

SAA09FTP3-006
B/L: 242.00
SYS: Horiz. Zero
Gravity Sim.

JAN 24 1995

Critical Item: Worm Gear Winch Assembly (12 Items)

Find Number: None

Criticality Category: 2

SAA No: 09FTP3-006

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

NASA
Part No: None

PMN/ C70-0870/Horizontal
Name: Zero Gravity Simulator

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

Drawing/ 79K16117, 79V16117,
Sheet No: 79K08951

Function: Acts as an anchor for one end of the wire cable when the Payload Bay Doors are opened/closed or Radiators stowed/deployed. Supports and maneuvers C-frame, counterweights, and sheave-pin assemblies during pre/postoperations.

Critical Failure Mode/Failure Mode No: 1) Gears disengage/09FTP3-006.001
2) Brake disengages/09FTP3-006.002
or Fails to set

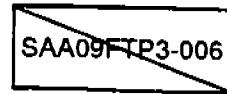
Failure Causes: 1) Structural Failure.
2) Discs worn or glazed.

Failure Effect: Torque for holding load will be lost. Load suspended from bracket will drop, resulting in possible loss (damage) to the Orbiter Payload Bay Doors, Radiators, Payload or other vehicle systems. Time to effect: immediate.

Acceptance Rationale

Design:

- o The model 484B 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. The gearcases in high bays 1 and 2 are constructed out of cast iron, while the gearcases in high bay 3 are aluminum. The frames and drum weldments are steel.



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Worm Gear Winch Assembly, 484B (Continued)

Design (Continued)

- The manufacturer assigns a load rating of 3,200 lbs. (with 2 layers of wire cable wrapped on the drum) and a design safety factor of 4 to 1 to the model 484B worm gear winch assembly. During Orbiter payload bay door or radiator movement, the worm gear winch assembly bears half the value of the counterweights (approx. 870 lbs.). Therefore, the operational safety factor is greater than 14 to 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 property of the worm gear.

Test:

- OMRSD File VI requires performance of a rated load test annually to verify system integrity.
- Each Simulator Assembly receives a static load test of 200 percent (3480 lbs.) of the rated working load on an annual basis per OMI V6B85
- Each Simulator Assembly receives an operational load test of 100 percent (1740 lbs.) of the rated working load on an annual basis per OMI V6B85.
- Pre-operational set up (attaching wire rope to counterweights and C-frame) during OMI V9023 verifies proper operation of worm gear winch assembly.

Inspection:

- OMI No. V6B85 requires the following annual inspections:
 - visually inspecting all components for surface corrosion.
 - check lubrication of each worm gear winch assembly, lubricate as required and oil winch shafts.

Failure History:

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

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Operational Use:

- o Corrective Action: No corrective action is available to mitigate the results of this failure mode.
- o Timeframe: Since no corrective action is available, no time frame is applicable.