

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : COMMUNICATION & TRACKING FMEA NO 05-2R -5100 -3 REV:06/27/88

ASSEMBLY : FWD BAY 3A
P/N RI : MC409-0025-100X
P/N VENDOR:
QUANTITY : 1
: ONE
:

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

CRIT. FUNC: 2
CRIT. HDW: 2

PREPARED BY:
DES H D HADDAD
REL *7-5-88* J Y HARADA
QE J T COURSEN

REDUNDANCY SCREEN: A- B- C-
APPROVED BY:
DES *H D Haddad 9/27/88*
REL *J Y Harada 9-30-88*
QE *J T Coursen 9/27/88*

APPROVED BY (NASA):
SSM *[Signature]* 9/19/88
REL *[Signature]* 9/17/88
QE *[Signature]* 9/18/88

ITEM:

KU-BAND, EA-1A KU-BAND, ELECTRONICS ASSEMBLY, PART 1A

FUNCTION:

PROVIDES CONTROL OF ANTENNA GIMBALS AND GIMBAL LOCK MOTOR DRIVE IN ALL STEERING MODES. PROVIDES RADAR & COMM MODE SWITCHING, DA WAVEGUIDE SWITCHING, REFERENCE FREQUENCIES TO DA, EA-2 AND SPA, MDM INTERFACES, SIGNAL DISTRIBUTION FOR THE KU-BAND SUBSYSTEM, COMM SUM CHANNEL FIRST IF DEMODULATION, CARRIER DETECTION, PN DECODING, GCIL AND D & C INTERFACES, ENABLING SIGNAL TO ADA (BSI), AND SELF-TEST. 83V74A23.

FAILURE MODE:

FAILS TO INHIBIT TRANSMITTER WHILE ANTENNA IS IN OBSCURATION ZONE.

CAUSE(S):

VIBRATION; TEMPERATURE, MECHANICAL SHOCK, CONTAMINATION, MISHANDLING, PIECE-PART STRUCTURAL FAILURE.

EFFECT(S) ON:

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

EFFECTS ON ABILITY TO CONTROL, POSITION, OR LOCK ANTENNA GIMBALS - 1/3

(A,B,C,D) NO EFFECT ON LOCKING KU-BAND ANTENNA GIMBALS.

EFFECTS ON MISSIONS REQUIRING KU-BAND SYSTEM SUPPORT - 2/2

(A,B) RF RADIATION CONTAMINATION IN PAYLOAD BAY RESULTING IN POSSIBLE DAMAGE TO A PRIME MISSION OBJECTIVE PAYLOAD.

(C) POSSIBLE LOSS OF MISSION DUE TO INABILITY TO ACCOMPLISH A PRIME MISSION OBJECTIVE USING AN RF CONTAMINATED PAYLOAD.

(D) NO EFFECT.

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EFFECTS ON PROVIDING DATA TO MSP FOR STATE VECTOR UPDATE - 3/3

(A,B,C,D) NO EFFECT ON STATE VECTOR UPDATE.

DISPOSITION & RATIONALE:

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

(A) DESIGN

ALL EEE PARTS ARE SELECTED FROM OR IN ACCORDANCE WITH MF0004-400 (OPPL) REQUIREMENTS. SUBASSEMBLIES ARE QUALIFIED BY TEST OR USE OF EXISTING DESIGNS QUALIFIED FOR OTHER NASA & MILITARY PROGRAMS. THE HOUSING IS SEALED AND PRESSURIZED WITH NITROGEN/HELIUM GAS TO PROTECT CIRCUITS AND COMPONENTS FROM DIRECT EXPOSURE TO THE ENVIRONMENT. THE SYSTEM DESIGN INCLUDES A DEPLOYED ASSEMBLY JETTISON CAPABILITY WHICH CAN BE USED IF THE SYSTEM FAILS TO RESPOND TO LOCK OR STOW COMMANDS.

CONFIGURATION -ALL LRU'S ARE OF THE LATEST DASH NUMBER CONFIGURATION WITH THE FOLLOWING EXCEPTIONS - S/N 103 AND S/N 105 RF MODULES ARE SEALED BUT NOT CONFORMALLY COATED. S/N 103 AIRBORNE CONNECTOR IS NOT CONFORMALLY COATED.

(B) TEST

ACCEPTANCE TESTING OF ALL UNITS INCLUDES EXAMINATION OF PRODUCT, AVT, ATT, LEAK AND FUNCTIONAL TEST. QUAL TEST INCLUDES POWER, EMC, CABIN ATMOSPHERE, LEAK, BONDING, LOW PRESSURE THERMAL, THERMAL CYCLE, QAVT, QVT, LIFE, SHOCK, AND PERFORMANCE AT THE LRU LEVEL. AS A PART OF QUAL TESTING, A SYSTEM TEST WAS PERFORMED WITH THE DR EXPOSED TO A QUAL LEVEL THERMAL VACUUM ENVIRONMENT AND THE EA-1, EA-2, AND SPA COLD PLATE TEMPERATURES CYCLED AT QUAL LEVELS. INTEGRATED AND SUBSYSTEM VERIFICATION IS PERFORMED AT EEC. SYSTEM DESIGN VERIFICATION TESTS WERE PERFORMED BY THE HUGHES AIRCRAFT COMPANY AT THEIR FACILITY. NASA CONDUCTED INTEGRATED KU-BAND AND TORSS VERIFICATION TESTS AT THE ESTL (JSC) AND SOFTWARE COMPATIBILITY TEST AT SAIL AND PASSIVE RADAR PERFORMANCE EVALUATION TEST AT WSMR. LRU SOFTWARE VALIDATION TESTED AGAINST SOFTWARE REQUIREMENTS.

