

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 02-1A-085-X

SUBSYSTEM NAME: LANDING/DECELERATION/LANDING GEAR CONTROL
REVISION : 0 02/22/89 W

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	NLG SHOCK STRUT ASSEMBLY	MC621-0012 1170600 MENASCO
SRU :	STEERING COLLAR (MENASCO)	1170604-101 1170600 MENASCO

QUANTITY OF LIKE ITEMS: 1
ONE

DESCRIPTION/FUNCTION:
STEERING COLLAR - PROVIDES ROTATING ATTACHMENT FOR STEERING ACTUATOR TO
THE NOSE GEAR STRUT AND TRANSMITS STEERING ACTUATOR MOVEMENTS TO THE NL
WHEELS.

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SUMMARY

SUBSYSTEM NAME: LANDING/DECELERATION/LANDING GEAR CONTROL
LRU NLG SHOCK STRUT ASSEMBLY
ITEM NAME: STEERING COLLAR (MENASCO)

FMEA NUMBER	ABBREVIATED FAILURE MODE DESCRIPTION	CIL FLG	CRIT
02-1A-085-01	STRUCTURAL FAILURE	X	1R2

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 02-1A-085-01

SUBSYSTEM: LANDING/DECELERATION/LANDING GEAR CONTROL REVISION: 0 02/22/89
LRU NLG SHOCK STRUT ASSEMBLY
ITEM NAME: STEERING COLLAR (MENASCO) CRITICALITY OF THIS FAILURE MODE: 1R2

FAILURE MODE:
STRUCTURAL FAILURE

MISSION PHASE:
DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS

CAUSE:
OVERLOAD, DEFECTIVE PART/MATERIAL

CRITICALITY 1/1 DURING INTACT ABORT ONLY? N

REDUNDANCY SCREEN A) PASS
B) FAIL
C) PASS

PASS/FAIL RATIONALE:
A)

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

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF NWS ACTUATOR STEERING AND DAMPING FUNCTION.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT, THE NLG CO-ROTATING WHEELS PROVIDE SUFFICIENT DAMPING AFTER LOSS OF ACTUATOR DAMPING FUNCTION.

(C) MISSION:
POSSIBLE LOSS OF MISSION/CREW/VEHICLE WITH TWO FAILURES - LOSS OF NOSEWHEEL STEERING AND LOSS OF DIFFERENTIAL BRAKING. THESE FAILURES WILL CAUSE LOSS OF DIRECTIONAL CONTROL.

(D) CREW, VEHICLE, AND ELEMENT(S):

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SAME AS C.

(E) FUNCTIONAL CRITICALITY EFFECTS

- DISPOSITION RATIONALE -

(A) DESIGN:

COLLAR IS FABRICATED OF 300M STEEL THAT IS HEAT TREATED TO 275-300 KS CAD PLATED AND PAINTED. MINIMUM FACTOR OF SAFETY IS 1.4.

(B) TEST:

QUALIFICATION TESTS: THE STEERING COLLAR IS CERTIFIED PART OF THE NL SHOCK STRUT.

SHOCK STRUT ASSEMBLY 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 SUBJECTE TO CYCLIC APPLICATION OF VERTICAL, FORE/AFT AND SIDE LOADS IN EACH CONDITION.

FATIGUE STRESS ANALYSIS DETERMINED THE FATIGUE LIFE OF THE SHOCK STRU ASSEMBLY A SCATTER FACTOR OF 4.0 WAS APPLIED TO THE LIFE CYCLE. THE PRESENT CONFIGURATION OF THE STRUT HAS A MARGIN OF SAFETY OF 5 PERCENT (ABOVE ALLOWABLE YIELD LOADS) FOR TUBULAR SECTIONS AND 16 PERCENT (ABOVE ALLOWABLE YIELD LOADS) FOR LUG SECTIONS.

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; CHECKS THE EXTERNAL SURFACES OF THE SHOCK STRUT FOR DAMAGED PAINT OR CORROSION AND INSPECTS STEERING COLLAR FOR CONDITION AND SECURITY OF ATTACHMENTS.

FREQUENCY - ALL VEHICLES AT EACH 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 ARE VERIFIED BY INSPECTION.

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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. DIMENSIONS AND SURFACE ROUGHNESS REQUIREMENTS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

HEAT TREATMENT PER MIL-H-6875, CADMIUM PLATING AND SHOT PEENING PER MIL-S-13165 ARE VERIFIED BY INSPECTION. CADMIUM PLATING AND SUBSEQUENT POST BAKE ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

MAGNETIC PARTICLE, NITAL ETCH AND ULTRASONIC INSPECTION ARE VERIFIED BY INSPECTION.

TESTING

ATP IS VERIFIED BY INSPECTION.

PACKAGING/HANDLING

HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION..

(D) FAILURE HISTORY:

NONE.

(E) OPERATIONAL USE:

NONE.

- APPROVALS -

RELIABILITY ENGINEERING: G. T. TATE
DESIGN ENGINEERING : R. A. GORDON
QUALITY ENGINEERING : W. J. SMITH
NASA RELIABILITY :
NASA SUBSYSTEM MANAGER :
NASA QUALITY ASSURANCE :

[Handwritten signatures and dates]
: *[Signature]*
: *R. Gordon 4/22/89*
: *W. J. Smith 2/22/89*
: *[Signature]*
: *[Signature]* 3/8/89
: *[Signature]* 3/8/89
: *[Signature]* 3/8/89