

SRB CRITICAL ITEMS LIST

SUBSYSTEM: SRB BEACON TRACKING SYSTEM

ITEM NAME: Antenna, C-Band, Helix(+Z Axis)

PART NO: 10406-0226-801

FM CODE: A03

ITEM CODE: 90-01, 90-02

REVISION: Basic

CRITICALITY CATEGORY: 1

REACTION TIME: Hours

NO REQUIRED: 2

DATE: April 5, 2001

CRITICAL PHASES: Boost

SUPERSEDES: March 1, 1997

FMEA PAGE NO: I-3B

ANALYST: E.Gleason/S. Parvathaneni

SHEET 1 OF 3

APPROVED: S. Parvathaneni

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FAILURE MODE AND CAUSES: Quartz filler separation from antenna backplate caused by:

- o Manufacturing defect
- o Material defect

FAILURE EFFECT SUMMARY: Possible damage to Orbitor heat shield tiles during boost phase leading to loss of vehicle and crew during re-entry.

A. DESIGN:

- o The SRBTS antenna is a cavity backed helix antenna designed to operate in the C-Band. It is a Herley-VEGA Systems Inc. Model 820C-1 that is intended for use on space re-entry vehicles. It has been qualified for use on the launch vehicles used at the White Sands Missile Range (WSMR). (All Failure Causes)
- o The antenna uses a quartz filler over the active antenna element. The quartz filler is bonded to a stainless steel backplate by a silver filled epoxy. A pull test performed by USA SRBE, reference memo DAC-042-89, failed to separate the quartz from the backplate. The separation occurred in the body of the quartz at 352.9 pounds. Load analysis performed by USA SRBE, reference memo JRM-028-89-E, shows that the antenna will see less than one pound of load in any axis during boost (this includes vibration and atmospheric pressure changes). (All Failure Causes)
- o Environmental qualification testing was performed per WSMR procedure, DP PROC 7270-2316. Test results are reported by General Testing Laboratories report A-2801 and WSMR record for DP-PROC-7270-2316 beginning 5-1-68 and ending 5-2-68. The environmental test included the following: (All Failure Causes)

TEST	CONDITIONS
- Heat	1700° applied to face of antenna for five minutes.
- Shock	300 g for 1/2 msec. Two times in each axis, six shocks total.
- Vibration	Sine vibration, 20 minutes in each axis at 15g from 25 Hz to 2500 Hz and .4 inch double amplitude displacement from 5 Hz to 25 Hz.

No failure was recorded during the qualification testing.

B. TESTING:

VENDOR RELATED TESTING

- o Each antenna is tested for correct electrical function per Vega Process Control Instruction PCI 301317G-1. (All Failure Modes)

KSC RELATED TESTING

- o Normal SRBTS function is verified during final RSS verification for launch per OMRSD File V, Vol. 1, requirement B55TSO.010 and in the final countdown per OMRSD File II, Vol. 1, requirement SOOFEO.250. Reception via an individual antenna cannot be verified after system integration. (All Failure Causes)
- o Each antenna is pull tested with 30 pounds of force applied between the slug and the antenna base plate. The applied pressure is held constant for two minutes per 10REQ-0021, para. 1.2.1.1.4.d (All Failure Causes)
- o VSWR testing is performed per 10REQ-0021, para. 1.2.1.1.4.c (All Failure Causes)

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C. INSPECTION:

KSC RELATED INSPECTION

- o USA SRBE Quality verify the torquing of the antenna to the inside doubler plate and electrical bonding measurement between the antenna baseplate and the doubler plate per 10REQ-0021, para 1.2.1.2.4.
- o USA SRBE Quality verify VSWR testing per 10REQ-0021, paragraph 1.2.1.1.4.c. (All Failure Modes)
- o USA GO quality verify normal function verification during final RSS verification for launch per OMRSD File V, Vol. 1, requirement B55TSO.010 and during final countdown per OMRSD, File II, Vol. 1, requirement S00FEO.250. (All Failure Causes)
- o USA SRBE Quality verify antenna pull test measurement between the antenna base plate per 10REQ-0021, para 1.2.1.1.4.d. (All Failure Causes)

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D. FAILURE HISTORY

O Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

o Not applicable to this failure mode.