

SAA09FTAB3-001
B/L: 422.00
SYS: RTG Jib Hoists
Pads A & B PCR

NOV 20 1995

Critical Item: Hoist Gearbox (2 Items)

Find Number: None

Criticality Category: 2

Redundancy Screen: A- N/A B- N/A C- N/A

SAA No: 09FTAB3-001

System/Area: Galileo/Ulysses RTG Jib
Hoists at the RSS, Pads
A & B PCR

NASA
Part No: None

PMN/
Name: K61-0183/Hoist for P/L 1/2-Ton
RTG

Mfg/
Part No: Ingersoll-Rand/
C62DC40 2D3/VRH2114

Drawing/
Sheet No: O&M Manual/
pages 22-25

Function: The hoist gearbox transmits power from the hoist motor to the drum.

Critical Failure Mode/FM No: Gear disengages/09FTAB3-001.001

Failure Causes: Structural failure of gears, shafts, mechanical load brake components, and the gearbox housing.

Failure Effect: Load suspended from hoist will drop resulting in the possible loss (damage) of a vehicle system.

Acceptance Rationale

Design:

- The gearbox is an off-the-shelf item manufactured by Ingersoll-Rand. Its design complies with Hoist Manufacturers Institute (HMI) and American Gear Manufacturers Association (AGMA) Standards.
- The gears are splined to shafts or integrally machined and are retained in place by shoulders within the confines of the gearbox.
- Load bearing members, such as the gear case and shafts, have been designed so that the calculated static stress, based upon the rated load (1000 Kg, 2200 lbs), does not exceed 20% of the average ultimate strength of the material. (5:1 minimum S.F.)

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Hoist Gearbox (Continued)

- All gearing design is based upon AGMA standards 220.02, "Rating of the Strength of Spur Gear Teeth" and 210.02, "Surface Durability (pitting) of Spur Gear Teeth."
- The hoists are rated at 1000 Kg (2200 lbs). The hoists are derated to 600 lbs when lifting the RTGs (18.33:1 S.F.) and 2000 lbs when lifting GSE (5.5:1 S.F.).
- At this time both hoist assemblies will be used in support of Galileo STS-34 at Pad-B and one will be transferred to Pad-A to support Ulysses STS-44.

Test:

- A load test at 100% of rated load is performed annually by Cat. 2 WAC 0653-2464 in accordance with NSS/GO-1740.9 requirement.
- OMRS File VI requires annual performance of a rated load test.
- An annual operational check of the hoist under full rated load is performed in accordance with Cat. 2 WAC 0653-2464.
- A proof load test at 125% of the rated load (2500 lbs) was performed at the LETF on initial receipt of hoists. This load was sufficient to satisfy the JPL requirement, as stated in JPL Memo 516-WRW-88-373, Subject: Crane Requirements for Lifting RTGs at KSC for GLL; dated 8 September 1988, that the proof load test weight must exceed the maximum planned RTG lift weight (600 lbs.) by a factor of at least 3.5.

Inspection:

- The hoist gearbox is checked externally per the Cat. 2 WAC 0653-2464 prior to each critical lift for the following:
 - a. damage
 - b. corrosion
 - c. loose fasteners
 - d. oil leakage
 - e. oil level (sight glass)

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Failure History:

- These are new hoists, therefore, no PRACA data is available.
- The GIDEP failure data interchange system has been researched and no data on this component was found.

Operational Use:

- No corrective action is available to circumvent this failure.