RBSP EFW AXB

Radiation Test Report

RBSP-EFW-AXB-009

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Revision A

Signature Page

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Change Record

Date	Revision	Description
3/16/2009	-	Draft
3/16/2009	A	Baseline Release

0. APPLICABLE DOCUMENTATION

The following documents are applicable to the extent specified herein. In the event of a conflict, the requirements of this document shall govern.

0.1 PROJECT DOCUMENTS

7417_9096 RBSP_EFW_PA_004	APL Flow Down Matrix
7417_9018	RBSP EMECP - Electromagnetic Environment Control Plan
RBSP_AXB_MEC_001	AXB Assembly
RBSP_EFW_AXB_002E	RBSP EFW AXB Wiring Schematic
RBSP_EFW_SYS_001	RBSP EFW Mission Requirements Document
RBSP_EFW_PA_001B	RBSP EFW Performance Assurance Implementation Plan

1. Introduction

The RBSP EFW Axial Boom (AXB) follows a long line of deployable stacer booms now flying on a number of spacecraft. Many of the modules in RBSP EFW are unchanged from those who have logged more than 60 years of on-orbit operation. Specifically, the RBSP AXB is an adaptation of the design of the THEMIS AXB with addition of new locking features for the deployment assist device (DAD) and a motor drive mechanism for in-flight length control during deployment.

This document is a report of radiation dose testing performed on three samples by UCB/SSL.

2. Samples

Three samples were analyzed:

1) a 2 square inch sample of Aluminum with Electroless Nickel Plating with Teflon Impregnate (Microlube, by Micro Plating, Inc.),
2) approximately 2 feet of AXB harness with Tefzel overwrap (Gore Cable, RCN8818, July 2008), and
3) a hemisphere coated with DAG-213.

3. Test

From February 10 to 20, 2009, the samples were given a total dose of 10 Megarads at 18 rads/s dose rate in the APL Space Departments Cobalt 60 Irradiator in Building 23, room 172. Average gamma ray photon energy is 1.25 MeV.

4. Criterion

The test was performed to verify the samples were unaffected by the doses expected on the RBSP Mission. Specific properties tested, respectively, were as follows:

1) plating integrity, adhesion, and conductivity,
2) Tefzel overwrap maintains integrity and function, and
3) DAG-213 coating remains conductive at similar levels to a Control specimen. Coating remains intact and adequately adhered.

5. Methodology

Following testing the samples were returned to UCB/SSL and tested in the following manner, respectively:

1) Surface conductivity measured on face with Ohm Stat meter (Static Solutions, Inc., RT-1000, SN:020803).
2) Visual inspection of overwrap. Light rubbing to ensure integrity. And,

3) Measure conductivity of the hemisphere both across the spherical face and radially through the surface (as shown).

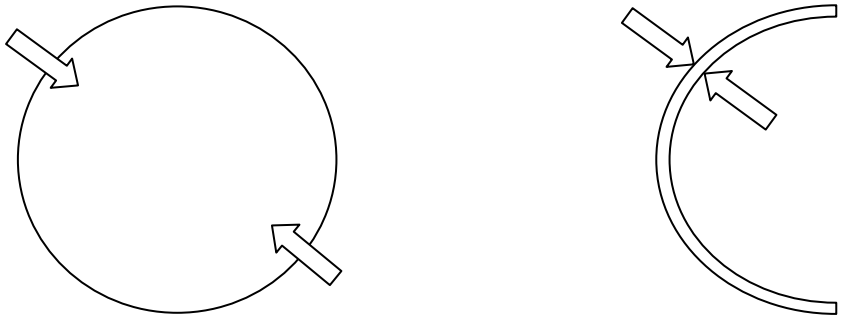

Figure 1: The hemisphere was measured both across the spherical face (left) and through the surface (right).

6. Results

All samples survived the testing. The results for each sample were as follows:

1) The Electroless Nickel Plating with Teflon Impregnate (Microlube) coating maintained surface appearance and properties through the test. Final surface conductivity was <1 kOhm/sq.
2) The Tefzel overwrap maintained integrity and function. The wire is all covered and there is no evidence of material deposits in the bag, even after handling. And,
3) The conductivity of the DAG-213 coating remained in family with the Control specimen. The coating was intact and remained adhered to the sphere throughout testing. Resistance values are shown in the Table.

Nominal Probe Resistance:		450 Ohms	
	Point	Control Sample	Test Sample
Through the Surface	1	6.2 kOhm	25.0 kOhm
	2	8.2 kOhm	
	3	23.4 kOhm	
	4	3.2 kOhm	
Across the Spherical Face	1	4.9 kOhm	12.0 kOhm
	2	5.7 kOhm	

7. Conclusion

All samples passed the testing for use on the RBSP AXB.