

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-6-C10 -X**

SUBSYSTEM NAME: HYDRAULICS

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, UMBILICAL ACTUATOR CIRCUIT AFT FUSELAGE RETURN LINE

REFERENCE DESIGNATORS: 50V58CV35
50V58CV36
50V58CV37
50V58CV38
50V58CV39
50V58CV40

QUANTITY OF LIKE ITEMS: 6
ONE EACH RETURN LINE FROM SIX ACTUATORS

FUNCTION:

ISOLATES THE UMBILICAL RETRACT ACTUATOR FROM REVERSE FLOW AND ABNORMAL RETURN LINE PRESSURES WHICH COULD AFFECT ACTUATOR PERFORMANCE OR CAUSE ACTUATOR STRUCTURAL DAMAGE.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: 02-6-C10-01

REVISION#: 1 07/24/98

SUBSYSTEM NAME: HYDRAULICS

LRU: VALVE, CHECK

ITEM NAME: VALVE, CHECK

CRITICALITY OF THIS
FAILURE MODE: 1R3

FAILURE MODE:

FAILS OPEN, INTERNAL REVERSE FLOW

MISSION PHASE: LO LIFT-OFF
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) FAIL
	B) N/A
	C) PASS

PASS/FAIL RATIONALE:

A)
"A" SCREEN IS FAILED SINCE NO PRESSURE TRANSDUCER EXISTS BETWEEN CHECK VALVE AND ASSOCIATED ACTUATOR, SO CHECK VALVE FAILING OPEN IS NOT GROUND DETECTABLE.

B)
"B" SCREEN IS NOT APPLICABLE SINCE CHECK VALVE IS A STANDBY REDUNDANT SYSTEM.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF REVERSE FLOW PROTECTION

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(B) INTERFACING SUBSYSTEM(S):

POTENTIAL FOR COMPONENT DAMAGE OR ADVERSE SYSTEM PERFORMANCE. HOWEVER, ANY REVERSE FLOW WOULD TEND TO CLOSE CHECK VALVE. TWO FAILURES ARE REQUIRED TO LOSE A HYDRAULIC SYSTEM: CHECK VALVE OPEN AND A RUPTURED LINE OR LEAKAGE BETWEEN THE CHECK VALVE AND ASSOCIATED ACTUATOR. REDUNDANT SYSTEMS ARE AVAILABLE.

(C) MISSION:

NO EFFECT-FULL CONTROL CAPABILITY IS MAINTAINED.

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

NO EFFECT-FULL CONTROL CAPABILITY IS MAINTAINED.

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF CREW/VEHICLE WITH THREE FAILURES: CHECK VALVE FAILS OPEN, RUPTURED LINE OR LEAKAGE BETWEEN THE CHECK VALVE AND ASSOCIATED ACTUATOR LEADING TO LOSS OF ONE HYDRAULIC SYSTEM, AND LOSS OF A SECOND HYDRAULIC SYSTEM.

-DISPOSITION RATIONALE-

(A) DESIGN:

VALVE IS DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF MIL-V-25875. 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.

ACCEPTANCE:

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- 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
NONE (FAILURE IS NOT GROUND DETECTABLE)

(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 MAO110-301 LEVEL 190. THE HARDWARE IS VAPOR DEGREASED AND ULTRASONICALLY CLEANED PRIOR TO INSTALLATION.

CRITICAL PROCESSES

PASSIVATION AND HEAT TREATING ARE VERIFIED BY INSPECTION

NDE

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. Kimura 7-30-98</u>
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 95-CIL-009_02-6