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-2 Payload Bay Access Bridge/Bucket 1-1/2 Ton Hoist
NASA Part No:	None	**PMN/ Name:**	A70-0883 Payload Bay Area Access Bridge, HB-2
Mfg/ Part No:	Yale CEW2-1/2-50WM-20/6.67D1	**Drawing/ Sheet No:**	79K16117 EQ1

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/09FTP3-014.002

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 10 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:

- A visual inspection (inspection plate removal) of the hoist gearbox for excessive or uneven wear of the gear teeth, and the load brake for worn discs is performed annually per OMI V6E49.
- 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.