2F	[ P ] [ F ]	[ P ] [ P [ P ] [ P	] [ x ]	*					
COMPARE [ /N	] [N]	] [	] [N]						
RECOMMENDATIONS:	(If differer	nt from NASA)							
[ 3 /2F	R ] [P]	[F] [P	[ A ] (ADD/DEL						
* CIL RETENTION	RATIONALE: (If	A	DEQUATE [ ] DEQUATE [ ]						
REMARKS: IOA'S RECOMMENDE HARDWARE FMEA 03 CROSSFEED VALVE SCREEN SINCE THE ACCESSIBLE BY TH OPEN AND "OPEN" OPEN DIODE ARE N DETECTABLE INFL	3-3-2008-2, SING TO FAIL CLOSED. E MCA STATUS OF HE CREW. THEREI RELAYS WHICH DO NOT DETECTABLE	OF 3/2R IS IND CE LOSS OF RED IOA RECOMME RELAY POSITIO FORE, "CLOSE" NOT CLOSE BE	IRECTLY DRIVEN UNDANCY CAUSES NDS FAILING TH NS ARE NOT REA RELAYS WHICH I	S IE B ADILY OO NOT ELED					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-4562 05-6L-2	A 257 <b>A-1</b>	-	NASA DATA: BASELINE [ ] NEW [ X ]									
MDAC ID:	OMS 456 DIODE												
LEAD ANALYST:	W.A. HA	JFLER											
ASSESSMENT: CRITICALITY REDUNDANCY SCREENS CIL													
CRITICALI FLIGHT	CIL ITEM												
	4C	A	В	<b>C</b>	IIBM								
NASA [ 2 /1R IOA [ 3 /2R	] [	P ] [ F ] [	P ] [ P ] [	P ] P ]	[ X ] * [ X ]								
COMPARE [ N /N	] [	и][	] [	]	[ ]								
RECOMMENDATIONS:	(If d	ifferent	from NASA	)									
[ 3 /2R	] [	b ] [	P ] [	P ] (AD	[ D ] DD/DELETE)								
* CIL RETENTION I	RATIONAL	E: (If ap	plicable)	A DEOUATE									
DEWA DVC .			II	ADEQUATE NADEQUATE									
REMARKS: IOA'S RECOMMENDED FMEA 03-3-2008-2, TO FAIL CLOSED. CRITICALITY, THIS NOT. IOA ASSUMES	, SINCE ' ACCORDII S FMEA SI	THIS FAIL NG TO THE HOULD BE	URE CAUSES LAST AVAIN THE NEW	S THE CROSS ILABLE NASA W NASA CIL	FEED VALVE \ LIST BUT IS								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-456E 05-6L-22		NASA DATA: BASELINE [ ] NEW [ X ]							
SUBSYSTEM: MDAC ID: ITEM:	OMS 456 DIODE									
LEAD ANALYST:	W.A. HAU	JFLER								
ASSESSMENT:										
CRITICAI FLIGH		REDUND	ANCY SCR	EENS	CIL ITEM					
HDW/FU		A	В	C						
NASA [ 3 /1F IOA [ 3 /2F	] [	P ] F ]	[ P ] [ P ]	[ P ] [ P ]	[ ] * [ X ]					
COMPARE [ /N	] [	и ]	[ ]	[ ]	[ N ]					
RECOMMENDATIONS:	(If d	ifferen	t from N	ASA)						
[ /	] [	3	[ ]	[ ]	[ ] ADD/DELETE					
* CIL RETENTION	RATIONAL	E: (If	applicab	le) ADEQUATE INADEQUATE	[ ]					
REMARKS:	THIS NAS	A FMEA.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		BASELINE [ ] NEW [ X ]						
SUBSYSTEM: MDAC ID: ITEM:			tim yr					
LEAD ANALYST:	W.A. HAUFLER							
ASSESSMENT:								
CRITICAL FLIGH	ITY REDUNDAN		CIL ITEM					
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NASA [ 3 /1R IOA [ 3 /2R	[ P ] [ F ] [	P ] [ P ] P ] [ P ]	[ ] * [ x ]					
COMPARE [ /N	] [N][	] [ ]	[ N ]					
RECOMMENDATIONS:	(If different	from NASA)						
· [ 3 /1R	] [P] [		[ A ] D/DELETE)					
	RATIONALE: (If ap	plicable) ADEQUATE INADEQUATE	[ ]					
POSITIONS ARE NO "CLOSE" RELAYS W CLOSE BECAUSE OF	T READILY ACCESSI HICH DO NOT OPEN	EN SINCE THE MCA STA BLE BY THE CREW. TH AND "OPEN" RELAYS WH ODE ARE NOT DETECTAB FLIGHT.	EREFORE,					

ASSESSMEN ASSESSMEN NASA FME	NT I	D:	1/01 OMS- 05-6	456		7D-1		NASA DATA: BASELINE [ ] NEW [ X ]										
SUBSYSTEMDAC ID:	M:		OMS 456 DIOD	E														
LEAD ANA	LYST	:	W.A.	HA	UFI	LER												
ASSESSME	NT:																	
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COMPARE	[	/	]	. [	N	]	[		]	[		]		[	N	]		
RECOMMEN	DATI	ons:	(I	f d	if:	fere	nt	fr	om NA	SA	)							
	.[	/	]	[		]	[		]	[		]	(Al		/D		ETE)	
* CIL RE	TENT	ION I	RATIO	NAL	E:	(If	ap	pl:	icabl		A NA	DEQUA?	re re	[		]		
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IOA AGREES WITH THIS NASA FMEA.

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-456E NASA FMEA #: 05-6L-2258-1													DATA ELINE NEW	[	x	]	
SUBSYSTE MDAC ID: ITEM:	M:			OMS 456 DIO									- ६ <u>तुब</u> <del>+</del> *,		•		
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COMPARE	[		/N	]	(	N	]		[ ]	1 ]	[	]		[		]	
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:									
SUBSYSTEM: MDAC ID: ITEM:	OMS 456 DIODE		-						
LEAD ANALYST:	W.A. HA	UFLER							
ASSESSMENT:									
CRITICAL FLIGH		REDUNDANC	CIL ITEM						
HDW/FU		<b>A</b> 1	в с						
NASA [ 3 /1R IOA [ 3 /2R	] [	P ] [ ]	F ] [ P ] P ] [ P ]	[ X ] * [ X ] .					
COMPARE [ /N	] [	N ] [ ]	N ] [ ]	[ ]					
RECOMMENDATIONS:	·			r D 1					
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* CIL RETENTION	RATIONAL	E: (If app	licable) ADEQUATI INADEQUATI	E [ ] E [ ]					
CRITICALITY THUS UNRELATED FAILUR INTERPRETATION O COULD CAUSE CONT THE SIGNAL THROU WHEN THE VALVES SCENARIO WITH AN IRRELEVANT. A BE COMPONENTS AND V WHEN THE VALVE M FAILURE DOES NOT FAILURE. FURTHE POWER BY AN ELEC MOTOR AT NO MORE MOTOR AND ACTUAT	REDUCED E" WHICH F NSTS 2 INUOUS P GH THIS REACH FU OTHER FA LLOWS RU ALVE MOT OTOR IS SIGNIFI RMORE, T TRICAL T THAN 35 ION MECH APPLICAT	, SINCE IT IS BEYOND 2206. NAS OWER ON TH ITEM WOULD IL CLOSED ILURE CONS PTURE ANYT OR TO PROP CONTINUOUS CANTLY CON HE VALVES HERMAL SHU 2 F, AND, IANISM SHAL	E SHOULD NOT BE CONSTITUTES A "NOT THE SCOPE OF 102 A IS RIGHT THAT TO A SSOCIATED VALVE OF OPEN. HOWEVER ISTING OF BELLOWS IME EXPOSING ELECTION OF AND HOT. TO THE BUT TO THE BUT ARE PROTECTED FROM TOFF DEVICE WITH ACCORDING TO THE L NOT FAIL AS A LAC MOTOR VALVE SERIOUS ACCORDING TO THE BUT TO	MULTIPLE A'S THIS FAILURE VE(S), SINCE OR OPENING R, NASA'S E RUPTURE IS CTRICAL S, NOT JUST THAT IS, THIS ELLOWS RUPTURE OM CONTINUOUS IN THE VALVE SPECS, "THE RESULT OF					

