

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ATMOSPHERIC REVIT. FMEA NO 06-1B -0338 -1 REV: 09/07/8

ASSEMBLY : FAN & DEBRIS TRAP CRIT. FUNC: 3
 P/N RI : MC621-0008-0059 CRIT. HDW: 1
 P/N VENDOR: SV729737-1 HAM STD VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : ONE PER SUBSYSTEM PHASE(S): PL LO X OO X DO LS

PREPARED BY: DES N. K. DUCNG
 REL N. L. STEISSLINGER
 QE D. STOICA

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

ITEM:
 SENSOR, CO2 PARTIAL PRESSURE

FUNCTION:
 MONITORS CABIN CO2 PARTIAL PRESSURE. MML V61P2540A, 0 TO 30 MMHG.

FAILURE MODE:
 CONTINUOUS FULL OR ZERO OUTPUT. OUT OF TOLERANCE

CAUSE(S):
 MECHANICAL SHOCK, VIBRATION, CORROSION, CONTAMINATION

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

(A) INABILITY TO DETERMINE CO2 PARTIAL PRESSURE.

(B) NO EFFECT.

(C) POSSIBLE EARLY MISSION TERMINATION. INABILITY TO DETERMINE WHETHER THE LIQH ELEMENTS ARE REMOVING CO2. MULTIPLE LIQH ELEMENT FAILURES WOULD BE REQUIRED BEFORE THERE WOULD BE AN IMPACT.

(D) NO EFFECT. LIQH CARTRIDGE CHANGEOUT ON REGULAR SCHEDULE PROVIDES ASSURANCE OF CO2 REMOVAL CAPABILITY.

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

(A) DESIGN
 ELECTRONIC COMPONENTS ARE DERATED EEE PARTS. SENSING ELEMENT IS LIMITED LIFE AND IS REPLACEABLE. THE UNIT CONSISTS OF INTEGRAL SENSING CIRCUIT WITHIN A HERMETICALLY SEALED ALUMINUM HOUSING WITH MS TYPE ELECTRICAL CONNECTOR FOR INPUT/OUTPUT SIGNAL. THE SENSING ELEMENT CONSISTS OF ELECTROCHEMICAL CELL WHICH GENERATES LOGARITHMIC VOLTAGE PROPORTIONAL TO THE PPO2 WHICH DIFFUSES THROUGH A PERMEABLE MEMBRANE.

(B) TEST
 ACCEPTANCE TEST - AVT LEVEL - SUBJECTED TO RANDOM VIBRATION SPECTRUM ENVELOPE OF 20 TO 80 HZ INCREASING AT 3 DB/OCTAVE TO 0.04 G**2/HZ AT 80

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HZ, CONSTANT AT 0.04 G**2/HZ FROM 60 TO 350 HZ, DECREASING AT DB/OCTAVE FROM 350 TO 2000 HZ. INSULATION RESISTANCE TEST, PC CONSUMPTION, RESPONSE TIME, AND CALIBRATION TEST.

QUALIFICATION TEST - SHOCK, VIBRATION, SALT FOG ENVIRONMENT CERTIFIED TEST TOGETHER WITH THE FAN PACKAGE. SENSOR SUBJECTED TO RANDOM VIBRATION SPECTRUM ENVELOPE OF 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE 0.09 G**2/HZ AT 150 HZ, CONSTANT AT 0.09 G**2/HZ FROM 150 TO 900 DECREASING AT 9 DB/OCTAVE FROM 900-2000 HZ FOR 48 MINUTES PER AXIS THREE ORTHOGONAL AXES. DESIGN SHOCK - THREE TERMINAL SAWTOOTH PULSES 20 G PEAK AMPLITUDE AND 11 MS DURATION APPLIED IN BOTH DIRECTIONS AL EACH OF THREE ORTHOGONAL AXES.

IN-VEHICLE TESTING - PFCO2 SENSOR CIRCUIT CHECK IS PERFORMED.

OMRSD - PFCO2 SENSOR IS CALIBRATED IN OR OUT OF THE VEHICLE WITHIN DAYS BEFORE END OF MISSION. CONTINUITY AND QUALITATIVE RESPONSE VERIFIED AFTER MATING THE VEHICLE CONNECTOR.

(C) INSPECTION

RECEIVING INSPECTION
INCOMING PARTS ARE VERIFIED FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL
PART CLEANLINESS IS MAINTAINED AND VERIFIED TO REQUIREMENTS.

ASSEMBLY/INSTALLATION
REQUIREMENT OF PERIODIC SENSOR CALIBRATION IS VERIFIED. ORIENTATION CONNECTOR MASTER KEYWAY IS DETERMINED AND VERIFIED BY INSPECTOR. INSPECTION POINTS ARE INCLUDED IN ASSEMBLY PROCESS.

CRITICAL PROCESSES
SOLDERING AND CRIMPING OF ELECTRONIC COMPONENTS ARE VERIFIED INSPECTION. CONFORMAL COATING OF PRINTED CIRCUIT BOARD IS CHECKED.

TESTING
ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PACKAGING FOR SHIPMENT IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY APPLICABLE TO THIS FAILURE MODE. THE PFCO2 SENSOR SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF SHUTTLE PROGRAM.

(E) OPERATIONAL USE

USE EMU CO2 SENSOR ONCE A DAY TO MONITOR CO2 LEVEL IN CABIN. POSSIBLE INCREASE IN LIQH CARTRIDGE CHANGEOUT FREQUENCY.