

SAA09FTP3-005
B/L: 380.00
SYS: CARGO HOIST

JAN 24 1995

Critical Item: Worm Gear Winch Assembly (12 Items)

Find Number: None

Criticality Category: 2

SAA No: 09FTP3-005

System/Area: Payload Bay Area Access
High Bays 1, 2, and 3
Orbiter Processing Facility

NASA
Part No: None

PMN/ H70-1508
Name: Cargo Hoist

Mfg/ Thern Inc./
Part No: Model 484B

Drawing/ 80K52908
Sheet No: 79K16117 79K08951

Function: Provides holding torque and transmits power from air operated wrench to maneuver and suspend flight hardware and GSE over the payload bay.

Critical Failure Mode/Failure Mode No: 1) Gears Disengage/09FTP3-005.001
2) Brake Disengages/09FTP3-005.002
or Fails to set

Failure Causes: 1) Structural Failure
2) Discs Worn or Glazed

Failure Effect: Torque for holding load will be lost. Load suspended from bracket will drop, resulting in possible loss (damage) of a vehicle system.
Time to effect: immediate.

Acceptance Rationale

Design:

- o The model 484 winch is a worm gear driven winch with a 62:1 reduction ratio and a maximum shaft input of 600 RPM. The worm gear reducer is designed to be motor driven and consists of a bronze gear and a steel worm keyed onto the input shaft. The gear operates in an oil bath and directly drives the drum shaft and drum. Both shafts operate in bronze bearings with oil seals.
- o Gearing is designed to comply with AGMA standards. The model 484 winches have steel frames and drum weldments and have either aluminum or cast iron gearcases. A set screw is used to retain the wire rope to the drum. However, the end of the wire rope is swaged to prevent it from slipping through the rope drum should the set screw loosen.



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Worm Gear Assembly 484B (Continued)

Design (Continued):

- The cargo hoist system has a safe working load of 1200 lbs., with 2 part reeving, the winch drum load is 600 lbs. The manufacturer's rated capacity at 4:1 safety factor with 2 layers of rope on the drum is 3,200 lbs. The safety factor on ultimate strength for this application is, therefore, 21.3:1.
- The disc brake is a self-adjusting, Weston brake. The disc brake bears little, if any, of the winch load due to the gear reduction and self-locking of the worm gear.

Test:

- OMRSD File VI requires performance of a rated load test annually to verify system integrity.
- The cargo hoist system has a rated load capacity of 1200 pounds. An annual load test at 100% of the rated load is performed per OMI V6H95.
- Preoperational set up (attaching wire rope to load) verifies proper operation of worm gear winch assembly.

Inspection:

- OMI V6H95 requires an annual visual inspection of the system.
- OMI V6H95 requires an annual inspection of the gearbox lubricant to verify oil level and that it is not contaminated with water or metal flakes, dried out, or caked. If necessary, remove old oil and replace with new.

Failure History:

- The PRACA database was queried and no failure data was retrieved against this component in the critical failure modes.
- The GIDEP failure data interchange system has been researched and no failures in the critical failure modes of this component were found.

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Operational Use:

o Corrective Action:

No corrective action is available to circumvent this failure.

o Timeframe:

Since no corrective action is available, no timeframe is applicable.