

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : COMMUNICATION & TRACKING FMEA NO 05-2R -5200 -3 REV:06/27/88

ASSEMBLY : FWD BAY 3A CRIT. FUNC: 2
P/N RI : MC409-0025-200X CRIT. HDW: 2
P/N VENDOR: VEHICLE 102 103 104
EFFECTIVITY: X X X
QUANTITY : 1 PHASE(S): PL LO OG X DO LS
: ONE
:

PREPARED BY: DES H D HADDAD APPROVED BY: DES Haddad 9/27/88 REDUNDANCY SCREEN: A- B- C-
REL 7-5-88 J Y HARADA APPROVED BY (NASA): BSM John Duff 9/9/88
QE J T COURSEN REL 8-30-88 REL 9/17/88
QE 9/18/88 QE 9/18/88

ITEM:

KU-BAND, EA-2, KU-BAND, ELECTRONICS ASSEMBLY, PART 2

FUNCTION:

PROVIDES TIMING SIGNALS FOR RADAR OPERATION. PROCESSES 2ND IF SIGNALS TO DETECT TARGET, ESTIMATES ITS PARAMETERS, & PROVIDES THESE PARAMETERS TO EA-1 FOR DISTRIBUTION TO THE ORBITER DATA PROCESSING SYSTEM. PROVIDES AGC AND RF POWER CONTROL TO DA AND CONTROLS THE SERVO IN THE RADAR TRACK MODE. NOT A FUNCTIONAL LRU DURING COMM OPERATIONS. 83V74A99

FAILURE MODE:

FAILS TO COMMAND DA TO SELECT RF POWER SETTING.

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 - 3/3

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

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

(A, B) LOSS OF ABILITY TO CONTROL RF POWER IN RADAR MODE. NO EFFECT ON COMM OPERATIONS.

(C) POSSIBLE LOSS OF ALL MISSION OBJECTIVES REQUIRING KU-BAND RENDEZVOUS RADAR DUE TO LIMITED DETECTION RANGE IF HIGH POWER CANNOT BE COMMANDED. POSSIBLE LOSS OF PRIME MISSION OBJECTIVE DUE TO EXCESSIVE RF RADIATION EXPOSURE OF RENDEZVOUS PAYLOAD (RADAR TARGET).

(D) NO EFFECT.

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EFFECTS ON PROVIDING DATA TO NSP 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 (CPPL) 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 102 AND S/N 104 ARE OF THE -2001 CONFIGURATION. THIS CONFIGURATION DOES NOT HAVE COMPLETE CONFORMAL COATING (AIRBORNE CONNECTORS AND ANALOG PROCESSOR) AND LACKS POSITIVE RETENTION FOR BRASS PURGE VALVE CAP AND AIRBORNE CONNECTORS' JACKSCREWS.

(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 DA 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 KSC. SYSTEM DESIGN VERIFICATION TESTS WERE PERFORMED BY THE HUGHES AIRCRAFT COMPANY AT THEIR FACILITY. NASA CONDUCTED INTEGRATED KU-BAND & TDSS VERIFICATION TESTS AT THE ESTL (JSC) AND SOFTWARE COMPATIBILITY TEST AT SAIL AND PASSIVE RADAR PERFORMANCE EVALUATION TEST AT WSMR.

GROUND TURNAROUND TEST - VERIFICATION THAT EA-2 COMMANDS CORRECT RF POWER SETTINGS - 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, MATS, 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. QE 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.

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

COMM: NONE. RADAR: ATTEMPT RENDEZVOUS WITH ALTERNATE SENSORS. USE BACK-UP RENDEZVOUS PROCEDURES.

WORKAROUND TO PROVIDE THE STATE VECTOR UPDATE

NO EFFECT, NONE REQUIRED.