

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ORBITAL MANEUVER FMEA NO 03-3 -4505 -2 REV: 4/20/86

ASSEMBLY : ENGINE SUBSYSTEM ABORT: CRIT. FUNC: 1R
 P/N RI : MC621-0009 TAL,ATO CRIT. HDW: 2
 P/N VENDOR: 1186804 VEHICLE 102 103 104
 QUANTITY : 2 EFFECTIVITY: X X X
 : 1 FOR EACH ENG SUB-SYS PHASE(S): PL LO OO DO X LS

PREPARED BY: DES V F ROZNOS APPROVED BY: DES *[Signature]* REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 REL C M AKERS REL *[Signature]* APPROVED BY (NASA): SSM *[Signature]*
 QE W J SMITH QE *[Signature]* REL *[Signature]* REL *[Signature]* 8-268

ITEM:
 REGULATOR, GN2 PRESSURE, PNEUMATIC ACTUATION SYSTEM.

FUNCTION:
 REDUCES AND REGULATES THE GN2 SUPPLY PRESSURE OF 2500 PSI TO THE REQ' ACTUATOR OPERATING PRESSURE OF 325 PSI (NOMINAL) THE REGULATOR LOCKS-UP AT A PRESSURE OF 360 PSI TO LIMIT ANY OVERPRESSURE CONDITION FROM AFFECTING B1-PROP VALVE OPERATION TIMING. THE REGULATOR UNIT ALSO INCLUDES AN INTEGRAL RELIEF VALVE ASS'Y. SEE FMEA 45011.

FAILURE MODE:
 FAILS CLOSED, RESTRICTED FLOW, LOW OUTLET PRESSURE.

CAUSE(S):
 CLOGGED GN2 FILTER - CONTAMINATION, CORROSION; - PISTON INTERFAC.
 BINDS: MATERIAL DEFECT, BROKEN SPRING, COCKED SPRINGS, FROZE MOISTURE.

EFFECT(S) ON:
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
 (A) LOSS OF REDUNDANCY - LOSS OF ONE ENGINE.
 (B) LOSS OF INTERFACE REDUNDANCY. LOSS OF ABILITY TO RESTART ONE ENGINE.
 (C) POSSIBLE EARLY MISSION TERMINATION. REDLINE ADDITIONAL PROPELLANT FOR RCS BACKUP DEORBIT. NEXT PLS DEORBIT IF SUFFICIENT PROPELLANT NOT AVAILABLE.
 (D) NO EFFECT. CRIT 1 FOR ABORTS REQUIRING POST-MECO DUMP. IF ENGINE RESTARTED WITH NO PURGE, HARD START COULD DAMAGE ENGINE AND VEHICLE. INABILITY TO RESTART ENGINE COULD RESULT IN EXCESSIVE PROPELLANT REMAINING - LANDING WEIGHT, C.G. ISSUES.

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(E) FUNCTIONAL CRITICALITY EFFECT - POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO PERFORM DEORBIT BURN. FAILURE NOT DETECTABLE UNTIL AFTER OMS BURN INITIATION (ACCUMULATOR PRESSURE WOULD BE DEPLETED) LOSS OF PRESSURIZATION CAPABILITY COULD RESULT IN INABILITY TO ACTUATE THE BI-PROP VALVES WITH RESULTANT INABILITY TO DEORBIT. CRITICALITY EFFECT ASSUMES FAILURE OF OTHER OMS ENGINE AND INABILITY TO PERFORM DEORBIT BURN.

DISPOSITION & RATIONALE:

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

(A) DESIGN

DESIGN FACTOR OF SAFETY IS 1.5. AN 18-MICRON INLET FILTER PROVIDES PROTECTION FROM CONTAMINATION. REDUNDANT ENGINES ARE PROVIDED EITHER OF WHICH IS ADEQUATE FOR DEORBIT. THE ACCUMULATOR STORES PRESSURANT WHICH IS ADEQUATE FOR 1 ENGINE FIRING.

(B) TEST

QUALIFICATION TEST

QUALIFICATION TESTS INCLUDED ENDURANCE, THERMAL, VIBRATION, SHOCK AND FUNCTIONAL TESTING. ALSO QUALIFIED AS PART OF ENGINE ASSEMBLY - 138 HOT-FIRE TESTS DURING ENGINE QUAL, 498 TESTS AT SYSTEM LEVEL AT WSTF. VIBRATION TEST AT ENGINE LEVEL.

ACCEPTANCE TESTS

EACH UNIT - VISUAL INSPECTIONS, PROOF, FUNCTIONAL AND CLEANLINESS.

GROUND TURNAROUND

V43CB0.192 PERFORMS LEAK AND FUNCTIONAL TEST FOR FIRST FLIGHT AND ON 5-FLIGHT INTERVALS.

S00FJ0.040 PERFORMS POST ACTUATION PNEUMATIC LEAK/ FUNCTIONAL TEST EVERY FLIGHT.

V43CE0.055 PNEUMATIC SYSTEM VENT VERIFIES REGULATOR FLOW CAPABILITY EACH FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

MATERIALS AND PROCESSES CERTIFICATION ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CLEANLINESS TO LEVEL 200 AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION.

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ASSEMBLY/INSTALLATION

MANUFACTURING, ASSEMBLY AND INSTALLATION PROCEDURES ARE VERIFIED BY INSPECTION. CRITICAL DIMENSIONS AND SURFACE FINISHES ARE VERIFIED BY INSPECTION, VISUAL AND DIMENSIONAL INSPECTION OF VALVE BODY AND COMPONENT DURING FABRICATION ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

THE WELDING PROCESS AND VERIFICATION THAT WELDS MEET SPECIFICATION REQUIREMENTS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT AND RADIOGRAPHIC INSPECTION OF WELDS ARE VERIFIED BY INSPECTION.

TESTING

TEST EQUIPMENT AND TOOL CALIBRATION ARE VERIFIED BY INSPECTION. ACCEPTANCE TEST IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING, PACKAGING, STORAGE AND SHIPPING REQUIREMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY FOR FAILED CLOSED MODE.

(E) OPERATIONAL USE

IF OMS BURN DURATION ALLOWS SUFFICIENT REACTION TIME, PLACE ARM/PRESS SWITCH IN "ARM" POSITION TO SAVE ACCUMULATOR PRESSURE FOR DEORBIT BURN START. IF ENGINE NOT AVAILABLE COMPLETE MISSION REQUIREMENTS USING CROSSFEED FOR PROPELLANT UTILIZATION. REDLINE ADDITIONAL PROPELLANT FOR RCS BACKUP DEORBIT. NEXT PLS DEORBIT IF PROPELLANT FOR RCS BACKUP NOT AVAILABLE. POSSIBLE MISSION IMPACT. DECREASED PROPELLANT AVAILABLE FROM OMS TO RCS THROUGH INTERCONNECT FOR ON-ORBIT OPERATION.