

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : COMMUNICATION & TRACKING FMEA NO 05-25 -25500 -1 REV: 01/05/88

ASSEMBLY : UPPER FWD FUS				CRIT. FUNC: 2
P/N RI : MC481-0071-0002				CRIT. HW: 2
P/N VENDOR:		VEHICLE	102 103 104	
QUANTITY : 1		EFFECTIVITY:	X X X	
: ONE		PHASE(S) :	PL LO OO X DO LS	
:				

PREPARED BY: <i>R. Davis</i>	REDUNDANCY SCREEN: A- B- C-	APPROVED BY (NASA):
DES <i>R. Davis</i> R DAVIS	APPROVED BY: <i>W. Ladd</i> 1/7/88	SSM <i>Allen J. Stinson</i> 1/21/88
REL <i>M. Alvarez</i> 1/6/88 ALVAREZ	REL <i>M. Alvarez</i> 1-12-88	REL <i>M. Alvarez</i> 3/12/88
QE <i>D. M. Courson</i> 1/11/88 COURSEN	QE <i>D. M. Courson</i>	QE <i>M. Alvarez</i>

ITEM:  
ANTENNA, PAYLOAD S-BAND RH/LH POLARIZATION.

FUNCTION:  
PROVIDES S-BAND COMMUNICATIONS LINK BETWEEN THE ORBITER AND THE PAYLOAD. THE S-BAND PAYLOAD ANTENNA OPERATES WITH EITHER RIGHT HAND OR LEFT HAND CIRCULAR POLARIZATION. THE POLARIZATION IS SELECTED (PWL OR CMD) BY USING THE RF TRANSFER SWITCH. 10V74A88.

FAILURE MODE:  
NO OUTPUT.

CAUSE(S):  
VIBRATION, TEMPERATURE, MECHANICAL SHOCK, CONTAMINATION, MISHANDLING, PIECE-PART STRUCTURAL FAILURE.

EFFECT(S) ON:  
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE  
(A, B) LOSS OF PAYLOAD RF COMMUNICATIONS.  
(C) POSSIBLE LOSS OF PRIME MISSION OBJECTIVE FOR MISSIONS WHICH REQUIRE COMMUNICATION WITH A PAYLOAD.  
(D) NO EFFECT.

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

(A) DESIGN  
THE S-BAND PAYLOAD ANTENNA IS A STRUCTURAL ITEM AND DOES NOT CONTAIN ANY ACTIVE COMPONENTS. THE ANTENNA IS A CROSSED DIPOLE STRIPLINE BALUN FEED UNIT. IT IS INSTALLED ON THE OUTER MOLD LINE AND PROTECTED BY THE THERMAL PROTECTION SYSTEM DURING RE-ENTRY. MEETS OR EXCEEDS THE MF0004-014 ENVIRONMENTAL SPECIFICATION REQUIREMENTS.

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(B) TEST

ACCEPTANCE TESTING OF ALL UNITS INCLUDE - EXAMINATION OF PRODUCT, AVT, ATT, POWER HANDLING, AND RADOME STABILITY. FUNCTIONAL TESTS (RETURN LOSS AND RADIATION PATTERNS) ARE PERFORMED BEFORE AND AFTER ACCEPTANCE TESTING. RETURN LOSS ALSO PERFORMED BEFORE AND AFTER EACH ENVIRONMENTAL TEST. QUALIFICATION TESTING INCLUDES - EXAMINATION OF PRODUCT, DESIGN SHOCK, POWER HANDLING VACUUM, THERMAL, QAVT, QVT, EMC, LIFE AND RADOME STABILITY. FUNCTIONAL TESTS (RETURN LOSS AND RADIATION PATTERNS) ARE PERFORMED BEFORE AND AFTER QUALIFICATION TESTING. RETURN LOSS ALSO PERFORMED BEFORE AND AFTER EACH ENVIRONMENTAL TEST. GROUND TURNAROUND TEST - CONFIRM VALID FRAME SYNC LOCK ON PAYLOAD INTERROGATORS (PI) 1 & 2 FOR LEFT HAND CIRCULAR (LHC) AND RIGHT HAND CIRCULAR POLARIZATION (RHC) USING MISSION SPECIFIC CHANNEL. MEASURE PI 1 & 2 RF POWER OUTPUT USING MISSION SPECIFIC POLARIZATION. PERFORMED TO SUPPORT FLIGHT MANIFEST.

