FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: MO-AA3-205-X

SUBSYSTEM NAME: STABILIZED PAYLOAD DEPLOYMENT SYSTEM
REVISION : 2 06/06/90

	PART NAME / VENDOR NAME	PART NUMBER / VENDOR NUMBER
■ SRU :	ACTUATOR - YO DRIVE	MC287-0037-0003

PART DATA

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

■ QUANTITY OF LIKE ITEMS: 1
ONE PER END ITEM

■ FUNCTION:
THE YO DRIVE ACTUATOR HAS REDUNDANT MOTORS AND INPUT CHANNELS. THE ACTUATOR DEVELOPS THE TORQUE NECESSARY FOR MOVING BOTH PEDESTALS OUTBOARD TO DEVELOP CLEARANCE FOR THE PAYLOAD TRUNNION FROM THE KEEL LATCH. THIS TORQUE IS USED TO MOVE THE PEDESTALS AND SUBSEQUENTLY THE PAYLOAD TO THE "OUTBOARD" POSITION AFTER THE ADJACENT AND KEEL LATCHES ARE RELEASED. FOLLOWING PAYLOAD RELEASE, THE ACTUATOR PROVIDES THE FORCE NECESSARY TO MOVE BOTH PEDESTALS INBOARD TO CLEAR THE ORBITER STRUCTURE.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: MO-AA3-205-01

REVISION# 2 06/06/90

SUBSYSTEM: STABILIZED PAYLOAD DEPLOYMENT SYSTEM

ITEM NAME: ACTUATOR - YO DRIVE

CRITICALITY OF THIS FAILURE MODE:2R3

■ FAILURE MODE:
BRAKE FAILS TO ENGAGE

MISSION PHASE:
LO LIFT-OFF
OO ON-ORBIT
DO DE-ORBIT

■ VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS
: 105 ENDEAVOUR

■ CAUSE:
CONTAMINATION, DEFECTIVE PART OR MANUFACTURING, ADVERSE TOLERANCES OR WEAR, FAILURE/DEFLECTION OF INTERNAL PARTS

■ CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

■ REDUNDANCY SCREEN A) PASS
■ B) FAIL
■ C) PASS

PASS/FAIL RATIONALE:
■ A)
PRELAUNCH INSTALLATION AND CHECKOUT

■ B)

■ C)

- FAILURE EFFECTS -

■ (A) SUBSYSTEM:
FIRST FAILURE WILL NOT AFFECT DUAL MOTOR OPERATION. SUBSEQUENT FAILURE OF ASSOCIATED MOTOR WILL ALLOW THE REDUNDANT MOTOR TO BACKDRIVE THROUGH THE FAILED BRAKE AND YO POSITIONING IS LOST.

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■ (B) INTERFACING SUBSYSTEM(S):
POSSIBLE CONTACT WITH RADIATOR IF FAILURE OCCURS AFTER PAYLOAD DEPLOYMENT.

■ (C) MISSION:
LOSS OF MISSION IF FAILURE OCCURS DURING DEPLOYMENT.

■ (D) CREW, VEHICLE, AND ELEMENT(S):
FAILURE RESULTS IN POSSIBLE DAMAGE TO RADIATOR AND LOSS OF FREON LOOP DURING LANDING.

■ (E) FUNCTIONAL CRITICALITY EFFECTS:
LOSS OF FUNCTION COULD RESULT IN MISSION ABORT.

- DISPOSITION RATIONALE -

■ (A) DESIGN:
THE ACTUATOR IS MADE OF HIGH STRENGTH MATERIALS, GEARING ARRANGEMENTS, DESIGN CONCEPTS AND ELECTRICAL COMPONENTS THAT HAVE A SUCCESSFUL HISTORY OF USE IN A SPACE ENVIRONMENT.

■ (B) TEST:
QUALIFICATION TESTS PER DTP4779-801 WERE SUCCESSFULLY COMPLETED JANUARY 5, 1990 AND WILL BE DOCUMENTED IN TEST REPORT STS9000115.

OMRSD: GROUND TURNAROUND
FREQUENCY OF CHECKOUT IS MISSION DEPENDENT. YO OUTBOARD-TO-INBOARD VERIFICATION S0790A.060-A, -B, -C.

■ (C) INSPECTION:
ALL DIMENSIONAL CHARACTERISTICS ARE VERIFIED BY INSPECTION. PROCESSES ARE VERIFIED BY INSPECTION EITHER AT ROCKWELL OR AT SUPPLIER FACILITIES. THE CLEANLINESS AND MATERIAL CERTIFICATION ARE VERIFIED BY INSPECTION.

■ (D) FAILURE HISTORY:
** AD6303.- MC287-0037-0008. DRIVE MOTOR OVERCURRENT CONDITION. DURING QUALIFICATION AS PART OF THE SPDS THE STARTING AND RUNNING DRIVE CURRENT EXCEEDED SPECIFICATION REQUIREMENTS AT 0.67 AND 0.36 AMPS RESPECTIVELY. OPERATING CURRENT FLOW WAS CONFIRMED BY DIRECT MEASUREMENT. SPECIFICATION REQUIREMENT FOR STARTING CURRENT WAS NOT ADJUSTED FOR SURGES WHICH CAN RUN AS HIGH AS 400 PERCENT OF NOMINAL RUNNING CURRENT. CR29287-0037-0001 AND MC287-0037 ARE AMENDED TO REFLECT 1.3 AMPS PER PHASE AS ACCEPTABLE STARTING CURRENT. CLOSED IN 891107.

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■ (E) OPERATIONAL USE:
NO HISTORY

- APPROVALS -

RELIABILITY ENGINEERING	W. R. MARLOWE	W. R. Marlowe 6-15-90
DESIGN ENGINEERING	G. CAMPBELL	[signature] for 6-15-90
QUALITY ENGINEERING	M. F. MERGEN	C.A. Collins for 6/14/90
NASA RELIABILITY	G.E	[signature] 9/7/90
NASA SUBSYSTEM MANAGER		[signature] 9/25/90
NASA QUALITY ASSURANCE		[signature] 9/26/90