

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ORBITAL MANEUVER FMEA NO 03-3 -4503 -2 REV: 11/14/87

ASSEMBLY : ENGINE SUBSYSTEM ABORT: CRIT. FUNC: 1R  
P/N RI : MC621-0009 TAL, ATO CRIT. HDW: 3  
P/N VENDOR: 1186803 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 ROZDOS APPROVED BY: REDUNDANCY SCREEN: A-PASS B-PASS C-PASS  
REL C M AKERS REL SSM APPROVED BY (NASA):  
QE W J SMITH QE REL 12-8-87

ITEM: VALVE, ENGINE PRESSURIZATION, GN2 ISOLATION, SOLENOID, N.C. SPRING LOADED.

FUNCTION: VALVE IS USED TO LIMIT DOWNSTREAM LEAKAGE FROM REGULATOR, RELIEF VALVE, CONTROL VALVES, PURGE VALVES, LINES AND FITTINGS DURING STATIC PERIODS. VALVES ARE NORMALLY CLOSED AND ARE OPENED BY MANUAL SWITCH PRIOR TO EACH ENGINE FIRING. VALVES UTILIZE DUAL COILS AND REDUNDANT POWER SOURCES AND LEADS. (SWITCH ALSO ENABLES ENGINE CONTROL VALVES AND CAN ALSO BE USED TO MANUALLY TERMINATE ENGINE FIRING IF REQUIRED). VALVES ARE OPENED PRIOR TO LAUNCH.

FAILURE MODE: FAILS CLOSED, FAILS TO OPEN, FAILS TO REMAIN OPEN, RESTRICTED FLOW.

CAUSE(S): CONTAMINATION, CORROSION, JAMMING OF POPPET, MATERIAL DEFECT, SHOCK, VIBRATION, ELECTRICAL FAILURE.

EFFECT(S) ON:  
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A) LOSS OF FUNCTION - LOSS OF ABILITY TO RESUPPLY ACCUMULATOR.  
(B) LOSS OF INTERFACE REDUNDANCY - LOSS OF ABILITY TO RESTART ONE ENGINE.  
(C) NO EFFECT - SAVE AFFECTED ENGINE FOR DEORBIT BURN.  
(D) NO EFFECT. CRIT 1 FOR ABORTS REQUIRING POST-MECO OMS DUMP. IF ENGINE RESTARTED WITH NO PURGE, HARD START COULD DAMAGE ENGINE AND VEHICLE. INABILITY TO RESTART ENGINE COULD RESULT IN EXCESSIVE

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PROPELLANT REMAINING - LANDING WT C.G. ISSUES.

(E) FUNCTIONAL CRITICALITY EFFECT - POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO PERFORM DEORBIT BURN. 1R EFFECT ASSUMES FAILURE OF DOWNSTREAM REGULATOR, ACCUMULATOR, ALTERNATE ENGINE AND INADEQUATE PROPELLANT FOR RCS DEORBIT.

DISPOSITION & RATIONALE:

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

(A) DESIGN

DESIGN FACTOR OF SAFETY IS 4.0 (BURST). 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 TESTS

INCLUDED ENDURANCE, THERMAL, SHOCK, VIBRATION, FUNCTIONAL TESTING, BURST. 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 PRESSURE, ELECTRICAL CHECKS, PULL-IN AND DROP-OUT VOLTAGE, LEAKAGE, FLOW, FUNCTIONAL AND CLEANLINESS.

GROUND TURNAROUND

SO0FJC.040 PERFORMS POST ACTUATION PNEUMATIC LEAK/FUNCTIONAL TEST EVERY FLIGHT.

V43CAO.050 PERFORMS ENGINE PNEUMATIC ELECTRICAL VERIFICATION FOR FIRST FLIGHT AND CONTINGENCY.

V43CAO.070 PERFORMS REDUNDANT CIRCUIT VERIFICATION FIRST FLIGHT AND EVERY 5TH FLIGHT.

V43CAO.075 PERFORMS ELECTRICAL INTERFACE VERIFICATION (CONTINGENCY).

V43CBO.192 PERFORMS REGULATOR LEAK AND FUNCTIONAL FIRST AND EVERY 5TH FLIGHT.

V43CEO.100 PERFORMS PNEUMATIC SYSTEM ELECTRICAL CONTROL VERIFICATION EACH FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

MATERIALS AND PROCESSES CERTIFICATIONS 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 INSPECTIONS OF VALVE BODY AND COMPONENT DURING FABRICATION IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT AND RADIOGRAPHIC INSPECTION OF WELDS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

THE WELDING PROCESS AND VERIFICATION THAT WELDS MEET SPECIFICATION REQUIREMENTS 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

(E) OPERATIONAL USE

DO NOT USE ENGINE FOR ON-ORBIT BURNS. SAVE ACCUMULATOR PRESSURE FOR DEORBIT BURN START.