

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-6-E09 -X**

SUBSYSTEM NAME: HYDRAJLICS

REVISION: 1 07/24/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: VALVE, CHECK CRISSAIR	ME284-0434

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
VALVE, CHECK, APU DRIVEN MAIN PUMP PRESSURE

REFERENCE DESIGNATORS: 50V58CV25
50V58CV28
50V58CV31

QUANTITY OF LIKE ITEMS: 3
ONE IN EACH POWER SYSTEM

FUNCTION:
ISOLATES THE MAIN PUMP FROM THE GSE SYSTEM DURING GROUND OPERATIONS
AND FROM THE HYDRAULIC SYSTEM WHEN THE CIRCULATION PUMP IS OPERATING TO
PRECLUDE MOTORING THE APU DRIVEN MAIN PUMP.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: 02-6-E09-02

REVISION#: 1 07/24/98

SUBSYSTEM NAME: HYDRAULICS

LRU: VALVE CHECK

ITEM NAME: VALVE, CHECK

CRITICALITY OF THIS
FAILURE MODE: 1R2

FAILURE MODE:

FAILS OPEN

MISSION PHASE: DO DE-ORBIT

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

CAUSE:

DAMAGED SEAT/POPPET, CONTAMINATION, BROKEN SPRING

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN	A) PASS
	B) FAIL
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

"B" SCREEN IS CONSIDERED FAILED SINCE NO TELEMETRY EXISTS TO DETECT CHECK VALVE FAILURE/SHAFT REVERSE ROTATION DURING FLIGHT IN TIME TO PREVENT BEARING DAMAGE.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF ONE OF THREE HYDRAULIC SYSTEMS. CHECK VALVE FAILING OPEN WOULD RESULT IN REVERSE ROTATION OF THE MAIN PUMP SHAFT DURING CIRCULATION PUMP OPERATIONS. POTENTIAL FOR RUNNING GEAR BOX HIGH SPEED BEARING ASSEMBLY

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WITHOUT ADEQUATE LUBRICATION OVER LONG PERIODS OF TIME (ASSUMPTION-
DURATION OF NOMINAL ORBIT CIRCULATION PUMP OPERATION) HIGH SPEED TURBINE
BEARING DAMAGE COULD OCCUR. POTENTIAL FOR LOSS OF APU AND ASSOCIATED
HYDRAULIC SYSTEM.

(B) INTERFACING SUBSYSTEM(S):

LOSS OF REDUNDANT HYDRAULIC POWER SYSTEM FOR TVC ACTUATOR FOR ENTRY
ENGINE RESTOW. LOSS OF NOSE WHEEL STEERING AND HYDRAULIC LANDING GEAR
DEPLOYMENT CAPABILITY IF SYSTEM ONE IS LOST. LOSS OF ONE OF THREE HYDRAULIC
POWER SYSTEMS TO FLIGHT CONTROL SURFACES AND BRAKES.

(C) MISSION:

NONE COMMITTED.

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

NONE

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF CREW/VEHICLE WITH TWO FAILURES: THIS FAILURE, RESULTING IN
APU SHUTDOWN, PLUS LOSS OF SECOND HYDRAULIC SYSTEM OR PYRO LANDING GEAR
DEPLOYMENT IF SYSTEM ONE IS LOST.

-DISPOSITION RATIONALE-

(A) DESIGN:

VALVE IS DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF
MIL-V-25675, GENERAL REQUIREMENTS FOR CHECK VALVE, MINIATURE, HYDRAULIC,
AIRCRAFT AND MISSILE. HYDRAULIC SYSTEM FILTRATION IS 5 MICRONS AND
CLEARANCES WITHIN THE CHECK VALVE ARE IN EXCESS OF 100 MICRONS.

(B) TEST:

QUALIFICATION:

- RANDOM VIBRATION - WITH 5 GPM FLUID FLOW, PERFORM VIBRATION TEST FOR 48
MINUTES IN EACH AXIS (LEVEL A). REPEAT FOR 12.5 HOURS IN EACH AXIS (LEVEL B).
PASS/FAIL CRITERIA: UNIT MUST PASS SUBSEQUENT LEAKAGE, CHECKING TIME,
AND CRACKING TEST.

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ACCEPTANCE.

- EXAMINATION OF PRODUCT - WEIGHT, WORKMANSHIP, FINISH, DIMENSIONS, AND CONSTRUCTION.
- PROOF PRESSURE - TESTED AT 4.500 PSIG IN BOTH DIRECTIONS. PASS/FAIL CRITERIA: NO INTERNAL OR EXTERNAL LEAKAGE.
- LEAKAGE TEST - TESTED IN HORIZONTAL AND VERTICAL POSITION AT VARIOUS PRESSURES. PASS/FAIL CRITERIA: 1.5 CC/M MAXIMUM AT 5 PSIG. 0 LEAKAGE AT OTHER PRESSURES.
- CHECKING TIME TEST - WITH VALVE IN VERTICAL POSITION, UNSEAT POPPET TO FULL OPEN AND ALLOW TO CHECK, THEN DROP HEAD PRESSURE FROM 5 TO 1 PSIG. PASS/FAIL CRITERIA: 1.5 SECONDS OR LESS AFTER RELEASE OF POPPET TO FLOW CESSATION.
- VALVE CLEANLINESS TEST - LEVEL 190 PER MAO110-301.

GROUND TURNAROUND TEST

ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

(C) INSPECTION:

RECEIVING INSPECTION

RECEIVING INSPECTION VERIFIES MATERIAL AND PROCESSES CERTIFICATION.

CONTAMINATION CONTROL

CLEANLINESS CONTROLS AT CRISSAIR ARE PER NAS1638 AS IMPOSED BY THE BUYER. WHEN THE HARDWARE IS DELIVERED, CONTAMINATION IS CLOSELY CONTROLLED PER MAO110-30-1 LEVEL 190. THE HARDWARE IS VAPOR DEGREASED AND ULTRASONICALLY CLEANED PRIOR TO INSTALLATION.

CRITICAL PROCESSES

PASSIVATION AND HEAT TREATING ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION OF POPPET IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING/ASSEMBLY PROCESSES ARE VERIFIED BY INSPECTION.

TESTING

ATP (PROOF, LEAKAGE, CRACKING PRESSURE, EXAMINATION OF PRODUCT) IS VERIFIED BY RI INSPECTION

HANDLING/PACKAGING

HARDWARE SHIPMENT IS IN A HEAT SEALED POLYETHYLENE BAG INSIDE A SHIPPING BOX.

(D) FAILURE HISTORY:

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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	: <u>J. Kemura 7-30-95</u>
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 95-CIL-009_02-6