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-456 NASA FMEA #: 05-6L-3							G 260	) <b>-</b> 1	L								DAT ELIN NE	ΙE	[	x		
SUBSYSTE MDAC ID: ITEM:	M:			OM 45	S																	
LEAD ANA	LY:	ST	:	W.	A. F	ΙAΙ	UF	LEF	2													
ASSESSME	ASSESSMENT:  CRITICALITY REDUNDANCY SCREENS																					
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FAILURE. POWER BY	, y	FU. N	RTHE ELEC	RMO	RE,	T	HE HEI	VZ RMZ	ALVE AL S	S SHI	A. PTU	KE OFF	PRC ' DI	TV ZV	EC IC	E W	FRC THI	M N	CC	יאנ E	VA VV:	LVE
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PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

ASSESSMENT DATE: 1/01/88

NASA DATA:

ASSESSMEN NASA FME					0 <b>A-1</b>		BASI	NEM [ X ]				
SUBSYSTEMDAC ID:			OMS 456 DIODE									
LEAD ANA	LYST	:	W.A. F	IAUF	LER							
ASSESSME	NT:											
		ICAL: LIGH	ITY T	R	EDUNI	DANCY SC	CIL ITEM					
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* CIL RE	TENT	ION :	RATION	ALE:	(If	applica	ADEQU	UATE [ ]				
REMARKS: IOA RECO	MMEN	DS T	HAT BE	LLOW	S FA	LURE SH	OULD NOT	BE CONSIDERED AND				
UNRELATE	D FA	ILUR	E" WHI	CH I	S BEY	YOND THE	SCOPE OF					
COULD CA	USE	CONT	INUOUS	POW	ER O	N THE AS	SOCIATED '	AT THIS FAILURE VALVE(S), SINCE				
WHEN THE	VAL	VES	REACH :	FULI	CLOS	SED OR O	PEN. HOW	ING OR OPENING EVER, NASA'S				
SCENARIO IRRELEVA	WIT.	H AN A BE	OTHER :	FAII RUPI	URE O	CONSISTI ANYTIME	NG OF BELI EXPOSING 1	LOWS RUPTURE IS ELECTRICAL				
COMPONEN WHEN THE	TS A	ND V. VE M	ALVE MO	OTOF	TO 1	PROPELLA UOUSLY O	NT IS SER: N AND HOT	IOUS, NOT JUST . THAT IS, THIS				
FAILURE FAILURE.	DOES FU	NOT RTHE	SIGNI RMORE,	FICA THE	NTLY VAL	CONTRIB VES ARE	UTE TO THI PROTECTED	E BELLOWS RUPTURE FROM CONTINUOUS				
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MOTOR AN	D AC	TUAT	ION ME	CHAN	IISM S	SHALL NO	r fail as	A RESULT OF VE SPEC MC284-0430				
SECT. 3.	1, 3	.2.1	.2.9,	3.2.	1.2.	11.						

ASSESSME ASSESSME NASA FME	NT D NT I A #:	ATE: D:	1/01/3 OMS-4: 05-6L	NASA DATA DMS-456I BASELINE D5-6L-2260B-2 NEW								NE	[		]		
SUBSYSTE MDAC ID:	M:		OMS 456 DIODE														
LEAD ANA	LYST	<b>':</b>	W.A. 1	JAH	JFI	LER											
ASSESSME	NT:													-			
		RI	EDUNI	DAN	CY	sc	REENS	S			CIL ITEM						
	FLIGHT HDW/FUNC							В			С	4 - 4 - 2	,		. 121.	L	
NASA IOA	[ 3 [ 3	/1R /2R	]	[	P F	]	[	F P	]	]	P P	]		]	X X	]	*
COMPARE	[	/N	]	[	N	]	[	N	]	[		]		[		]	
RECOMMEN			(If			ferei					)	]					
* CIL RE										II	AD NAD	EQUATI	E E	[		]	TE)
IOA RECO CRITICAL UNRELATE INTERPRE COULD CA THE SIGN WHEN THE SCENARIO IRRELEVA COMPONEN WHEN THE FAILURE FAILURE POWER BY MOTOR AN PROLONGE	TTY D FA TATI USE AL T VAI WIT TS A TO AC AN DOES TO A D AC D AC	THUS ILUR ON O CONT HROU VES H AN A BE NO V VE M NOT RTHE ELEC MORE TUAT WER	REDUCE WHIEF NSTS INUOUS GH THI REACH OTHER LLOWS ALVE MOTOR I SIGNI RMORE, TRICAL THAN ION ME APPLIC	ED CH CH CH CH CH CH CH CH CH CH CH CH CH	, S IS 22(OWI ITI LL ILL PTO OR CON HE HEI AN I	SINCI S BEY D6. D6. DEM WC CLOS JRE O JRE O JRE O JRE O VTLY VALY VALY CMAL F, AI ISM S	E I I YON NA TOUL SED CON ANY PRO UOU CO SH SHA SE	T (D 'SA HE D OI SI SI SI SI SI SI SI SI SI SI SI SI SI	CON THE INH CON INH CON INH CON INH INH INH INH INH INH INH INH INH IN	STITU SCOI RIGI SOCIA IBIT PEN. MG OI EXPOS NT IS N ANI UTE PROTI DEVI	UTE PE HT ATE F E SS S D H ECCI ICE ICE ILL	S A "NO F ION THAT TO VALVA COSING TOWEVER BELLOWS THE BITTE	MUL'A'S THI: VE(: OR R, : STR STR STHA' ELL OM SP RES	TI S (NA) UF INC OW CTH ECU	FA PEASA PEA	E III SI SI SI SI SI SI SI SI SI SI SI SI	URE NCE NG IS THIS VPTURE VUOUS LVE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMG-457	257-2	NASA DATA: BASELINE [ ] NEW [ X ]							
MDAC ID:	OMS 457 DIODE									
LEAD ANALYST:	W.A. HAU	UFLER								
ASSESSMENT:										
CRITICAL: FLIGH		REDUNDA	NCY SCRE	ENS	CIL ITEM					
HDW/FUI		A	В	С						
NASA [ 3 /1R IOA [ 3 /2R	] [	P ] F ]	[ P ] [ P ]	[ P ] [ P ]	[ x ] *					
COMPARE [ /N	] [	N ]	[ ]	[. ]	[ N ]					
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)						
[ 3 /2R	] [	P ]	[ P ]	[ P ]	[ DD/DELETE)					
* CIL RETENTION	RATIONAL	E: (If a	applicabl	le) ADEQUATE INADEQUATE	[ ]					
REMARKS: IOA'S RECOMMENDE FMEA 03-3-2008-2 TO FAIL CLOSED.	D CRITICA , SINCE '	ALITY OF THIS FAI	7 3/2R IS LURE CAU	S DRIVEN BY O	MS HARDWARE					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-457 05-6L-2	A 257A-2	NASA DATA BASELINE NEW		
SUBSYSTEM: MDAC ID:	OMS 457 DIODE				
LEAD ANALYST:	W.A. HA	UFLER			
ASSESSMENT:					
CRITICAL: FLIGH		REDUNDAN	ICY SCREEN		CIL
and the second s	NC	A	В		ITEM
NASA [ 2 /1R IOA [ 3 /2R	] [	P ] [ F ] [	P ] [ P ] [	P ] P ]	[ X ] * [ X ]
COMPARE [ N /N	] [	N ] [	] [	]	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NASA	)	
[ 3 /3	1 [	] [	] [	] (A)	[ D ] DD/DELETE)
* CIL RETENTION 1	RATIONAL	E: (If ap	_ ,	ADEQUATE NADEQUATE	
REMARKS: IOA RECOMMENDS RI LAST AVAILABLE NO NASA CIL LIST BUT TO A NON-CIL, ANI FAILURE HAS NO EI	ASA CRIT I IS NOT D IOA TE	ICALITY, . IOA AS NTATIVELY	THIS FMEA SUMES THA CONCURS.	SHOULD BE T NASA DOWN IOA BELI	IN THE NEW NGRADED THIS EVES THIS
(MDM) IS BEHIND					

