

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING DECELERATION FMEA NO 02-1F -G09-LP-H01 REV:06/27/88

ASSEMBLY : MLG STRUT ACTUATOR
P/N RI : MC287-0034
P/N VENDOR: PARKER-BERTEA
QUANTITY : 2
 : ONE PER ACTUATOR
 :
VEHICLE 102
EFFECTIVITY: X
PHASE(S): PL LO OO DO X LS
CRIT FUNC: 11
CRIT. HDW: 103 104
 X X X

PREPARED BY: DES N LEVERT
REL C NELSON
QE M SAVALA
REDUNDANCY SCREEN: A-FAIL B-FAIL C-PAS
APPROVED BY: DES N. Levert
REL CN Nelson 7-25-88
QE M Savala 7-25-88
APPROVED BY (NASA): SSM R. Balciunas
REL R. Balciunas 8/11/88
QE R. Balciunas 8/11/88

ITEM:
RELIEF VALVE, LOW PRESSURE

FUNCTION:
PREVENTS LOSS OF HYDRAULIC FLUID FROM THE ACTUATOR IN THE EVENT OF LEAKAGE AT THE EXTEND PORT. THE VALVE CRACKS AT 40 +/- 15 PSID AND RESEALS AT NO LESS THAN 20 PSID.

FAILURE MODE:
FAILS OPEN

CAUSE(S):
CONTAMINATION, BROKEN SPRING

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A) AT DOWN GEAR COMMAND - LOSS OF ACTUATOR DAMPING FUNCTION.
(B) POTENTIAL FOR LANDING GEAR DAMAGE DUE TO EXCESSIVE DEPLOYMENT VELOCITY.
(C,D) POTENTIAL FOR LOSS OF CREW/VEHICLE WITH TWO FAILURES: RUPTURE OF RETURN LINE BETWEEN ACTUATOR AND RETURN LINE CHECK VALVE AND ACTUATOR RELIEF VALVE FAILING OPEN, PERMITTING EXCESSIVE VELOCITY OF GEAR DEPLOYMENT.
(E) FUNCTIONAL CRITICALITY EFFECTS-SEE ITEM (D) ABOVE. "A" SCREEN FAILED SINCE GROUND TURNAROUND CHECKOUT REQUIRES AN INVASIVE TEST. "B" SCREEN IS FAILED BECAUSE THERE IS NO INFLIGHT INSTRUMENTATION AND THE FAILURE WOULD ONLY MANIFEST ITSELF UNDER A RUPTURED LINE CONDITION.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING DECELERATION FMEA NO 02-1F -G09-LP-H01 REV:06/27/8

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN

SYSTEM CLEANLINESS IS TO LEVEL 220 PER MA0110-301. LOW PRESSURE RELIEF VALVE INCORPORATES INNER AND OUTER (DUAL) NESTED SPRINGS. THE SPRINGS ARE MADE FROM CORROSION RESISTANT MATERIAL (17-7PH) WITH MODERATE STRESS AND ARE GUIDED.

(B) TEST

QUALIFICATION-RANDOM VIBRATION 0.4 G2/HZ, 12 MINUTES AT EACH AXIS AND 0.14 G2/HZ, 34 MINUTES AT EACH AXIS. ENDURANCE TESTS, 100 DUTY CYCLES. EACH TEMPERATURE: -35, 20, 90 AND 140 DEGREES F. ONE DUTY CYCLE EQUALS 10 DEPLOY/RETRACT SEQUENCE. ACTUATOR EXTEND-TIME TEST, PROOF PRESSURE TEST, PERFORMANCE RECORD TEST INCLUDING HIGH PRESSURE STATIC EXTERNAL LEAKAGE TEST, LOW PRESSURE STATIC EXTERNAL LEAKAGE TEST AND DYNAMIC SEAL LEAKAGE TEST. POST TEST PROCEDURE INCLUDES DISASSEMBLY AND INSPECTION OF WORKING COMPONENTS. 400 FULL STROKE CYCLES WERE CONDUCTED ON THE LANDING GEAR TEST ARTICLE (SIMULATOR).

ACCEPTANCE-ACTUATOR EXTEND-TIME TEST, PERFORMANCE RECORD TEST INCLUDING HIGH PRESSURE STATIC EXTERNAL LEAKAGE TEST, LOW PRESSURE STATIC EXTERNAL LEAKAGE TEST AND DYNAMIC SEAL LEAKAGE TEST. LOW PRESSURE RELIEF VALVE TESTED AT THE INDIVIDUAL COMPONENT LEVEL FOR CRACK, RESEAT AND PROPER FLOW. UNIT CLEANLINESS TEST.

OMRSD-THERE IS NO TEST AVAILABLE.

(C) INSPECTION

RECEIVING INSPECTION CERTIFICATION RECORDS AND CERTIFIED TEST REPORTS ARE MAINTAINED ON CERTIFYING MATERIAL AND PHYSICAL PROPERTIES.

CONTAMINATION CONTROL SYSTEM CLEANLINESS IS VERIFIED TO LEVEL 220 PER MA0110-301. FLUORESCENT CONTAMINATION PARTICLE COUNT CONDUCTED PRIOR TO ATP.

CRITICAL PROCESSES HEAT TREAT PROCESS IS VERIFIED BY INSPECTION.

NDE INSPECTION VERIFIES THAT SPRINGS ARE BOTH MAGNETIC PARTICLE AND PENETRATION INSPECTED. OTHER DETAIL PARTS ARE MAGNETIC PARTICLE OR PENETRATION INSPECTED, DEPENDING ON THE ALLOY, AND VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION INSPECTION OF SPRING DIMENSIONS AND OTHER DIMENSIONS IS VERIFIED.

TESTING ATP IS VERIFIED BY INSPECTION.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING DECELERATION FMEA NO 02-1F -G09-LP-H01 REV:06/27

HANDLING/PACKAGING

PARTS PROTECTION TO PRECLUDE CONTAMINATION DURING SHIPMENT IS VERIFIED INSPECTION.

(D) FAILURE HISTORY

THERE IS NO HISTORY OF FAILURE FOR THIS FAILURE MODE.

(E) OPERATIONAL USE

NONE