

OCT 10 1990

Critical Item: Hydra-Set

Find Number: None

Criticality Category: 2

SAA No: 01MM025-001

System/Area: Centerwide

NASA

Part No: N/A

PMN: H72-0828 -03, -04, -06, -07, & -08

Mfg/

Part No: Del Mar Avionics

Drawing/

Sheet No: 79K08312-2, -3, -4, -5, -7

Function: Precision vertical handling of flight hardware.

Critical Failure Mode(s):

- | | |
|-------------------------------|--------------------------------------|
| 1. Leaking Seal (piston head) | FMN: 01MM025-001.001/006/011/016/021 |
| 2. Leaking Seal (piston rod) | FMN: 01MM025-001.002/007/012/017/022 |
| 3. Leaking Seals (up pump) | FMN: 01MM025-001.003/008/013/018/023 |
| 4. Leaking Seals (down valve) | FMN: 01MM025-001.004/009/014/019/024 |
| 5. Down Valve fails open | FMN: 01MM025-001.005/010/015/020/025 |

Failure Cause(s): 1-4. Twisted or cut O-ring, 5. Internal leakage, broken spring.

Failure Effect:

- 1&2. Hydraulic fluid leaking past the piston rod seal could spill on and contaminate flight hardware. Hydraulic fluid leaking past either seal would result in the uncontrolled lowering of the load a maximum of 12 inches.
- 3&4. Hydraulic fluid leaking past either outer seal could spill on and contaminate flight hardware. Leakage past either the inner or outer seal on the high pressure side of either assembly would also result in the uncontrolled lowering of the load.
- 5. Load will continue to descend out of control until the piston bottoms out or the load contacts an obstruction. The rate of descent is proportional to how far the valve is opened at the time of failure.

The above failure effects could all ultimately result in damage to a payload.

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Acceptance Rationale

Design:

- o In the event of a seal failure, piston and piston rod travel would be limited to a maximum of 12 inches by mechanical stops.
- o Slow degradation type failure would be detectable during O&M inspection and maintenance checks. Close tolerance between mated parts preclude gross seal failure and a quick descent of flight hardware.
- o Down valve piston is spring loaded closed, in addition high pressure fluid assists in closing valve.
- o Down valve manufactured to close tolerance to prevent cocking of piston in valve body.

Test:

- o OMRSD File VI requires confidence checks during bi-monthly maintenance to check seal integrity per E6507/Permanent Deviation P001.

Inspection:

- o OMRSD File VI (as implemented by ONI E3511) requires:
- o Units be inspected for hydraulic leakage or other contaminants before and after each use. Verification of current load test prior to each use.

Failure History:

- o The PRACA data base was queried and 15 PR's were found that address minor leakage along the lines of the critical failure modes. The problems were discovered during O&M inspections or preoperational checks. No instances of damage to flight hardware were reported.
- o The GIDEP failure data interchange system has been researched and no data on this component was found in these failure modes.

Operational Use:

- o Myrde-sets used successfully in Apollo and Space Shuttle Manned Programs at KSC for handling flight hardware.
- o Qualified by usage and analysis in Apollo and Space Shuttle programs.