

SRB CRITICAL ITEMS LIST

SUBSYSTEM: THRUST VECTOR CONTROL

ITEM NAME: Check Valve, Lines and Fittings (Part of APU)

PART NO.: 10200-0020-104 (Rigid Line) FM CODE: A03
10200-0020-108 (Rigid Line)
10200-0021-101 (Hose Assy)
10200-0021-102 (Hose Assy)
10200-0052-101 (Rigid Line)
10200-0052-102 (Rigid Line)
10201-0002-107 (Rigid Line)
10201-0002-113 (Rigid Line)
10201-0004-103 (Rigid Line)
10201-0004-105 (Rigid Line)
10209-0025-801 (Fitting Connector)
10209-0040-801 (Fitting Connector)
10209-0094-801 (Fitting Connector)
10209-0068-801 (Fitting Elbow)
5903960 (Valve)

ITEM CODE: 20-01-11A

REVISION: Basic

CRITICALITY CATEGORY: 1R

REACTION TIME: Seconds

NO. REQUIRED: See Parts List

DATE: March 31, 1997

CRITICAL PHASES: Final Countdown, Boost

SUPERCEDES: March 1, 1996

FMEA PAGE NUMBER: A-31

ANALYST: B. Snook/H. Longani

SHEET 1 OF 4

APPROVED: P. Kalia

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FAILURE MODE AND CAUSES: External leakage of hydrazine fluid (System A and/or B) (Requires Failure of Fuel Pump shaft seal to become critical) caused by:

- o Defective or damaged sealing surface
- o Defective line swage
- o Contamination
- o Improper torque
- o Improperly lockwired
- o Thread Failure

FAILURE EFFECT SUMMARY: Fire and explosion 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) Fail - Loss of line seals not verified during turnaround or refurbishment
- 2) Fail - Leakage not detectable by measurements
- 3) Fail - Contamination

RATIONALE FOR RETENTION:

A. DESIGN

- o All lines are 304L stainless steel tubing per MIL-T-6845. (Defective Line Swage)
- o Dynatube fittings are titanium 6AL-4V and are attached to the tubing by mechanical internal swaging. (Defective Line Swage)
- o Flex lines consist of a fluoroflex-T teflon base inner tube, two high tensile stainless steel spiral wraps, a teflon inner layer tape and an outer braid of 304 or 302 CRES. (Defective Line Swage)
- o All threaded fittings and connectors are torqued per engineering specifications and are lockwired per MS 33540 as applicable. (Improper Torque, Improperly Lockwired)
- o Tube and hose assemblies are fabricated per 10PRC-0038. This includes preparation and inspection of tube/hose ends and fittings, assembly alignment checks, and acceptance criteria of the assembled unit. (All Failure Causes)
- o The Aft skirt is purged with GN2 prior to APU startup. This reduces the O2 concentration to less than four percent per OMRSD File II, Vol. 1, requirement number SOOFMO.430. (All Failure Causes)

B. TESTING

- o Proper TVC system function is demonstrated during hotfire operations per 10REQ-0021, para. 2.3.16 which includes Hotfire. (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. Fuel pump shaft seal static leakage is determined per 10REQ-0021, para. 2.1.3 after pump mating. (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. (Bearing Seizure Due to Improper Soaking and/or Contamination)

- o Helium 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 B42AP0-010. (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 B42AP0-012. (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 B42AP0.012. (Contamination)
- o Verification of APU Fuel system GN2 blanket pressure check per File V, Vol. I, requirement number B42AP0.030 (All Failure Causes)

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C. INSPECTION

VENDOR RELATED INSPECTIONS

- o Inspection of sealing surfaces QAR per SIP 1260. (Defective or Damaged Sealing Surface)
- o Critical Processes/Inspections:
 - Swaging per 10PRC-0038
 - Tube bending per 10PRC-0038
 - Tube end flaring per 10PRC-0038

KSC RELATED INSPECTIONS

- o Individual tube assemblies are inspected for the requirements of 10PRC-0038 per 10REQ-0021, para. 2.3.0. (All Failure Causes)
- o Inspection of tube/hose assemblies, fittings and connectors, prior to installation per 10REQ-0021, para. 2.3.0. (Defective or Damaged Sealing Surface, Defective Line Swage)
- o Assembly torque and lockwire are verified per 10REQ-0021, para. 2.1.4 during assembly. (Improper Torque, Improperly Lockwired)
- o Proper function of TVC system is demonstrated during hotfire per 10REQ-0021, para. 2.3.16. (All Failure Causes)
- o Inspections for leaks, rubbing and discoloration are conducted per 10REQ-0021, para. 2.3.11.3 and 2.3.15.5 respectively, following low speed GN2 spin, and high speed GN2 spin. (All Failure Causes)

D. FAILURE HISTORY

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

E. OPERATIONAL USE

- o Not applicable to this failure mode.