SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ORBITAL MANEUVER

FMEA NO 03-3 -45011 -3 REV:11/14/8

ASSEMBLY :ENGINE SUBSYSTEM
P/N RI :MC621-0009
HDW: 2
P/N VENDOR:1186804
QUANTITY :2
:SP-30
:1 FOR EACH ENG SUBSYS

ABORT:
TAL, ATO

CRIT. FUNC: 1R
CRIT. HDW: 2

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

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

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

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
DES	D W CARLSON	DES	SSM
REL	C M AKERS	REL	REL
QE	W J SMITH	QE	QE

ITEM:
VALVE, RELIEF, PRESSURE, PNEUMATIC AND ACTUATION SYSTEM.

FUNCTION:
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 MIN. THE RELIEF VALVE IS AN INTEGRAL PART OF THE REGULATOR ASSEMBLY.

FAILURE MODE:
FAILS CLOSED, (WITH FAILED OPEN REGULATOR - BOTH FAILURES ARE THE RESULT OF A SINGLE CONDITION RELATING TO JAMMING OR LEAKAGE OF SENSING PISTON).

CAUSE(S):
GAS LEAKAGE INTO VALVE BELLEVILLE SPRING CAVITY CAUSING REGULATOR TO FAIL OPEN AND THE RELIEF VALVE TO FAIL CLOSED (SINGLE POINT FAILURE); CONTAMINATION, SEAL PACKING DAMAGE, JAMMED SENSING PISTON (BINDING OF RELIEF VALVE/REGULATOR COMMON PISTON), CORROSION, POPPET BINDS IN GUIDE, SPRING COCKS - FORCES CHANGE.

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

(A) LOSS OF ENGINE. (SYSTEM WOULD NOT BE USED IF FAILURE CONDITION KNOWN BEFORE OME FIRING INITIATION). FAILURE UPON FIRING INITIATION OR DURING FIRING WOULD RESULT IN SLOW BI-PROP VALVE CLOSING.

(B) LOSS OF REDUNDANCY - SLOW CLOSING OF BI-PROP VALVE. POSSIBLE DAMAGE TO BI-PROP VALVE ACTUATOR.

(C) POSSIBLE EARLY MISSION TERMINATION, REDLINE ADDITIONAL PROPELLANT FOR RCS BACK-UP DEORBIT. NEXT PLS DEORBIT IF SUFFICIENT PROPELLANT NOT AVAILABLE.

(D) NO EFFECT. CRITICALITY 1 FOR ABORT. ONE ENGINE CANNOT DEPLETE PROPELLANT WITHIN TIME REQUIRED. REDUCED FLOW RATE DURING DUMP COULD CAUSE LANDING WEIGHT, C.G. PROBLEMS.

(E) FUNCTIONAL CRITICALITY EFFECT - POSSIBLE LOSS OF CREW/VEHICLE. 1R EFFECT ASSUMES LOSS OF BOTH OMS ENGINES AND INADEQUATE PROPELLANT FOR DEORBIT.

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

DESIGN
DESIGN FACTOR OF SAFETY IS 2.4. AN 18-MICRON INLET FILTER PROVIDES PROTECTION FROM CONTAMINATION. REDUNDANT ENGINES ARE PROVIDED EITHER OF WHICH IS ADEQUATE FOR DEORBIT.

TEST

QUALIFICATION TEST
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 TEST
EACH UNIT VISUAL INSPECTIONS, PROOF PRESSURE, FUNCTIONAL AND CLEANLINESS.
GROUND TURNAROUND
V43CB0.192 PERFORMS GN2 REGULATOR 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.
V43CB0.193 PERFORMS GN2 RELIEF VALVE LEAK/FUNCTIONAL FOR FIRST FLIGHT AND EVERY 5TH FLIGHT.

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 B INSPECTION. CRITICAL DIMENSIONS AND SURFACE FINISHES ARE VERIFIED B INSPECTION. VISUAL AND DIMENSIONAL INSPECTIONS OF VALVE BODY AN COMPONENT DURING FABRICATION IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
PENETRANT AND RADIOGRAPHIC INSPECTION OF WELDS ARE VERIFIED B 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 B INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY FOR THIS FAILURE MODE EXISTS FOR THE OMS IDENTIFICATION OF THE POTENTIAL FOR THIS TYPE OF FAILURE MODE OCCURRE DURING EVALUATION OF THE CREW MEMBER BACK PACK.

(E) OPERATIONAL USE

CLOSE TANK ISOLATION VALVE. VENT PRESSURE DOWN BY OPENING PURG VALVE. THIS WOULD ALLOW ONE ADDITIONAL FIRING. USE FOR DEORBIT BURN COMPLETE MISSION REQUIREMENTS USING CROSSFEED FOR PROPELLAN UTILIZATION. REDLINE ADDITIONAL PROPELLANT FOR RCS BACKUP DEORBIT NEXT PLS DEORBIT IF PROPELLANT FOR RCS BACKUP NOT AVAILABLE. POSSIBL MISSION IMPACT. DECREASED PROPELLANT AVAILABLE FROM OMS TO RC THROUGH INTERCONNECT FOR ON-ORBIT OPERATION.