GROUND TURNAROUND TEST - VERIFICATION THAT TWT TURNS OFF WHEN ANTENNA ENTERS OBSCURATION ZONE. PERFORMED EVERY FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTION VERIFIES INCOMING MATERIALS.

CONTAMINATION CONTROL

CONTAMINATION CONTROL PROCESSES ARE MONITORED BY QE. PRECAUTIONS ARE TAKEN TO PREVENT CONTAMINATION (SMOCKS, GLOVES, HATS, BOOTIES AS REQUIRED ARE WORN, AND EATING & DRINKING ARE PROHIBITED). SIGNS ARE POSTED IDENTIFYING CLEANLINESS REQUIREMENTS IN WORK AREAS.

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ASSEMBLY/INSTALLATION

INSPECTION WITNESSES CONTAMINATION CONTROL, SOLDERING, BONDING AND TORQUE OPERATIONS. QC ENSURES WORK TICKETS REFLECT DRAWING AND SPEC REQUIREMENTS. DETAILED INSPECTION IS PERFORMED ON ALL ASSEMBLY AND DETAIL PARTS PRIOR TO NEXT OPERATION PER PROGRAM QUALITY REQUIREMENT AND WORK TRANSFER QUALITY REQUIREMENTS. INSPECTION REQUIREMENTS ARE TRANSMITTED TO OUTSIDE VENDORS, AND COMPLIANCE IS VERIFIED BY SOURCE INSPECTION AND VENDOR SURVEILLANCE. A FORMAL CONNECTOR ASSEMBLY/HANDLING TRAINING COURSE FOR ALL TECHNICIANS AND INSPECTORS WAS IMPLEMENTED IN NOVEMBER, 1986. SPECIAL HANDLING OF COMMUNICATION BOARDS, INCLUDING BAKEOUT PRIOR TO ASSEMBLY, LIMITED APPLICATION OF HEAT, AND USE OF SPECIALLY TRAINED ASSEMBLY OPERATORS, WAS ADDED IN 1986 TO PRECLUDE BOARD DELAMINATION. NEW WORK STATIONS WERE INSTALLED IN THE EA-1/SPA ASSEMBLY AREA IN 1987 WHICH PROVIDE IMPROVED LAYOUT, REDUCED DAMAGE SUSCEPTIBILITY, AND IMPROVED LIGHTING.

CRITICAL PROCESSES

CRITICAL PROCESSES, SUCH AS, SOLDERING AND CRIMPING, ARE CERTIFIED. THE FORMAL CERTIFICATION OF ALL TECHNICIANS AND INSPECTORS FOR CRIMPING OPERATIONS WAS IMPLEMENTED IN NOVEMBER, 1986. ANNUAL VISION TESTS ARE GIVEN TO INSPECTORS. ALL CRITICAL PROCESSES ARE MONITORED AND VERIFIED BY QC PER PROGRAM QUALITY REQUIREMENT INSTRUCTIONS.

TESTING

INSPECTION VERIFIES ATT/AVT, LEAK AND INSULATION RESISTANCE/DIELECTRIC STRENGTH TESTS. USE OF NON-SKID TEST PROBES TO MINIMIZE SLIPPAGE WAS IMPLEMENTED IN SEPTEMBER, 1986.

HANDLING/PACKAGING

ALL KITTING, ASSEMBLY, TEST, INSPECTION, TROUBLESHOOTING, AND REWORK OPERATIONS ON STATIC-SENSITIVE DEVICES ARE PERFORMED AT STATIC-SAFE WORK STATIONS AND IN ACCORDANCE WITH PROGRAM INSTRUCTION. HARDWARE ITEMS ARE PACKAGED, PROTECTED, AND INSPECTED PER ENGINEERING DRAWING REQUIREMENTS AND PROGRAM QUALITY REQUIREMENT INSTRUCTIONS.

(D) FAILURE HISTORY

POST ATP FAILURE HISTORY - NO REPORTED FAILURES OF THIS TYPE TO DATE.

(E) OPERATIONAL USE

WORKAROUND TO REGAIN ABILITY TO CONTROL, POSITION, OR LOCK ANTENNA GIMBALS

NO EFFECT, NONE REQUIRED.

WORKAROUND TO REGAIN SUPPORT OF MISSION OBJECTIVES

NONE.

WORKAROUND TO PROVIDE THE STATE VECTOR UPDATE

NO EFFECT, NONE REQUIRED.