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PRINT DATE: 09/24/90

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 06-20-1123-X

S050260E
ATTACHMENT
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SUBSYSTEM NAME: LIFE SUPPORT

REVISION : 2 09/21/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	VALVE, PRESSURE RELIEF	ME284-0525-0001

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
VALVE, PRESSURE RELIEF/CHECK (BETWEEN TANKS A AND B)

REFERENCE DESIGNATORS: 90V62RV1

QUANTITY OF LIKE ITEMS: 1
ONE BETWEEN TANKS A AND B

FUNCTION:

CONTROLS FLOW OF WATER IN ORDER TO PREFERENTIALLY FILL SUPPLY WATER
STORAGE TANK A BEFORE FILLING REMAINING STORAGE TANKS. CHECKS FLOW
FROM TANK B TO A.

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SUBSYSTEM: LIFE SUPPORT
LRU :VALVE, PRESSURE RELIEF
ITEM NAME: VALVE, PRESSURE RELIEF

REVISION# 2 09/21/90 R

CRITICALITY OF THIS
FAILURE MODE:IR2

FAILURE MODE:
FAILS TO CLOSE, INTERNAL LEAKAGE

MISSION PHASE:
LO LIFT-OFF

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

CAUSE:
MECHANICAL SHOCK, VIBRATION, CONTAMINATION, CORROSION

■ CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

- (A) SUBSYSTEM:
LOSS OF CHECK VALVE FUNCTION. TANK B WILL DRAIN INTO TANK A.
- (B) INTERFACING SUBSYSTEM(S):
DURING LAUNCH, TANK B WILL BACKFLOW INTO, FILL, AND PRESSURIZE TANK A. THE INCREASED PRESSURE WILL CAUSE THE FUEL CELL WATER RELIEF VALVES TO OPEN AND DUMP FUEL CELL AND TANK A WATER OVERBOARD UNTIL TANK B IS EMPTY.

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- (C) MISSION:
NO EFFECT.
- (D) CREW, VEHICLE, AND ELEMENT(S):
POSSIBLE ADVERSE CREW HEALTH EFFECTS IF TANK B IODINE CONCENTRATION IS LOW, THERE IS A MICROBIAL GROWTH IN TANK B, AND IF LEAKAGE INTO TANK A IS SIGNIFICANT. SECOND ASSOCIATED FAILURE (BLOCKED FUEL CELL WATER OVERBOARD DUMP NOZZLE OR RELIEF VALVES), MAY DEAD HEAD FUEL CELLS AND CAUSE LOSS OF CREW/VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

- DISPOSITION RATIONALE -

(A) DESIGN:

STAINLESS STEEL CONSTRUCTION PREVENTS CORROSION. NONMETALLICS ARE ETHYLENE PROPYLENE. POPPET IS CONSTRUCTED FROM KEL-F PER AMS-3650. VALVE IS RESISTANT TO 5 PPM IODINE IN WATER.

(B) TEST:

QUALIFICATION TESTS FOR 100 MISSION LIFE INCLUDE RANDOM VIBRATION OF 0.09 G SQ/HZ FOR 48 MINUTES PER AXIS AND SHOCK TEST OF 20 G PER AXIS.

ACCEPTANCE TEST - PROOF PRESSURE TEST OF 54 PSIG INTERNAL FOR 5 MINUTES IS APPLIED TO BOTH PORTS SIMULTANEOUSLY. EXTERNAL LEAKAGE MUST BE LESS THAN 1×10^{-6} (NEG 6 POWER) SCCS HE AT 36 PSIG. INTERNAL LEAKAGE - 0.01 CC WATER PER MINUTE MAXIMUM AT 0.8 PSID FOR INLET PORT; 0.01 CC WATER PER MINUTE MAXIMUM AT 15 PSID FOR OUTLET PORT. RESEAT PRESSURE TEST - 22 INCHES WATER MINIMUM WITH FLOW LESS THAN 0.01 CC PER MIN. RESEATS AT 0.8 PSID MINIMUM.

OMRSD: RELIEF VALVE IS VERIFIED CLOSED BEFORE EACH FLIGHT.

(C) INSPECTION:

RECEIVING INSPECTION
RAW MATERIAL IS VERIFIED.

CONTAMINATION CONTROL

CONTAMINATION PROTECTION CONTROL IS VERIFIED. CLEANLINESS TO 300 LEVEL IS VERIFIED.

ASSEMBLY/INSTALLATION

VISUAL INSPECTION FOR DAMAGE DURING INSTALLATION.

TESTING

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ACCEPTANCE TEST PROCEDURE IS WITNESSED BY INSPECTION.

HANDLING/PACKAGING
HANDLING, PACKAGING, AND SHIPPING ARE VERIFIED.

■ (D) FAILURE HISTORY:

TWO INSTANCES OF SLIGHT REVERSE LEAKAGE HAVE OCCURRED (CAR # A00393 AND KE1266).

(E) OPERATIONAL USE:

DURING LIFTOFF, IF TANK B BECOMES EMPTY, CREW SHOULD SWITCH TO FES CONTROLLER B. ONCE ON ORBIT, CREW SHOULD PRESSURIZE SUPPLY WATER TANK A, THEN CLOSE TANK B INLET VALVE AND OPEN TANK A OUTLET VALVE TO ENSURE POTABLE WATER SUPPLY IN TANK A.

- APPROVALS -

RELIABILITY ENGINEERING:	D. R. RISING	<i>DR</i>	<i>9/24/90</i>
DESIGN ENGINEERING	S. CASTILLO	<i>SC</i>	<i>9/24/90</i>
QUALITY ENGINEERING	M. SAVALA	<i>MS</i>	<i>9/24/90</i>
NASA RELIABILITY			
NASA SUBSYSTEM MANAGER			
NASA QUALITY ASSURANCE			