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PRINT. DATE: 06/02/94

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE  
NUMBER: 05-2B-23400 -X**

**SUBSYSTEM NAME: COMM & TRACK: ULTRA HIGH FREQ COMM (UHF)  
REVISION: 1 6/2/94**

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	<b>PART NAME VENDOR NAME</b>	<b>PART NUMBER VENDOR NUMBER</b>
LRU	: ANTENNA	MC481-0088-0001

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**PART DATA**

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
ANTENNA, UHF - ATC (VOICE)**

**REFERENCE DESIGNATORS: 20V74A90**

**QUANTITY OF LIKE ITEMS: 1  
ONE**

**FUNCTION:  
PROVIDES FOR THE TRANSMISSION AND RECEPTION OF UHF VOICE  
COMMUNICATIONS TO THE GROUND AND EVA ON ORBIT.**

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE**  
**NUMBER: 05-2B-23400 - 01**

REVISION# 1 6/2/94

SUBSYSTEM NAME: COMM & TRACK: ULTRA HIGH FREQ COMM (UHF)

LRU: ANTENNA

CRITICALITY OF THIS

ITEM NAME: ANTENNA

FAILURE MODE: 2 2

**FAILURE MODE:**  
 LOSS OF SIGNAL

**MISSION PHASE:**

PL	PRELAUNCH
LO	LIFT-OFF
OO	ON-ORBIT
DO	DE-ORBIT
LS	LANDING SAFING

**VEHICLE/PAYLOAD/KIT EFFECTIVITY:**

102	COLUMBIA
103	DISCOVERY
104	ATLANTIS
105	ENDEAVOUR

**CAUSE:**

VIBRATION, TEMPERATURE, MECHANICAL SHOCK, CONTAMINATION, MISHANDLING.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

**REDUNDANCY SCREEN**

A) N/A
B) N/A
C) N/A

**PASS/FAIL RATIONALE:**

A)

B)

C)

**- FAILURE EFFECTS -**

**(A) SUBSYSTEM:**

(1) 2/2 EVA - LOSS OF UHF RF COMMUNICATIONS TO AND FROM EVA.

(2) 1R/3 OTHER MISSION PHASES - LOSS OF UHF A/A AND A/G COMMUNICATIONS.

**(B) INTERFACING SUBSYSTEM(S):**

(1) 2/2 EVA - LOSS OF UHF RF COMMUNICATIONS TO AND FROM EVA.

(2) 1R/3 OTHER MISSION PHASES - LOSS OF UHF A/A AND A/G COMMUNICATIONS.

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**(C) MISSION:**

- (1) 2/2 EVA - LOSS OF MISSION IF EVA COMMUNICATIONS IS REQUIRED.
- (2) 1R/3 OTHER MISSION PHASES - NO EFFECT.

**(D) CREW, VEHICLE, AND ELEMENT(S):**

- (1) 2/2 EVA - NO EFFECT.
- (2) 1R/3 OTHER MISSION PHASES - NO EFFECT DUE TO FIRST FAILURE.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

AFTER THREE FAILURES (1 ANTENNA AND 2 S-BAND), POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF STATE VECTOR UPDATE.

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**-DISPOSITION RATIONALE-**

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**(A) DESIGN:**

UHF ANTENNA IS A STRUCTURAL ELEMENT AND DOES NOT CONTAIN ANY ACTIVE COMPONENTS. THE ANTENNA IS INSTALLED ON THE OUTER MOLD LINE (OML) AND IS PROTECTED BY THE THERMAL PROTECTION SYSTEM DURING RE-ENTRY. MEETS OR EXCEEDS MF0004-014 ENVIRONMENTAL REQUIREMENTS.

**(B) TEST:**

ACCEPTANCE TESTING INCLUDES - 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, QTT, 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 VERIFY VOICE COMMUNICATION EVERY FLIGHT. RF POWER OUTPUT IS VERIFIED FOR FIRST FLIGHT; THEREAFTER, ON AN INTERVAL OF FIVE FLIGHTS, OR FOLLOWING LRU REPLACEMENT.

**(C) INSPECTION:**

RECEIVING INSPECTION PERFORMS VISUAL AND DIMENSIONAL EXAM OF ALL INCOMING PARTS. CERTIFICATION RECORDS/TEST REPORTS ARE MAINTAINED CERTIFYING MATERIALS AND PHYSICAL PROPERTIES AS REQUIRED.

CONTAMINATION CONTROL DETAILED CLEANING AND CONTAMINATION CONTROL INSTRUCTIONS ARE SPECIFIED ON MANUFACTURING OPERATIONS SHEETS. FINAL ASSEMBLY ON CLEAN BENCH, INSPECTION VERIFIES CLEANLINESS.

ASSEMBLY/INSTALLATION DETAILED INSPECTION IS PERFORMED ON ALL ASSEMBLY AND DETAIL PARTS PRIOR TO NEXT OPERATION.

CRITICAL PROCESSES ALL CRITICAL PROCESSES INCLUDING APPLICATION OF CHEMICAL FILM, PRIMER AND EPOXY COATING, SOLDERING, AND LAMINATION OF RADOME, ARE OBSERVED AND VERIFIED BY INSPECTION.

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TESTING ALL PARTS OF THE ATP ARE OBSERVED AND VERIFIED BY QC, AND ARE ALSO VERIFIED BY ROCKWELL QA OR DCAS.

HANDLING/PACKAGING SPECIAL CONTAINERS, TOTE BOXES - STORED AND TRANSPORTED IN WOODEN BOXES WITH LIDS AND SURROUNDED BY 3 INCHES OF CUSHIONING. PACKAGING IS VERIFIED BY DCAS.

**(D) FAILURE HISTORY:**

THERE HAVE BEEN NO "LOSS OF SIGNAL" FAILURES TO DATE.

**(E) OPERATIONAL USE:**

NO CREW CORRECTIVE ACTION AVAILABLE TO RECOVER USE OF FAILED ANTENNA.

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- APPROVALS -

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PAE MANAGER : K. L. PRESTON  
 PRODUCT ASSURANCE ENGR : T. R. CLARK  
 DESIGN ENGINEERING :  
 NASA SSMA :  
 NASA SUBSYSTEM MANAGER :

*K. L. Preston 7/8/94*  
*Terrence R. Clark 6/6/94*  
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