

APR 28 1995

B/L: 510.00
 SYS: 30 TON
 ROUGH
 TERRAIN
 MOBILE
 CRANE

Critical Item: Gearmatic Winch Gearcase Assembly (1 ITEM)

Find Number: S511717

Criticality Category: 1

SAA No:	09FT01-015	System/Area:	30-TON ROUGH TERRAIN MOBILE CRANE/LC39
NASA Part No:	NONE	PMN/ Name:	K61-3442 30-TON ROUGH TERRAIN MOBILE CRANE
Mfg/ Part No:	Braden Carco Gearmatic S511717	Drawing/ Sheet No:	VEN-2103/150-162

Function:

Transfers torque from the winch drive motor to the winch drum.

Critical Failure Modes/Failure Mode Nos:

- a. Gears Disengage/ 09FT01-015.002.
- b. Cam Clutch fails to engage/ 09FT01-015.003.

Failure Causes:

- a. FMN 09FT01-015.002/ Structural Failure of the gears, couplings, and gear box housing.
- b. FMN 09FT01-015.003/ Worn Cam Clutch.

Failure Effects:

- a. FMN 09FT01-015.002:

Torque for holding load will be lost. Load suspended from the hook will drop. Possible loss of life or vehicle. The worst case of criticality applies because of plans to use the 30 Ton Rough Terrain Mobile Crane to lift any load within the capability of the crane including flight hardware and/or GSE containing hazardous material (e.g., the hydrazine carts at the launch Pad contingency). Detection Method: Visual. Time to Effect: Seconds.

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b. FMN 09FT01-015.003:

Ability to stop load will be lost. Load will continue to drop. Dropping Flight Hardware in close proximity to structure may not give operator sufficient time to take correcting action causing Loss (Damage) to Flight Hardware. Detection Method: Visual. Time to Effect: 2 to 3 Seconds.

ACCEPTANCE RATIONALE**Design:**

- The gearbox is an off the shelf item manufactured by Braden Carco Gearmatic Company. The design is based on American Gear Manufactures Association (AGMA) standards. The gearbox is a two stage planetary design with three planetary gears per stage.
- The maximum applied line pull at full rated load is 15,000 lbs.(four part reeving). This results in a safety factor of 4.4:1 based on ultimate strength.
- When handling either the APU or SRB hydrazine carts (1454 and 1200 lbs.), the operational safety factors are 41.3:1 and 50:1, respectively.
- The gears are splined to shafts or integrally machined and are retained in place by shoulders within the confines of the gearbox.

Test:

- Oil sample testing is performed annually by Ferrography. The results are returned to System Engineering for review and is documented in the crane log book to document wear trends.
- A pre-operational checklist in OMI Q3205 is performed prior to lifting operations, and reported on form KSC 28-528 (Pre Operational Check List).
- The mobile crane is load tested with a load equal to the rated load at the minimum radius in accordance with the manufacturer's load chart. The lifting and lowering functions are operationally verified prior to use per PMI-L20 (Rated Load Tests and Operational Test Instructions for Mobile Cranes). The winch gear case assembly is part of the hoisting system and is included in the load test.
- OMRSD File VI requires annual performance of a rated load test.
- The crane was proof tested at 110% of the rated load shortly after purchase at KSC (08/94).

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Inspection:

- The Winch Gear Assembly is checked semi-annually in accordance with PMI-H105. Inspection includes:
 - Damage, corrosion control
 - Oil leakage
 - Loose fasteners
 - Corrosion/deterioration of metal and paint
 - Structural defects
 - Drain and replace fluid in planetary.

Failure History:

- Current data on test failures, unexplained anomalies, and other failures experienced during ground processing activities can be found in the PRACA database. The PRACA database was researched and no failure data was found on this component in the critical failure mode.
- The GIDEP failure data interchange was researched and no failure data was found on this component in the critical failure mode.

Operational Use:

- Correcting Action:
 - FMN 09FT01-015.002: There is no action which can be taken to mitigate the failure effect.
 - FMN 09FT01-015.003: Operator can select "up" control to avert a drop.
- Time frame:
 - FMN 09FT01-015.002: Since no correcting action is available, time frame does not apply.
 - FMN 09FT01-015.003: 5 Seconds.