

SHUTTLE CRITICAL ITEMS LIST - CREITER

SUBSYSTEM :AUXILIARY POWER (APUS) FMEA NO 04-2 -PP12 -11 REV:02/24/78

ASSEMBLY :AUXILIARY POWER UNIT	ABORT	CRIT. FUNC:	12
P/N RI :MC201-0001-0221	RTLS, AOA, ATO, TAL	CRIT. HOW:	2
P/N VENDOR:SS P/N 718604	VEHICLE	102	103 104
QUANTITY :3	EFFECTIVITY:	X	X X
:1 PER APU	PHASE(S):	PL X L3 X CO	CO X L5 X

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

PREPARED BY: J R MUNROE DES APPROVED BY: *[Signature]* DES APPROVED BY (NASA): SSM *[Signature]*

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3-15-78

ITEM:
PUMP, LUBE OIL - POSITIVE DISPLACEMENT (GEAR).

FUNCTION:
(1) TO SUPPLY LUBRICANT UNDER PRESSURE TO BEARINGS AND SEALS. (2) TO TRANSFER LUBRICANT FROM GEARBOX TO HYDRAULIC SYSTEM WATER BOILER.

FAILURE MODE:
LOSS OF OUTPUT (INCLUDING DEGRADED OUTPUT).

CAUSE(S):
SHAFT SHEAR, GEAR OR BEARING SEIZURE, WORN GEARS, FLOW RESTRICTION, ASSEMBLY ERROR OF PUMP ROTOR.

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

(A) FUNCTIONAL DEGRADATION. DECREASED FLOW TO GEAR TRAIN RESULTS IN INCREASED LUBE TEMPERATURE. INDICATION TO PMS. POSSIBLE AUTO (UNDERSPEED) SHUTDOWN.

(B) POSSIBLE LOSS OF SHAFT POWER TO ONE HYDRAULIC PUMP.

(C) POSSIBLE ABORT DECISION.

(D) NO EFFECT UNTIL SECOND SYSTEM LOSS. CRITICALITY 1 FOR SSME-INDUCED RTLS, ATO, AOA, OR TAL DUE TO THE POSSIBLE ADDITIONAL LOSS OF ASSOCIATED APU/HYD AND MAIN ENGINE.

(E) FUNCTIONAL CRITICALITY EFFECT - POSSIBLE LOSS OF CREW/VEHICLE IF TWO OUT OF THREE APU'S ARE LOST.

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

(A) DESIGN
LUBE SYSTEM 40-MICRON FILTER WITH 2 GRAMS AC COURSE DUST CAPABILITY. THIS ITEM ALSO HAS A BYPASS RELIEF VALVE AROUND IT. GEAR BOX MAGNETIC CHIP DETECTOR. S70-0606 LUBE OIL SERVICING UNIT, 25-MICRON FILTER. SIMILAR TO PUMPS USED IN EXTENSIVE AIRCRAFT APPLICATIONS. MARGIN OF SAFETY ON SHAFT/DRIVE PIN IS HIGH.

SHUTTLE CRITICAL ITEMS LIST - CREDIT

SUBSYSTEM: AUXILIARY POWER (APUS) FMEA NO 04-2 -PP12 -11 REV:02/85

(B) TEST

ACCEPTANCE TEST PRIOR TO INSTALLATION ON APU. ACCEPTANCE TESTED WITH ASSEMBLED APU.

QUALIFIED AS PART OF APU.

CERTIFICATION TESTS CONDUCTED ARE - 27 MISSION DUTY CYCLES, THERMAL VACUUM, BENCH SHOCK, FOR A TOTAL OF 41.7 HR. OPERATION INCLUDING VIBRATION.

QMSD: APU 1/2/3 PUMP PERFORMANCE IS VERIFIED DURING T-5 HEN RUN EVERY FLOW.

(C) INSPECTION

RECEIVING INSPECTION

MATERIAL AND PROCESSES CERTIFICATIONS ARE VERIFIED.

CONTAMINATION CONTROL

CLEANLINESS REQUIREMENTS ARE VERIFIED BY INSPECTION. FLUID SAMPLES ARE ANALYZED FOR CONTAMINATION AND 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. TORQUING IS VERIFIED BY INSPECTION. SHAFTS, GEARS, AND BEARINGS ARE VERIFIED BY INSPECTION. ASSEMBLY OF PUMP ROTOR IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

RADIOGRAPHIC, PENETRANT, AND MAGNETIC PARTICLE INSPECTION FOR SURFACE AND SUBSURFACE DEFECTS IS VERIFIED BY INSPECTION.

CRITICAL PROCESSES

HEAT TREATMENT TO SPECIFICATION REQUIREMENTS IS VERIFIED BY INSPECTION.

TESTING

TEST EQUIPMENT AND TOOL CALIBRATION ARE VERIFIED BY INSPECTION. ATP IS WITNESSED AND VERIFIED BY INSPECTION.

HANDLING/PACKAGING

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

(D) FAILURE HISTORY

NONE

(E) OPERATIONAL USE

SHUT DOWN APU