

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE
NUMBER:M5-6SS-0128A -X**

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0 02/27/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:PANEL A6A3	V828-730150
LRU	:FUSE, SUBMINIATURE	ME451-0018-0300

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

FUSE, SUBMINIATURE, 3 AMP - CLOSE INDICATOR SWITCH, PMA 2/3 PASSIVE MECHANISM GROUP 1/2, SYSTEM A/B HOOKS CONTROL CIRCUIT

REFERENCE DESIGNATORS: 36V73A7A3F15
36V73A7A3F17
38V73A7A3F19
38V73A7A3F21

QUANTITY OF LIKE ITEMS: 4
(FOUR)

FUNCTION:

PROVIDE POWER TO THE PMA HOOKS CLOSE INDICATOR SWITCHES INDICATOR SWITCHES ARE USED TO TURN OFF POWER TO THE HOOK MOTORS WHEN THEY HAVE REACHED THEIR FULLY CLOSED POSITION.

REFERENCE DOCUMENTS: 1) VS70-953103, INTEGRATED SCHEMATIC - 53JA, 53JC, 53JE, 53JG; PMA 2/3 PASSIVE MECHANISM GROUP 1/2, SYS A/B HOOKS CONTROL

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CORRECTING ACTION DESCRIPTION:

NO SPECIAL CORRECTIVE ACTION REQUIRED. CREW WOULD NORMALLY RETURN SWITCH TO CENTER OFF POSITION AFTER HOOKS ARE FULLY CLOSED.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

FUSE FAILS OPEN - MOTOR CONTINUES TO DRIVE AFTER HOOKS REACH FULLY CLOSED POSITION. CLUTCH WILL ALLOW MOTOR TO SLIP BEFORE EXCESSIVE TORQUE DAMAGES MOTOR. TELEMETRY WILL INDICATE EXCESSIVE TIME ELAPSED FOR HOOK CLOSURE. CREW PROCEDURES WOULD BE TO THEN REMOVE POWER FROM MOTOR USING SWITCH.

(B) INTERFACING SUBSYSTEM(S):

CONTINUOUS RUNNING OF PMA 2/3 HOOKS DRIVE MOTOR MAY CAUSE OVERHEATING RESULTING IN MOTOR FAILURE.

(C) MISSION:

FIRST FAILURE - NO EFFECT

(D) CREW, VEHICLE, AND ELEMENT(S):

FIRST FAILURE - NO EFFECT

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF CREW/VEHICLE AFTER SEVEN FAILURES:

- 1) FUSE FAILS OPEN - LOSS OF INHIBIT TO STOP MOTOR AFTER PMA 2/3 HOOKS CLOSING. MOTOR RUNS CONTINUOUSLY.
- 2) ONE OR MORE HOOKS IN THE ACTIVE MECHANISM FAIL TO CLOSE COMPLETELY.
- 3) PMA 2/3 SWITCH FAILS CLOSED IN "CLOSED" POSITION. LOSS OF ABILITY TO TURN OFF MOTOR WITH SWITCH.
- 4) PMA 2/3 HOOKS "CLOSE" CONTROL CIRCUIT BREAKER FAILS TO OPEN. LOSS OF ABILITY TO REMOVE POWER TO MOTOR.
- 5) GENERAL PURPOSE POWER CONTACTOR IN MPCA-1/2 FAILS CLOSED. LOSS OF ABILITY TO DE-ENERGIZE MAIN BUS POWER TO AFFECTED CIRCUIT. MOTOR FAILS DUE TO OVERHEATING. LOSS OF MOTOR DRIVE REDUNDANCY TO PMA 2/3 HOOKS GROUP.
- 6) LOSS OF ASSOCIATED REDUNDANT MOTOR IN PMA 2/3 HOOKS GROUP.
- 7) ONE ODS PASSIVE HOOK PYRO FAILS TO FIRE. LOSS OF ODS PYROTECHNIC UNDOCKING CAPABILITY.

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DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)):

(F) RATIONALE FOR CRITICALITY DOWNGRADE:

ALTHOUGH THE CRITICALITY REMAINS UNCHANGED AFTER WORKAROUNDS CONSIDERATION (ALLOWED PER CR S050107W), THEY ARE PROVIDING ADDITIONAL FAULT TOLERANCE TO THE SYSTEM.

AFTER THE SEVENTH FAILURE, THE CREW WOULD PERFORM EVA TO REMOVE 96 BOLTS FROM THE DOCKING BASE TO CIRCUMVENT THE WORST CASE "DESIGN CRITICALITY" EFFECT. IF UNABLE TO PERFORM EVA (EIGHTH FAILURE), POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ALL UNDOCKING CAPABILITY.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: MINUTES

TIME FROM FAILURE OCCURRENCE TO DETECTION: SECONDS

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: MINUTES

**IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?
YES**

**RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
CREW WILL HAVE SUFFICIENT TIME TO ATTEMPT CIRCUIT DE-ENERGIZATION.**

HAZARD REPORT NUMBER(S): ORBI 401

**HAZARD(S) DESCRIPTION:
INABILITY TO SAFELY SEPARATE THE ORBITER FROM A MATED ELEMENT.**

- APPROVALS -

SS&PAE
DESIGN ENGINEERING

: T. K. KIMURA
: C. J. ARROYO

J. Kimura, 4-13-98
