

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE

NUMBER: 02-6-E10 -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, CIRCULATION PUMP PRESSURE LINE ON FILTER MODULE

REFERENCE DESIGNATORS: 50V58CV23
50V58CV26
50V58CV29

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

FUNCTION:

ISOLATES HIGH PRESSURE REVERSE FLOW TO CIRCULATION PUMP.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: 02-6-E10-02

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:

LO LIFT-OFF
DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102 COLUMBIA
103 DISCOVERY
104 ATLANTIS
105 ENDEAVOUR

CAUSE:

CONTAMINATION, DAMAGED SEAT/POPPET, BROKEN SPRING

CRITICALITY 1/1 DURING INTACT ABORT ONLY? YES

RTLS RETURN TO LAUNCH SITE

REDUNDANCY SCREEN

A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

HIGH PRESSURE APPLIED TO LOW PRESSURE CIRCULATION PUMP POSSIBLY RESULTING IN EMI HOUSING RUPTURE LOSS ONE HYDRAULIC SYSTEM.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE
NUMBER: 02-6-E10-02**

{B} INTERFACING SUBSYSTEM(S):

LOSS OF HYDRAULIC POWER FOR ENGINE VALVE CONTROL FOR ONE ENGINE RESULTING IN LOSS OF ONE SSME THRUST CONTROL; HOWEVER, ENGINE WILL CONTINUE TO OPERATE. LOSS OF REDUNDANT HYDRAULIC POWER FOR FOUR TVC ACTUATORS. 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. LOSS OF ONE OF THREE ET UMBILICAL RETRACT ACTUATORS FOR EACH UMBILICAL PLATE. HYDRAULIC FLUID ON TPS SCREED MAY CAUSE DEGRADED TPS BONDS.

(C) MISSION:

ABORT DECISION OR POSSIBLE EARLY MISSION TERMINATION.

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

NONE

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF CREW/VEHICLE WITH TWO FAILURES: THIS FAILURE PLUS LOSS OF SECOND HYDRAULIC SYSTEM, OR, IF SYSTEM ONE WAS LOST WITH FIRST FAILURE. THIS FAILURE PLUS LOSS OF LANDING GEAR PYROTECHNIC DEPLOY. CRITICALITY 1 FOR SSME INDUCED RTLS.

-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.

ACCEPTANCE:

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE
NUMBER: 02-6-E10-02**

- 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 MAQ110-301.

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 MAQ110-301 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:

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.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE
NUMBER: 02-6-E10- 02

(E) OPERATIONAL USE:

NONE - RAPID LEAK FROM RUPTURE WOULD DEplete HYDRAULIC SYSTEM BEFORE ACTION COULD BE TAKEN.

- APPROVALS -

EDITORIALLY APPROVED	: BNA	: <u>J. Komura 7-30-88</u>
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 95-CIL-009_02-6