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PRINT DATE: 09/14/95

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

**NUMBER: M5-6MR-0351-X**

**SUBSYSTEM NAME: ORBITER DOCKING SYSTEM**

**REVISION: 0 SEP 30, 1995**

	<b>PART NAME VENDOR NAME</b>	<b>PART NUMBER VENDOR NUMBER</b>
LRU	: STANDARD SWITCH PANEL NO. 3	SFD33101201
SRU	: CIRCUIT BREAKER	MC454-0026-2050

**PART DATA**

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
CIRCUIT BREAKER, 5 AMP

**REFERENCE DESIGNATORS: 31P73A12A2CB1**

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

**FUNCTION:**

- 1) PROVIDES CIRCUIT PROTECTION FOR THE +28 VCD CABIN PAYLOAD #2 BUS.
- 2) PROVIDES POWER FOR THE FOLLOWING POWER AND CONTROL CIRCUITS:
  - a) SWITCH (S3) DM CL CAMERA POWER
  - b) SWITCH (S11) KEEL CAMERA ON/OFF
  - c) SWITCH (S8): ODS CL CAMERA POWER

**REFERENCE DOCUMENTS:**

- 1) ECN 104-25017. ELECTRICAL CHANGE NOTICE, SHUTTLE/MIR MISSION #2, ORBITER DOCKING SYSTEM
- 2) VS72-200143. INTEGRATED SCHEMATIC STS-74
- 3) JSC-26736. STS-74 CARGO SYSTEM MANUAL
- 4) VS70-063114. INTEGRATED SCHEMATIC - DOCKING SYSTEM, RUSSIAN MIR MISSION 2.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL FAILURE MODE  
NUMBER: M5-6MR-0351-01**

REVISION# 0 SEP 30, 1995

SUBSYSTEM NAME: ORBITER DOCKING SYSTEM  
LRU: MC454-0026-2050  
ITEM NAME: CIRCUIT BREAKER

CRITICALITY OF THIS  
FAILURE MODE: 2R3

FAILURE MODE:  
FAILS OPEN, FAILS TO CONDUCT, FAILS TO CLOSE

MISSION PHASE:  
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS

CAUSE:  
A) STRUCTURAL 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) PASS  
   C) FAIL

PASS/FAIL RATIONALE:  
A)

B)

C)  
ALL POWER TO STANDARD SWITCH PANELS ROUTED THROUGH A SINGLE MPCA 2  
CONNECTOR (J3), AND A SINGLE CABLE CONNECTOR (P310).

METHOD OF FAULT DETECTION:  
LOSS OF VIDEO OUTPUT FROM DOCKING MODULE CENTERLINE CAMERA AND ODS CL  
CAMERA.

MASTER MEAS. LIST NUMBERS:      NONE

CORRECTING ACTION:  
SWITCH TO DM EXTERNAL CAMERA, OR ODS TRUSS CAMERA.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - OIL FAILURE MODE  
NUMBER: M5-6MR-0351-01**

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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

LOSS OF POWER TO THE FOLLOWING POWER AND CONTROL SWITCHES: DOCKING MODULE (DM) CENTERLINE (CL) CAMERA POWER (S3), KEEL CAMERA ON/OFF CONTROL (S11), ORBITER DOCKING SYSTEM (ODS) CL CAMERA POWER (S8).

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

LOSS OF POWER TO THE DM CL CAMERA AND THE ODS CL CAMERA. LOSS OF ON/OFF CONTROL TO THE KEEL CAMERA.

**(C) MISSION:**

FIRSTS FAILURE - NO EFFECT: THE DM CL CAMERA IS BACKED UP BY THE DM EXTERNAL CAMERA. THE ODS CL CAMERA IS BACKED UP BY THE ODS TRUSS CAMERA. THE KEEL CAMERA IS PROVIDED FOR THE CONTINGENCY THAT RE-BERTHING THE DM IS REQUIRED. (RE-BERTHING IS NOT PART OF A NOMINAL MISSION.)

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

NO EFFECT.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF MISSION OBJECTIVES AFTER THREE FAILURES.

- 1) CIRCUIT BREAKER CB1 FAILS OPEN - LOSS OF POWER TO THE ODS CL CAMERA AND THE DM CL CAMERA. LOSS OF ON/OFF CONTROL TO THE KEEL CAMERA. SWITCH TO ODS TRUSS CAMERA (DM EXTERNAL CAMERA). (KEEL CAMERA NOT REQUIRED FOR NOMINAL MISSION.)
- 2) SWITCH S7: ODS TRUSS CAMERA (S4: DM EXTERNAL CAMERA POWER) FAILS OPEN. LOSS OF POWER TO THE ODS TRUSS CAMERA (DM EXTERNAL CAMERA). PERFORM STANDARD SWITCH PANEL CABLE CHANGEOUT USING AN INFLIGHT MAINTENANCE PROCEDURE, AND USE SSP 2 CIRCUIT BREAKER TO RECOVER FUNCTION.
- 3) CIRCUIT BREAKER ON SSP 2 FAILS OPEN - UNABLE TO DOCK WITH DM (MIR) DUE TO LOSS OF VIDEO FROM ODS CL AND ODS TRUSS CAMERA (DM CL CAMERA AND DM EXTERNAL CAMERA).

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**- TIME FRAME -**

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**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**

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

NUMBER: M5-6MR-0351-01

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**-DISPOSITION RATIONALE-**

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**(A) DESIGN:**

REFER TO APPENDIX D, ITEM #1, CIRCUIT BREAKER.

**(B) TEST:**

REFER TO APPENDIX D, ITEM #1, CIRCUIT BREAKER.

POWER CONTROL CIRCUIT OPERATION IS VERIFIED DURING GROUND CHECKOUT.  
ANY TURNAROUND TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.**(C) INSPECTION:**

REFER TO APPENDIX D, ITEM #1, CIRCUIT BREAKER.

**(D) FAILURE HISTORY:**

REFER TO APPENDIX D, ITEM #1, CIRCUIT BREAKER.

**(E) OPERATIONAL USE:**PERFORM STANDARD SWITCH PANEL CABLE CHANGEOUT USING AN INFLIGHT  
MAINTENANCE PROCEDURE

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**- APPROVALS -**

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PRODUCT ASSURANCE ENGINEERING  
 PRODUCT ASSURANCE MANAGER  
 DESIGN ENGINEERING  
 CHIEF ENGINEER  
 NASA SS&MA  
 NASA SUBSYSTEM MANAGER  
 JSC MOD

:R. BLACKWELL :  
 :W. MARLOWE :  
 :T. NGUYEN :  
 :B. BRANDT :  
 : :  
 : :  
 : :

*R. Blackwell*  
*W. Marlowe*  
*T. Nguyen*  
*B. Brandt*  
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