

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : LANDING/DECELERATION-LGC FMEA NO 02-1A -099 -1 REV:09/19/88

ASSEMBLY : NOSE LANDING GEAR (NLG)			CRIT. FUNC:	1
P/N RI : V070-510601			CRIT. HDW:	1
P/N VENDOR:	VEHICLE	102	103	104
QUANTITY : 7	EFFECTIVITY:	X	X	X
: SEVEN	PHASE(S):	PL	LO	OO DO X LS

PREPARED BY:		REDUNDANCY SCREEN:	A-	B-	C-
DES R. A. GORDON	APPROVED BY:	DES <i>R.A. Gordon 9/1/88</i>	SSM <i>[Signature]</i>	REL <i>[Signature]</i>	QE <i>[Signature]</i>
REL J. S. MULLEN		REL <i>[Signature]</i>	REL <i>[Signature]</i>	REL <i>[Signature]</i>	QE <i>[Signature]</i>
QE W. J. SMITH		QE <i>[Signature]</i>	QE <i>[Signature]</i>	QE <i>[Signature]</i>	QE <i>[Signature]</i>

ITEM:
NOSE LANDING GEAR DOOR HOOK PUSHROD ASSEMBLY

FUNCTION:
PROVIDES THE DRIVING FORCE TO OPERATE DOOR HOOKS WHICH CLOSE AND LOCK DOORS.

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
TO MINIMUM OF A 1.4 FACTOR OF SAFETY 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: DOOR PUSHROD ASSEMBLIES VERIFIED FOR STRUCTURAL INTEGRITY AND PROOF LOADS, WITH FUNCTIONAL/KINEMATIC/ENDURANCE CYCLING SIMULATOR. DOOR LOADS (AERO) VERIFIED IN SIMULATOR FOR WORST CASE CONDITION. CERTIFICATION INCLUDES A FATIGUE LOAD TEST SPECTRUM REPRESENTING THE EQUIVALENT LOADING FOR THE LIFE OF THE NOSE GEAR. A SCATTER FACTOR OF 4.0 WAS APPLIED SUCH THAT THE SPECTRUM WAS REPEATED A TOTAL OF FOUR TIMES.

THE DOOR PUSHROD ASSEMBLIES WERE ALSO 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 FROM UP AND LOCKED TO DOWN AND LOCKED EACH TIME). THESE TESTS WERE PERFORMED WITH MAXIMUM DOOR OPENING AIR LOADS ON THE DOOR AND THE APPROPRIATE AIR LOADS ON THE SHOCK STRUT ASSEMBLY.

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 WHEELWELL ZONAL INTERNAL DETAIL INSPECTION; A VISUAL DETAILED INSPECTION OF THE NLG WHEELWELL IS PERFORMED TO VERIFY THE CONDITION AND SECURITY OF THE PUSHRODS.

FREQUENCY - ALL VEHICLES AT GROUND TURNAROUND.

(C) INSPECTION

RECEIVING INSPECTION

MATERIAL AND PROCESS CERTIFICATIONS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CORROSION PROTECTION REQUIREMENTS ARE VERIFIED BY INSPECTION.

CLEANLINESS REQUIREMENTS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

FABRICATION, ASSEMBLY AND INSTALLATION VERIFIED BY MANDATORY INSPECTION POINTS. DIMENSIONS AND SURFACE FINISHES VERIFIED BY INSPECTION.

CRITICAL PROCESSES

HEAT TREATING IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

MAGNETIC PARTICLE INSPECTION OF ROD ENDS VERIFIED BY 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.