

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -083 -1 REV:09/19/88

ASSEMBLY : NOSE LANDING GEAR (NLG)						CRIT. FUNC: 1
P/N RI : MC621-0012						CRIT. HDW: 1
P/N VENDOR: 1170666 MENASCO						
QUANTITY : 1		VEHICLE	102	103	104	
: ONE		EFFECTIVITY:	X	X	X	
:		PHASE(S):	PL	LO	OO	DO X LS

PREPARED BY:		REDUNDANCY SCREEN:	A-	B-	C-
DES R. A. GORDON	APPROVED BY:	DES	APPROVED BY (NASA)		
REL J. S. MULLEN		REL	SSM	<i>[Signature]</i>	
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ITEM:
NLG UPLOCK ROLLER RETAINER ASSEMBLY.

FUNCTION:
RETAINS ROLLER WHICH IS THE MAIN HOLDING PIN FOR NLG STRUT IN THE RETRACTED POSITION. THE UPLOCK HOLDS THE ROLLER WHEN THE NLG IS RETRACTED.

FAILURE MODE:
STRUCTURAL FAILURE

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

EFFECT(S) ON:

- (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
- (A) FUNCTIONAL DEGRADATION, PRE-RELEASE OF N/G ASSEMBLY. DOOR MAY BUCKLE UNDER GEAR WEIGHT AND CRACK OPEN.
- (B) PROBABLE LOSS OF DOOR ASSEMBLY INTEGRITY TO SEAL COMPARTMENT FROM HIGH TEMPERATURE FLOWS.
- (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 FATIGUE LOAD SPECTRUM FOR RETRACTION, EXTENSION, OPERATIONAL AND STOWAGE CONDITIONS. DESIGNED TO A MINIMUM FACTOR OF SAFETY OF 1.4 WITH STANDARD MATERIAL ALLOWABLES. MATERIALS USED ARE NOT SUSCEPTIBLE TO CORROSION DUE TO EXPOSURE TO EXPECTED ORBITER ENVIRONMENT.

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(B) TEST

QUALIFICATION TESTS: THE FATIGUE LOAD TEST SPECTRUM REPRESENTED THE EQUIVALENT LOADING FOR THE LIFE OF EACH LANDING GEAR. A SCATTER FACTOR OF 4.0 WAS APPLIED SUCH THAT THE SPECTRUM WAS REPEATED FOR A TOTAL OF FOUR TIMES. NO RESIDUAL TENSION STRESSES ARE PREVALENT IN THE MECHANISM FOR LONG PERIODS OF TIME IF AT ALL.

THE UPLOCK ROLLER RETAINER ASSEMBLY WAS ALSO CERTIFIED AS AN INTEGRAL PART OF THE NLG/MLG MECHANISM INSTALLATION (LANDING GEAR OPERATION) - 3 CYCLES OF THE LANDING GEAR DURING ALT, 15 DEVELOPMENT CYCLES AND 353 QUALIFICATION LIFE 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 AIR LOADS ON THE SHOCK STRUT ASSEMBLY. THE GEAR ACTUAL LOAD WAS LIMITED TO 25,000 LBS. WHILE RESTRICTING THE DOWN MOTION OF THE GEAR. THE MAXIMUM TENSION LOAD IN THE RETRACT LINK WAS 10,100 LBS AND MAXIMUM COMPRESSION LOAD WAS 8,300 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: NLG ZONAL DETAIL VISUAL INSPECTION; A DETAILED VISUAL INSPECTION OF THE NLG WHEELWELL IS PERFORMED TO VERIFY THE CONDITION AND SECURITY OF THE UPLOCK ROLLER AND RETAINER ASSEMBLY.

FREQUENCY - ALL VEHICLES AT GROUND TURNAROUND.

(C) INSPECTION

RECEIVING INSPECTION

INSPECTION VERIFIES ALL RAW MATERIALS TO COMPLY WITH MATERIAL REQUIREMENTS THROUGH PERIODIC COUPON ANALYSIS.

CONTAMINATION CONTROL

ALL CLEANLINESS LEVELS VERIFIED BY INSPECTION. CORROSION CONTROL REQUIREMENTS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

ALL MATERIAL PROCESSES VERIFIED BY MIP'S PRIOR TO NEXT MANUFACTURING OPERATIONS. DIMENSIONS AND SURFACE ROUGHNESS ARE VERIFIED BY INSPECTION

CRITICAL PROCESSES

HEAT TREATMENT PER MIL-H-6875 IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

MATERIAL SURFACE DEFECTS ARE DETECTED BY FLUORESCENT PENETRANT INSPECTION.

TESTING

ATP IS VERIFIED BY INSPECTION.

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PACKAGING/HANDLING

HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NONE.

(E) OPERATIONAL USE

NONE.