

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-6-A07 -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, SSME RETURN LINE

REFERENCE DESIGNATORS: 50V58CV1
 50V58CV2
 50V58CV3

QUANTITY OF LIKE ITEMS: 3
 ONE IN EACH ENGINE HYDRAULIC POWER SYSTEM RETURN LINE

FUNCTION:
 PREVENTS BACK FLOW AND RAPID LOSS OF FLUID FROM THE RESERVOIR IN THE
 EVENT OF RETURN LINE RUPTURE UPSTREAM OF VALVE.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

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SUBSYSTEM NAME: HYDRAULICS

LRU: VALVE, CHECK

ITEM NAME: VALVE, CHECK

CRITICALITY OF THIS
FAILURE MODE: 1/1

FAILURE MODE:

FAILS CLOSED

MISSION PHASE: LO LIFT-OFF

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

CAUSE:
CONTAMINATION, BINDING

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:
NONE

(B) INTERFACING SUBSYSTEM(S):

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LOSS OF CONTROL OF ONE ENGINE'S PROPELLANT CONTROL VALVES. FUEL CONTROL VALVES WILL FREE FLOAT. ENGINE CANNOT RESPOND TO SHUT DOWN COMMAND. POTENTIAL FOR UNCONTAINED ENGINE DAMAGE.

(C) MISSION:

POSSIBLE LOSS OF CREW/VEHICLE IF CATASTROPHIC FUEL MIXTURE IS REACHED. (FAILURE MODE IS NOT DETECTABLE BY CREW OR GROUND. PROCEDURES WOULD CAUSE CREW TO TAKE UNDESIRABLE CORRECTIVE ACTION WHEN ATTEMPTING TO SHUT DOWN ENGINE DUE TO LACK OF INSIGHT INTO SYSTEM.)

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

SAME AS (C)

-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. HIGH SYSTEM DELTA PRESSURE ACROSS THE VALVE WILL TEND TO OVERCOME ANY INCREASED CRACKING PRESSURE DUE TO CONTAMINATION AND MAINTAIN VALVE IN OPEN POSITION DURING ASCENT. SPRING DESIGN WILL CAUSE BROKEN SPRING TO NEST AND VALVE WILL TEND TO FAIL IN OPEN POSITION. HYDRAULIC SYSTEM FILTER IS 5 MICRON NOMINAL, 15 MICRON ABSOLUTE. A PARTICLE AT LEAST 0.17 INCH LONG AND 0.0357 INCH DIAMETER WOULD BE REQUIRED TO HOLD THE CHECK VALVE CLOSED.

(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:

- 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.

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- 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
- CRACKING PRESSURE TEST - INCREASE PRESSURE STARTING AT 0 PSI. PASS/FAIL CRITERIA: PRESSURE AT FLOW GREATER THAN 2 CC/MIN SHALL BE 5+/-3 PSIG
- PRESSURE DROP TEST - ESTABLISH FLUID FLOW THROUGH VALVE OF 0-94.5 GPM. PASS/FAIL CRITERIA: PRESSURE DROP SHALL EXCEED 23 PSID
- 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 MAO110-301 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 POLETHYLENE BAG INSIDE A SHIPPING BOX.

(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

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- APPROVALS -

EDITORIALLY APPROVED
TECHNICAL APPROVAL

. BNA
. VIA APPROVAL FORM

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