

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -011 -1 REV:09/19/88

ASSEMBLY : MAIN LANDING GEAR (MLG) CRIT. FUNC: :  
P/N RI : V070-510201 CRIT. HDW: :  
P/N VENDOR: VEHICLE 102 103 104  
QUANTITY : 8 EFFECTIVITY: X X X  
: FOUR LEFT HAND, PHASE(S): PL LO OO DO X LS  
: FOUR RIGHT HAND

REDUNDANCY SCREEN: A- B- C-  
PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
DES R. A. GORDON DES *R.A. Gordon* 7/2/88 SSM *Charles Campbell*  
REL J. S. MULLEN REL *J.S. Mullen* REL *Earl Gary Spalding*  
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ITEM:  
MAIN LANDING GEAR DOOR HOOK ASSEMBLY

FUNCTION:  
LOCKS MLG DOOR AFTER GEAR IS RETRACTED AND RELEASES DOORS FOR OPENING DURING GEAR DEPLOYMENT.

FAILURE MODE:  
STRUCTURAL FAILURE

CAUSE(S):  
OVERLOAD, DEFECTIVE PART/MATERIAL.

EFFECT(S) ON:  
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE  
(A, B) LEAKAGE THRU DOOR SEAL EXPOSES COMPARTMENT TO HIGH THERMAL FLOWS POSSIBLE STRUCTURAL INTERNAL DAMAGE TO COMPARTMENT.  
(C, D) POSSIBLE LOSS OF MISSION/CREW/VEHICLE DUE TO RE-ENTRY OVERHEATING

DISPOSITION & RATIONALE:  
(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE  
(A) DESIGN  
DESIGNED TO A MINIMUM FACTOR OF SAFETY OF 1.4 WITH STANDARD MATERIAL ALLOWABLES. MATERIALS USED ARE NOT SUSCEPTIBLE TO CORROSION DURING EXPOSURE TO EXPECTED ORBITAL ENVIRONMENT.

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**(B) TEST**

**QUALIFICATION TESTS:** COMPONENTS VERIFIED FOR STRUCTURAL INTEGRITY AND PROOF LOADS, WITH FUNCTIONAL/KINEMATIC/ENDURANCE CYCLING ON SIMULATOR. DOOR LOADS (AERO) VERIFIED IN SIMULATOR FOR WORST CASE CONDITION.

THE DOOR HOCA ASSEMBLIES WERE ALSO CERTIFIED AS AN INTEGRAL PART OF THE MLG MECHANISM INSTALLATION (LANDING GEAR OPERATION) - 32 CYCLES OF THE LANDING GEAR DURING ALT, 15 DEVELOPMENT CYCLES AND 353 QUALIFICATION LI CYCLES FOR A TOTAL OF 400 CYCLES. (THE LANDING GEAR WAS CYCLED FROM UP AND LOCKED TO DOWN AND LOCKED EACH TIME). . . THESE TESTS WERE PERFORMED WITH MAXIMUM DOOR OPENING AIR LOADS ON THE DOOR WITH THE APPROPRIATE AI LOADS ON THE SHOCK STRUT ASSEMBLY. THE GEAR ACTUATOR LOAD WAS LIMITED 66,800 LBS. WHILE RESTRICTING THE DOWN MOTION OF THE GEAR. THE MAXIMUM TENSION LOAD IN THE RETRACT LINK WAS 22,700 LBS AND MAXIMUM COMPRESSION LOAD WAS 15,500 LBS.

**ENVIRONMENT:**

HIGH TEMP TESTS; 3 CYCLES AT 140 DEG F

COLD TEMP TESTS; 3 CYCLES AT -35 DEG F TO -40 DEG F

**ACCEPTANCE TESTS:** ACCEPTANCE INCLUDES VERIFICATION THAT CERTIFIED MATERIALS AND PROCESSES WERE USED. ACCEPTANCE TESTS ALSO VERIFY DIMENSIONS, WEIGHTS AND FINISHES.

**OMRSD:** LH/RH WHEELWELL ZONAL INTERNAL DETAIL INSPECTION; A VISUAL DETAILED INSPECTION OF THE MLG WHEELWELLS IS PERFORMED TO VERIFY THE CONDITION AND SECURITY OF THESE ITEMS.

**FREQUENCY - ALL VEHICLES AT GROUND TURNAROUND.**

**(C) INSPECTION**

**RECEIVING INSPECTION**

MATERIALS AND PROCESS CERTIFICATIONS ARE VERIFIED BY INSPECTION.

**CONTAMINATION CONTROL**

CLEANLINESS REQUIREMENTS AND CORROSION PROTECTION PER DRAWING AND APPLICABLE SPECIFICATION ARE VERIFIED BY INSPECTION.

**ASSEMBLY/INSTALLATION**

MACHINING VERIFIED ON MANUFACTURING ORDERS TO BE TO DRAWING TOLERANCES AND APPLICABLE MACHINING SPECIFICATIONS.

**CRITICAL PROCESSES**

HEAT-TREAT FOR MAXIMUM CRYOGENIC PROPERTIES PER APPLICABLE HEAT TREAT SPECIFICATION PRIOR TO APPLICATION OF PLATING, AND CHROMIUM PLATING PER APPLICABLE SPECIFICATION ARE VERIFIED BY INSPECTION. APPLICATION OF DRY FILM LUBE TO SPECIFIC AREAS PER DRAWING AND DRY FILM LUBE SPECIFICATION AND BUSHING INSTALLATION PER DRAWING AND BUSHING INSTALLATION SPECIFICATION ARE VERIFIED BY INSPECTION.

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**NONDESTRUCTIVE EVALUATION**

PENETRANT INSPECTION OF DETAIL PARTS PER MTO501-504 IS VERIFIED BY INSPECTION.

**TESTING**

ACCEPTANCE TESTING IS VERIFIED BY INSPECTION.

**PACKAGING/HANDLING**

HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION.

**(D) FAILURE HISTORY**

NONE.

**(E) OPERATIONAL USE**

NONE.