SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :LIFE SUPPORT FMEA NO 06-2F -311000 -3 REV.10/29/

ASSEMBLY :SMOKE DETECTION
P/N RI :MC431-0127-0103/-1103
P/N VENDOR:
QUANTITY :9
:3 IN CREW CABIN
:2 IN EACH OF 3 AV BAYS

CRIT. FUNC: 1
CRIT. HDW:

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

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

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

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
DES	D. WADA	DES	SSM 10/29/
REL	D. RISING	REL	REL 10/29/
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ITEM:
SMOKE DETECTOR ASSEMBLY
CABIN AND AVIONIC BAY AREAS.

FUNCTION:
TO PROVIDE A WARNING TO CREW DURING THE INCIPIENT STAGE OF A POTENTIAL FIRE CONDITION. CONSISTS OF THREE DETECTOR HEADS IN THE CABIN AREA AND TWO IN EACH AVIONICS BAYS, EACH WITH A BUILT IN LOGIC DEVICE WHICH ACTUATES AN EXTERNAL ALARM.

FAILURE MODE:
LOSS OF SMOKE CONCENTRATION OUTPUT

CAUSE(S):
MECHANICAL SHOCK, OPEN (ELECTRICAL), PIECE-PART STRUCTURAL FAILURE, CORROSION.

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

(A) LOSS OF ONE OF TWO REDUNDANT SMOKE DETECTORS IN AVIONICS BAY OR CABIN.

(B) LOSS OF ONE OF TWO REDUNDANT SMOKE DETECTORS AND POSSIBLE TIME DELAY TO DETECT SMOKE.

(C) NO EFFECT.

(D) SECOND ASSOCIATED FAILURE (REDUNDANT SMOKE DETECTOR) WOULD RESULT I LOSS OF ALL SMOKE DETECTION IN AVIONICS BAY. UNDETECTABLE FIRE MAY CAU LOSS OF CREW/VEHICLE.

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

(A) DESIGN
CORROSION RESISTANT MATERIALS PER QQ-7-763 AND QQ-P-35; AIR INLET SCREE -50 MICRON AND LARGE SURFACE (2 1/2 " DIA); DUAL SENSE CHAMBERS TO COMPENSATE FOR ENVIRONMENTAL CHANGES- PRESSURE, TEMPERATURE, RADIATION; SELF-TEST CIRCUITRY - VERIFIES, ALARM LOGIC AND SIGNAL (VCO, LSI); HIGH

RELIABILITY, SOLID STATE HARDWARE; EEE PARTS MEET MF0004-400 REQUIREMENTS; CLEANLINESS PER MC999-0096 (CLEAN ROOM 300,000); SOLDERING PER ATLANTIC RESEARCH SPECIFICATION ST-41204 CONFORMAL COATING.

(B) TEST

QUALIFICATION TEST - QUALIFIED FOR 100 MISSION LIFE; ELECT. BONDING; ACCELERATION - 5G; 20G SHOCK/AXIS AND 100 MISSION VIBRATION (0.09G SQ/HZ FOR 48 MIN/AXIS); RANDOM VIBRATION (.067G SQ/HZ FOR 5 MIN/AXIS), 5% SALT AND 85% RH FOR 120 HRS,30-24 HR. TEMP. CYCLE TEST (65 TO 135 DEG.F).

ACCEPTANCE TEST - FUNCTIONAL TESTS, 48 HRS @ 24, 28, 32 VDC (INCLUDES SMOKE TESTS); DIELECTRIC STRENGTH AT 500 V/SEC MAX TO 1250 VOLTS RMS; INSULATION RESISTANCE AT 500 VDC; BURN-IN/RUN-IN ; VIBRATION (0.04G SQ/HZ FOR 0.5 MIN/AXIS). TURNAROUND: SELF TEST EVERY FLIGHT; VISUAL INSPECTION OF INLET SCREEN FOR DEBRIS EVERY TEN FLIGHTS.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL AND VENDOR PURCHASE COMPONENTS ARE VERIFIED BY RECEIVING INSPECTION.

CONTAMINATION CONTROL

CORROSION PROTECTION PROVISIONS AND CONTAMINATION CONTROL PLAN ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

PARTS PROTECTION, MANUFACTURING PROCESSES, INSTALLATION AND ASSEMBLY ARE VERIFIED BY INSPECTION. ENVELOPE AND INTERFACE DIMENSIONS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

SOLDERING IS VERIFIED BY INSPECTION. COATING AND PLATING PROCESSES ARE VERIFIED BY INSPECTION. CONFORMAL COATING IS VERIFIED BY INSPECTION.

TESTING

ACCEPTANCE TESTING IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO APPLICABLE FAILURES.

(E) OPERATIONAL USE

THE CREW WILL USE THE REDUNDANT SMOKE DETECTOR IN THE AFFECTED AREA. THE CREW HAS BEEN TRAINED WITH THE ONBOARD ALARM PROCEDURE TO REACT TO A SINGLE SMOKE ALARM WITH RISING SMOKE CONCENTRATIONS REGARDLESS OF PREVIOUS KNOWLEDGE OF A DEFECTIVE SMOKE DETECTOR.