SHUTTLE CRITICAL ITEMS LIST - ORBITER

SYSTEM :ORBITAL MANEUVER FMEA NO 03-3 -45011 -1 REV:12/04/87

EMBLY :ENGINE SUBSYSTEM
RI :MC621-0009
VENDOR:1186804
NTITY :2
:SP-30
:1 FOR EACH ENG SUBSYS

ABORT:
TAL, ATO

CRIT. FUNC: 1R
CRIT. HDW: 3

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X

PHASE(S): PL LO X OO X DO X LS

REDUNDANCY SCREEN: A-PASS B-PASS C-PASS

PARED BY:
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APPROVED BY:
DES
REL
QE

APPROVED BY (NASA):
SSM
REL 12-9-87
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E:
VALVE, RELIEF, PRESSURE, PNEUMATIC ACTUATION SYSTEM.

CTION:
PROVIDES PRESSURE RELIEF IN EVENT REGULATOR FAILS OPEN OR PRESSURE RISES IN LINE DUE TO THERMAL INCREASE. THE RELIEF PRESSURE IS 450 TO 500 PSI AND THE RESEAT PRESSURE IS 400 PSI MINIMUM. THE RELIEF VALVE IS AN INTEGRAL PART OF THE REGULATOR ASSEMBLY.

URE MODE:
LS OUT OF TOLERANCE, FAILS OPEN, EXTERNAL LEAKAGE, POPPET DOES NOT EAT.

E(S):
CORROSION, CONTAMINATION, POPPET BINDS IN GUIDE, SPRING BREAKS OR COCKS, SEAT CRACKS, VIBRATION, SHOCK.

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

(A) FUNCTIONAL DEGRADATION (RESULTS IN LOSS OF PNEUMATIC ACTUATION SYSTEM PRESSURANT). NO EFFECT UNLESS LEAKAGE IS EXCESSIVE.

(B) DEGRADATION OF INTERFACE FUNCTION - MAY HAVE ONLY ONE ENGINE START REMAINING. (ACCUMULATOR PROVIDES PRESSURANT FOR ONE ENGINE FIRING).

(C) NO EFFECT.

(D) NO EFFECT. ENGINE CAN BE ISOLATED AND PROPELLANT UTILIZED BY OTHER ENGINE. CRIT 1 FOR ABORT REQUIRING POST-MECO OMS DUMP. FAILURE RESULTS IN DEPLETION OF GN2 REQUIRED FOR PURGE AND SUBSEQUENT RESTART. SWITCH IN "ARM POSITION" RETAINS ACCUMULATOR PRESSURE, BUT DISABLES POST-BURN PURGE. IF ENGINE RESTARTED WITH NO PURGE, HARD START COULD DAMAGE ENGINE AND VEHICLE. INABILITY TO RESTART ENGINE COULD RESULT IN EXCESSIVE PROPELLANT REMAINING (LANDING WT. C.G. ISSUES).

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(E) FUNCTIONAL CRITICALITY EFFECT - POSSIBLE LOSS OF CREW/VEHICLE DU TO INABILITY TO PERFORM DEORBIT BURN. 1R EFFECT ASSUMES FAILURE O ACCUMULATOR, OTHER OMS ENGINE AND INADEQUATE PROPELLANT FOR RC DEORBIT.

DISPOSITION & RATIONALE:
(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A) DESIGN

DESIGN FACTOR OF SAFETY IS 2.4. THE 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
ENDURANCE, THERMAL, VIBRATION, SHOCK AND FUNCTIONAL TESTING. ALSO QUALIFIED AS PART OF ENGINE ASSEMBLY - 138 HOTFIRE TESTS DURING ENGINE QUAL. 498 TESTS AT SYSTEM LEVEL AT WSTF. VIBRATION TEST AT ENGINE LEVEL.

ACCEPTANCE TEST
EACH UNIT-VISUAL INSPECTIONS, PROOF PRESSURE, FUNCTIONAL AND CLEANLINESS.
GROUND TURNAROUND
SOOFJO.040 PERFORMS POST ACTUATION PNEUMATIC LEAK/FUNCTIONAL TEST EVERY FLIGHT.
V43CBO.193 PERFORMS GN2 RELIEF VALVE LEAK/FUNCTIONAL FOR FIRST FLIGHT AND EVERY 5TH 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.

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.

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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.

FAILURE HISTORY
NO FAILURE HISTORY FOR THIS FAILURE MODE EXISTS FOR THE OMS.

CAR AC7422 RECORDS AN INSTANCE OF OBSERVED LEAKAGE DUE TO REGULATION ABOVE THE RELIEF PRESSURE. THIS WAS CAUSED BY CONTAMINATION OF THE REGULATOR WHICH WAS CORRECTED BY CLEANLINESS CONTROLS AND ELIMINATION OF REVERSE FLOW CONDITION DURING TEST.

OPERATIONAL USE
DURING ASCENT ABORT, PLACE ARM/PRESS SWITCH IN THE ARM POSITION. PRIOR TO MECO, RETURN SWITCH TO THE ARM/PRESS POSITION TO ENABLE THE POST-BURN PURGE. FOR NORMAL OPERATIONS, DO NOT USE ENGINE UNTIL THE DEORBIT BURN. 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.