PROTECTED INTERNALLY FROM REVERSE CURRENT.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-457B		NASA DATA: BASELINE [ ] NEW [ X ]								
	OMS 457 DIODE										
LEAD ANALYST:	W.A. HAUFLER	W.A. HAUFLER									
ASSESSMENT:											
CRITICAL FLIGH	ITY REDUNDA	ANCY SCREENS	CIL ITEM								
HDW/FU		В С	11211								
NASA [ 3 /3 IOA [ 3 /2R	] [ ] ] [ F ]	[ ] [ ] [ P ]	[ ] * [ x ]								
COMPARE [ /N	] [N]	[ N ] [ N ]	[ N ]								
RECOMMENDATIONS:	(If different	t from NASA)									
[ /	] [ ]	[ ]. [ ]	[ ] (ADD/DELETE)								
* CIL RETENTION	RATIONALE: (If		QUATE [ ]								
		INADE	QUATE [ ]								
REMARKS: IOA AGREES WITH	THIS NASA FMEA.										
SAN TO SAN THE	1.2 (2.3 b) (2.4 c) (1.4 c) (2.4 75.74 * 11.00 m to 1.00 1.										
		A Section 1997									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-458 05-6L-2204-1	NASA DATA BASELINE NEW								
	OMS 458 DRIVER, HYBRID									
LEAD ANALYST:	W.A. HAUFLER									
ASSESSMENT:										
CRITICAL FLIGH	r		CIL ITEM							
HDW/FUI	NC A	ВС								
NASA [ 3 /3 IOA [ 3 /2R	] [ P ] [	P ] [ P ]	[ ] *							
COMPARE [ /N	] [N][	и] [и]	[ ]							
RECOMMENDATIONS:	(If different i	from NASA)								
[ 3 /2R	] [P] [	P ] [ P ] (A	[ ] DD/DELETE)							
	RATIONALE: (If app	olicable) 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.										

•							1/01/88 OMS-459 05-6L-2204-1								BASELINE [ ] NEW [ X ]							
SUBSYSTEM: OMS MDAC ID: 459 ITEM: DRIVER,							R,	H	/BR	ID												
LEAD AN	ALY	ST	:		W.	A.	HA	UF	LER													- **
ASSESSM	ENT	:																				
	CR							RI	EDU	NDA	AN(	CY	SC	REE	NS				IL			
	1			GH'I FUN				A				В			(	С		1.	rem			
NASA IOA		3 3	/: /:	3 2 R	]		[	P	]		[	P	]		[ [ ]	P	]	[	:	] ]	*	
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RECOMME	NDA'	TI	ONS	5:		(If	đ	if	fer	ent	<b>.</b> 1	fro	om 1	NAS	A)							
	[	3	/:	2R	]		נ	P	]		[	P	]		[ ]	P		[ ADD,	/DE		TE)	
* CIL R	ETE:	NT:	IOI	N I	RAT	ION	AL	E:	(I	fa	ıpı	<b>p1</b> :	Lca!	ble	•	AD	EQUATE	]		1		
REMARKS	:													•			EQUATE	_	;	j		
WORST C	ASE	I	s '	VAI	LVE	DE	CL	ARI														
USED TO																	NDANCY					LT
IN FALS																						r 37
MISSION TO TALK																	BE USEI T FLIGI			4D	ANT.	ĽΧ
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SEE JSC 10588 PAGE 5-18.

MALFUNCTION PROCS DO NOT MENTION THIS AND OMS FIRING SEQUENCER

SOFTWARE DOES NOT USE THESE TALKBACKS.

ASSESSMENT ASSESSMENT NASA FMEA	ID:	OMS-460	204-1		NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTEM: MDAC ID: ITEM:		OMS 460 DRIVER,			· · · · · · · · · · · · · · · · · · ·					
LEAD ANALYS	ST:	W.A. HAU	JFLER							
ASSESSMENT	:									
CR:	ITICALI FLIGHT		REDUNDA	ANCY SCREI	ens	CIL ITEM				
1	HDW/FU		A	В	C	111111				
NASA [ ] AOI	3 /3 3 /2R	] [	P ]	[ ] [ P ]	[ ] [ P ]	[ ] *				
COMPARE [	/N	] [	n j	[ и ]	[ N ]	[ ]				
RECOMMENDA!	TIONS:	(If di	ifferent	from NAS	SA)					
. [	3 /2R	] [	P ]	[ P ]	[ P ] (A	[ ] DD/DELETE)				
* CIL RETE	NTION I	RATIONALI	E: (If a	applicable	ADEQUATE					
USED TO COL IN FALSELY MISSION. TO TALKBAC	MPLETE FAILIMASA WO KS TO I N PROCSOES NO	CROSSFEING THE CIDULD BE INDETERMINIS DO NOT IT USE THE	ED. LOS ROSSFEEI RIGHT II E VALVE MENTION	S OF ALL D SYSTEM IF F SENSORS POSITION N THIS AND	REDUNDANCY RESULTING IN	REDUNDANTLY T AND				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-461			NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	OMS 461 DRIVER,	HYBRID			
LEAD ANALYST:	W.A. HA	UFLER			
ASSESSMENT:					
CRITICAL FLIGH		REDUNDAN	CY SCREE	ens	CIL ITEM
HDW/FU		A	В	С	
NASA [ 3 /3 IOA [ 3 /2R	] [	P ] [	P ]	[ ] [ P ]	[ ] *
COMPARE [ /N	] [	и] [	<b>N</b> ]	[ N ]	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)	
[ 3 /2R	] [	P ] [	PJ	[ P ] (A	[ ] DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If ap	plicable	e) ADEQUATE INADEQUATE	[ ]
REMARKS: WORST CASE IS VA USED TO COMPLETE IN FALSELY FAILI MISSION. NASA W TO TALKBACKS TO MALFUNCTION PROC SOFTWARE DOES NO SEE JSC 10588 PA	CROSSFE NG THE C OULD BE DETERMIN S DO NOT T USE TH	ED. LOSS ROSSFEED RIGHT IF E VALVE I MENTION	S OF ALL SYSTEM I SENSORS POSITION THIS ANI	ED AND REDUN REDUNDANCY RESULTING IN CAN BE USED BUT FLIGH	DANT VALVE IS COULD RESULT LOSS OF REDUNDANTLY T AND

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-462		NASA DATA: BASELINE [ ] NEW [ X ]				
SUBSYSTEM: MDAC ID: ITEM:	OMS 462 DRIVER, HYBRID		42	a kanangan sa s <del>a</del>			
LEAD ANALYST:	W.A. HAUFLER						
ASSESSMENT:				and the second second			
FLIGH:				CIL ITEM			
HDW/FUI	NC A	ВС					
NASA [ 3 /3 IOA [ 3 /2R	] [ P ] [	P ] [ P	]	[ ] *			
COMPARE [ /N	] [N][	и] [и	]	[ ]			
RECOMMENDATIONS:	(If different i	rom NASA)					
[ 3 /2R	] [P] [	P ] [ P		[ ] D/DELETE)			
	RATIONALE: (If app	A	DEQUATE DEQUATE	[ ]			
USED TO COMPLETE IN FALSELY FAILING MISSION. NASA WO TO TALKBACKS TO NALFUNCTION PROCE	LVE DECLARED FAILE CROSSFEED. LOSS NG THE CROSSFEED SOULD BE RIGHT IF SOULD BE RIGHT IF SOULD BE TALKBAGE 5-18.	OF ALL RED SYSTEM RESU SENSORS CAN DSITION. B THIS AND OM	UNDANCY C LTING IN BE USED UT FLIGHT S FIRING	OULD RESULT LOSS OF REDUNDANTLY AND			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-463 05-6L-2	204-1	NASA DATA BASELINE NEW								
SUBSYSTEM: MDAC ID: ITEM:	OMS 463 DRIVER,										
LEAD ANALYST:	W.A. HA	UFLER									
ASSESSMENT:											
CRITICAL FLIGH	CIL ITEM										
	NC	A	В	С	TIEM						
NASA [ 3 /3 IOA [ 3 /2R	] [	P ] [	P ] [	<b>P</b> ]	[ ].*						
COMPARE [ /N	] [	и ] [	и ] [	<b>N</b> ]	[ ]						
RECOMMENDATIONS:	(If d	ifferent :	from NASA	)							
[ 3 /2R	] [	P ] [	Þ ] [	P ] (A	[ ] DD/DELETE)						
* CIL RETENTION	RATIONAL	E: (If app	plicable)								
			I	ADEQUATE NADEQUATE	•						
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.											

