FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: M4-1BG-VP015-X

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC
REVISION : 1 11/12/91

| | PART NAME / VENDOR NAME | PART NUMBER / VENDOR NUMBER |
|---|---|---|
| ■ LRU : | VENT, O2 | V070-454721-002 |

PART DATA

□ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
VENT PORT, O2

■ REFERENCE DESIGNATORS: 40V45VP015

■ QUANTITY OF LIKE ITEMS: 1
ONE PER VEHICLE

□ FUNCTION:
PROVIDES VENTING CAPABILITY FOR O2 TANK ASSEMBLIES AS PART OF THE PRESSURE RELIEF SYSTEM.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: M4-1BG-VP015-01

SUBSYSTEM: ELECTRICAL POWER GENERATION - CRYO, GENERIC
REVISION# 1 11/12/91 R
LRU :VENT, O2
ITEM NAME: VENT, O2
CRITICALITY OF THIS FAILURE MODE:1R2

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■ FAILURE MODE:
PLUGGED OR RESTRICTED

MISSION PHASE:
PL PRELAUNCH
LO LIFT-OFF
OO ON-ORBIT
DO DE-ORBIT
LS LANDING SAFING

■ VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS
: 105 ENDEAVOUR

■ CAUSE:
CONTAMINATION

■ CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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■ REDUNDANCY SCREEN A) PASS
■ B) N/A
■ C) FAIL

PASS/FAIL RATIONALE:
■ A)

■ B)
REDUNDANCY SCREEN B - N/A SINCE PORT PROVIDES RELIEF PATH FOR TANK RELIEF VALVES WHICH ARE STANDBY REDUNDANT.

■ C)
REDUNDANCY SCREEN C - FAILS SINCE PORT PROVIDES RELIEF PATH FOR ALL O2 TANK ASSEMBLIES.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: M4-1BG-VP015-01

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- FAILURE EFFECTS -

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- (A) SUBSYSTEM:
  SUBSYSTEM DEGRADATION - LOSS OF O2 TANK RELIEF CAPABILITY.

- (B) INTERFACING SUBSYSTEM(S):
  NO EFFECT AFTER FIRST FAILURE

- (C) MISSION:
  NO EFFECT AFTER FIRST FAILURE

- (D) CREW, VEHICLE, AND ELEMENT(S):
  NO EFFECT AFTER FIRST FAILURE

- (E) FUNCTIONAL CRITICALITY EFFECTS:
  POSSIBLE LOSS OF CREW/VEHICLE DUE TO O2 TANK RUPTURE IF AN ADDITIONAL FAILURE RESULTS IN TANK OVERPRESSURIZATION.

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- DISPOSITION RATIONALE -

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- (A) DESIGN:
  45 MICRON FILTER SCREEN IN RELIEF VALVE. VENT PORT IS A 3/4 INCH FITTING WHICH CONNECTS TO A DYNATUBE FITTING AND THEN THROUGH SEVERAL FEET OF 1/2 INCH TUBING TO THE RELIEF VALVE. ALL CRES CONSTRUCTION. CAP IS INSTALLED DURING FERRY FLIGHT. RELIEF LINE IS ANGLED DOWNWARD TO THE PORT IN VERTICAL AND HORIZONTAL VEHICLE ORIENTATIONS TO PREVENT COLLECTION OF RAINWATER.

- (B) TEST:
  PLUMBING ASSEMBLY QUALIFICATION TEST INCLUDED: VIBRATION - RANDOM (0.01 G SQ/HZ MAXIMUM), SINUSOIDAL (+/- 0.25 G PEAK) AND ACOUSTIC (25 TO 8000 HZ, 130-148 DB) FOR 175 MISSION EQUIVALENT. 100 THERMAL CYCLES (AMBIENT/CRYO/+200 DEG F/AMBIENT/CRYO/AMBIENT).

  CRYO PLUMBING CLEANED AND VERIFIED TO LEVEL 200A BY PARTICLE COUNT AND NON-VOLATILE RESIDUE AFTER INSTALLATION. PREFLIGHT AND POST FLIGHT VISUAL CHECKS VERIFIED THAT VENT PORT IS OPEN.

  OMRSD: DURING TURNAROUND, PERFORM VISUAL INSPECTION. MONITOR RELIEF VALVE CRACK TEST FOR FLOW EVERY ORBITER MAINTENANCE DOWN PERIOD (OMDP) OR IF FLOW WAS REQUIRED DURING THE PREVIOUS FLIGHT.

- (C) INSPECTION:
  CONTAMINATION CONTROL

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE 20
NUMBER: M4-1BG-VP015-01

CLEANED TO LEVEL 200A, OF CLEANING SPECIFICATION, AND MAINTAINED DURING ASSEMBLY. VERIFIED BY INSPECTION ON MANUFACTURING ORDERS.

- (O) FAILURE HISTORY:
THERE HAVE BEEN NO ACCEPTANCE TEST, QUALIFICATION TEST, FIELD OR FLIGHT FAILURES ASSOCIATED WITH THIS FAILURE MODE.

- (E) OPERATIONAL USE:
NO CREW ACTION AFTER FIRST FAILURE. AFTER SECOND FAILURE, CREW WILL DEACTIVATE ASSOCIATED TANK HEATERS IN RESPONSE TO HIGH PRESSURE FAULT ANNUNCIATION.

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- APPROVALS -

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|---|---|---|
| RELIABILITY ENGINEERING | M. D. WEST | M D West for Oder |
| DESIGN ENGINEERING | M. M. SCHEIERN | M M Scheiern |
| QUALITY MANAGER | O. J. BUTTNER | for Oder |
| NASA RELIABILITY | | Tim Holtzschlager |
| NASA SUBSYSTEM MANAGER | | Harold Pierce 4/9/92 |
| NASA QUALITY ASSURANCE | | Jeff Williams for DP |