

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -107 -1 REV:09/19/83

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

PREPARED BY:	REDUNDANCY SCREEN: A-	B-	C-
DES R. A. GORDON	APPROVED BY:	APPROVED BY (NASA):	
REL J. S. MULLEN	DES <i>R.A. Gordon 9/21/83</i>	SSM <i>(Signature)</i>	
QE W. J. SMITH	REL <i>(Signature)</i>	REL <i>(Signature) 9/21/83</i>	
	QE <i>(Signature)</i>	QE	

ITEM:
NOSE LANDING GEAR SUPPORT BEAM

FUNCTION:
PROVIDES SUPPORT BETWEEN UPPER DRAG BRACES ON NLG.

FAILURE MODE:
STRUCTURAL FAILURE

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

EFFECT(S) ON:

- (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
- (A) LOSS OF LOAD CARRYING CAPABILITY.
- (B) DAMAGE TO VEHICLE STRUCTURE.
- (C) PROBABLE LOSS OF MISSION/CREW/VEHICLE DUE TO GEAR COLLAPSE.

DISPOSITION & RATIONALE:

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

(A) DESIGN
DESIGNED TO FATIGUE LOAD SPECTRUM FOR LANDING, TAXI, AND GROUND HANDLING CONDITIONS. DESIGNED TO LANDING IMPACT LOADS (SPIN- UP AND SPRING BACK INCLUDING CROSSWIND DRIFT CONDITIONS) USING A MINIMUM FACTOR OF SAFETY 1.0 TO YIELD STRENGTH OF MATERIAL IN ACCORDANCE WITH ESTABLISHED CRITERIA FOR COMMERCIAL AND MILITARY AIRCRAFT. DESIGNED TO A MINIMUM FACTOR OF SAFETY OF 1.4 FOR TAXI AND GROUND HANDLING LOADS MATERIAL PROCESSES - BARE PARTS ARE NOT EXPOSED TO CORROSIVE ACID ENVIRONMENT IN PLATING SHOULD MORE THAN 30 DAYS AND PARTS ARE SHOT PEENED AFTER MACHINE OPERATIONS TO PREVENT STRESS CORROSION ON 300 M MATERIALS.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -107 -1 REV:09/19/88

(B) TEST

QUALIFICATION TESTS:

CERTIFICATION INCLUDES ULTIMATE STRENGTH TEST, SHOCK STRUT DROP TESTS, STATIC LOADS TEST, DYNAMIC TESTS AND 400 DEPLOYMENT CYCLES.

THE SUPPORT BEAM 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 LI CYCLES FOR A TOTAL OF 400 CYCLES. (THE LANDING GEAR WAS CYCLED FROM 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 SUPPORT BEAM 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 SUPPORT BEAM AND IT'S ATTACHMENTS ARE INSPECTED FOR CONDITION AND SECURITY.

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 PROTECTION REQUIREMENTS ARE 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, CD-TI PLATING AND SHOT PEENING ARE VERIFIED BY INSPECTION.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -107 -1 REV:09/19/88

NONDESTRUCTIVE EVALUATION

MATERIAL SURFACE DEFECTS ARE VERIFIED BY FLUORESCENT PENETRANT INSPECTION.

TESTING

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

PACKAGING/HANDLING

HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NONE.

(E) OPERATIONAL USE

NONE