ASSESSMEN ASSESSMEN NASA FME	<b>):</b>	OMS-464								1.77		DATA: LINE NEW		]				
SUBSYSTEM MDAC ID:				OMS 464 DRIVER, HYBRID														
LEAD ANA	LYS	ST:	:	W.	.A. I	IAI	JFI	LER										
ASSESSMENT:																		
CRITICALITY REDUNDANCY SCREENS FLIGHT									CIL									
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NASA IOA		3 3	/3 /2R	]		[	P	]	]	p	]	[	P	]		[	]	*
COMPARE	[		/N	]		[	N	]	[	N	]	[	N	]		[	]	
RECOMMEN	DA?	ric	ONS:		(If	d:	if	fere	nt i	fro	om 1	NASA	)					
	[	3	/2R	]		[	Þ	]	ſ	P	]	[	P	]	(AI	[ DD/DI	] ELE	TE)
* CIL RE	TEI	n <b>T</b> I	ION :	RA!	TION	ALI	E:	(If	apı	<b>ol</b> :	ical		ΑI	DEQU	ATE ATE	[	]	
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.																		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-465	BASELI N	BASELINE [ ] NEW [ X ]								
SUBSYSTEM: MDAC ID: ITEM:	OMS 465 DRIVER, HYBRID										
LEAD ANALYST:	W.A. HAUFLER										
ASSESSMENT:											
CRITICAL FLIGH HDW/FU	CIL ITEM										
NASA [ 3 /3 IOA [ 3 /2R	] [ ] ]	[	[ ] *								
COMPARE [ /N	] [ N ]	[ и ] [ и ]	[ ]								
RECOMMENDATIONS:	(If different	from NASA)									
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* CIL RETENTION	RATIONALE: (If a	applicable) ADEQUAT INADEQUAT									
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.											

ASSESS ASSESS NASA	SMEN SMEN FME	T VT ¥	DA II	ATE:	1/01 OMS- 05-6	/88 466 L-2	3 22 C	)2-:	1	NASA DATA: BASELINE [ ] NEW [ X ]									
SUBSYS MDAC : ITEM:	D:				OMS 466 DRIV	ER,	. F	IYB)	RID										
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ASSESS	SMEI	VT:	;													ž.			
	(		FI	LIGHT	Г				UNDAN			REEN	s C			CIL			
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REMARI LOSS ( TALKBA VALVE CONSII NASA V TALKBA MALFUI SOFTWA DETERI BURN. PRESSI	OF ACK CLA CLA OERA NOUI ACKS NCTI ARE MINI JURE	TO OSI ATI LD S) CON DO TSI DI	ED ED BE TO VAI	REW REST	. WOULTING TERMING TO USE CLOSUING ANCE J	RSI F S NE NOI TH RE USI	EN VA VA VI VI	LOS LOS LOS LV MEN' SE' LA	E WOU SS OF RS CA E POS TION TALKB A PRE SOLAT	LD M IT: TH: AC: SSI	BE ISS ION IS KS. URE	FALS ION I USED BI AND ( PH) SENS	SEI DUI (1 UT OMS YSI SOI	E TO REDU FLI FLI CAL R, E	AILI SAF NDAN GHT RING LY C XCEP NOT	NG T ETY AND SEQ ANNO T DU CAUS	HE TO UEN T RIN E A	A O	R B
THERE	IS	NC	) F	LUII	O MOV	EME	rn:												

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SUBSYSTE MDAC ID:			OMS 467 DRIVE	ER, H	YBRI	D								
LEAD ANA	LYST	:	W.A.	HAUF	LER									
ASSESSME	ENT:													
	F	LIGH				idancy -					CI	L EM	Ī	
	HD	W/FU	INC	A	1	В		C	:					
NASA IOA	[ 3	/3	]	[ [.	]	[	]	[	]		[ [		]	*
COMPARE	[	/	]	[	]	[	]	[	]		[		]	
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•	[	/	]	[	]	[	]	[	]	(Al	] \QC	/DE	] ELE	ETE)
* CIL RI	ETENT	NOI	RATION	VALE:	(If	appl	icab	A	DEQUAT		[		]	
REMARKS	:							TMM	DECONT	. <b>.:</b> .	L		7	

NO DIFFERENCES.

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SUBSYSTE MDAC ID: ITEM:			OMS 468 DRIVE	R, H	YBRI	D							
LEAD ANA	LYS'	T:	W.A. 1	HAUF	LER								
ASSESSME	NT:												
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			NC	A		E	3	C	3			2M	
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COMPARE	[	/	1	[	]	[	]	[	]		[	)	
RECOMMEN	IDAT	ions:	(If	dif:	fere	nt fr	om N	ASA)					
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REMARKS:		CEC											

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SUBSYSTE MDAC ID:	M:		OMS 469 DRIVE					,	•							
LEAD ANA	LYS	r:	W.A.	HAI	JF:	LER										
ASSESSME	NT:															
	1	FLIGH'					DAN			EEN				CIL		
	H	DW/FU	NC		A			В			С					
NASA IOA	[	3 /3 3 /2R	]	[	P	]	[ [	P	]	[	P	]		[	] *	
COMPARE	[	/N	]	[	N	]	[	N	]	[	N	]		[	]	
RECOMMEN	DAT:	ions:	(If	d	if	fere	nt	fr	om N	ASA	)					
•	[	3 /2R	]	[	P	]	[	P	]	[	P	]	(A)		) ELET	E)
* CIL RE		TION	RATION	AL	E:	(If	ap	pl.	icab		Αl	DEQUA	ATE ATE	[	]	
REMARKS: LOSS OF TALKBACK VALVE CI CONSIDER NASA WOU TALKBACK MALFUNCT SOFTWARE DETERMIN BURN. J PRESSURE THERE IS	ALL C TO COSE RATI ULD CS) TION E DO UE V TUST E DI	CREWD RESONS. BE RITO DE PROCES NO ALVE CLOS	GHT IF TERMIN S DO N T USE CLOSUF ING A	ST SIE OT TH E TA	C N VA M ES VI NK	ASE LOSS SORS LVE ENTICE TA A A ISO OWNS	WOU OF CA POS ON LKE PRE LAT	N IT TH AC SS	BE USSI	FAL ION USED AND PH SEN ALVE	SE DU UT OM YS SO	LY FI E TO REDUI FLIC S FI ICALI R, E	AILI SAF NDAN GHT RING LY C XCEP	NG T ETY TLY AND SEQ ANNO T DU CAUS	THE A TO QUENC OT URING SE A	ER A

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-470 05-6L-2202-1	NASA DAT BASELIN NE	
SUBSYSTEM: MDAC ID: ITEM:	OMS 470 DRIVER, HYBRID	, <del></del>	
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:			
CRITICAL: FLIGHT HDW/FUI			CIL ITEM
NASA [ 3 /3 IOA [ 3 /2R	] [ p ]	[ ] [ ]	[ ] *
COMPARE [ /N	] [ N ]	[ N ] [ N ]	[ ]
RECOMMENDATIONS:	(If different	t from NASA)	
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* CIL RETENTION I	RATIONALE: (If a	applicable) ADEQUATE INADEQUATE	[ ]
TALKBACK TO CREW VALVE CLOSED RESU CONSIDERATIONS. NASA WOULD BE RICE TALKBACKS) TO DETALKBACKS) TO DETERMINE DOES NOT DETERMINE VALVE OBURN. JUST CLOSE	WORST CASE WOULTING IN LOSS OF THE SENSORS OF THE S	CAN BE USED (REDUNDA DITION. BUT FLIGHT N THIS AND OMS FIRIN KBACKS. PHYSICALLY RESSURE SENSOR, EXCE ATION VALVE WILL NOT REAM (UNLESS BURNING	ING THE A OR B FETY  NTLY TO AND G SEQUENCER CANNOT PT DURING A CAUSE A

ASSESSME NASA FME	NT ID:	: ON	(S-471	02-2			Г	BASELI N	NE		]
SUBSYSTE MDAC ID:	M:	ON 47 DF		HYBRI	D						
LEAD ANA	LYST:	W.	A. HAU	FLER							
ASSESSME	NT:										
	CRITIC	CALITY IGHT	Z.	REDUN	DANCY	SCR	EENS			CIL	
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	OMS-473 05-6L-2202-2	BASELII	
SUBSYSTEM: MDAC ID: ITEM:	OMS 473 DRIVER, HYBRID		
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:	•		
CRITICAL FLIGH	ITY REDUND	ANCY SCREENS	CIL ITEM
HDW/FU		ВС	
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ASSESSME ASSESSME NASA FME	NT II	ATE:		88 74 -20	04-1						A DAT SELIN NE			]	
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SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

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SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

MOTOR AND ACTUATION MECHANISM SHALL NOT FAIL AS A RESULT OF

PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430

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SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

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PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430

