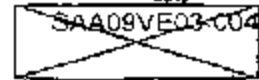


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USA Ground Operations CIL Sheet

Critical Item: Winch Differential/Planetary Reducer Assembly
NASA Part No: 75M14129-1
Mfg/Part No: Space Corp. / 2035-1 (See note.)
System: Orbiter Engine Service Platform

Criticality Category: 2
Total Quantity: 12

Find No.	Qty	Area	PNR	Baseline	Drawing / Sheet
None	4	MLP-1	A70-0663	302.00	75M14129 / 1
None	4	MLP-2	A70-0663	302.00	75M14129 / 1
None	3	MLP-3	A70-0663	302.00	75M14129 / 1

Function:

Transmits power and reduces rotational speed from the motor to the cable drum.

Note: This assembly is made up of Winsmith Corp. Differential Reducer P/N A50-118C and Space Corp. Planetary Reducer P/N 2035-2.

Failure Mode No. Failure Mode	Failure Cause Failure Effect	Detection Method Time to Effect	Crit Cat
09VE03-004.001 Gear disengagement	1) Structural failure of gears. 2) Structural failure of gear box. 3) Structural failure of shafts. Load suspended from winch will drop. Possible damage to SSME.	Visual Immediate	2

ACCEPTANCE RATIONALE

Design:

- Gearing is captured on shafts by interference fits, keys and shoulders which would require a structural failure for disengagement.

SSME VERTICAL CHANGEOUT PLATFORM

- Total weight of ECP is 50,600 lbs., plus 35,000 lbs. for SSME and Engine Vertical Installer and 3,000 lbs. for Tilt Mechanism.

- Off center location of engine on the platform places a maximum load of 29,623 lbs. on any corner of the platform. This load is supported by the hoist with a two-part reeving giving it a mechanical advantage of two to one. Therefore, the line pull (29,623 lbs.), divided by two, equals 14,811.5 lbs., plus frictional losses in the sheaves (2,463.5 lbs.) equals 17,275 lbs. net at the hoist.

ECP WINCHES

- Winsmith first reduction planetary gear box is rated for 13.4 hp at 1800 rpm input; actual motor input is only 7.5 hp at 1800 rpm.

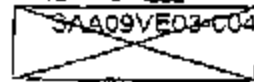
- Second planetary reduction meets AGMA requirement for allowable working stresses, i.e., max. working stresses are 53 percent of AGMA allowances.

- Bearing capacities are adequate for a life of approximately 60,000 revolutions.

- Other mechanical components have a stress level of 33 percent on yield or 20 percent on ultimate. (Minimum design safety factor is 5:1.)

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- These winches were custom designed in 1965 to NASA specifications for the Saturn ESP and configured for horizontal line pull. They were reconfigured for vertical line pull for STS.

Test:

- OMRSD, File VI requires annual performance of a rated load test to verify system integrity.
- An annual load test and operational check of each winch is performed in accordance with OMI V6C44.
- Oil sample testing will be performed annually by ferrography per OMI V6C44.

Inspection:

- A maintenance check of each winch is performed annually per OMI V6C44.

Failure History:

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

Operational Use:

Correcting Action	Timeframe
There is no action which can be taken to mitigate the failure effect.	Since no correcting action is available, timeframe does not apply.