

**SHUTTLE CRITICAL ITEMS LIST - ORBITER**

SUBSYSTEM :ACTUATION MECH-ADP                      FMEA NO 02-4E -054000-1                      REV:02/17/88

ASSEMBLY :AIR DATA PROBE (ADP)		CRIT. FUNC:	1R	
P/N RI :V070-592046, 48 (RI)		CRIT. HDW:	2	
P/N VENDOR:	VEHICLE	102	103	104
QUANTITY :2	EFFECTIVITY:	X	X	X
:1 PER SIDE	PHASE(S):	PL	LO X OO	DO X LS

PREPARED BY:		REDUNDANCY SCREEN:	A-PASS	B-PASS	C-PASS
DES	R. H. YEE	APPROVED BY:	APPROVED BY (NASA):		
REL	J. S. MULLEN	DES	<i>R. H. Yee for A.C. Ordway</i>	SSM	<i>C. M. ... 2/25/88</i>
QE	W. J. SMITH	REL	<i>[Signature]</i>	REL	<i>[Signature]</i>
		QE	<i>[Signature]</i>	QE	<i>[Signature]</i>

ITEM:  
TRANSMITTAL LINES

FUNCTION:  
TO TRANSMIT PRESSURE FROM THE AIR DATA PROBE (ADP) TO THE AIR DATA TRANSDUCERS.

FAILURE MODE:  
INOPERATIVE, BLOCKED, LEAKAGE

CAUSE(S):  
STRUCTURAL FAILURE, DEFECTIVE PART/MATERIAL OR MANUFACTURING DEFECT, CONTAMINATION/FOREIGN OBJECT/DEBRIS

EFFECT(S) ON:  
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE  
  
(A,B) LOSS OF OR DEGRADED FUNCTION OF ONE AIR DATA PROBE.  
  
(C,D) CREW MUST RESOLVE DILEMMA RESULTING FROM ONE FAILED PROBE AND DESELECT OUTPUT DATA FROM FAILED SIDE. FLIGHT CONTROL USING SECOND PROBE IS ADEQUATE FOR LANDING. POTENTIAL LOSS OF CREW/VEHICLE DUE TO FLIGHT CONTROL INSTABILITIES WHEN ALL AIR DATA IS LOST.

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

(A) DESIGN  
DESIGN UTILIZES DYNATUBE FITTINGS CLEANED FABRICATED PER MA0102-306; CLEANED PER MA0110-301. ANALYSIS OF VIBRATION LOADS INDICATES MARGIN OF SAFETY GREATER THAN 2. MATERIAL - 3AL-2.5V CWSR TITANIUM TUBING; CORROSION PROTECTION PER MA0608-301. JOINTS SWAGED PER MA0107-315.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTUATION MECH-ADP FMEA NO 02-4E -054000-1 REV:02/17/88

(B) TEST

ACCEPTANCE TESTS: AIR DATA SYSTEM LEAK TEST PERFORMED AT PALMDALE.  
LEAKAGE TESTS MADE AT AN ALTITUDE EQUIVALENT TO 100,000 FT.

QUALIFICATION TESTS: QUAL-VIBRATION TESTS (QVT) WILL BE PERFORMED WITH  
VIBRATION LEVELS FROM 20 HZ PER AXIS FOR 31 MINUTES AT LEVEL "B" AND 34  
MINUTES AT LEVEL "A".

OMRSD: A MULTIPOINT PRESSURE TEST IS PERFORMED USING GSE EVERY THREE  
FLIGHTS TO VERIFY TRANSMITTAL LINE INTEGRITY. AMBIENT PRESSURE READOUT  
IS VERIFIED EVERY FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

INSPECTION VERIFIES THAT 3A1-2.5V CWSR TITANIUM TUBING IS CERTIFIED TO  
REQUIREMENTS OF MBO170-084 AND THAT FITTINGS ARE CERTIFIED TO  
SPECIFICATION REQUIREMENTS.

CONTAMINATION CONTROL

CORROSION CONTROL PER MA0608-301 AND CLEANLINESS REQUIREMENTS VERIFIED BY  
INSPECTION.

ASSEMBLY/INSTALLATION

INSPECTION VERIFIES FABRICATION AND INSTALLATION PER MA0102-306.  
INSPECTION VERIFIES THAT ALL PROCESSING MATERIALS IN CONTACT WITH  
TITANIUM ARE PER MF0004-018.

NONDESTRUCTIVE EVALUATION

INSPECTION VERIFIES CERTIFICATION THAT TITANIUM TUBING IS PENETRANT AND  
ULTRASONIC INSPECTED.

CRITICAL PROCESSES

SWAGING OF FITTINGS TO TUBING PER MA0107-315 AND TUBE BENDING PER MA0102-  
306 VERIFIED BY INSPECTION. INSPECTION VERIFIES TUBE SWAGING AND TUBE  
BENDING TOOLING.

TESTING

INSPECTION VERIFIES LEAK TESTING.

(D) FAILURE HISTORY

THERE HAVE BEEN NO ACCEPTANCE TEST, QUALIFICATION TEST, FIELD OR FLIGHT  
FAILURES ASSOCIATED WITH THIS FAILURE MODE.

(E) OPERATIONAL USE

THE PROBE FAILURE CAUSES A SIDE-TO-SIDE DILEMMA AND THE SOFTWARE  
DOWNMODES TO USING DEFAULT GAINS. THE CREW MUST MAINTAIN PITCH ATTITUDE  
WITHIN "THETA" LIMITS DISPLAYED ON THE CATHODE RAY TUBE (CRT). CRT  
DISPLAYS ALPHA, MACH, AND ALTITUDE FROM EACH AIR DATA TRANSDUCER ASSEMBLY  
(ADTA) TO CREW. IF THE NAV DERIVED ALPHA, MACH, AND ALTITUDE DISPLAYED  
ON DEDICATED DISPLAYS (AMI, AVVI) ARE CORRECT, THE CREW CAN COMPARE THE  
ADTA DATA WITH THE NAV DERIVED DATA TO RESOLVE THE DILEMMA.