PRINT DATE: 08/18/98

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-2A-011100 -X

SUBSYSTEM NAME: FLIGHT CONTROL MECH - RUDDER SPEED BRAKE & BF
REVISION: 0 02/02/88

PART DATA

	PART NAME **VENDOR NAME**	**PART NUMBER** **VENDOR NUMBER**
ASSY	: RUDDER/SPEEDBRAKE (R/SB) SUN	MC621-0053-0068 5004918B
SRU	: POWER DRIVE UNIT ASSEMBLY	

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
POWER DRIVE UNIT ASSEMBLY

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 1
ONE REQUIRED

FUNCTION:
THE POWER DRIVE UNIT TRANSLATES HYDRAULIC PRESSURE INTO A ROTARTY MOTION TO POSITION THE LEFT AND RIGHT SURFACE PANELS AS COMMANDED.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE
NUMBER: 02-2A-011100- 01

REVISION#: 1 08/07/98

SUBSYSTEM NAME: FLIGHT CONTROL MECH - RUDDER SPEED BRAKE & BF
LRU:
ITEM NAME: POWER DRIVE UNIT ASSEMBLY

CRITICALITY OF THIS FAILURE MODE: 1/1

FAILURE MODE:
EXTERNAL LEAKAGE/COMPONENT RUPTURE

MISSION PHASE:
LO LIFT-OFF
DO DE-ORBIT

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

CAUSE:
COMPLETE SEAL FAILURE OR RUPTURE OF SERVOACTUATOR IN AND DOWNSTREAM OF SWITCHING VALVE (SERVOVALVE BODY, ISOLATION VALVE BODY, DELTA PRESSURE TRANSDUCER BODY, MANIFOLD SUPPLY, LEE PLUGS, ETC.) COVERS GROSS FLUID LOSS OF AND BETWEEN SWITCHING VALVE MODULE AND POWER VALVE MODULE.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) N/A
B) N/A
C) N/A

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF RUDDER OR SPEEDBRAKE FUNCTIONS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE NUMBER: 02-2A-011100- 01

(B) INTERFACING SUBSYSTEM(S):
LOSS OF ALL HYDRAULIC FLUID (THREE SYSTEMS), RESULTING IN LOSS OF ALL HYDRAULICALLY ACTUATED FUNCTIONS.

(C) MISSION:
LOSS OF MISSION, CREW/VEHICLE.

(D) CREW, VEHICLE, AND ELEMENT(S):
SAME AS (C)

-DISPOSITION RATIONALE-

(A) DESIGN:
EXTERNAL DYNAMIC LEAKAGE NOT TO EXCEED ONE DROP IN 100 CYCLES. ATMOSPHERIC SEALS INCLUDE BACK-UP RING AND BARRIER SEALS. CONDUCTED LEAKAGE, TOLERANCE ASSESSMENT, CRITICAL SEAL STUDY SSV76-36. BARRIER SEAL LIMITS LEAKAGE RATE TO 6 GPH CALCULATED. PDU IS DESIGNED FOR 100K PRESSURE PULSE CYCLES (1.5 X OPERATING PRESSURE) AND A BURST PRESSURE OF 2.5 X OPERATING PRESSURE.

(B) TEST:
QUALIFICATION TESTS: THERMAL CYCLE (-40 DEG F TO +275 DEG F), FULL LIFE/LIMIT LOAD (400 MISSION DUTY CYCLES), RANDOM VIBRATION, PROOF PRESSURE (1.5 X OPERATING PRESSURE), ULTIMATE LOAD, 100,000 PRESSURE IMPULSE CYCLES (1.5 X OPERATING PRESSURE), BURST (2.5 X OPERATING PRESSURE AT +275 DEG F).

ACCEPTANCE TESTS: PROOF PRESSURE, PRESSURE IMPULSE AND THERMAL CYCLING, DYNAMIC/STATIC LEAKAGE.

GROUND TURNAROUND TEST
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

(C) INSPECTION:
RECEIVING INSPECTION

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE NUMBER: 02-2A-011100- 01

RAW MATERIALS AND PROCESS CERTIFICATIONS VERIFIED. FABRICATION, TEST AND INSPECTION DATA ON FILE.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCEDURES VERIFIED. COMPLIANCE TO PROCEDURES CONFIRMED. CLEANLINESS OF INTERNALLY WETTED SURFACES TO LEVEL 190 VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
CLOSE TOLERANCE FITS AND ASSEMBLY TORQUES ARE VERIFIED BY INSPECTION. PERSONNEL ARE TRAINED/CERTIFIED IN THE USE OF SPECIALLY DESIGNATED TOOLS/FIXTURES WHICH ARE REQUIRED IN ASSEMBLY DOCUMENTATION. CORRECT SEAL AND MATING PART, ASSEMBLY AND INSTALLATION VERIFIED.

NONDESTRUCTIVE EVALUATION
PIECE PARTS EVALUATED BY SELECTED PENETRANT, MAGNETIC PARTICLE, ULTRASONIC, AND RADIOGRAPHIC INSPECTIONS.

TESTING
ATP IS VERIFIED BY INSPECTION. ROCKWELL DESIGN AND QUALITY PERSONNEL, WITH NASA PARTICIPATION, CONDUCT A DETAILED ACCEPTANCE REVIEW OF THE HARDWARE AT THE VENDOR'S FACILITY, PRIOR TO THE SHIPMENT OF EACH END ITEM COVERED BY THE CONTROL PLAN.

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED.

(D) FAILURE HISTORY:
CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATA BASE.

(E) OPERATIONAL USE:
NONE.

- APPROVALS -

EDITORIALLY APPROVED	: BNA	: J. Kimura 8-18-98
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 95-CIL-009_02-2A