

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE**NUMBER:05-1-12200A -X****SUBSYSTEM NAME:** GUIDANCE, NAVIGATION, AND CONTROL**REVISION:** 0 06/18/01

PART DATA

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

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

DEVICE DRIVER UNIT (DDU) - COMMANDER STATION

REFERENCE DESIGNATORS: 30V73A1**QUANTITY OF LIKE ITEMS:** 1
1 COMMANDER SIDE**FUNCTION:**

PROVIDES POWER TO THE ROTATION HAND CONTROL (RHC), TRANSLATION HAND CONTROL (THC), RUDDER PEDAL TRANSDUCER ASSEMBLY (RPTA), SPEEDBRAKE THRUST CONTROL (SBTC), AND BACKUP FLIGHT CONTROL (BFC).

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

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

NUMBER: 05-1-12200A- 01

REVISION#: 0 06/18/01

SUBSYSTEM NAME: GUIDANCE, NAVIGATION, AND CONTROL

LRU: DEVICE DRIVER UNIT

ITEM NAME: DEVICE DRIVER UNIT

CRITICALITY OF THIS

FAILURE MODE: 1R3

FUNCTIONAL CRITICALITY/

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

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

REDUNDANCY SCREEN

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

PASS/FAIL RATIONALE:

A)

B)

C)

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MASTER MEAS. LIST NUMBERS: V73X3001X
V73X3002X
V73X3003X
V73X3050X

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:

THE FLIGHT CONTROL FUNCTION AND BFC ENGAGE FUNCTION MAY BE TRANSFERRED TO THE PILOT'S STATION.

REMARKS/RECOMMENDATIONS:

THE DEVICE DRIVER UNIT COOLING IS CONVECTIVE TO SURROUNDING MEDIA AND CONDUCTIVE THROUGH THE MOUNTING PROVISION. IT IS NOT AIR-COOLED. HENCE, IT DOES NOT HAVE CO-LOCATION PROBLEM AS WOULD THE OLD DDU'S, WHICH LOSS OF ONE COMMON AIR DUCT COULD CAUSE LOSS OF BOTH DDU'S DUE TO OVERTEMPERATURE.

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.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

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

(B) INTERFACING SUBSYSTEM(S):

LOSS OF ONE POWER SUPPLY WILL CAUSE POTENTIAL LOSS OF BFS ENGAGE CAPABILITY. BFS WILL ENGAGE ON ONLY WITH A 3 OF 3 VOTE FROM RHC BFS MODE BUTTON.

AFTER LOSS ONE OF THREE REDUNDANT CHANNELS FOR THE RHC, THC, SBTC, AND RPTA, RM SOFTWARE WILL SWITCH FROM 3 CHANNEL MID-VALUE SELECT TO 2 CHANNEL AVERAGING FOR THESE CONTROLLERS. LOSS OF ANOTHER REDUNDANT POWER SUPPLY WILL CAUSE LOSS OF POWER FOR TWO OF THREE REDUNDANT CHANNELS FOR THE RHC, THC, SBTC, AND RPTA, WHICH WILL CAUSE THE SOFTWARE TO DISABLE THE CONTROLLER FUNCTION AT THE COMMANDER'S STATION. THE COMMANDER CAN RESELECT THAT FUNCTION ON ORBIT, IF DESIRED.

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(C) MISSION:

FIRST FAILURE - NO EFFECT

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

FIRST FAILURE - NO EFFECT

(E) FUNCTIONAL CRITICALITY EFFECTS:

1) POSSIBLE LOSS OF CREW/VEHICLE IF UNABLE TO UTILIZE BFS WHEN REQUIRED DUE TO INABILITY TO ENGAGE BFS. REQUIRES THREE FAILURES (LOSS OF ONE POWER SUPPLY FROM COMMANDER'S STATION, LOSS OF ONE POWER SUPPLY FROM PILOT'S STATION, AND PASS GENERIC SOFTWARE PROBLEM).

2) POSSIBLE LOSS OF CREW/VEHICLE DURING CRITICAL FLIGHT PHASES DUE TO LOSS OF ABILITY TO CONTROL VEHICLE USING CONTROL STICK STEERING (CSS). REQUIRES FOUR FAILURES (LOSS TWO OF THREE POWER SUPPLIES FROM COMMANDER'S STATION, AND LOSS OF TWO OF THREE POWER SUPPLIES FROM PILOT'S STATION).

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: MINUTES

- APPROVALS -

S&R ENGINEER	: T. T. AI	:/S/ T. AI_____
DDU SSM	: R. D SMITH	:/S/ R. D. SMITH_____
FC HAND CONTROLLERS SSM	: D. HEIDMANN	:/S/ D. HEIDMANN_____