

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE**  
**NUMBER:05-1-12200C -X**

**SUBSYSTEM NAME:** GUIDANCE, NAVIGATION, AND CONTROL

**REVISION:** 0 08/15/01

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**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
	:FLT DK AVNS INSTL AREA	
LRU	:DEVICE DRIVER UNIT AEROSPACE AVIONICS INC.	MC454-0154-0001 715305-1

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
 DEVICE DRIVER UNIT (DDU) - AFT STATION

**REFERENCE DESIGNATORS:** 30V73A3

**QUANTITY OF LIKE ITEMS:** 1  
 1 AFT

**FUNCTION:**  
 PROVIDES POWER TO THE AFT ROTATION HAND CONTROL (RHC), AND AFT TRANSLATION  
 HAND CONTROL (THC).

**REFERENCE DOCUMENTS:** MCR 19029 - DEVICE DRIVER UNIT (DDU), REV 2 (11/24/99)

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**LRU:** DEVICE DRIVER UNIT

**ITEM NAME:** DEVICE DRIVER UNIT

**CRITICALITY OF THIS**

**FAILURE MODE:** 2R3

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**FUNCTIONAL CRITICALITY/**

**REQUIRED FAULT TOLERANCE/ACHIEVED FAULT TOLERANCE:**2R/1/1

**FAILURE MODE:**

LOSS OF DEVICE DRIVER UNIT (DDU) FLIGHT CONTROL POWER SUPPLIES (A,B,C). LOSS OF POWER OUTPUT FROM ONE, TWO, OR THREE POWER SUPPLIES.

**MISSION PHASE:**

- PL PRE-LAUNCH
- LO LIFT-OFF
- OO ON-ORBIT
- DO DE-ORBIT
- LS LANDING/SAFING

**VEHICLE/PAYLOAD/KIT EFFECTIVITY:**

- 102 COLUMBIA
- 103 DISCOVERY
- 104 ATLANTIS
- 105 ENDEAVOUR

APPLIES TO VEHICLES THAT HAVE MEDS AND NEW DDU INSTALLED ONLY

**CAUSE:**

CONTAMINATION, VIBRATION, SHOCK, PIECE PART FAILURE, TEMPERATURE, LOSS OF INPUT POWER.

**CRITICALITY 1/1 DURING INTACT ABORT ONLY?** NO

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

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**REDUNDANCY SCREEN**

- A) PASS
- B) PASS
- C) PASS

**PASS/FAIL RATIONALE:**

A)

B)

C)

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**MASTER MEAS. LIST NUMBERS:** V73X3021X  
V73X3022X  
V73X3023X  
V73X3052X

**CORRECTING ACTION:** MANUAL

**CORRECTING ACTION DESCRIPTION:**

CREWS ARE TRAINED TO COMPENSATE FOR AFT STATION DDU FAILURE USING THE COMMANDER STATION HAND CONTROLLERS. THE PILOT WILL BE AT THE COMMANDER STATION DURING RENDEZVOUS OPERATION TO RECOVER FROM LOSS OF AFT STATION DDU.

**REMARKS/RECOMMENDATIONS:**

RENDEZVOUS PROCEDURES PROVIDE MANY DECISION POINTS AND THE REDUCTION OF CLOSING VELOCITY AS THE ORBITER APPROACHES THE RENDEZVOUS TARGET WILL PRECLUDE ANY POTENTIAL LOSS OF CREW/VEHICLE.

NOTE: THERE IS NO SINGLE POINT FAILURE THAT CAN CAUSE LOSS OF ALL THREE POWER SUPPLY OUTPUTS. IT REQUIRES AT LEAST TWO INTERNAL FAILURES TO CAUSE LOSS OF ALL THREE POWER SUPPLY OUTPUTS.

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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

LOSS OF ONE OF THREE DDU FLIGHT CONTROL POWER SUPPLIES AT THE AFT STATION.

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

RM SOFTWARE WILL PROTECT AGAINST LOSS OF ONE DDU POWER SUPPLY FOR THE RHC AND THC BY SWITCHING FROM 3 CHANNEL MID-VALUE SELECT TO 2 CHANNEL AVERAGING FOR THESE CONTROLLERS.

**(C) MISSION:**

FIRST FAILURE - NO EFFECT.

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

FIRST FAILURE - NO EFFECT.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

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POSSIBLE LOSS OF MISSION DUE TO INABILITY TO DOCK WITH RENDEZVOUS TARGET (PAYLOAD OR STATION). REQUIRES TWO FAILURES (LOSS TWO OF THREE DDU POWER SUPPLIES) BEFORE EFFECT OCCURRED.

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**- TIME FRAME -**

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**TIME FROM FAILURE TO CRITICAL EFFECT: MINUTES**

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**- APPROVALS -**

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SAFETY ENGINEERING	: T. AI	:/S/ T. AI_____
DDU SSM	: R. D SMITH	:/S/ R. D. SMITH_____
FLIGHT CONTROL SSM	: D. HEIDMANN	:/S/ D. HEIDMANN_____
GN&C/FC ANALYSIS-ORBIT SSM:	R. FRIEND	:/S/ R. FRIEND_____