

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -079 -1 REV:09/19/88

ASSEMBLY : NOSE LANDING GEAR (NLG)	CRIT. FUNC:	1R
P/N RI : MC621-0012	CRIT. HDW:	2
P/N VENDOR: 1170875 MENASCO	VEHICLE	102 103 104
QUANTITY : 1	EFFECTIVITY:	X X X
: ONE	PHASE(S):	PL LO OO DO LS X
:		

PREPARED BY:	REDUNDANCY SCREEN:	A-PASS B-FAIL C-PAS
DES R. A. GORDON	APPROVED BY:	APPROVED BY (NASA)
REL J. S. MULLEN	DES <i>R. Gordon 9/21/88</i>	SSM <i>[Signature]</i>
QE W. J. SMITH	REL <i>[Signature]</i>	REL <i>[Signature] 9/27/88</i>
	QE <i>[Signature]</i>	QE <i>[Signature]</i>

ITEM:
NOSE LANDING GEAR OVERCENTER DOWNLOCK BUNGEE

FUNCTION:
THE NOSE GEAR DOWNLOCK ASSY IS PROVIDED WITH A SPRING BUNGEE WITH SUFFICIENT FORCE TO HOLD THE DOWNLOCK MECHANISM (LOCKING TOGGLES) SECURELY LOCKED DURING LANDING AND GROUND OPERATIONS.

FAILURE MODE:
STRUCTURAL FAILURE

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

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A, B) LOSS OF BUNGEE FUNCTION.

(C, D) POSSIBLE LOSS OF MISSION/CREW/VEHICLE WITH TWO FAILURES, LOSS OF BUNGEE AND LOSS OF EXTEND ACTUATOR.

FAILS SCREEN "B" BECAUSE THERE IS NO INDICATION OF THIS FAILURE PRIOR TO LANDING

DISPOSITION & RATIONALE:
(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN
DESIGNED TO A MINIMUM OF 1.4 FACTOR OF SAFETY WITH STANDARD MATERIAL ALLOWABLE. SPRING BUNGEE IS DESIGNED TO FUNCTION WITH A SINGLE SPRING FRACTURE.

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(B) TEST

(B) TEST

QUALIFICATION TESTS:

CERTIFICATION INCLUDES ULTIMATE STRENGTH TEST, SHOCK STRUT DROP TESTS, STATIC LOADS TEST, DYNAMIC TESTS AND 400 DEPLOYMENT CYCLES. THE DOWNLOCK BUNGEE ASSEMBLY WAS CERTIFIED AS AN INTEGRAL PART OF THE NLG/MLG MECHANISM INSTALLATION (LANDING GEAR OPERATION) - 32 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 FR UP AND LOCKED TO DOWN AND LOCKED EACH TIME).

ENVIRONMENT:

HIGH TEMP TESTS: 3 CYCLES AT 140 DEG F

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

THE DOWNLOCK BUNGEE ASSEMBLY WAS ALSO TESTED AS AN INTEGRAL PART OF THE NLG SHOCK STRUT ASSEMBLY DURING DROP TESTS - TEN DROP TESTS WERE PERFORMED TO SATISFY THE DESIGN REQUIREMENTS FOR THE SHOCK STRUT ASSEMBLY.

MAXIMUM VERTICAL LOAD WAS 109,400 LBS.

MAXIMUM SINK SPEED WAS 13.6 FPS.

FATIGUE LOAD SPECTRUM TESTS WERE CONDUCTED FOR LANDING, LANDING ROLLOUT BRAKING AND TURNING LOAD CONDITIONS - THE STRUT WAS SUBJECTED TO CYCLIC APPLICATION OF VERTICAL, FORE/AFT AND SIDE LOADS IN EACH CONDITION.

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; THE OVERCENTER DOWNLOCK BUNGEE ASSEMBLY AND IT'S ATTACHMENTS ARE INSPECTED FOR CONDITION AND SECURITY.

FREQUENCY - ALL VEHICLES AT GROUND TURNAROUND.

(C) 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 PROTECTION REQUIREMENTS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

ALL MATERIAL PROCESSES VERIFIED BY MIP'S PRIOR TO NEXT MANUFACTURING OPERATIONS. TORQUE VALUES SPECIFIED ON DRAWINGS ARE VERIFIED AT THE TIME OF ACCOMPLISHMENT. INSTALLATION OF COTTER PIN AND LOCK WIRE VERIFIED AT ASSEMBLY LEVEL.

NONDESTRUCTIVE EVALUATION

FLUORESCENT PENETRANT INSPECTION VERIFIED BY INSPECTION.

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CRITICAL PROCESSES

INSPECTION VERIFIES HEAT TREATMENT.

TESTING

TORSIONAL OVERLOADS ARE VERIFIED BY DYNAMIC AND STATIC TESTS PERFORMED QUALIFICATION TESTING.

HANDLING/PACKAGING

HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NONE.

(E) OPERATIONAL USE

NONE.

02-1A-67