

SRB CRITICAL ITEMS LIST

SUBSYSTEM: THRUST VECTOR CONTROL

ITEM NAME: Fuel Pump Filter (Part of APU)

PART NO.: 5903458
(Part of 740412/734579(ALT.))

FM CODE: A04

ITEM CODE: 20-01-13

REVISION: Basic

CRITICALITY CATEGORY: 1R

REACTION TIME: Seconds

NO. REQUIRED: 2

DATE: March 1, 1995

CRITICAL PHASES: Boost

SUPERCEDES: March 1, 1994

FMEA PAGE NUMBER: A-40

ANALYST: R. Inure/P. Kalia

SHEET 1 OF 4

APPROVED: P. Kalia

FAILURE MODE AND CAUSES: Ineffective Filtering (Systems A and B) caused by:

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

FAILURE EFFECT SUMMARY: Loss of TVC will lead to vehicle breakup and 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 -Filters are inspected and functionally tested during turnaround and refurbishment.
- 2) Pass -APU turbine speed measurement B46R1406C, B46R1407C, B46R1408C and B46R1409C.
- 3) Fail - Contamination.

RATIONALE FOR RETENTION:

A. DESIGN

- o The Fuel Pump Filter is designed and qualified in accordance with end item specification 10SPC-0050. (All Failure Causes)
- o The filter is designed as a replaceable 25 micron absolute unit. (All Failure Causes)
- o Fluid procurement is controlled by SE-S-0073. (Contamination)

- o Hydrazine is filtered through a 25 micron filter upstream of the fuel pump filter. (Contamination)
- o The filter will have a pressure drop of no greater than 5.0 psi clean. (Manufacturing Defect)
- o The filter will have a pressure drop of no greater than 50.0 psi at maximum flow rate after entrainment of 1CC of fine solids. (Manufacturing Defect)
- o The filter is designed per SE-F-0044. (Material Defect)
- o The filter is replaced after each flight. (All Failure Causes)
- o O-ring material is ethylene propylene selected for compatibility with hydrazine. (Material Defect)
- o Qualification testing verified design requirements as reported in Sundstrand APU Qualification Test Report AER-1539-6, Rev. B. (All Failure Causes)

B. TESTING

- o Acceptance testing is performed per Sundstrand ATP TS2409 on all new units. This includes verification of performance with a hotfire functional test and decontamination and precision cleaning of the fuel system. (All Failure Causes)
- o During refurbishment and prior to reuse, the APU fuel filter is subjected to the same ATP as new units per Sundstrand ATP TS2409. (All Failure Causes)
- o Helium (influent) is verified for cleanliness and composition (purity and particulate count) prior to fuel pump shaft seal leak check per 10REQ-0021, para. 2.3.2.5. (Contamination)
- 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 Hydrazine is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydrazine circuits per 10REQ-0021, para. 2.3.2.1 and OMRSD File V, Vol. 1 Requirement Number B42APO.010. (Contamination)
- o GN2 is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydrazine circuits per 10REQ-0021, para. 2.3.2.2 and OMRSD File V, Vol. 1 Requirement Number B42APO.012. (Contamination)
- o TVC system functional test is performed during hotfire operations per 10REQ-0021, para. 2.3.16. (All Failure Causes)

- o GN2 (from MLP portable panels) is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydrazine circuits per OMRSD File V, Vol. 1 Requirement Number B42APO.012. (Contamination)

C. INSPECTION

VENDOR RELATED INSPECTIONS

- o Vendor inspection and test records are verified per SIP 1128 by USBI QAR. (All Failure Causes)
- o Verification of material certifications is performed per SIP 1128 by USBI QAR. (Material Defect)
- o Verification of vendor inspection of seals and sealing surfaces is performed per SIP 1128 by USBI QAR. (Defective or Damaged Element Sealing Surface)
- o Witnessing of acceptance test is performed by USBI, per SIP 1128 by USBI QAR. (All Failure Causes)
- o Verifications that are required on new units are performed on refurbished units per SIP 1128 by USBI QAR. (All Failure Causes)
- o Critical Processes/Inspections:
 - Welding per WTS 68.06

KSC RELATED INSPECTIONS

- o Helium (influent) cleanliness and composition (purity and particulate count) are verified prior to fuel pump shaft seal leak check per 10REQ-0021, para. 2.3.2.5. (Contamination)
- o Precision cleaning of tubes/boxes is verified by USBI per 10REQ-0021, para. 2.3.0. (Contamination)
- 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 Hydrazine cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydrazine circuits per 10REQ-0021, para. 2.3.2.1 and OMRSD File V, Vol. 1 Requirement Number B42APO.010. (Contamination)
- o GN2 cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydrazine circuits per 10REQ-0021, para. 2.3.2.2 and OMRSD File V, Vol. 1 Requirement Number B42APO.012. (Contamination)

- o Proper function of TVC system is demonstrated during hotfire operations per 10REQ-0021, para. 2.3.16 to include hotfire. (All Failure Causes)
- o GN2 (from MLP portable panels) cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydrazine circuits per OMRSD File V, Vol. 1 Requirement Number B42APO.012. (Contamination)
- o GN2 (from servicing cart) cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydrazine circuits per OMRSD File V, Vol. 1 Requirement Number B42APO.012. (Contamination)
- o Hydrazine (from servicing cart) cleanliness and composition are verified prior to introduction to on-board hydrazine circuits per OMRSD File V, Vol. 1 Requirement Number B42APO.010. (Contamination)

D. FAILURE HISTORY

- o Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

- o Not applicable to this failure mode.