

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE
 NUMBER:05-2P-300ANT -X

SUBSYSTEM NAME: GPS THREE STRING

REVISION: 0

04/09/97

 PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:ANTENNA, UPPER, STRING 1 BOEING	VO70-742650-002
LRU	:ANTENNA, LOWER, STRING 1 BOEING	VO70-742650-003
LRU	:ANTENNA, UPPER, STRING 2 BOEING	MC481-0090-0004
LRU	:ANTENNA, LOWER, STRING 2 BOEING	MC481-0090-0003
LRU	:ANTENNA, UPPER, STRING 3 BOEING	VO70-742650-001
LRU	:ANTENNA, LOWER, STRING 3 BOEING	VO70-742650-004

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
 UPPER AND LOWER GPS RECEIVER ANTENNAS.

REFERENCE DESIGNATORS: 10V74A86
 10V74A177
 10V74A179
 20V74A87
 20V74A178
 20V74A180

QUANTITY OF LIKE ITEMS: 6
 THREE UPPER AND THREE LOWER

FUNCTION:

THERE ARE THREE GPS STRINGS. EACH STRING HAS AN UPPER AND LOWER ANTENNA WHICH ARE MOUNTED IN OPPOSITE SECTORS FROM EACH OTHER ON THE SKIN OF THE ORBITER STRUCTURE. THESE ANTENNAS EACH HAVE A +/-80 DEGREE FIELD OF RECEPTION TO ENABLE MAXIMUM SATELLITE COVERAGE WITHOUT RECEIVING THE SAME SATELLITE SIGNAL ON BOTH ANTENNAS. THE GPS SATELLITE SIGNALS ARE RECEIVED BY THE ANTENNAS, AMPLIFIED, COMBINED, AND THEN SENT TO THE GPS RECEIVER.

FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE

NUMBER: 05-2P-300ANT-01

REVISION#: A 10/14/99

SUBSYSTEM NAME: GPS THREE STRING

LRU: ANTENNA, GPS

ITEM NAME: ANTENNA, GPS

CRITICALITY OF THIS
FAILURE MODE: 1R3

FAILURE MODE:

LOSS OF RECEPTION, LOSS OF RECEPTION SENSITIVITY, LOSS OF POLARIZATION
DESCRIMINATION, LOSS OF DIRECTIONALITY

MISSION PHASE: DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	102	COLUMBIA
	103	DISCOVERY
	104	ATLANTIS
	105	ENDEAVOUR

CAUSE:

PIECE PART FAILURE (VIBRATION, MECHANICAL STRESS), CONTAMINATION, ELECTRICAL
STRESS, THERMAL STRESS, PROCESSING ANOMALY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN

- A) PASS
- B) N/A
- C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF ONE OF TWO ANTENNAS FOR ONE OF THREE GPS RECEIVERS. CAUSES
PARTIAL LOSS OF SATELLITE RECEPTION COVERAGE FOR ONE GPS RECEIVER BUT
ALLOWS THAT GPS RECEIVER TO CONTINUE FUNCTIONING.

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(B) INTERFACING SUBSYSTEM(S):

FAILED GPS OUTPUTS ARE IGNORED AND THE OUTPUTS OF THE REMAINING GPS' ARE USED.

(C) MISSION:

NO EFFECT

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

NO EFFECT - FIRST FAILURE. OPERATIONS CONTINUE WITH PARTIAL RECEPTION LOSS OF ONE GPS STRING. NO EFFECT - SECOND FAILURE ON THE SAME STRING. LOSS OF ONE GPS STRING. OPERATIONS CONTINUE WITH TWO REMAINING GPS STRINGS. POSSIBLE LOSS OF CREW/VEHICLE AFTER THIRD AND FOURTH FAILURES WHERE THE REMAINING TWO GPS RECEIVER STRINGS FAIL (LOSS OF OUTPUT FAILURE, ERRONEOUS OUTPUT FAILURE) DUE TO INABILITY TO MAKE LANDING SITE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

NO EFFECT

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: N/A

TIME FROM FAILURE OCCURRENCE TO DETECTION: SECONDS

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: N/A

IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?
N/A

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
N/A

- APPROVALS -

PRODUCT ASSURANCE ENGR : M. HOLTHAUS
DESIGN ENGR : J. R. SWANSON

Mark Holthaus 10/19/99
J.R. Swanson 10/21/99