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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				1/01/88 OMS-479 05-6L-2002-1					NASA DATA: BASELINE [ NEW [ X							]	
SUBSYSTEM: MDAC ID: ITEM:				OMS 479 FUSE	, 1	A											
LEAD AND	ALYS	ST:	:	W.A.	HA	UF	LER										
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SUBSYSTEM: MDAC ID: ITEM:	OMS 480 FUSE,	1A			÷ . •	<del></del> .	• • • • • • • • • • • • • • • • • • • •
LEAD ANALYST:	W.A.	HAUFLE	ER				
ASSESSMENT:							
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SUBSYSTEM: MDAC ID: ITEM:	OMS 482 RELAY			ili mi	
LEAD ANALYST:					
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NASA DATA:

ASSESSMENT DATE: 1/01/88

ASSESSMENT ID: NASA FMEA #:	OMS-483 05-6L-2131-2	BASELINE ( NEW ( X	
	OMS 483 RELAY		
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:			
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		в с	
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IOA RECOMMENDS TO CRITICALITY THUS UNRELATED FAILUR INTERPRETATION OF COULD CAUSE CONTO THE SIGNAL THROUTHE VALVES SCENARIO WITH AN IRRELEVANT. A BE COMPONENTS AND WHEN THE VALVE METAILURE DOES NOTO FAILURE.	REDUCED, SINCE IT E" WHICH IS BEYOND F NSTS 22206. NAS INUOUS POWER ON TH GH THIS ITEM WOULD REACH FULL CLOSED OTHER FAILURE CONS LLOWS RUPTURE ANYT ALVE MOTOR TO PROFOTOR IS CONTINUOUS SIGNIFICANTLY CON RMORE, THE VALVES	E SHOULD NOT BE CONSIDE CONSTITUTES A "MULTIPE THE SCOPE OF IOA'S A IS RIGHT THAT THIS FASSOCIATED VALVE(S), INHIBIT CLOSING OR OPE OR OPEN. HOWEVER, NASA SISTING OF BELLOWS RUPTURINE EXPOSING ELECTRICAL PELLANT IS SERIOUS, NOT ELY ON AND HOT. THAT IS TRIBUTE TO THE BELLOWS ARE PROTECTED FROM CONTITOFF DEVICE WITHIN THE	LE ALLURE SINCE CNING A'S ORE IS JUST S, THIS RUPTURE

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.

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ASSESSMENT DATE: 1/01/88 NASA DATA: ASSESSMENT ID: OMS-485 BASELINE [ NEW [ X ] NASA FMEA #: 05-6L-2130-2 SUBSYSTEM: OMS MDAC ID: 485 ITEM: RELAY LEAD ANALYST: W.A. HAUFLER ASSESSMENT: REDUNDANCY SCREENS CIL CRITICALITY ITEM FLIGHT HDW/FUNC Α В C [ P ] [ F ] [ P ] [X] \* [P] [P] NASA [ 2/1R ] [ P j IOA [ 3 /2R ] COMPARE [ N /N ] [ ] [ N ] [ ] [ N ] RECOMMENDATIONS: (If different from NASA) [3/2R] [P] [F] [P] (ADD/DELETE) \* CIL RETENTION RATIONALE: (If applicable) ADEQUATE INADEOUATE **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

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

WHEN THE VALVE MOTOR IS CONTINUOUSLY ON AND HOT. THAT IS, THIS FAILURE DOES NOT SIGNIFICANTLY CONTRIBUTE TO THE BELLOWS RUPTURE

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

FURTHERMORE, THE VALVES ARE PROTECTED FROM CONTINUOUS

NASA FMEA #: 05-					OMS-486 05-6L-2130-1				NASA DATA: BASELINE [ ] NEW [ X ]							. <u></u> w.		
SUBSYST MDAC ID ITEM:				OMS 486 RELAY	Z.									:1.				
LEAD AN	ALYS	ST	:	W.A.	HAU	FI	LER				– .			TVE				
ASSESSM	ENT:	:														÷		2 <sup>*</sup> * .
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NASA IOA	[	3	/1R /2R	]	[	P P	]	[ [	P F	]		[	P P	]		[ x	]	*
COMPARE	[		/N	]	[		]	[	N	]		[		]		[ N	]	
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NASA DATA:

ASSESSMENT DATE: 1/01/88

ASSESSMENT ID: NASA FMEA #:	OMS-487 05-6L-2131-2	[ x ]	
SUBSYSTEM:	OMS 487 RELAY		
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:			
	ITY REDUNDAN		CIL ITEM
FLIGH HDW/FU	NC A	ВС	IIEM
NASA [ 3 /1R IOA [ 3 /3	] [ P ] [	F ] [ P ]	[ X ] * [ ]
COMPARE [ /N	ן [ א ]	N ] [ N ]	[и]
RECOMMENDATIONS:	(If different	from NASA)	
[ 3 /3	] [][	] [ ] (AD	[ D ] D/DELETE)
	RATIONALE: (If ap	plicable) ADEQUATE INADEQUATE	[ ]
CRITICALITY THUS UNRELATED FAILUR INTERPRETATION O COULD CAUSE CONT THE SIGNAL THROU WHEN THE VALVES SCENARIO WITH AN IRRELEVANT. A BE COMPONENTS AND V WHEN THE VALVE M FAILURE DOES NOT FAILURE. FURTHE POWER BY AN ELEC	REDUCED, SINCE I E" WHICH IS BEYON F NSTS 22206. NA INUOUS POWER ON T GH THIS ITEM WOUL REACH FULL CLOSED OTHER FAILURE CON LLOWS RUPTURE ANY ALVE MOTOR TO PRO OTOR IS CONTINUOU SIGNIFICANTLY CO RMORE, THE VALVES TRICAL THERMAL SH	RE SHOULD NOT BE CONT CONSTITUTES A "MULD THE SCOPE OF IOA'S SA IS RIGHT THAT THI HE ASSOCIATED VALVE (D INHIBIT CLOSING OR OPEN. HOWEVER, SISTING OF BELLOWS RIME EXPOSING ELECTR PELLANT IS SERIOUS, SLY ON AND HOT. THAN TRIBUTE TO THE BELL ARE PROTECTED FROM UTOFF DEVICE WITHIN ACCORDING TO THE SF	TIPLE S FAILURE S), SINCE OPENING NASA'S RUPTURE IS RICAL NOT JUST AT IS, THIS LOWS RUPTURE CONTINUOUS THE VALVE

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.

	1/01/88 OMS-488 05-6L-2130-	-1		[ x ]
MDAC ID:	OMS 488 RELAY		em st e	***
LEAD ANALYST:	W.A. HAUFLE	ER	÷	
ASSESSMENT:				
CRITICALI FLIGHT HDW/FUN	•	DUNDANCY SCREEN B	S C	CIL ITEM
•		_		
NASA [ 3 /1R IOA [ 3 /2R	] [ P ]	[ F ] [ [ F ] [	P ] P ]	[ X ] *
COMPARE [ /N	] [ ]	[ ] [	]	[ ]
RECOMMENDATIONS:	(If diffe	erent from NASA	)	
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REMARKS: IOA AGREES WITH T	THIS NASA FM	EA		egist the egg that the

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NASA DATA:

ASSESSMENT DATE: 1/01/88

ASSESSMENT ID: NASA FMEA #:		BASELINE NEW	[ X ]
MDAC ID:	OMS 489 RELAY		
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:			
	ITY REDUNDA	NCY SCREENS	CIL ITEM
FLIGH HDW/FU	NC A	В С	IIEM
NASA [ 2 /1F IOA [ 3 /2F	[ P ] [ P ]	[ F ] [ P ] [ P ] [ P ]	[ X ] *
COMPARE [ N /N	] [ ]	[и] [и]	[ N ]
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CRITICALITY THUS UNRELATED FAILUR INTERPRETATION OF COULD CAUSE CONT THE SIGNAL THROUGH THE VALVES SCENARIO WITH AN IRRELEVANT. A BE COMPONENTS AND OF WHEN THE VALVE OF FAILURE DOES NOT FAILURE. FURTHER POWER BY AN ELECT MOTOR AT NO MORE MOTOR AND ACTUAT	REDUCED, SINCE TO THE WHICH IS BEYONDER WHICH IS BEYONDER ON THE WOULD REACH FULL CLOSE TO THE FAILURE CONTINUOUS RUPTURE AND THE WALVE MOTOR IS CONTINUOUS SIGNIFICANTLY CONTINUOUS THE VALVE TRICAL THERMAL SETHICAL THERMAL THERMAL THERMAL SETHI	INADEQUATE  URE SHOULD NOT BE CON  IT CONSTITUTES A "MUIN  ND THE SCOPE OF IOA'S  ASA IS RIGHT THAT THE  THE ASSOCIATED VALVE  LD INHIBIT CLOSING OF  D OR OPEN. HOWEVER,  NSISTING OF BELLOWS IN  YTIME EXPOSING ELECTION  OPELLANT IS SERIOUS,  USLY ON AND HOT. THE  ONTRIBUTE TO THE BELLOW  S ARE PROTECTED FROM  HUTOFF DEVICE WITHIN  ACCORDING TO THE SIMPLE  ELE AC MOTOR VALVE SPIN	NSIDERED AND LTIPLE S IS FAILURE (S), SINCE R OPENING NASA'S RUPTURE IS RICAL NOT JUST AT IS, THIS LOWS RUPTURE CONTINUOUS THE VALVE PECS, "THE SULT OF

