SEP 0 2 1993

SAA09FT01-005

B/L: 323.60
SYS: CONDOR 170

Critical Item: HOLDING VALVE, COLUMN / BOOM EXTENSION CYLINDERS (2 ITEMS)

Find Number: 36

Criticality Category: 2

SAA No:	09FT01-005	**System/Area:**	CONDOR 170/LC39
NASA Part No:	NONE	**PMN/ Name:**	K60-1016 CONDOR 170
Mfg/ Part No:	CALAVAR 18849	**Drawing/ Sheet No:**	18849 1

Function: Hold column/boom extension cylinders in a fixed position. Allows backflow to retract/extend cylinder when pilot pressure is applied from the opposite supply line. Acts as a counterbalance valve preventing cylinder motion from exceeding the hydraulic systems ability to supply fluid resulting in pump cavitation. Provides for thermal relief.

Critical Failure Mode/Failure Mode No:
1) Fails Open / 09FT01-005.001
2) Relieves Prematurely / 09FT01-005.002

Failure Cause: Contamination, Spring Failure.

Failure Effect:

1&2) Column Extension Cylinder (Blind Side): Hydraulic fluid can bleed out of the cylinder allowing the column to retract until it reaches its fully retracted position or an obstruction is encountered.
1&2) Boom Extension Cylinder (Rod Side) (Cylinder in Tension): Hydraulic fluid can bleed out of the cylinder allowing the boom to extend until it reaches its fully extended position or an obstruction is encountered.

Failure is detectable by operator observation of uncommanded motion. Possible loss (damage) to a vehicle system if failure occurs in close proximity to flight hardware.
Time to effect: seconds

ACCEPTANCE RATIONALE

Design:

- The valve is derived from a commercially available design produced by Dana Corp. for Calavar.
- There are two 10 micron filters are in the hydraulic system.

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- The valve has a rated working pressure of 3000 psi, the working pressure of the system is 2500 psi.
- The maximum pressure required to hold the load (worse case column cylinder) is 554 psi. The pressure required to hold the load after a piston seal failure is 845 psi.
- The valve and seat material are steel.
- Relief pressure is set at 3750 + 0/-50 psi.
- Allowable leakage 5 dpm at 3000 psi.

Test:

- Pre-operational set up verifies proper operation of CONDOR 170 components and all functions.
- OMRSD File VI verifies performance of an operational test annually. This assures proper operation of the CONDOR 170 systems including the holding valves.
- Relief pressure is calibrated and set by Dana Corp., the valve manufacturer.

Inspection:

- No preventive maintenance inspection is available that would be applicable to the critical failure mode.

Failure History:

- Problem Reports PV-6-230763 and PV-6-243005 document bleed down of the column extension cylinder (1/2 in. per min.) due to excessive holding valve leakage from contamination. In both cases the valves were removed, cleaned, reinstalled, and the CONDOR was returned to service. Problem Report PV-6-185380 documents failure of the column holding valve due to contamination from the failure of the piston head seal. The valve was removed, cleaned and replaced. The seal was replaced and continued to leak. The cylinder barrel was examined and found to be out of tolerance, beyond the ability of the seals to seat. The barrel was replaced and the CONDOR returned to service.
- The GIDEP failure data interchange system was researched and no failure data was found on this component in the critical failure mode.

Operational Use:

- Correcting Action:

  Use of platform controls to reposition platform away from flight hardware if there is sufficient time/distance for the operator to react.

- Timeframe:

  Seconds.

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