

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-2A-011200 -X

SUBSYSTEM NAME: FLIGHT CONTROL MECH RUDDER/SPEEDBRAKE & BF
REVISION: 0 02/02/88

PART DATA

PART NAME	PART NUMBER
VENDOR NAME	VENDOR NUMBER
: RUDDER/SPEEDBRAKE (R/SB)	
SRU : DRIVE SHAFTS	MC621-0053-0003 5001385
SRU : DRIVE SHAFTS	MC521-0053-0005 5001385
SRU : DRIVE SHAFTS	MC621-0053-0006 5001385
SRU : DRIVE SHAFTS	MC621-0053-0007 5001385
SRU : DRIVE SHAFTS	MC621-0053-0014 5001385
SRU : DRIVE SHAFTS	MC621-0053-0016 5001385

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
 DRIVE SHAFTS

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 10
 TEN

FUNCTION:
 TRANSMITS RPM/TORQUE BETWEEN PDU AND ROTARY ACTUATORS. TO POSITION
 RUDDER AND SPEEDBRAKE LEFT AND RIGHT HAND PANELS AS COMMANDED

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NUMBER: 02-2A-011200- 01

REVISION#: 1 08/07/98

SUBSYSTEM NAME: FLIGHT CONTROL MECH - RUDDER SPEED BRAKE & BF

LRU:

CRITICALITY OF THIS

ITEM NAME: DRIVE SHAFTS

FAILURE MODE: 1/1

FAILURE MODE:

FAILS TO TRANSMIT RPM/TORQUE, OPEN DRIVELINE

MISSION PHASE: DO DE-ORBIT

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

CAUSE:

SHEARED SPLINE (COUPLING, CROWN OR HUB), SHEARED POSITIONING BOLT, SHEARED DRIVE SHAFT RIVETS, SHEARED DRIVE SHAFT

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 RPM/TORQUE INPUT INTO ONE OR MORE ROTARY ACTUATORS RESULTING IN LOSS OF RUDDER AND SPEEDBRAKE FUNCTIONS

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(B) INTERFACING SUBSYSTEM(S):
NONE.

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

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

-DISPOSITION RATIONALE-

(A) DESIGN:
DRIVE SHAFTS, POSITIONING BOLTS, AND RIVETS ARE SIZED TO DESIGN LIMIT LOAD X 1.4 SAFETY FACTOR. MINIMUM MARGIN OF SAFETY OF 0.42 FOR ALL SHAFTS. SPLINES DESIGNED TO ANSI B 92-1 FATIGUE ANALYSIS OF SHAFT SPLINES BASED ON MISSION DUTY CYCLES X 4.

(B) TEST:
QUALIFICATION TESTS: QUALIFICATION TEST - VIBRATION (20 - 2,000 HZ), THERMAL CYCLE (-40 DEG F TO +275 DEG F), FATIGUE, ULTIMATE LOAD AND LIMIT LOAD.

ACCEPTANCE TESTS: STATIC TORQUE, OPERATING CYCLES AND FREE PLAY.

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

(C) INSPECTION:
RECEIVING INSPECTION
MATERIAL AND PROCESS CERTIFICATIONS VERIFIED. RAW MATERIALS CONFORM TO CHEMICAL REQUIREMENTS VERIFIED. HEAT TREAT HARDNESS VERIFIED.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCEDURES AND PRACTICES ARE VERIFIED BY INSPECTION

ASSEMBLY/INSTALLATION

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ASSEMBLY AND INSTALLATION OPERATIONS OF SHAFTS, SPLINES, POSITIONING BOLTS AND RIVETS ARE VERIFIED BY SHOP TRAVELER MIPS. RIVET HOLES ARE MATCH DRILLED AT ASSEMBLY, DEBURRED PER DRAWING REQUIREMENTS, AND VERIFIED BY INSPECTION. ALIGNMENT REQUIREMENTS VERIFIED. SURFACE TEMPER INSPECTION (NITAL ETCH TO EXAMINE MICROSTRUCTURE) IS VERIFIED BY INSPECTION

NONDESTRUCTIVE EVALUATION

MAGNETIC PARTICLE INSPECTION AND ULTRASONIC INSPECTION ARE VERIFIED.

CRITICAL PROCESSES

DRY FILM LUBRICATION, SHOT PEENING, ELECTROLESS NICKEL PLATING AND GRIT BLASTING ARE VERIFIED. HEAT TREATING, INCLUDING CARBURIZATION, VERIFIED BY INSPECTION

TESTING

CERTIFICATION OF ACCEPTANCE TESTS VERIFIED.

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

TECHNICAL APPROVAL

: VIA APPROVAL FORM

: J. Kumasa 8-18-98

: 95-CIL-009_02-2A