(C) INSPECTION

RECEIVING INSPECTION

LOT CODES, CERTIFIED SPECIAL PROCESSES, AND PROPER CERTIFICATION ARE VERIFIED AT RECEIVING INSPECTION. RECEIVING INSPECTION PERFORMS VISUAL AND DIMENSIONAL EXAM OF ALL INCOMING PARTS.

CONTAMINATION CONTROL

CLEANLINESS SPEC IS IMPLEMENTED BY AUTONETICS PROCEDURES. QC VERIFIES APPROPRIATE PROCEDURES/SHOP PRACTICES ARE UTILIZED FOR CONTAMINATION CONTROL.

ASSEMBLY/INSTALLATION

SOLDERING, FINISH REQUIREMENTS, AND CRITICAL FASTENER TORQUING ARE VERIFIED BY INSPECTION. INSPECTION POINTS ARE DETERMINED BY QUALITY ENGINEERING IN ACCORDANCE WITH APPLICABLE REQUIREMENTS AND ARE DOCUMENTED ON INSPECTION PLANNING.

NONDESTRUCTIVE EVALUATION

DYE PENETRANT IS PERFORMED AS PART OF PHYSICAL INSP.

CRITICAL PROCESSES

ALL CRITICAL PROCESSES ARE MONITORED AND VERIFIED BY QA AS PROCESS CONTROL/SURVEILLANCE ACTIVITY OPERATIONS AUDIT. THE CRITICAL PROCESSES INCLUDE APPLICATION OF CHEM. FILM, PRIMER AND EPOXY COATING, LAMINATION OF RADOME, SOLDERING OF STRIPLINE, AND GOLD PLATING OF RADIATING ELEMENTS.

TESTING

INSPECTION VERIFIES RADOME STABILITY WITH RESPECT TO MOUNTING FLANGE REFERENCE PLANE. ALL PARTS OF THE ATP ARE OBSERVED AND VERIFIED BY QUALITY CONTROL.

HANDLING/PACKAGING

PACKAGING FOR TRANSPORT DURING ASSY/TEST IS VERIFIED BY INSPECTION.

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(D) FAILURE HISTORY

THERE ARE TWO FAILURES THAT APPLY TO THE LOSS OF OUTPUT FAILURE MODE.

FAILURE AC0780 OCCURRED DURING ACCEPTANCE VIBRATION TEST. THE INPUT CONNECTOR MONITOR CHANGES FROM A SHORT (NORMAL) TO OPEN (ABNORMAL) DUE TO AN INADEQUATE SOLDER FILLER ON THE BLIND SIDE OF THE CROSSTRAP CAUSED BY A MANUFACTURING PROBLEM. THE CORRECTIVE ACTION RELOCATED THE STRIPLINE CROSSTRAP CIRCUIT TO THE TOP SIDE OF THE DIELECTRIC BOARD. THESE CORRECTIVE ACTIONS WERE IMPLEMENTED FOR ALL FLIGHT UNITS.

FAILURE AD0706 OCCURRED DURING POST ACCEPTANCE VIBRATION TESTING. THE VSWR WAS OUT OF TOLERANCE. THE PROBLEM WAS CLASSIFIED AS AN UNEXPLAINED ANOMALY, HOWEVER, THIS FAILURE WAS SIMILAR TO THOSE EXPERIENCED WITH THE QUAD ANTENNA'S STRIPLINES, AND THE CORRECTIVE ACTION IMPLEMENTED THE SAME MANDATORY CONFIDENCE TESTING AS THE ONE APPLIED TO THE QUAD ANTENNAS. THE UNIT WAS RETESTED AND SUCCESSFULLY PASSED THE CONFIDENCE AND ACCEPTANCE TESTING; NO FURTHER INCIDENCES HAVE OCCURRED.

(E) OPERATIONAL USE

NO CREW CORRECTIVE ACTION AVAILABLE.