SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :AUXILIARY POWER (APUS) FMEA NO 04-2 -CONTL6-1 REV:02/26/8

ASSEMBLY :APU CONTROLLER
P/N RI :MC201-0001-0065
P/N VENDOR:SS P/N 729485C
QUANTITY :3
:ONE PER APU
:

CRIT. FUNC: 1R
CRIT. HDW: 3

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

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

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
DES	R STEDMAN	DES	SSM
REL	T R BOLTZ	REL	REL
QE	W J SMITH	QE	QE

ITEM:
LUBE OIL REPRESSURIZATION CIRCUIT

FUNCTION:
(1) PROVIDES SIGNAL TO OPERATE GN2 SOLENOID VALVE WHEN THE LUBE OIL CAS PRESSURE (V46P0151A) IS BETWEEN 5.5 +/- 1.5 AND 8.5 +/- 1.5 PSIA.

FAILURE MODE:
LOSS OF OUTPUT, ERRONEOUS OUTPUT.

CAUSE(S):
CONTROLLER INTERNAL PIECE PART FAILURE, EMI, OPEN OR SHORT CIRCUIT.

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

(A) NO EFFECT UNLESS GEARBOX PRESSURE HAS DECAYED BELOW 4 PSIA. IF PRESSURE HAS DECAYED, APU MAY NOT RESTART. THIS FAILURE WOULD NOT BE DETECTABLE IN FLIGHT UNLESS REPRESSURIZATION OF THE GEARBOX WAS REQUIRE

(B) IF GEARBOX PRESSURE IS LOW, LOSS OF ONE HYDRAULIC SYSTEM FOR ENTRY.

(C) NONE.

(D) NO EFFECT UNTIL SECOND SYSTEM LOST.

(E) FUNCTIONAL CRITICALITY EFFECT - LOSS OF CREW/VEHICLE IF GEARBOX PRESSURE DECAYS BELOW 4.5 PSIA, REPRESSURIZATION CIRCUIT FAILS, AND LOSS OF SECOND APU OCCURS. NOT DETECTABLE IN FLIGHT BECAUSE OTHER CAUSES OF LOSS OF REPRESSIZATION EXIST (REF 04-2-LV14-2 - REPRESS VALVE FAILED CLOSED, 04-2-MD19-2 - LOSS OF GN2 THROUGH FILL QD).

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

(A) DESIGN
ELECTRICAL COMPONENTS ARE REQUIRED TO BE QUALIFIED, PROPERLY DERATED AN APPLIED PER MC201-0001, PARAGRAPH 3.3.2.2. MECHANICAL PARTS SELECTED FROM MF0004-100. ELECTRICAL PARTS SELECTED FROM MF0004-400. CONFORMAL COATING PER SUNDSTRAND SPEC CP 17.32-01. CLEANLINESS PER MA0110-301. CONTROLLER VIBRATION DAMPED AT MOUNTING.

THE OPPL CALLS FOR GLASSIVATION FOR INTEGRATED CIRCUIT DIE, SINGLE SEAL FOR TANTALUM WET SLUG CAPACITORS, ETC. DERATING OF EEE PARTS IS EXPANDED BEYOND THE SIMPLISTIC (75% X RATED) REQUIREMENTS OF THE CONTRACT.

(B) TEST

CONTROLLER IS FUNCTIONALLY TESTED DURING ATP. CONTROLLER IS SUBJECTED TO AVT. CONTROLLER IS THERMAL TESTED DURING ATP - RANGE 70 DEG F, 130 DEG F, 30 DEG F.

CONTROLLER IS QUALIFIED FOR QAVT, EMI, THERMAL VACUUM (-65 DEG F TO 165 DEG F, 80 K FT FOR 10 CYCLES). ADDITIONAL HUMIDITY, FLIGHT VIBRATION, AND THERMAL VACUUM TESTS ARE CONDUCTED FOR THE OPERATIONAL CONFIGURATION.

ALL EEE PARTS ARE SUBJECTED TO SCREENING AND BURN-IN TESTS TO DETECT MARGINAL PARTS AND TO INDUCE INFANT MORTALITY FAILURES.

OMRSD: LPS AUTO BITE TEST IS PERFORMED ON EACH APU EVERY FLOW.

(C) INSPECTION

RECEIVING INSPECTION

VISUAL AND DIMENSIONAL INSPECTIONS ARE PERFORMED ON ALL INCOMING PARTS. MATERIAL AND PROCESSES CERTIFICATIONS ARE VERIFIED.

CONTAMINATION CONTROL

CLEANLINESS IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING, ASSEMBLY, AND INSTALLATION REQUIREMENTS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

SOLDERING TO NHB 5300.4(3A) 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 BY INSPECTION.

(D) FAILURE HISTORY

NO FLIGHT FAILURES TO DATE. SANGAMO CAPACITORS FAILED IN ATP, RESULTING IN ALL CAPACITORS BEING CHANGED OUT (CAR AC9235).

ALTERNATE WAS PART SUBSTITUTED IN CONTROLLER, RESULTING IN ERRATIC OUTPUT DURING VEHICLE CHECKOUT (CAR AC2853). CIRCUIT WAS REDESIGNED TO BE IMMUNE TO COMPONENT MANUFACTURING VARIATIONS.

(E) OPERATIONAL USE

ATTEMPT TO START/RUN WITH LOW GEARBOX PRESSURE.