

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING DECELERATION FMEA NO 02-1F -H01-SV-B02 REV:06/27/8

ASSEMBLY : NLG STRUT ACTUATOR

P/N RI : MC287-0034

P/N VENDOR: PARKER-BERTEA

QUANTITY : 1
: ONE PER ACTUATOR

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X
PHASE(S):	PL LO	OO	DO X LS

CRIT. FUNC: :

CRIT. HDW: :

PREPARED BY:

DES N LEVERT
REL C NELSON
QE M SAVALA

REDUNDANCY SCREEN: A-N/A B-N/A C-N/A

APPROVED BY:

DES
REL
QE

APPROVED BY (NASA):

SSM
REL
QE

ITEM:

VALVE, SHUTTLE

FUNCTION:

THE SHUTTLE VALVE IS A TWO-POSITION PRESSURE OPERATED VALVE. WHEN IN NORMALLY OPEN POSITION IT PERMITS FLOW FROM THE NET SIDE TO THE GROUND SIDE OF THE ACTUATOR PISTON THROUGH THE TIMING ORIFICE FOR THE GEAR EXTENSION PHASE. WHEN ACTUATED CLOSED, DURING GROUND OPERATIONS, VALVE PERMITS FLOW THROUGH THE RETRACT PORT TO ENTER THE NET SIDE OF PISTON TO ACHIEVE GEAR RETRACTION.

FAILURE MODE:

FAILS CLOSED

CAUSE(S):

BROKEN SPRING, CONTAMINATION

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A, B) GEAR WILL NOT EXTEND DUE TO HYDRAULIC LOCKUP.

(C) NONE, COMMITTED TO LAND.

(D) POSSIBLE LOSS OF CREW/VEHICLE IF GEAR DOES NOT DEPLOY.

DISPOSITION & RATIONALE:

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

(A) DESIGN

SPOOL/SLEEVE SAME MATERIAL/THERMAL EXPANSION LAPPED ASSEMBLY. HARD MATERIAL IS USED TO PREVENT GALLING. RELIEF GROOVES IN SPOOL LANDS ARE USED TO CLEAR SILTING. SPOOL LANDS DO NOT CROSS PORTS. COMBINED SPRING (500 POUNDS) AND EXTEND PRESSURE (2,260 PSI) EQUALS 3,480 LBS. RETURN SPRINGS ARE CORROSION RESISTANT WITH MODERATE STRESS AND ARE GUIDED. MICRON FILTRATION AT EXTEND/RETURN PORTS. VALVE POSITION (OPEN), FOLLOWING RAISING GEAR, IS MONITORED PRIOR TO LAUNCH. FLIGHT PROCEDURE AND SYSTEM OPERATING CONDITIONS, (SUBSEQUENT TO LAUNCH AND PRIOR TO DEPLOY GEAR COMMAND), KEEP VALVE IN OPEN POSITION. (HYDRAULIC SYSTEM C ISOLATION VALVE IS CLOSED UNTIL PRIOR TO LANDING.)

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(B) TEST

QUALIFICATION-RANDOM VIBRATION 0.5 G2/HZ, 14 MINUTES AT EACH AXIS 0.07 G2/HZ, 34 MINUTES EACH AXIS. ENDURANCE-100 DUTY CYCLES AT E TEMPERATURE -40, 20, 90 AND 160 DEGREES F. ONE DUTY CYCLE EQUALS DEPLOY/RETRACT SEQUENCE. 400 FULL STROKE CYCLES ARE CONDUCTED ON LAND GEAR TEST ARTICLE (SIMULATOR).

ACCEPTANCE-SPOOL/SLEEVE VERIFIED NO JAMMING AT -65 AND 275 DEGREES THEN IDENTIFIED/CONTROLLED AS MATCHED SET. PART LEVEL ACCEPTANCE ACTUATION AND RESEAT PRESSURE, FLOW/DELTA PRESSURE AND INTERNAL LEAK ACTUATION/RESEAT PRESSURE REVERIFIED AT ASSEMBLY LEVEL. 400 FULL STR CYCLES CONDUCTED.

OMRSD-EXTEND NOSE LANDING GEAR FROM CREW STATION, PERFORMED PRIOR TO E MISSION.

(C) INSPECTION

RECEIVING INSPECTION

CERTIFICATION RECORDS AND CERTIFIED TEST REPORTS ARE MAINTAI CERTIFYING MATERIAL AND PHYSICAL PROPERTIES.

CONTAMINATION CONTROL

SYSTEM CLEANLINESS IS VERIFIED TO LEVEL 220 PER MA0110-301. FL CONTAMINATION PARTICLE COUNT CONDUCTED PRIOR TO ATP. AFTER ATP, A FL SAMPLE IS DRAWN TO VERIFY FLUID CLEANLINESS. IF CONTAMINATED, ACTUA IS CYCLED AND FLUSHED UNTIL CONFIRMATION OF CLEANLINESS IS ATTAINED. PORTS ARE CAPPED WITH CLOSURES CLEANED TO UNIT CLEANLINESS REQUIREMEN

CRITICAL PROCESSES

HEAT TREATING AND PASSIVATION ARE VERIFIED BY INSPECTION.

NDE

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

ASSEMBLY/INSTALLATION

STRICT COMPLIANCE WITH MACHINING SPECIFICATION AND CORROSION CONTROL P REQUIRED, AND COPIES OF THESE SPECIFICATIONS ARE INCLUDED IN E PLANNING PACKAGE. QUALITY CONTROL WITNESSES SEAL AND BACKUP R INSTALLATION AND ALL TORQUES. "O" RING GROOVES AND SEAL FACES INSPECTED FOR PROPER FINISH. ALL SEALS ARE INSPECTED FOR DAMAGE PR TO INSTALLATION. TORQUES WITNESSED AND VERIFIED BY INSPECTI INSPECTION OF DIMENSIONS AT FINAL INSPECTION. SPRING DIMENSIONS VERIFIED BY INSPECTION.

TESTING

ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PARTS PROTECTION TO PRECLUDE CONTAMINATION DURING SHIPMENT IS VERIFIED INSPECTION.

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(D) FAILURE HISTORY

THERE IS NO HISTORY OF FAILURE FOR THIS FAILURE MODE.

(E) OPERATIONAL USE

NONE