B/L: 288.00
SYS: PAYLOAD BAY AREA ACCESS BRIDGE

Critical Item: Gearbox, Hoist (4 Items Total)

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Find Number: None

Criticality Category: 1

SAA No:	09FTP3-014	**System/Area:**	OPF HB-1 Payload Bay Access Bridge/Bucket 1-1/2 Ton Hoist
NASA Part No:	None	**PMN/ Name:**	A70-0883 Payload Bay Area Access Bridge, HB-1
Mfg/ Part No:	Yale SDL 1-1/2F50W-20/7	**Drawing/ Sheet No:**	79K08951 EQ-13

Function: Transmits power and reduces rotational speed from prime mover to cable drum to provide access to the Orbiter payload bay.

Critical Failure Mode/Failure Mode No: Gear disengages/09FTP3-014.001

Failure Cause: Structural failure of gears, shafts, mechanical load brake, and gearbox housing.

Failure Effect: Torque for holding the load will be lost. Bucket would fall with possible loss of life and or possible loss (damage) of a vehicle or payload system. Time to effect: immediate.

ACCEPTANCE RATIONALE

Design:

- The gearbox is an off-the-shelf item manufactured by Yale Industries. 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, does not exceed 20% of the average ultimate strength of the material, i.e. 5:1 factor of safety.
- 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."
- Minimum safety factor for gearing is 15 to 1.

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- Hoist used in derated capacity. The rated load is 3000 pounds. Maximum applied load on hoist due to 2-part reeving is 2,000 pounds.

Test:

- An annual operational check of the hoist under full rated load is performed in accordance with OMI V6E49.
- OMRSD File VI requires annual performance of a rated load test to verify system integrity.
- Acceptance/proofload test at 150% of the system rated load was performed on initial installation and after any teardown inspection.
- Oil sample testing is performed annually by ferrography per OMI V6E49. The analysis is returned to System Engineering for review and is documented in the crane log book.
- Vibration analysis is performed semi-annually in accordance with OMI V6E49 to document operational performance and Hoist degradation.

Inspection:

- The hoist gearbox is checked monthly in accordance with OMI V6E49 for the following:
  a. damage, corrosion
  b. loose fasteners
  c. oil leakage
- The hoist gearbox oil level is checked monthly in accordance with OMI V6E49.

Failure History:

- The PRACA database was researched and no failure data was found on this component in the critical failure mode.
- The GIDEP failure data interchange system was researched and no failure data was found on this component in the critical failure mode.

Operational Use:

- Correcting Action:

  There is no action which can be taken to mitigate the failure effect.

- Timeframe:

  Since no correcting action is available, timeframe does not apply.