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-490 NASA FMEA #: 05-6L-2							.27	7-1	-								DA ELI N		[	x	]	
SUBSYSTE MDAC ID:				OM 49 RE																		
LEAD ANA	LYS	ST	:	W.	А. Н	ΑÜ	FI	ER	t							÷						
ASSESSME	ENT	:																				
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NASA IOA	[	2	/1F /3	? ] ]		[	P	]		[	P	]		[	P	]			[	X	]	*
COMPARE	[	N	/N	]		[	N	]		[	N	]		[	N	]			[	N	]	
RECOMMEN	NDA:	rI(	ons:	:	(If	di	ff	fer	ent	: 1	fro	m	NAS	A)	)							
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REMARKS:		W	ITH		s na																	
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NASA DATA:

ASSESSMENT DATE: 1/01/88

NASA FMEA #:	OMS-491 05-6L-2127-2	NEV	A [ X ]
MDAC ID:	OMS 491 RELAY		
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:			
CRITICAL FLIGH		ANCY SCREENS	CIL ITEM
	NC A	В С	
NASA [ 3 /1R IOA [ 3 /3	[ P ] ] [ ]	[ F ] [ P ] [ ] [ ]	[ X ] * [ ]
COMPARE [ /N	] [ N ]	[и] [и]	[ N ]
RECOMMENDATIONS:	(If differen	t from NASA)	
. [ /	] [ ]	[ ] [ ]	[ ] ADD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicable) ADEQUATE INADEQUATE	[ ]
THAT BELLOWS FAI FIELD, SINCE IT IS BEYOND THE SC IS RIGHT THAT TH ASSOCIATED VALVE INHIBIT CLOSING OPEN. HOWEVER, OF BELLOWS RUPTU EXPOSING ELECTRI SERIOUS, NOT JUS	LURE SHOULD NOT CONSTITUTES A "" OPE OF IOA'S ING IS FAILURE COULT (S), SINCE THE COR OPENING WHEN NASA'S SCENARIO RE IS IRRELEVANG CAL COMPONENTS OF WHEN THE VALVE	ND SCREENS, BUT IOA I BE CONSIDERED IN THI MULTIPLE UNRELATED FOR TERPRETATION OF NSTS D CAUSE CONTINUOUS POSIGNAL THROUGH THIS THE VALVES REACH FUT WITH ANOTHER FAILURI T. A BELLOWS RUPTURI AND VALVE MOTOR TO POSIGNED TO POSIGNITION OF THE MOTOR IS CONTINUOUS S NOT SIGNIFICANTLY	RECOMMENDS E EFFECTS AILURE" WHICH 22206. NASA OWER ON THE ITEM WOULD LL CLOSED OR E CONSISTING E ANYTIME ROPELLANT IS

3.2.1.2.11.

THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE

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,

PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	NASA DATA: BASELINE [ ] NEW [ X ]								
MDAC ID:	OMS 492 RELAY								
LEAD ANALYST:	W.A. HAUFLER								
ASSESSMENT:									
CRITICAL FLIGH HDW/FU	SCREENS CIL ITEM								
NASA [ 3 /1R IOA [ 3 /1R	[ P ] [ NA ] [ P ] [ F	A] [P] []* ] [P] [X]							
COMPARE [ /	] [ ] [ N	] [ ] [ N ]							
RECOMMENDATIONS:	(If different fro	om NASA)							
[ 3 /1R	] [P] [F	] [P] [A] (ADD/DELETE)							
* CIL RETENTION	RATIONALE: (If appli	icable) 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.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-493 05-6L-2126-2	NASA DATA: BASELINE [ ] -2 NEW [ X ]						
SUBSYSTEM: MDAC ID:	OMS 493 RELAY							
LEAD ANALYST:	W.A. HAUFLER							
ASSESSMENT:								
	TTY REDUNDANCY	SCREENS	CIL					
FLIGHT HDW/FUN		· c	ITEM					
NASA [ 2 /1R IOA [ 3 /3	] [P] [F]	] [ P ] ] [ ]	[ X ] *					
COMPARE [ N /N	] [N][N	] [N]	[ N ]					
RECOMMENDATIONS:	(If different fr	om NASA)						
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	RATIONALE: (If appl	icable) ADEQUATE INADEQUATE	[ ]					
THAT BELLOWS FAIR FIELD, SINCE IT OF IS BEYOND THE SCOOL IN THAT THE INTERPOLUTION OF BELLOWS RUPTUR EXPOSING ELECTRIC SERIOUS, NOT JUST THE BELLOWS RUPTUR IN THE BELLOWS RUPTU	NASA'S CRITS AND S LURE SHOULD NOT BE CONSTITUTES A "MULT OPE OF IOA'S INTERP IS FAILURE COULD CA (S), SINCE THE SIGN OR OPENING WHEN THE NASA'S SCENARIO WIT RE IS IRRELEVANT. CAL COMPONENTS AND I WHEN THE VALVE MO HIS FAILURE DOES NO URE FAILURE. FURTH	CONSIDERED IN THE IPLE UNRELATED FATE RETATION OF NSTS 2 USE CONTINUOUS POWAL THROUGH THIS IT VALVES REACH FULLY A BELLOWS RUPTURE VALVE MOTOR TO PROTOR IS CONTINUOUS IT SIGNIFICANTLY COERMORE, THE VALVES	EFFECTS LURE" WHICH 22206. NASA WER ON THE TEM WOULD L CLOSED OR CONSISTING ANYTIME DPELLANT IS LY ON AND ONTRIBUTE TO					

3.2.1.2.11.

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,

ASSESSMENT DATE: ASSESSMENT ID:	1/01/88 OMS-494		NASA DATA: BASELINE [ ]							
	05-6L-21	27-1			[ x ]					
MDAC ID:	OMS 494 RELAY		•							
LEAD ANALYST:	W.A. HAU	FLER								
ASSESSMENT:										
CRITICAL: FLIGHT		REDUNDAN	NCY SCREI	ens	CIL ITEM					
HDW/FUI		<b>À</b> , ,	В	C   Fig.	- <b> </b>					
NASA [ 2 /1R IOA [ 3 /3	] [	P ] [	[ P ] [ ]	[ P ] [ ]	[ X ] *					
COMPARE [ N /N	] [ ]	и] [	[ и ]	[ N ]	[ N ]					
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)						
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* CIL RETENTION 1	RATIONALE	: (If ar	plicable	ADEQUATE						
REMARKS:				INADEQUATE	[ ]					
IOA AGREES WITH	THIS NASA	FMEA .		Berling of the Berling State of State o	girti National (National Asset)					

