

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-1E-105 -X

SUBSYSTEM NAME: LANDING DECELERATION - WHEEL, BRAKE & TIRE
REVISION: 0 03/07/88

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: NOSE LANDING GEAR (NLG)	MC621-0050
SRU	: THERMAL RELIEF PLUG B. F. GOODRICH	49-127

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
THERMAL RELIEF PLUG

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 4
TWO PER WHEEL

FUNCTION:
A THERMAL RELIEF DEVICE INSTALLED IN EACH WHEEL ASSEMBLY WHICH RELIEVES THE TIRE INFLATION PRESSURE WHEN THE TIRE BEAD SEAT TEMPERATURE IS EXCEEDED.

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NUMBER: 02-1E-105- 01

REVISION#: 1 08/03/97

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LRU: NOSE LANDING GEAR (NLG)

CRITICALITY OF THIS

ITEM NAME: THERMAL RELIEF PLUG

FAILURE MODE: 1/1

FAILURE MODE:

PREMATURE OPERATION - RESULTING IN LANDING WITH A FLAT TIRE.

MISSION PHASE: DO DE-ORBIT

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

CAUSE:

DEGRADED QUALITY - RELIEVES PRESSURE BELOW SPECIFIED BEAD SEAT TEMPERATURE.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN

- A) N/A
- B) N/A
- C) N/A

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF ROLLING AND LOAD CARRYING CAPABILITY ON THE AFFECTED TIRE/WHEEL ASSEMBLY AND FAILURE OF ADJACENT TIRE/WHEEL ASSEMBLY DURING ROLLOUT. PROBABLE FAILURE OF NLG STRUT OR ITS ATTACHMENTS.

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(B) INTERFACING SUBSYSTEM(S):
SAME AS A.

(C) MISSION:
PROBABLE LOSS OF MISSION/CREW/VEHICLE DUE TO NLG COLLAPSE (IF BOTH
TIRE/WHEEL ASSEMBLIES FAIL).

(D) CREW, VEHICLE, AND ELEMENT(S):
SAME AS C.

(E) FUNCTIONAL CRITICALITY EFFECTS:

-DISPOSITION RATIONALE-

(A) DESIGN:
THE EUTECTIC MATERIAL IN THE PLUG WAS SELECTED FOR ITS STABLE THERMAL
CHARACTERISTICS. DESIGN PRECLUDES LOSS OF PRESSURE WITHOUT THE MELTING
OF THE EUTECTIC MATERIAL.

(B) TEST:
QUALIFICATION TESTS: THE PERFORMANCE OF THE THERMAL RELIEF PLUG (TRP) WAS
TESTED DURING THE NOSE WHEEL QUAL TESTS WHICH INCLUDED A THERMAL TEST
AND EXPOSURE TO SALT FOG ENVIRONMENT.

THERMAL TEST: THE WHEEL/TIRE ASSEMBLY WAS PRESSURIZED TO 300 PLUS OR
MINUS 20 PSIG AND HEATED TO 283 DEGREES F. PLUS OR MINUS 10 DEGREES F.
PRESSURE WAS RELIEVED WITHIN THE SPECIFIED LIMITS.

ENVIRONMENTAL TEST: THE WHEEL WAS EXPOSED TO SALT FOG ENVIRONMENT PER
MIL-STD-810, METHOD 509, PROCEDURE I FOR 96 HOURS.

ACCEPTANCE TESTS INCLUDE LOT SAMPLE TESTS, DIMENSIONAL CHECKS, FINISH,
CLEANLINESS AND THAT CERTIFIED MATERIALS AND PROCESSES HAVE BEEN USED.

GROUND TURNAROUND TEST
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH
OMRSD. THE OMRSD DATA PROVIDED BELOW IS NO LONGER BEING KEPT UP-TO-DATE.
IF THERE IS ANY DISCREPANCY BETWEEN THE GROUND TESTING DATA PROVIDED
BELOW AND THE OMRSD, THE OMRSD IS THE MORE ACCURATE SOURCE OF THE DATA.

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NLG WHEEL AND TIRE INSPECTION;
THE THERMAL RELIEF PLUGS ARE INSPECTED (PER THE ML0308-0143 SPEC.) FOR EVIDENCE OF LOOSENESS, DEFORMATION OR CORROSION.

NLG WHEEL/TIRE CERT:
VERIFIES NLG WHEEL/TIRE ASSEMBLY HAS BEEN BUILT UP AND TESTED PER THE VO70-510502 DRAWING, ML0308-0028 NOSE LANDING GEAR RIGGING SPECIFICATION AND ML0308-0143 NLG WHEEL/TIRE INSTALLATION AND INSPECTION SPECIFICATION.

FREQUENCY - ALL VEHICLES AT GROUND TURNAROUND.

(C) INSPECTION:

RECEIVING INSPECTION

RECEIVING INSPECTION SAMPLE INSPECTS PER MIL-STD-105 EUTECTIC MELTING POINT. RECEIVING INSPECTION LEAK TESTS THE PLUGS.

CONTAMINATION CONTROL

CORROSION CONTROL REQUIREMENTS ARE VERIFIED BY INSPECTION.

ASSEMBLY /INSTALLATION

WHEEL ASSEMBLED PER REQUIREMENTS AND INSPECTED FOR PROPER ASSEMBLY.

CRITICAL PROCESSES

CHEMISTRY OF FUSIBLE MATERIAL VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT SAMPLE INSPECTION PER MIL-STD-105 IS 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:

FAILURE DETECTED ON ORBIT - AN ABORT DECISION IS REQUIRED TO SELECT A SUITABLE LANDING PROFILE/SITE. CREW WILL USE AERO RUDDER AND DIFFERENTIAL BRAKING IN AN ATTEMPT TO MAINTAIN DIRECTIONAL CONTROL.

- APPROVALS -

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