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PRINT DATE: 03/10/95

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE
NUMBER: 05-6J-2055A -X

SUBSYSTEM NAME: EPD&C MAIN PROPULSION SYSTEM

REVISION: 03/03/95

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: PANEL R4	VO70-730278
SRU	: SWITCH, TOGGLE	ME452-0102-7153

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
| TOGGLE SWITCH (1 POLE, 2 POSITION) - LH2 OUTBOARD FILL AND DRAIN VALVE CONTROL

REFERENCE DESIGNATORS: 32V73A4S8

QUANTITY OF LIKE ITEMS: 1
| ONE PER LH2 OUTBOARD FILL/DRAIN VALVE

FUNCTION:
PROVIDES MANUAL CONTROL OF POWER TO THE OPEN AND CLOSE SOLENOIDS OF THE LH2 OUTBOARD FILL/DRAIN VALVE.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2055A -3 REV: 11/20/87
 ASSEMBLY : PANEL R4
 P/N RI : ME452-0102-7153
 P/N VENDOR:
 QUANTITY : 1
 : ONE
 : 1 PER LH2 OUTBOARD FILL/DRAIN VALVE

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X
PHASE(S):	PL X	LO X	CO DO LS

REDUNDANCY SCREEN: A-PASS B-PASS C-PASS

PREPARED BY:	APPROVED BY:	APPROVED BY (NASA):
DES <i>J BROWN</i>	DES <i>[Signature]</i>	EPDC SSM <i>[Signature]</i>
REL <i>F DEFENSOR</i>	REL <i>[Signature]</i>	MPS SSM <i>[Signature]</i>
QE D MASAI	QE <i>[Signature]</i>	EPDC REL <i>[Signature]</i>
		MPS REL <i>[Signature]</i>
		QE <i>[Signature]</i>

ITEM:

TOGGLE SWITCH (1 POLE, 2 POSITION, LEVER LOCKED), LH2 OUTBOARD FILL/DRAIN VALVE CONTROL.

FUNCTION:

PROVIDES MANUAL CONTROL OF POWER TO THE OPEN AND CLOSE SOLENOIDS OF LH2 OUTBOARD FILL/DRAIN VALVE. 32V73A458.

FAILURE MODE:

FAILS CLOSED, CONTACT-TO-CONTACT SHORT.

CAUSE(S):

PIECE PART STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, VIBRATION, THERMAL STRESS

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A) CASE 1: ACROSS OPEN CONTACTS PROVIDING AN INADVERTENT OPEN COMMAND AND CLOSE INHIBIT COMMAND.

CASE 2: ACROSS CLOSE CONTACTS PROVIDING AN INADVERTENT CLOSE COMMAND AND OPEN INHIBIT COMMAND.

(B) CASE 1: PREMATURE OPENING OF THE LH2 OUTBOARD FILL/DRAIN VALVE.

CASE 2: NO EFFECT - FIRST FAILURE. BISTABLE FEATURE WILL MAINTAIN FILL/DRAIN VALVE IN OPEN POSITION.

SHUTTLE CRITICAL ITEMS LIST - ORBITER.

SUBSYSTEM :EPD&C - MAIN PROP.

FMEA NO 05-6J -2055A -3

REV:11/20/87

(C,D) NO EFFECT - FIRST FAILURE. POSSIBLE LOSS OF CREW AND VEHICLE AFTER SECOND FAILURE:

CASE 1 - LH2 INBOARD FILL/DRAIN VALVE FAILS OPEN RESULTING IN OVERBOARD LEAKAGE OF LH2. LOSS OF USABLE PROPELLANT WILL LEAD TO A PREMATURE ENGINE CUTOFF. FIRE/EXPLOSIVE HAZARD BOTH INTERIOR AND EXTERIOR TO THE VEHICLE. POSSIBLE UNCONTAINED ENGINE DAMAGE DUE TO PUMP CAVITATION. POSSIBLE VIOLATION OF ET MINIMUM STRUCTURAL REQUIREMENTS DUE TO REDUCED ULLAGE PRESSURE.

CRITICALITY 1/1 FOR RTLS AND TAL ABORTS; RESULTS IN POSSIBLE LOSS OF AFT COMPARTMENT PURGE (RTLS AND TAL CRITICAL). HELIUM IS REQUIRED TO MAINTAIN CONCENTRATION OF O2/H2 BELOW FLAMMABILITY LIMITS. POSSIBLE PRESENCE OF PROPELLANT IN THE FILL/FEED LINE MAY IGNITE UPON EXPOSURE TO ATMOSPHERIC OXYGEN RESULTING IN FIRE/EXPLCSION HAZARD.

CASE 2 - LOSS OF GROUND OPEN COMMAND RESULTING IN PREMATURE CLOSURE OF LH2 OUTBOARD FILL/ DRAIN VALVE. TERMINATION OF PROPELLANT LOADING WHICH MAY CAUSE A PRESSURE SPIKE AND POSSIBLE RUPTURE OF ORBITER FILL LINE AND/OR GSE INTERFACE/FACILITY LINES. POSSIBLE AFT COMPARTMENT OVERPRESSURIZATON AND FIRE/EXPLOSION HAZARD. POSSIBLE LOSS OF ADJACENT CRITICAL FUNCTIONS DUE TO CRYO EXPOSURE.

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A-D) DISPOSITION AND RATIONALE:

REFER TO APPENDIX A, ITEM NUMBER 1 - TOGGLE SWITCH.

(B) GROUND TURNAROUND TEST

COPPER PATH VERIFICATION, V41ABO.111B, E EVERY FLIGHT

(E) OPERATIONAL USE

FLIGHT - FOR RTLS OR TAL ABORTS, ON GROUND CALL, CREW CAN CLOSE INBOARD FILL/DRAIN VALVE IF TIME PERMITS.

GROUND - TERMINATE LOADING.