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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-495 05-6L-2	127-2	NASA DATA: BASELINE [ ] NEW [ X ]						
MDAC ID:	OMS 495 RELAY								
LEAD ANALYST:	W.A. HA	UFLER							
ASSESSMENT:									
CRITICAL FLIGH	ITY T	REDUNDA	NCY SCRE	ENS	CIL ITEM				
	NC	A	В	С	1111				
NASA [ 3 /1R IOA [ 3 /3	] [	P ]	[ F ] [ ]	[ P ] [ ]	[ X ] * [ ]				
COMPARE [ /N	] [	N ]	[ N ]	[ N ]	[ N ]				
RECOMMENDATIONS: (If different from NASA)									
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* CIL RETENTION	RATIONAL	E: (If a	pplicabl	e) ADEQUATE INADEQUATE	[ ]				
REMARKS: IOA CONCURS WITH THAT BELLOWS FAI FIELD, SINCE IT IS BEYOND THE SO IS RIGHT THAT TH ASSOCIATED VALVE INHIBIT CLOSING OPEN. HOWEVER, OF BELLOWS RUPTU EXPOSING ELECTRI SERIOUS, NOT JUST HOT. THAT IS, THE BELLOWS RUPTU PROTECTED FROM OF	CURE SHO CONSTITU COPE OF I IS FAILU (S), SIN OR OPENI NASA'S S RE IS IR CAL COMP THIS FAIL URE FAIL CONTINUOU	ULD NOT TES A "M OA'S INT RE COULD CE THE S NG WHEN CENARIO RELEVANT PONENTS A THE VALVE JURE DOES JURE. FU	BE CONSICULTIPLE CERPRETATE CAUSE CONTINUE THE VALVE WITH ANO C. A BEL AND VALVE MOTOR I S NOT SIG URTHERMOR BY AN EL	DERED IN THE UNRELATED FATION OF NSTS CONTINUOUS POTENTIAL THE PAILURE LOWS RUPTURE OF TO PROBLEM TO PROBLEM TO THE PAILURE OF THE VALV	EFFECTS LLURE" WHICH 22206. NASA WER ON THE TEM WOULD L CLOSED OR CONSISTING ANYTIME OPELLANT IS LY ON AND CONTRIBUTE TO				

SEE AC MOTOR VALVE SPEC MC284-0430 SECT. 3.1, 3.2.1.2.9,

3.2.1.2.11.

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SUBSY MDAC ITEM:	ID:	M:			OMS 496 REI	5														•
LEAD	ANA	LYS	ST	:	W.Z	۱. F	JAI	JFI	ER											
ASSES	SSME	NT	:															-		
			FI	CAL	r				DUN	DAN		SCR	REENS				CI IT			
		1	HDV	V/FUI	NC			A			В			С						
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-497 05-6L-2126-2	NASA DATA: BASELINE [ ] NEW [ X ]
MDAC ID:	OMS 497 RELAY	
LEAD ANALYST:	W.A. HAUFLER	
ASSESSMENT:		
FLIGH	ITY REDUNDA T NC A	ANCY SCREENS CIL ITEM B C
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NASA [ 2 /1R IOA [ 3 /3	] [ P ] ] [ ]	[F] [P] [X]* [] []
COMPARE [ N /N	] [ N ]	[ N ] [ N ]
RECOMMENDATIONS:	(If different	t from NASA)
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* CIL RETENTION	RATIONALE: (If a	applicable) ADEQUATE [ ] INADEQUATE [ ]
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3.2.1.2.11.

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,

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ASSESSMENT DATE: 1/01/88

NASA DATA:

ASSESSMENT ID: OMS-499 BASELINE [ NEW [ X ] 05-6L-2131-2 NASA FMEA #: SUBSYSTEM: OMS MDAC ID: 499 RELAY ITEM: W.A. HAUFLER LEAD ANALYST: ASSESSMENT: CRITICALITY REDUNDANCY SCREENS CIL ITEM FLIGHT В HDW/FUNC Α [ 3 / 1R ][ P ] [ F ] NASA IOA [3/3][ N ] [ N ] [ N ] [N]COMPARE [ /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.

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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-501 05-6L-2130-2	NASA DATA: BASELINE [ ] NEW [ X ]
MDAC ID:	OMS 501 RELAY	
LEAD ANALYST:	W.A. HAUFLER	
ASSESSMENT:		
CRITICAL: FLIGH	ITY REDUNDANCY SCRE	ENS CIL ITEM
	NC A B	С
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SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

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PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

ASSESSMENT DATE: 1/01/88

NASA DATA:

ASSESSMENT ID: NASA FMEA #:	OMS-504 05-6L-2			BASELINE NEW	[ x ]					
SUBSYSTEM: MDAC ID: ITEM:	OMS 504 RELAY									
LEAD ANALYST:	W.A. HA	UFLER								
ASSESSMENT:					mark of the second of the seco					
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HDW/FU		A	В	C	IILM					
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- Albert -

NASA DATA: ASSESSMENT DATE: 1/01/88 BASELINE [ ASSESSMENT ID: NEW [ X ] NASA FMEA #: 05-6L-2130-2 SUBSYSTEM: OMS 505 MDAC ID: ITEM: RELAY LEAD ANALYST: W.A. HAUFLER ASSESSMENT: REDUNDANCY SCREENS CIL CRITICALITY ITEM FLIGHT C HDW/FUNC В [ P ] NASA [ 2/1R ] [ b ] [ F ] [ P ] (X) \* [ P ] IOA [ 3 /2R ] [ P ] [N/N] [N] [ COMPARE ] 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.

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NASA DATA:

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/01/88 OMS-507 05-6L-2127-2	NASA I BASEI	DATA: LINE [ ] NEW [ X ]
SUBSYSTEM: MDAC ID: ITEM:	OMS 507 RELAY		
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:			
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PROTECTED FROM CONTINUOUS POWER BY AN ELECTRICAL THERMAL SHUTOFF

THE BELLOWS RUPTURE FAILURE. FURTHERMORE, THE VALVES ARE

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.

ASSESSME	ASSESSMENT DATE: 1/01/8 ASSESSMENT ID: OMS-50 NASA FMEA #: 05-6L- SUBSYSTEM: OMS							5-1								ASA DAT. BASELIN NE	E	[	x	]		
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ASSESSMENT DATE: 1/01/88

ASSESSMENT ID: NASA FMEA #:	OMS-509 05-6L-2126-2	BASELINE NEW	[ ] [ X ]
MDAC ID:	OMS 509 RELAY		
LEAD ANALYST:	W.A. HAUFLER		
ASSESSMENT:			
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3.2.1.2.11.

ASSESSMENT DATE: 1/01/88

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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.

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NASA DATA:

ASSESSMENT DATE: 1/01/88

ASSESSMI NASA FMI	ENT I EA #:	D:	OMS- 05-6	512 L-21	27-2				BASEL:	INE NEW			
SUBSYSTI MDAC ID: ITEM:	EM:		OMS 512 RELA										
LEAD ANA	ALYST	1;	W.A.	HAU	FLER	-							
ASSESSMI	ENT:												-
		'ICAL 'LIGH'		1	REDUN	DANCY	SCI	REENS			CII		
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INHIBIT OPEN. I OF BELLA EXPOSING SERIOUS	CLOS HOWEV DWS R G ELE , NOT	ER, UPTU CTRI UUS	OR OP NASA' RE IS CAL C T WHE	ENING S SCI IRRI OMPOI N TH	G WHE ENARI ELEVA NENTS E VAL	N THE O WITH NT. AND VE MO	VAI H AN A BI VALV I'OR	LVES R NOTHER ELLOWS /E MOTO IS CO	EACH I FAILU RUPTU OR TO NTINUO	FULI JRE JRE PRO DUSI	CON ANY PEI Y (	LOSI ISI ITII LLAI ON	ED OR STING ME NT IS AND
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ASSESSMEN ASSESSMEN NASA FMEA	T	II	):					L26	5-1									DATA LINE NEW	[		]		
SUBSYSTEM MDAC ID: ITEM:					OM 51 RE																		
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ASSESSMEN NASA FMEA		OMS-514 05-6L-20			BASELINE NEV	
SUBSYSTEM MDAC ID: ITEM:	-	OMS 514 RESISTOR	R, 1.2K	1/4W		
LEAD ANAI	LYST:	W.A. HAU	JFLER			
ASSESSMEN	NT:					
C	CRITICAL FLIGH	ITY T	REDUNDA	ANCY SCRE	EENS	CIL ITEM
	HDW/FU		A	В	С	_ :
NASA IOA	[ 2 /1R [ 3 /2R	] [	P ] F ]	[ P ] [ P ]	[ P ] [ P ]	[ X ] * [ X ]
COMPARE	[ N /N	] [	N ]	[ ]	[ ]	[ ]
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	[ 3 /2R	] [	P]	[ P ]	[ P ]	[ D ] ADD/DELETE)
* CIL RET	TENTION 1	RATIONALE	E: (If a	applicabl	e) ADEQUATE INADEQUATE	[ ]
CRITICALI UNRELATEI INTERPRE	ITY THUS FAILUR FATION O	REDUCED, E" WHICH F NSTS 22	SINCE IS BEYO 206. 1	IT CONST OND THE S NASA IS F	TITUTES A "MU SCOPE OF IOA' RIGHT THAT TH	S HIS FAILURE
THE SIGNATION THE SCENARIO	AL THROUGH VALVES WITH AN	GH THIS I REACH FUI OTHER FAI	TEM WOU LL CLOSI LURE CO	JLD INHIE ED OR OPE ONSISTING	OCIATED VALVE BIT CLOSING OF EN. HOWEVER, G OF BELLOWS	OR OPENING NASA'S RUPTURE IS
COMPONENT WHEN THE FAILURE I	TS AND V. VALVE MODOES NOT	ALVE MOTO OTOR IS O SIGNIFIO	OR TO PICONTINUO CANTLY (	ROPELLANT DUSLY ON CONTRIBUT		NŌT JUST HAT IS, THIS LLOWS RUPTURE
POWER BY MOTOR AT	AN ELECTION NO MORE	TRICAL THE	IERMAL S	SHUTOFF D	ROTECTED FROM DEVICE WITHIN DING TO THE S FAIL AS A RE	THE VALVE
						. –

PROLONGED POWER APPLICATION." SEE AC MOTOR VALVE SPEC MC284-0430

SECT. 3.1, 3.2.1.2.9, 3.2.1.2.11.

