FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-6-C06 -X

SUBSYSTEM NAME: HYDRAULICS

REVISION: 1 07/24/98

PART DATA

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

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
VALVE, CHECK, LANDING GEAR HYDRAULIC CIRCUIT AFT FUSELAGE RETURN LINE

REFERENCE DESIGNATORS: 50V58CV19
50V58CV20
50V58CV21

QUANTITY OF LIKE ITEMS: 3
ONE EACH RETURN LINE FROM THREE LANDING GEAR CIRCUITS

FUNCTION:
ISOLATES THE LANDING GEAR CIRCUIT AND COMPONENTS FROM REVERSE FLOW AND ABNORMAL RETURN LINE PRESSURES WHICH COULD AFFECT PERFORMANCE, CAUSE COMPONENT STRUCTURAL DAMAGE OR INADVERTENT OPERATION OF COMPONENTS UPSTREAM OF THE VALVE.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE
NUMBER: 02-6-C06-02

REVISION#: 1 07/24/98

SUBSYSTEM NAME: HYDRAULICS
LRU: VALVE, CHECK
ITEM NAME: VALVE, CHECK

CRITICALITY OF THIS FAILURE MODE: 1/1

FAILURE MODE:
FAILS CLOSED

MISSION PHASE: DO DE-ORBIT

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:
SYSTEM RETURN PATH FROM LANDING GEAR (SYSTEM 1 ONLY) AND BRAKES IS BLOCKED.

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(B) INTERFACING SUBSYSTEM(S):
IF FAILURE OCCURS ON SYSTEM 1 OR 2, FAILURE WOULD RESULT IN UNCOMMANDED BRAKE PRESSURE. IF FAILURE OCCURS ON SYSTEM 1. FAILURE WOULD ALSO RESULT IN INHIBITED LANDING GEAR DEPLOYMENT IF FAILURE OCCURS ON SYSTEM 3, TWO FAILURES ARE REQUIRED TO GET UNCOMMANDED BRAKE PRESSURE: THIS FAILURE PLUS LOSS OF HYDRAULIC SYSTEM 1 OR 2.

(C) MISSION:
POSSIBLE LOSS OF CREW/VEHICLE DUE TO BRAKE PRESSURE APPLIED AT TOUCHDOWN RESULTING IN BRAKE/WHEEL/TIRE DAMAGE AND LOSS OF ROLLOUT CONTROL, ALSO, DUE TO INHIBITED LANDING GEAR DEPLOY. IF FAILURE IS IN SYSTEM ONE

(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.

- 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 TESTS - 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 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.

(E) OPERATIONAL USE:

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NONE

- APPROVALS -

EDITORIALLY APPROVED	: BNA	: J. Kennedy 7-30-98
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