

SHUTTLE CRITICAL ITEMS LIST - ORBITER

S50230C  
ATTACHMENT -  
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REV:09/15/88

SYSTEM : ATMOSPHERIC REVIT.

FMEA NO 06-1C -0214 -1

ASSEMBLY : ATMOS VENTING CONTROL  
/N RI : MC250-0002-1001  
/N VENDOR: 2731-0001-5 CARLETON  
QUANTITY : 1  
:  
: ONE PER SUBSYSTEM

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

PREPARED BY:	DES H. PRICE <i>HP</i>	APPROVED BY:	DES <i>[Signature]</i>	REDUNDANCY SCREEN:	A-PASS	B-PASS	C-PASS
REL N. L. STEISSLINGER <i>NLS</i>	REL <i>[Signature]</i>	SSM	<i>[Signature]</i>	APPROVED BY (NASA):	<i>[Signature]</i>	9/27/88	
QE S. MOR	5/17/88	QE <i>[Signature]</i>	<i>[Signature]</i>	REL <i>[Signature]</i>	<i>[Signature]</i>	9/27/88	
				QE <i>[Signature]</i>	<i>[Signature]</i>	9/23/88	

ITEM:

PRESSURE SENSOR, CABIN TOTAL

FUNCTION:

PROVIDES STATUS OF PRESSURE WITHIN CREW COMPARTMENT. THIS MEASUREMENT OR DP/DT IS REQUIRED DURING ASCENT TO ENABLE AN ABORT CALL.  
MML V61P2405A.

FAILURE MODE:

OPEN, SHORTED, OUT OF TOLERANCE

CAUSE(S):

MECHANICAL SHOCK, VIBRATION, CORROSION, CONTAMINATION

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A) LOSS OF FUNCTION - UNABLE TO MONITOR CABIN TOTAL PRESSURE WITH THIS INSTRUMENT.

(B) NO EFFECT.

(C) POSSIBLE LOSS OF MISSION OBJECTIVES; UNABLE TO PERFORM A 10.2 PSIA EVA.

(D) ADDITIONAL ACTION BY CREW TO MONITOR CABIN ATMOSPHERE.

(E) FUNCTIONAL CRITICALITY EFFECT - SECOND ASSOCIATED FAILURE, OF DP/DT SENSOR, WOULD LOSE ABILITY TO MAKE A PROPER ABORT CALL BASED ON CABIN LEAKAGE AND MAY RESULT IN LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN

THE TRANSDUCER COMPRISES A STRAIN GAGE SENSING ELEMENT, AMPLIFIER, AND

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DC-TO-DC CONVERTER/REGULATOR, ALL HOUSED IN A 17-4 PH CRES CONDITION A STAINLESS STEEL HERMETIC ENCLOSURE WITH HERMETICALLY SEALED CIRCULAR CONNECTOR, 17-4 PH CRES CONDITION A, WHICH IS PRECIPITATION HARDENED CORROSION RESISTANT STEEL AND HAS A HIGH STRENGTH TO WEIGHT RATIO. THE 17-4 PH CRES CONDITION A PRESSURE DIAPHRAGM FORMS ONE SURFACE OF AN EVACUATED AND HERMETICALLY SEALED CHAMBER WHICH PROVIDES PRESSURE REFERENCE FOR DETERMINATION OF THE ABSOLUTE PRESSURE. AN OVERLOAD STOP PREVENTS OVERSTRESS OF THE DIAPHRAGM AND BENDING BEAM, THEREBY INSURING THAT THE TRANSDUCER WILL WITHSTAND EXTREMELY HIGH OVERPRESSURE WITHOUT PERMANENT DAMAGE. FULL EMI AND RFI PROTECTION IS INCORPORATED TO ELIMINATE INTERFERENCE PROBLEMS. THE PRESSURE TRANSDUCER IS TEMPERATURE COMPENSATED BETWEEN -50 AND +150 F.