ASSESSME ASSESSME NASA FME	NT ID:	: 1/01/ OMS-5 NONE						ASA DATA BASELIN NE		]	
SUBSYSTEM MDAC ID:	M:	OMS 515 RESIS	STOR,	1.2	K 1/4V						
LEAD ANA	LYST:	W.A.	HAUF	LER							
ASSESSME	NT:										
	CRITICA FLIG		R	EDUN	DANCY	SCR	EENS		CII		
	HDW/F		A		В		C	!	111	311	
NASA IOA	[ 3 /3	]	[ .	]	[	]	[	]	[	]	*
COMPARE	[ N /N	]	[	]	[	]	ι.	]	[	]	
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REMARKS:	. IOA	IDENTI	FIED .	A NO	NCRED	BLE	FAII	URE MOD	Ε.		

ASSESSME ASSESSME NASA FME	NT	II	<b>):</b>	O	MS-5		1-1				ASA BASE		[		
SUBSYSTE MDAC ID:					16	TOR,	12K	1/4W							
LEAD ANA	LYS	T:	:	W	.A.	HAUF	LER								
ASSESSME	NT:														
			[CAI LIGI		Y	RI	EDUN	DANCY	SCR	REENS			CII		
			V/FU			A		В		C	!				
NASA IOA	[ [	3 3	/3 /3	.]		[ [	]	[	]	[	]		[	]	*
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RECOMMEN	IDAT	'IC	ons:	:	(If	dif	fere	nt fr	om N	(ASA)					
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* CIL RE	ETEN	T	CON	RA	TION	ALE:	(If	appl.	icab	A	DEQU.	ATE	]	]	
REMARKS:	REN	ICI	ES.	- 5"	e a r				-						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-517 NONE		NASA DATA: BASELINE NEW	[	]
SUBSYSTEM: MDAC ID: ITEM:	OMS 517 RESISTOR, 12K	1/4W			
LEAD ANALYST:	W.A. HAUFLER				
ASSESSMENT:					
CRITICAL FLIGH HDW/FU	T	ANCY SCREEN	s c	CIL	1
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NASA [ / IOA [ 3 /2R	] [ ] [ F ]	[ P ] [	P ]	[ X	] *
COMPARE [ N /N	] [и]	[ N ] [	и ј	[ N	]
RECOMMENDATIONS:	(If differen	t from NASA	.)		
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* CIL RETENTION REMARKS:	RATIONALE: (If		ADEQUATE NADEQUATE	[	]
	DENTIFIED A NON	CREDIBLE FA	ILURE MODE		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		BASELINE NEW								
SUBSYSTEM: MDAC ID: ITEM:	OMS 518 RESISTOR, 5.1K 1/									
LEAD ANALYST:	W.A. HAUFLER									
ASSESSMENT:			· · · · · · · · · · · · · · · · · ·							
CRITICAL FLIGH	ITY REDUNDANC	Y SCREENS	CIL ITEM							
HDW/FU	· · · ·	<b>B C</b>								
NASA [ 3 /3 IOA [ 3 /2R	[ F ] [	P ] [ P ]	[ ] * [ X ]							
COMPARE [ /N	] [ и ] [	и] [и]	[ N ]							
RECOMMENDATIONS:	(If different f	rom NASA)								
[ 3 /2R	[ P ] [	P ] [ P ] (A	[ ] DD/DELETE)							
	RATIONALE: (If app	ADEQUATE								
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.										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-519 NONE				BASELINE NEW	[	]					
SUBSYSTEM: MDAC ID: ITEM:	OMS 519 RESISTOR,											
LEAD ANALYST:	W.A. HAUF	LER										
ASSESSMENT:												
CRITICAL	REDUNDA	NCY	SCREE	ens		CIL	CIL ITEM  [ ] * [ ]  [ ]  D/DELETE					
FLIGH HDW/FU		<b>L</b>	В		С		11.401	•				
NASA [ / IOA [ 3 /3	] [	]	[	]	[	]	[	]	*			
COMPARE [ N /N	] [	]	[	]	[	]	[	]				
RECOMMENDATIONS:	(If dif	ferent	fro	om NAS	SA)							
[ /	] [	]	[	]	[	] (Al	[ DD/DI	] ELE	TE:			
* CIL RETENTION	RATIONALE:	(If a	appl:	icable	AI	DEQUATE DEQUATE	[	]				
REMARKS: NO ISSUE. IOA I	DENTIFIED	A NONC	CRED	BLE I	FAIL	JRE MODE	•					

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	1/01/88 OMS-520 05-6L-2083-1	NASA BĀSI	DATA: ELIÑE [ ] NEW [ X ]						
SUBSYSTEM: MDAC ID: ITEM:									
LEAD ANALYST:	W.A. HAUFLER								
ASSESSMENT:	·								
CRITICA FLIG	LITY REDUND.	ANCY SCREENS	CIL ITEM						
	INC A	ВС							
NASA [ 2 /1] IOA [ 3 /2]	R ] [ P ]	[ P ] [ P ] [ P ] [ P ]	[ X ] * [ X ]						
COMPARE [ N /N	] [N]	[ ] [ ]	[ ]						
RECOMMENDATIONS	(If differen	t from NASA)	en en en en en en en en en en en en en e						
[ 3 /2]	[P]	[ P ] [ P ]	[ D ] (ADD/DELETE)						
	RATIONALE: (If	ADEQU	JATE [ ] JATE [ ]						
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.

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-521							NASA DATA: BASELINE [ NEW [								
NASA FME	Α :	#:		NOI	NE:					N	EW	L	1		
SUBSYSTE MDAC ID: ITEM:	M:			OMS 523 RES		1.2	2K 1/4V	<b>7</b>				٠			
LEAD ANALYST: W.A. HAUFLER															
ASSESSME	NT	:													
CRITICAL FLIGH					R	EDUN	IDANCY	SCR	REENS				CIL ITEM		
	1		W/FU		A	A		В		C					
NASA IOA	[	3	/3	]	[	]	[	]	[ [	]		[	]	*	
COMPARE	[	N	/N	]	[	]	[	]	[	]		[	]		
RECOMMEN	'DA'	ΓI	ons:		(If dif	fere	ent fro	om N	IASA)						
	[		/	]	[	]	[	]	[	]	(AI	[ DD/I	] DELE	TE)	
* CIL RE	TE	NT:	ION	RAT:	IONALE:	(If	appl:	icab	A	DEQUAT DEQUAT		[	]		
REMARKS:		I	OA I	DEN'	rified .	A NO	NCRED:	BLE	E FAIL	URE MO	DE.				

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: OMS-522 NASA FMEA #: 05-6L-2091-1								NASA DATA: BASELINE [ ] NEW [ X ]					
SUBSYSTEM MDAC ID:	M:		OMS 522 RESIS	STOR,	12K	1/4W	Ī		·				
LEAD ANA	LYST	<b>':</b>	W.A.	HAUF	LER								
ASSESSME	NT:												
•		'ICAL 'LIGH						EENS		CIL ITEM			
		W/FU		A		В		C	<b>3</b> .		A 2 -4 -		
NASA IOA	[ 3	/3	]	( (	]	[	]	[	]	[	]	*	
COMPARE	[	/	]	[	]	ξ	]		]	Ţ	]		
RECOMMEN	DATI	ons:	(I	f dif	fere	nt fr	om N	ASA)					
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REMARKS:	DFNC	ידיכ											