

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- 02

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:

ERRONEOUS POWER OUTPUT FROM DEVICE DRIVER UNIT (DDU) FLIGHT CONTROL POWER SUPPLIES (A,B,C). ERRONEOUS 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.

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)

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: 05-1-12200A- 02

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 ERRONEOUS OUTPUT FOR ALL THREE POWER SUPPLY OUTPUTS. IT REQUIRES AT LEAST TWO INTERNAL FAILURES TO CAUSE ERRONEOUS OUTPUT FOR ALL THREE POWER SUPPLY OUTPUTS.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

ERRONEOUS POWER OUTPUT FROM ONE OF THREE DDU FLIGHT CONTROL POWER SUPPLIES AT COMMANDER STATION.

(B) INTERFACING SUBSYSTEM(S):

ERRONEOUS OUTPUT FOR ONE OF THREE DDU POWER SUPPLIES WILL CAUSE LOSS OF BFS ENGAGE CAPABILITY AT THE COMMANDER STATION. BFS WILL ENGAGE ON ONLY WITH A 3 OF 3 VOTE FROM RHC BFS MODE BUTTON.

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

(C) MISSION:

FIRST FAILURE - NO EFFECT.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: 05-1-12200A- 02**

(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 (ERRONEOUS POWER OUTPUT FROM ONE POWER SUPPLY FROM COMMANDER'S STATION DDU, ERRONEOUS POWER OUTPUT FROM 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 (ERRONEOUS POWER OUTPUT FOR TWO OF THREE POWER SUPPLIES FROM COMMANDER'S STATION, AND ERRONEOUS POWER OUTPUT FOR 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_____