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PRINT DATE: 15.12.96

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE

NUMBER: M5-6SS-B026-X

SUBSYSTEM NAME: E - DOCKING SYSTEM

REVISION: 0 DEC, 1996

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: LACU RSC-E	MC621-0087-1004 33Y.5212.007

PART DATA

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
LINE REPLACEABLE UNIT (LRU) LATCH ACTUATOR CONTROL UNIT (LACU) - CAPTURE
LATCH MOTORS LOGIC AND POWER CONTROL.**

REFERENCE DESIGNATORS: 45V53A1A2

**QUANTITY OF LIKE ITEMS: 1
(ONE)**

FUNCTION:

**PROVIDES CAPTURE LATCHES ACTUATORS CONTROL. THE UNIT PROVIDES LATCH
MOTOR CONTROL VIA COMMANDS FROM THE DSCU FOR AUTOMATIC SEQUENCE
IMPLEMENTATION, OR COMMANDS FROM THE CONTROL PANEL FOR MANUAL
OPERATIONS.**

OUTPUT FUNCTIONS:

- 1) LATCH MOTOR CONTROL: PLUS/MINUS POWER FOR LATCH CLOSING/OPENING.**
- 2) LATCHES "OPEN" FEEDBACK SIGNAL TO INITIATE AUTOMATIC "RING IN"
OPERATION (AFTER HOOK CLOSURE.)**
- 3) SIGNALS TO THE DCU AND CONTROL PANEL FEEDBACKS THROUGH THE DSCU:
MOTORS ON, LATCHES CLOSED/OPEN.**

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE

NUMBER: M&SS-B026-02

REVISION# 0 DEC. 1996

SUBSYSTEM NAME: E - DOCKING SYSTEM

LRU: MC621-0087-1004

ITEM NAME: LATCH ACTUATION CONTROL UNIT

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

INADVERTENT ACTIVATION OF CAPTURE LATCH OPEN CONTROL SIGNAL FOR ALL CAPTURE LATCHES.

MISSION PHASE:

OO ON-ORBIT

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

CAUSE:

INTERNAL COMPONENT FAILURE(S)

CRITICALITY 1R1 DURING INTACT ABORT ONLY? NO

CRITICALITY 1R2 DURING INTACT ABORT ONLY (AVIONICS ONLY)? NO

**REDUNDANCY SCREEN A) PASS
 B) N/A
 C) PASS**

PASS/FAIL RATIONALE:

A)

B)

N/A - AT LEAST TWO REMAINING PATHS ARE DETECTABLE IN FLIGHT.

C)

METHOD OF FAULT DETECTION:

NONE.

MASTER MEAS. LIST NUMBERS: NONE

CORRECTING ACTION:

AFTER THE SECOND FAILURE, THE CREW WOULD FIRE RCS JETS TO AVOID COLLISION BETWEEN THE ORBITER AND ISS.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

DEGRADATION OF REDUNDANCY FOR CONTROL OF THE CAPTURE LATCH MOTORS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
NUMBER: M5-6SS-B026-02

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT.

(C) MISSION:
NO EFFECT.

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

(E) FUNCTIONAL CRITICALITY EFFECTS:
WORST CASE, SHUTTLE MECHANISM CONTROL: POSSIBLE LOSS OF CREW OR VEHICLE
AFTER TWO FAILURES.
1) ONE OF THREE INADVERTENT CONTROL SIGNALS. DEGRADATION OF CONTROL
AGAINST UNWANTED COMMAND. 2) SECOND INADVERTENT ASSOCIATED CONTROL
SIGNAL RESULTING IN SIMULTANEOUS OPENING OF ALL CAPTURE LATCHES.

DESIGN CRITICALITY (PRIOR TO OPERATIONAL DOWNGRADE, DESCRIBED IN F): 1R2

(F) RATIONALE FOR CRITICALITY CATEGORY DOWNGRADE:
CRITICALITY DOWNGRADED FROM 1R2 TO 1R3 DUE TO ADDITIONAL FAULT TOLERANCE
PROVIDED BY WORKAROUNDS ALLOWED PER CR S050107W.

AFTER THE SECOND FAILURE, THE CREW WOULD FIRE RCS JETS TO ENABLE THEREBY
CIRCUMVENT THE WORST CASE "DESIGN CRITICALITY" EFFECT. IF UNABLE TO PERFORM
THE WORKAROUND (THIRD FAILURE), POSSIBLE LOSS OF CREW/VEHICLE DUE TO AN
INADVERTENT COLLISION BETWEEN THE ORBITER AND ISS.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: MINUTES

TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: HOURS

TIME REQUIRED TO IMPLEMENT CORRECTIVE ACTION LESS THAN TIME TO EFFECT?
YES

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
CREW WOULD HAVE SUFFICIENT TIME TO PERFORM RCS JET FIRING.

HAZARDS REPORT NUMBER(S) : ORBI 402B

HAZARD DESCRIPTION:
UNCONTROLLED/INADVERTENT COLLISION BETWEEN ORBITER AND ISS.

- APPROVALS -

PRODUCT ASSURANCE ENGR : M. NIKOLAYEVA
DESIGN ENGINEER : B. VAKULIN




