SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :COMMUNICATION & TRACKING   FMEA NO 05-2R -5200   -1 REV:06/27/88

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

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PREPARED BY:          APPROVED BY:          APPROVED BY (NASA):
DES       H D HADDAD  DES                   SSM
REL       J Y HARADA  REL                   REL
QE        J T COURSEN QE                     QE
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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:
   LOSS OF OUTPUT, ERRATIC OPERATION, INADVERTENT OPERATION, ERRONEOUS
   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

| 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,C) LOSS OF ALL MISSION OBJECTIVES REQUIRING KU-BAND RENDEZVOUS
   RADAR.

   (D) NO EFFECT.

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

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

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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 & 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 AND TDRSS VERIFICATION TESTS AT THE ESTL (JSC) AND SOFTWARE
  COMPATIBILITY TEST AT SAIL AND PASSIVE RADAR PERFORMANCE EVALUATION TEST
  AT WSMR.

  GROUND TURNAROUND TEST - PERFORM RADAR SELF-TEST. VERIFY RADAR TRACKING
  OPERATION BY TRACKING CEILING OF OFF. VERIFY THAT RF POWER RESPONDS
  CORRECTLY TO HIGH, MEDIUM AND LOW PANEL COMMANDS IN RADAR MODE. VERIFY
  TWT TURNS OFF WHEN ENTERING 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.

  ASSEMBLY/INSTALLATION
  INSPECTION WITNESSES CONTAMINATION CONTROL, SOLDERING, BONDING AND TORQUE

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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 - CAR AC8528-010 S/N 105 RADAR FAILED TO LOCK TO CEILING AT KSC DUE TO WIRING ERROR - TEST EQUIPMENT WAS MODIFIED.

(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.