

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING DECELERATION FMEA NO 02-1F -H01-CC-J02 REV:06/27/

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: 1  
CRIT. HDW:  
DO X LS

PREPARED BY: DES N LEVERT  
REL C NELSON  
QE M SAVALA

REDUNDANCY SCREEN: A-FAIL B-FAIL C-PA  
APPROVED BY: DES N. Levert  
REL C. Nelson  
QE M. Savala 7-25-88

APPROVED BY (NASA): SSM R. Balciunas 8/1/88  
REL W. J. ... 8/2/88  
QE ...

ITEM:  
CHECK VALVE, CAVITATION

FUNCTION:  
PERMITS FLUID FROM SUPPLY TO ENTER THE PISTON END OF THE CYLINDER DURING GEAR EXTENSION PHASE TO PREVENT CAVITATION. PREVENTS REVERSE FLOW (BACKWASHING) THROUGH THE EXTEND PORT FILTER DURING GEAR RETRACT PHASE AND MAINTAINS FLUID IN THE ACTUATOR IN THE EVENT OF UPSTREAM LINE FAILURE.

FAILURE MODE:  
FAILS CLOSED

CAUSE(S):  
CONTAMINATION

EFFECT(S) ON:  
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A, B) CAVITATION OF GROSS SIDE OF ACTUATOR DURING DEPLOYMENT.

(C, D) POSSIBLE LOSS OF CREW/VEHICLE WITH TWO FAILURES: FAILURE OF GEAR TO FULLY LOCK IN EXTENDED POSITION DUE TO CAVITATION VACUUM BEHIND PISTON AND FAILURE OF THE DOWNLOCK BUNGEE TO OVERCOME RESISTANCE TO CAVITATION VACUUM FORCES. FAILURE TO LOCK GEAR INTO POSITION MAY RESULT IN GEAR COLLAPSE.

(E) FUNCTIONAL CRITICALITY EFFECTS-SEE ITEM (D) ABOVE. "A" SCREEN FAILED BECAUSE IN ORDER TO VERIFY THE CHECK VALVE FUNCTION, THE BUNGEE MUST BE DEACTIVATED. ALTHOUGH GEAR COLLAPSE WOULD BE DETECTED, THERE IS INSUFFICIENT TIME TO CORRECT THE PROBLEM. ("B" SCREEN IS FAILED.)

DISPOSITION & RATIONALE:

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

(A) DESIGN

ANTICAVITATION ORIFICE UPSTREAM OF CHECK VALVE HAS AN 80 MICRON FILTER EACH END. SYSTEM CLEANLINESS IS TO LEVEL 220 PER MA0110-301. EXTEND AND RETRACT PORTS ARE PROTECTED WITH AN 80 MICRON FILTER.

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(B) TEST

QUALIFICATION-RANDOM VIBRATION AND ENDURANCE TESTS REPRESENTATIVE MISSION ENVIRONMENT. 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.

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. UNIT CLEANLINESS TEST.

OMRSD-THERE IS NO TEST AVAILABLE.

(C) INSPECTION

RECEIVING INSPECTION

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

CONTAMINATION CONTROL

SUPPLIER TEST STAND FLUID PARTICLE COUNT CHECKED TWICE A DAY, WHEN APPLICABLE. FLUID CONTAMINATION PARTICLE COUNT CONDUCTED PRIOR TO AND AFTER ATP, A FLUID SAMPLE IS DRAWN TO VERIFY FLUID CLEANLINESS. IF CONTAMINATED, ACTUATOR IS CYCLED AND FLUSHED UNTIL CONFIRMATION IS ATTAINED.

CRITICAL PROCESSES

HEAT TREATMENT IS VERIFIED BY INSPECTION.

NDE

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

ASSEMBLY/INSTALLATION

INSPECTION OF DIMENSIONS IS VERIFIED. QUALITY CONTROL WITNESSES SEALS AND BACKUP RING INSTALLATION. O-RING GROOVES AND SEAL FACES INSPECTED FOR PROPER FINISH. ALL SEALS INSPECTED PRIOR TO INSTALLATION. COMPONENT PARTS VERIFIED UNDAMAGED PRIOR TO CLEANING AND PACKAGING.

TESTING

ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PARTS PROTECTION TO PRECLUDE CONTAMINATION DURING SHIPMENT IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

THERE IS NO HISTORY OF FAILURE FOR THIS FAILURE MODE.

(E) OPERATIONAL USE

NONE