

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :AUXILIARY POWER (APUS) FMEA NO 04-2 -LV12 -10 REV:02/25/82

ASSEMBLY :FUEL SUPPLY
P/N RI :ME284-0558-0005/6
P/N VENDOR:HR P/N 48003800
QUANTITY :6
:2 PER FEEDLINE

	VEHICLE	102	103	104
EFFECTIVITY:	X	X	X	
PHASE(S):	PL X	LO X	CC X	DO X LS X

PREPARED BY: DES S Y HWANGBO REL T R BOLTZ 728REL QE W J SMITH

REDUNDANCY SCREEN: A- B- C-
APPROVED BY: *[Signature]* APPROVED BY (NASA):
SSM *[Signature]*
REL *[Signature]*
QE *[Signature]*

ITEM: VALVE, SOLENOID, NORMALLY CLOSED, FUEL ISOLATION

FUNCTION:
(1) TO OPEN AND ALLOW FUEL TO FLOW FOR APU OPERATION. (2) TO PROVIDE BACKUP SHUTOFF CAPABILITY IN THE EVENT THE APU SHUTOFF VALVE (50V461V02) FAILS OPEN OR LEAKS. (3) TO PROVIDE REVERSE PRESSURE RELIEF.

FAILURE MODE:
EXTERNAL LEAK

CAUSE(S):
WELD FAILURE, STRUCTURAL FAILURE OF TORQUE TUBE ALLOWING FUEL INTO THE SOLENOID CAVITY AND DECOMPOSITION, SOLENOID COIL WINDING SHORTING, ELECTRICAL POWER LEFT ON OR FAILS ON, CAUSING FUEL DECOMPOSITION AND EXPLOSION WITHIN THE VALVE.

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE
(A) LOSS OF AN APU OPERATION IF LEAK IS GROSS.
(B) ADJACENT EQUIPMENT AND COMPONENTS EXPOSED TO RAW FUEL. POSSIBLE LOSS OF SHAFT POWER TO ONE HYDRAULIC PUMP.
(C) ABORT DECISION IS REQUIRED IF FAILURE OCCURS PRIOR TO ENTRY COMMITMENT.
(D) POSSIBLE LOSS OF CREW/VEHICLE IF FUEL ENTERS AFT FUSELAGE AND IS IGNITED.

DISPOSITION & RATIONALE:
(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE
(A) DESIGN
SIMILAR CONSTRUCTION TO APU GGVM. IDENTICAL TORQUE TUBE AND ARMATURE TO GGVM. WELDS AND ASSEMBLY SIMILAR TO GGVM. VALVE REQUIRED TO MEET 1400 PSIG BURST PRESSURE.
PATHS FOR LEAKAGE CONSIST OF FOUR CLASS 'A' WELDS WITH MINIMUM REQUIRED 0.030 IN. PENETRATION.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :AUXILIARY POWER (APUS) FM2A NO 04-2 -LV11 -10 REV:02/26/88

TEMPERATURE-OF VALVES MONITORED ON FDA IN CASE CREW NEGLECTS TO TURN POWER OFF. VALVE POSITION MAY BE MONITORED ON CRT AND ON GROUND.

SERIES REDUNDANT DRIVERS HAVE BEEN ADDED TO SWITCH POWER OFF TO VALVES. COIL CONSTRUCTION SIMILAR TO THE GGVM COILS BUT DRAWS A HALF-AMP LESS CURRENT.

(B) TEST

VALVE LEAK CHECKED AND PROOFED AT 1,050 PSIG IN ATP. MAXIMUM LEAKAGE IS 1×10^{-4} SCCH. GGVM PROOF TO 2,282 PSIG.

OMRSD: TOXIC VAPOR CHECKS, POST-FLIGHT SYSTEM INSPECTION AND FUEL VALVE COIL RESISTANCE CHECKS ARE PERFORMED EVERY FLOW.

(C) INSPECTION

RECEIVING INSPECTION
MATERIAL AND PROCESSES CERTIFICATIONS ARE VERIFIED.

CONTAMINATION CONTROL
CLEANLINESS TO LEVEL 100 IS VERIFIED BY INSPECTION. CORROSION PROTECTION REQUIREMENTS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
MANUFACTURING, ASSEMBLY, AND INSTALLATION REQUIREMENTS ARE VERIFIED BY INSPECTION. CRITICAL DIMENSIONS AND SURFACE FINISHES ARE VERIFIED BY INSPECTION. BURR AND WELD SPLATTER INSPECTION AT 20X MAGNIFICATION IS VERIFIED. SOLENIOD AND TORQUE TUBE ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
PENETRANT AND RADIOGRAPHIC INSPECTION OF WELDS AND ASSEMBLIES IS VERIFIED.

CRITICAL PROCESSES
WELDING PER SPECIFICATION REQUIREMENTS IS VERIFIED BY INSPECTION.

TESTING
TEST EQUIPMENT AND TOOL CALIBRATION ARE VERIFIED BY INSPECTION. ATP (INCLUDING INSULATION RESISTANCE AND DIELECTRIC STRENGTH) IS WITNESSED AND VERIFIED BY INSPECTION.

HANDLING/PACKAGING
HANDLING, PACKAGING, STORAGE AND SHIPPING PROCEDURES ARE VERIFIED.

(D) FAILURE HISTORY
NO FAILURES

(E) OPERATIONAL USE
IF LEAKAGE IS DETECTED BY THE GROUND CREW, THE WORST CASE (FUEL LEAKAGE) IS ASSUMED, AND THE CREW HAS THE OPTION TO RUN THE APU TO DEPLETION.