(B) TEST

ACCEPTANCE TEST - PROOF PRESSURE OF 40 +/- 0.1 PSIA FOR A DURATION OF 3 MINUTES. LEAK TEST AT 20 PSIA WITH 0.2 SCCM MAX LEAKAGE. THE SENSOR IS CALIBRATED FOR ACCURACY FROM 0 TO 20 PSIA AT INTERVALS OF 4 PSIA AND TEMPERATURES OF 25, 75, AND 120 F.

QUALIFICATION TEST - LIFE CYCLE TESTING - THE SENSOR WAS SUBJECTED TO 200 CYCLES AT 1.5 PSIA. COMPONENT BURST PRESSURE IS 80 PSIA. TRANSDUCER CALIBRATION VERIFICATION PERFORMED. SUBJECTED TO THE FOLLOWING AS PART OF THE N2/O2 CONTROL PANEL: RANDOM VIBRATION SPECTRUM - 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.03 G\*\*2/HZ AT 150 HZ. CONSTANT AT 0.03 G\*\*2/HZ FROM 150 TO 1000 HZ. DECREASING AT 6 DB/OCTAVE FROM 1000 TO 2000 HZ FOR 48 MINUTES PER AXIS FOR THREE ORTHOGONAL AXES. DESIGN SHOCK - 20 G TERMINAL SAWTOOTH PULSE OF 11 MS DURATION IN EACH DIRECTION OF THREE ORTHOGONAL AXES. ATP TO VERIFY LEAKAGE IS PERFORMED AFTER SHOCK AND VIBRATION TESTING.

IN-VEHICLE TESTING - CABIN PRESSURE MEASUREMENT IS VERIFIED AT ATMOSPHERIC PRESSURE, 10 AND 8 PSIA.

OMRSD - A FIVE POINT TRANSDUCER CALIBRATION IS PERFORMED BEFORE THE FIRST REFLIGHT OF EACH ORBITER AND AT INTERVALS OF FIVE FLIGHTS.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL VERIFIED BY INSPECTION FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL

CLEANLINESS LEVEL 200A PER MA0110-301 AND 100 ML RINSE TEST VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

DIMENSIONAL CHECK INCLUDING MIPS FOR PERPENDICULARITY AND CONCENTRICITY PERFORMED AND VERIFIED BY INSPECTION. INSTALLATION TORQUE VERIFIED BY INSPECTION. BRAZE APPLICATION VERIFIED BY INSPECTION.

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**CRITICAL PROCESSES**

PARTS PASSIVATION VERIFIED BY INSPECTION. APPLICATION OF LUBRICANT ON SEAL RING VERIFIED BY INSPECTION. SOLDERING APPLICATION VERIFIED BY INSPECTION.

**TESTING**

ATP IS VERIFIED BY INSPECTION.

**HANDLING/PACKAGING**

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

**(D) FAILURE HISTORY**

FIVE FAILURES HAVE OCCURRED:

AB9454-010, 5/15/81. CABIN PRESSURE SENSOR OUTPUT WAS OUT OF SPEC LIMITS AT 0.4, 10.0 AND 20 PSIA DURING ATP. TRANSDUCER MOUNTING CLAMPS WERE AFFECTING BONDING RESISTANCE. CORRECTIVE ACTION - RELOCATION OF THE MOUNTING CLAMP.

AD0953-010, 4/15/86 AT KSC. SENSOR READ HIGH; 15.5 PSIA - SHOULD BE 14.7 PSIA.

AD0974-010, 5/6/86 IN SUPPLIER ATP. SENSOR DID NOT MEET ACCURACY REQUIREMENT.

AD1156-010, 7/23/86 IN SUPPLIER ATP. SENSOR WAS OUT OF TOLERANCE AT 0 PSIA.

AD2171-010, 9/19/84 AT PALMDALE. SENSOR EXHIBITED AN UPWARD SHIFT. THE CAUSE OF THESE FAILURES WAS THE TRANSDUCER DESIGN. CORRECTIVE ACTION WAS A REDESIGN, INCORPORATING NEWER TECHNOLOGY AND GREATER ACCURACY.

**(E) OPERATIONAL USE**

TBS.