

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : FLIGHT CONTROL MECH FMEA NO 02-2B -A01-FE-3 REV: 12/04/87

ASSEMBLY : TVC ACTUATOR

P/N RI : MC621-0015

P/N VENDOR: MOOG

QUANTITY : 6

: ONE PER ACTUATOR

| | | | |
|--------------|-----|---------|-------|
| VEHICLE | 102 | 103 | 104 |
| EFFECTIVITY: | X | X | X |
| PHASE(S): | PL | LO X OO | DO LS |

CRIT. FUNC: 1

CRIT. HDW: 1

PREPARED BY:

DES N LEVERT
REL C NELSON
QE M SAVALA

REDUNDANCY SCREEN: A-N/A B-N/A C-N/A

APPROVED BY:

DES *[Signature]*
REL *[Signature]*
QE *[Signature]*

APPROVED BY (NASA):

SSM *[Signature]*
REL *[Signature]*
QE *[Signature]* 11/7/88

ITEM:

SERVOVALVE INLET FILTER

FUNCTION:

PROVIDES 10 MICRON NOMINAL, 15 MICRON ABSOLUTE FILTRATION OF HYDRAULIC FLUID SUPPLIED TO THE SERVOVALVES, SOLENOID ISOLATION VALVES, AND SERVOVALVE DIFFERENTIAL PRESSURE SENSORS.

FAILURE MODE:

CLOGGED ELEMENT

CAUSE(S):

EXCESSIVE CONTAMINATION

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A) LOSS OF ONE ACTUATOR FUNCTION.

(B) POSSIBLE LOSS OF ONE ENGINE POSITION CONTROL WHICH MAY CAUSE ENGINE COLLISION.

(C,D) POSSIBLE LOSS OF MISSION, CREW/VEHICLE. LOSS OF FUNCTION CAN RESULT IN LOSS OF VEHICLE CONTROL.

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN

DESIGNED PER MIL-F-8815 AND IS A STAINLESS STEEL WIRE MESH MATERIAL. ELEMENT SIZED TO RETAIN WORST CASE 100 MISSION CONTAMINANT LEVEL. REFERENCE MOOG REPORT (WINTEC NUMBER TR419) FLOW PERFORMANCE CONTAMINANT CAPACITY. THE SERVOVALVE INLET FILTER IS PROTECTED BY A 5 MICRON HYDRAULIC SYSTEM FILTER UPSTREAM OF THE ACTUATOR. THE SERVOVALVE INLET FILTER IS PROVIDED WITH A DELTA PRESSURE INDICATOR.

(B) TEST

QUALIFICATION-ELEMENT BUBBLE POINT MONITORED DURING QUALIFICATION TESTING. FILTER USEFUL LIFE WAS VERIFIED BY DEMONSTRATING ACCEPTABLE PERFORMANCE AFTER THE COMPLETION OF A 400 MISSION QUALIFICATION TEST WITH EXPOSURE OF FLUID THAT HAD MAXIMUM ALLOWABLE HYDRAULIC SYSTEM

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CONTAMINATION LEVEL. TEST ENVIRONMENTS INCLUDE FULL VIBRATION TESTING. CONTAMINATION ADDED TO FLUID UPSTREAM OF FILTER TO VERIFY PERFORMANCE UNTIL 3,000 PSID WAS PRODUCED ACROSS ELEMENT TO VERIFY DIRT CAPACITY AND STRUCTURAL INTEGRITY.

ACCEPTANCE-ELEMENT RECEIVES COMPONENT ACCEPTANCE TEST TO VERIFY BUBBLE POINT/VIBRATION OF ELEMENT AND CASE FOLLOWED BY FLUSH SAMPLE. PARTICLE COUNT VERIFIES CLEANLINESS. CLEAN ELEMENT INSTALLED IN ACTUATOR FOLLOWING UNIT ATP AND PRIOR TO DELIVERY TO ROCKWELL. FLUID FROM ACTUATOR IS VERIFIED TO MEET CLEANLINESS LEVEL 190 PER MA0110-301.

CMRSD-HYDRAULIC SYSTEM FILTER INSPECTION, DELTA PRESSURE INDICATOR CHECKED PRIOR TO EACH MISSION. HYDRAULIC FLUID SAMPLES ARE TAKEN AFTER EVERY FLIGHT AND VERIFIED TO BE WITHIN SPECIFIED CLEANLINESS LEVELS.

(C) INSPECTION

RECEIVING INSPECTION

AT THE FILTER SUPPLIER (WINTEC), THE FILTER MATERIAL IS DEBURRED AFTER MACHINING AND INSPECTED UNDER 10X MAGNIFICATION. MOOG SOURCE INSPECTION VERIFIES DEBURRING PRIOR TO FINAL ASSEMBLY OF FILTER ELEMENT. AT MOOG, FILTER MESH MATERIAL CERTIFICATIONS ARE VERIFIED, AND CRITICAL DIMENSIONS ARE INSPECTED. FOLLOWING DIMENSIONAL INSPECTION, FILTER ELEMENTS ARE RECLEANED AND CERTIFIED.

CONTAMINATION CONTROL

THE HYDRAULIC SYSTEM TEST STAND FLUID IS MAINTAINED CLEAN PER CONTAMINATION CONTROL PLAN. END ITEM FLUID SAMPLE IS VERIFIED PRIOR TO SHIPMENT OF ACTUATOR.

TESTING

ROCKWELL DESIGN AND QUALITY PERSONNEL, WITH NASA PARTICIPATION, CONDUCT A DETAILED ACCEPTANCE REVIEW OF THE HARDWARE AT THE VENDOR'S FACILITY, PRIOR TO THE SHIPMENT OF EACH END ITEM COVERED BY CONTROL PLAN. ATP VERIFICATION IS MIP FOR RI QA REPRESENTATIVE.

(D) FAILURE HISTORY

THERE IS NO HISTORY OF FAILURE FOR THIS FAILURE MODE.

(E) OPERATIONAL USE

NONE