

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -005 -1 REV:09/19/88

ASSEMBLY : MAIN-LANDING GEAR (MLG) CRIT. FUNC: :
P/N RI : MC621-0011 CRIT. HDW: :
P/N VENDOR: 1170350-501 MENASCO VEHICLE 102 103 104
QUANTITY : 2 EFFECTIVITY: X X X
: LEFT HAND PHASE(S): PL LO OO DO LS
: RIGHT HAND

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

ITEM:
MAIN LANDING GEAR LOCK BRACE ASSEMBLY

FUNCTION:
LINKAGE THAT LOCKS THE SHOCK STRUT AND DRAG BRACE INTO POSITION

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,D) PROBABLE LOSS OF MISSION/CREW/VEHICLE DUE TO LANDING 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 FOR 32K AND 65K PAYLOAD CONFIGURATIONS.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -005 -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 LOCK BRACE WAS 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 LIFE CYCLES FOR TOTAL OF 400 CYCLES. (THE LANDING GEAR WAS CYCLED FROM UP AND LOCKED T 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 LOCK BRACE WAS ALSO TESTED AS AN INTEGRAL PART OF THE MLG SHOCK STR ASSEMBLY DURING DROP TESTS - ELEVEN DROP TESTS WERE PERFORMED TO SATISF THE DESIGN REQUIREMENTS FOR THE SHOCK STRUT ASSEMBLY.

MAXIMUM VERTICAL LOAD WAS 179,817 LBS.

MAXIMUM SINK SPEED WAS 11.69 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: MLG ZONAL DETAIL VISUAL INSPECTION; THE LOCK BRACE ASSEMBLY IS INSPECTED FOR CONDITION AND SECURITY. ALIGNMENT IS VERIFIED BY INSTALLING THE DOWNLOCK PIN.

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.

ASSEMBLY/INSTALLATION

ALL MATERIAL PROCESS 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 PER MS33540 VERIFIED AT ASSEMBLY LEVEL.

NONDESTRUCTIVE EVALUATION

MATERIAL SURFACE DEFECTS ARE DETECTED BY MAGNETIC PARTICLE, NITAL ETCH AND FLUORESCENT PENETRANT.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -005 -1 REV:09/19/81

CRITICAL PROCESSES

SHOT PEENING IS VERIFIED BY INSPECTION. CHROME AND CD-TI PLATING ARE VERIFIED BY INSPECTION.

TESTING

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

HANDLING/PACKAGING

HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NONE

(E) OPERATIONAL USE

NONE.