

**FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M5-6SS-0126A -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
SRU	:HYBRID DRIVER CONTROLLER	MC477-0262-0002

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
HYBRID DRIVER, TYPE II - ONE SECOND DELAY, CLOSE**

REFERENCE DESIGNATORS: 36V73A7A3AR2
36V73A7A3AR4
36V73A7A3AR6
36V73A7A3AR8

QUANTITY OF LIKE ITEMS: 4
(FOUR)

FUNCTION:

PROVIDES AN INHIBIT SIGNAL TO THE RELAY ONE SECOND AFTER HOOKS HAVE REACHED THEIR FULLY CLOSED POSITION. THE INHIBIT SIGNAL OPENS THE RELAY, OVERRIDING THE RELAY CONTROL SIGNAL. PROVIDES ONE SECOND DELAY BETWEEN HOOKS REACHING FULLY CLOSED POSITION AND HOOK MOTOR SHUT OFF.

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

FAILURE MODES EFFECTS ANALYSIS FMEA – NON-CIL FAILURE MODE
NUMBER: M5-6SS-0126A-01**REVISION#: 0 02/27/98****SUBSYSTEM NAME: ISS DOCKING SYSTEM**
LRU: PANEL A6A3
ITEM NAME: HYBRID DRIVER CONTROLLER**CRITICALITY OF THIS**
FAILURE MODE: 1R3**FAILURE MODE:**
LOSS OF OUTPUT, FAILS TO CONDUCT, FAILS TO TURN 'ON'**MISSION PHASE: OO ON-ORBIT****VEHICLE/PAYLOAD/KIT EFFECTIVITY:**
103 DISCOVERY
104 ATLANTIS
105 ENDEAVOUR**CAUSE:**A) PIECE PART FAILURE, B) CONTAMINATION, C) VIBRATION, D) MECHANICAL SHOCK, E)
PROCESSING ANOMALY, F) THERMAL STRESS**CRITICALITY 1/1 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)

SCREEN B IS "N/A" BECAUSE THE HYBRID DRIVER CONTROLLER IS CONTAINED WITHIN A
STANDBY SYSTEM.

C)

METHOD OF FAULT DETECTION:

MOTOR WILL NOT STOP AT PRESCRIBED TIME.

MASTER MEAS. LIST NUMBERS: NONE

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
NUMBER: M5-6SS-0126A-01**

CORRECTING ACTION: MANUAL

**CORRECTING ACTION DESCRIPTION:
CREW CAN REMOVE POWER FROM MOTOR VIA TOGGLE SWITCH AFTER INDICATOR
SHOWS HOOKS ARE FULLY CLOSED.**

- FAILURE EFFECTS -

(A) SUBSYSTEM:

HYBRID DRIVER FAILS TO TURN ON - MOTOR CONTINUES TO DRIVE AFTER HOOKS REACH FULLY CLOSED POSITION. NORMAL CREW PROCEDURES WOULD BE TO REMOVE POWER FROM MOTOR USING SWITCH AFTER INDICATOR SHOWS HOOKS CLOSED.

(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) HYBRID DRIVER CONTROLLER FAILS TO CONDUCT. 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 DEENERGIZE 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. LOSS OF PMA 2/3 UNDOCKING CAPABILITY.
- 7) ONE ODS PASSIVE HOOK PYRO FAILS TO FIRE. LOSS OF ODS PYROTECHNIC UNDOCKING CAPABILITY.

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

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
 NUMBER: M5-6SS-0126A-01

(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 OPEN CIRCUIT BREAKER TO DE-ENERGIZE MOTOR.

HAZARD REPORT NUMBER(S): NONE

HAZARD(S) DESCRIPTION:
 NONE

- APPROVALS -

SS&PAE
 DESIGN ENGINEERING

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

: J. Kimura 4-13-98
 : Ch. Arroyo