

SRB CRITICAL ITEMS LIST

SUBSYSTEM: THRUST VECTOR CONTROL

ITEM NAME: Fluid Manifold Assembly

PART NO.: 10201-0066-102
10201-0098-801 (alt.)

FM CODE: A09

ITEM CODE: 20-01-47

REVISION: Basic

CRITICALITY CATEGORY: 1R

REACTION TIME: Seconds

NUMBER REQUIRED: 2

DATE: March 1, 2001

CRITICAL PHASES: Boost

SUPERCEDES: March 31, 2000

FMEA PAGE NUMBER: A-152

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SHEET 1 OF 4

APPROVED: S. Parvathaneni

DCN 042
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FAILURE MODE AND CAUSES: Ineffective filtering (System A and B) caused by:

- o Material defect
- o Manufacturing defect
- o Defective or damaged element sealing surface
- o Contamination

FAILURE EFFECT SUMMARY: Loss of TVC will lead to loss of mission, vehicle and crew. One success path remains after the first failure. Operation is not affected until both paths are lost.

REDUNDANCY SCREENS AND MEASUREMENTS:

- 1) Pass -All units are subject to ATP during turnaround and refurbishment.
- 2) Fail -Ineffective filtering is not readily detectable.
- 3) Fail -Contamination

RATIONALE FOR RETENTION:

A. DESIGN

- o The Fluid Manifold Assembly is designed and qualified in accordance with end item specification 10SPC-0054. (All Failure Causes)
- o Filter is 15 micron absolute designed for use with MIL-H-83282 or MIL-PRF-83282 hydraulic fluid. (Material Defect)

DCN 042

- o Element collapse pressure is 1500 psid, normal operating pressure is 65 psig with 15 psid across the filter. (All Failure Causes)
- o Containment capacity is 0.7 grams of AC fine at 5 GPM flow, 45 psid maximum. (Contamination)
- o Mesh pack is 304/304L/347 CRES, support assembly is 304L CRES. (Material Defect)
- o Mesh pack is welded in place. (Manufacturing Defect)
- o Fluid procurement is controlled by SE-S-0073. (Contamination)
- o Flange element o-ring seal groove is per MIL-G-5514F. (Defective or Damaged Sealing Surface)
- o O-ring is viton which is compatible with hydraulic fluid. (Defective or damaged sealing surface)
- o Qualification testing verified design requirements as reported in Pneudraulics, Inc. Qualification Test Report QTR 8090, Rev. A or Wright Components QTR 80335A for the alternate manifold. (All Failure Causes)

B. TESTING

- o Acceptance testing of the case drain filter is performed by Wintec ATP 4241-674. This includes a visual examination, bubble point test, mean pore size and cleanliness. (All Failure Causes)
- o Acceptance testing of the manifold assembly is performed per Wright Components ATP 15980 at vendor's plant. This includes a visual examination, filter element assembly and cleanliness. (All Failure Causes)
- o During refurbishment, the manifold assembly is subject to acceptance tested per the criteria of 10SPC-0054 at USA SRBE/TBE Florida operations. (All Failure Causes)
- o Helium is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board circuits per 10REQ-0021, para. 2.3.2.5. (Contamination)
- o Hydraulic fluid is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board Hydraulic circuits per 10REQ-0021, para. 2.3.2.6. (Contamination)
- o Effluent hydraulic fluid is verified for moisture content and cleanliness (water content and particulate count) from the rock actuator, the tilt reservoir, the rock reservoir and the tilt actuator per 10REQ-0021, para. 2.3.12.3. (Contamination)

- o Functional test is performed during hotfire operations per 10REQ-0021, para. 2.3.11, 2.3.15, and 2.3.16 respectively for: (All Failure Causes)
 - Low speed GN2 spin
 - High speed GN2 spin
 - Hotfire
- o Hydraulic fluid is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydraulic circuits during prelaunch operations per OMRSD File V, Vol. 1, Requirement Number B42HP0.010. (Contamination)

C. INSPECTION

I. VENDOR RELATED INSPECTIONS

- o Witnessing of acceptance test is performed by USA SRBE PQAR SIP 1213. (All Failure Causes)
- o Verification of material test report is performed by USA SRBE PQAR per SIP 1213. (Material Defects)
- o Verification of manifold assembly components' assembly is performed by USA SRBE PQAR per SIP 1252 or SIP 1298. (Manufacturing Defect)
- o Critical Processes/Inspections
 - TIG weld per WSF-008

II. KSC RELATED REFURBISHMENT INSPECTION

- o Visual inspection of fluid manifold assembly will be performed per 10SPC-0131, para. II. (All Failure Causes)
- o Functional testing of fluid manifold assembly will be performed per 10SPC-0131, paragraph IV.

All manual tests will be witnessed by Quality or verified for those instances when controlled software is utilized and a test report is generated. (All Failure Causes)

III. KSC RELATED ASSEMBLY AND OPERATIONS INSPECTIONS

- o Helium cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board circuits per 10REQ-0021, para. 2.3.2.5. (Contamination)
- o Hydraulic fluid cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydraulic circuits per 10REQ-0021, para. 2.3.2.6. (Contamination)

- o The moisture content and cleanliness (water content and particulate count) of the effluent hydraulic fluid from the rock actuator, the tilt reservoir, the rock reservoir and the tilt actuator are verified per 10REQ-0021, para. 2.3.12.3. (Contamination)
- o Proper function of TVC system is demonstrated during hotfire operations per 10REQ-0021 para. 2.3.11, 2.3.15, and 2.3.16: (All Failure Causes)
 - Low speed GN2 spin
 - High speed GN2 spin
 - Hotfire
- o Hydraulic fluid cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board Hydraulic circuits during prelaunch operations per OMRSD File V, Vol. 1, Requirement Number B42HP0.010. (Contamination)

D. FAILURE HISTORY

- o Criticality Category 1R:
- o Failure Histories may be obtained from the PRACA database

E. OPERATIONAL USE

- o Not applicable to this failure mode.