

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE  
NUMBER: M5-6MR-B028-X**

**SUBSYSTEM NAME: ORBITER DOCKING SYSTEM**

**REVISION: 1      OCT, 1995**

	<b>PART NAME VENDOR NAME</b>	<b>PART NUMBER VENDOR NUMBER</b>
LRU	DSCU RSC-E	MC521-0087-1002 33Y.5212.005

**PART DATA**

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
LINE REPLACEABLE UNIT (LRU) DSCU - DOCKING SYSTEM CONTROL UNIT.

**REFERENCE DESIGNATORS: 40V53A1A2**

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

**FUNCTION:**

THE DSCU IS USED TO IMPLEMENT THE AUTOMATED DOCKING SEQUENCE AND TO RECEIVE AND PROCESS THE COMMANDS FROM THE APDS CONTROL PANEL. THE UNIT PROVIDES TELEMETRY TO THE DCUs AND STATUS INDICATION TO THE APDS CONTROL PANEL.

**OUTPUT FUNCTIONS:**

1. PROVIDES HI-ENERGY DAMPERS POWER AND CONTROL.
2. PROVIDES CONTROL FOR DOCKING RING EXTENSION AND RETRACTION.
3. PROVIDES FIXERS POWER AND CONTROL.
4. PROVIDES HOOKS OPENING AND CLOSING CONTROL.
5. PROVIDES CAPTURE LATCHES OPENING AND CLOSING CONTROL.
6. PROVIDES TELEMETRY TO THE DCUs AND STATUS INDICATION TO THE APDS PANEL.

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

**NUMBER: M5-6MR-B028-08**

**REVISION# 1 OCT, 1995**

**SUBSYSTEM NAME: ORBITER DOCKING SYSTEM**

**LRU: MC621-0087-1002**

**ITEM NAME: DSCU**

**CRITICALITY OF THIS**

**FAILURE MODE: 1R3**

**FAILURE MODE:**

**INADVERTENT ACTIVATION OF ONE OF THREE HOOKS OPEN CONTROL SIGNAL**

**MISSION PHASE:**

**OO ON-ORBIT**

**VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS**

**CAUSE:**

**MULTIPLE INTERNAL COMPONENT FAILURES**

**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)**

**N/A**

**C)**

**METHOD OF FAULT DETECTION:**

**NONE**

**MASTER MEAS. LIST NUMBERS: NONE**

**- FAILURE EFFECTS -**

**(A) SUBSYSTEM:**

**DEGRADATION AGAINST REDUNDANCY FOR INADVERTENT HOOKS OPEN ACTIVATION COMMAND:**

**(B) INTERFACING SUBSYSTEM(S):**

**INADVERTENT ACTIVATION OF ONE OF THREE HOOKS OPEN CONTROL SIGNALS TO THE PACU 1(2).**

**(C) MISSION:**

**FIRST FAILURE - NO EFFECT.**

173

**ORIGINAL**

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE  
NUMBER: M5-6MR-8028-08**

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

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF MISSION AFTER TEN FAILURES. 1) INADVERTENT ACTIVATION OF ONE OF THREE HOOKS OPEN CONTROL SIGNALS TO PACU 1(2). - NO EFFECT.  
2) INADVERTENT ACTIVATION OF SECOND HOOKS OPEN CONTROL SIGNAL TO PACU 1(2) - HOOKS OPEN COMMAND PRESENT AT PACU INPUT  
3 & 4) TWO APDS CIRCUIT BREAKERS FOR A SINGLE MAIN LOGIC BUS IN THE A7A2 PANEL FAIL CLOSED - LOSS OF CIRCUIT PROTECTION.  
5&6) TWO ADDITIONAL APDS CIRCUIT BREAKERS FOR ANOTHER MAIN LOGIC BUS IN THE A7A2 PANEL FAIL CLOSED - LOSS OF CIRCUIT PROTECTION.  
7) ONE RPC FAILS ON (PSU MAIN BUS POWER) - INADVERTENT POWER TO THE PSU.  
8) PSU POWER ON SWITCH FAILS CLOSED - INADVERTENT OPENING OF ONE GROUP OF SIX HOOKS.

**DESIGN CRITICALITY (PRIOR TO OPERATIONAL DOWNGRADE, DESCRIBED IN F):** N/A

**(F) RATIONALE FOR CRITICALITY CATEGORY DOWNGRADE:**

NONE. CRITICALITY UNCHANGED. WORKAROUNDS ADD TO REDUNDANCY.

9) INABILITY TO CLOSE TWELVE MIR SPACE STATION HOOKS - LOSS OF CAPABILITY TO SEAL THE ORBITER/MIR DOCKING MECHANISM INTERFACE. POTENTIAL LEAKAGE OF PRESSURE THROUGH THIS INTERFACE DURING ORBITER/MIR DYNAMIC MOVEMENT.  
10) UNABLE TO CLOSE APPROPRIATE HATCHES - INABILITY TO ISOLATE LEAKAGE RESULTING IN A POTENTIAL LOSS OF CREW AND VEHICLE.

**- 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 REQUEST CLOSING OF MIR SPACE STATION HOOKS OR TO CLOSE APPROPRIATE HATCHES TO ISOLATE LEAKAGE.

**HAZARDS: REPORT NUMBER(S):** ORBI 511

**HAZARD DESCRIPTION:**

LOSS OF PRESSURE IN HABITABLE VOLUME.

**- APPROVALS -**

PRODUCT ASSURANCE ENGR

: M. NIKOLAYEVA

DESIGN ENGINEER

: B. VAKULIN

171

**ORIGINAL**