TIMED

Thermosphere • Ionosphere • Mesosphere • Energetics and Dynamics

Contamination Control

Syed W. Ali

The Johns Hopkins University
Applied Physics Laboratory
Laurel, Md. 20723-6099
Tel. - (301) 953-6130
Fax - (301) 953-6696

E-Mail - AliSW1@jhuapl.edu

TIMED

Thermosphere • Ionosphere • Mesosphere • Energetics and Dynamics

PURPOSE

The purpose of this presentation is to summarize the methods to be used in the cleaning and inspection of TIMED flight and GSE hardware and define the level of cleanliness that shall be achieved to meet the requirements of the TIMED contamination control plan of JHU/APL 7363 - 9031

TIMED

Thermosphere • Ionosphere • Mesosphere • Energetics and Dynamics

REQUIREMENTS

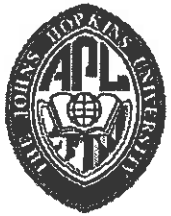
Parameter	Value
• Cleanliness class for S/C Integration	Class 100,000 per FED-STD-209E
• S/C Surface Cleanliness	Level 750A at launch per MIL-STD-1246C
• Purge Gas	N_2 gas boil off from liquid LN_2 per MIL-PRF-27401C type 1 grade B

MATERIAL SELECTION

- All material used in the spacecraft including Instruments (SABER, GUVI, SEE, TIDI) shall meet the NASA publication 1124, "Outgassing Data for Selecting Spacecraft Materials", for the following two criteria:
  - Maximum Total Mass Loss (TML) <1%
  - Maximum Collected Volatile Condensable Material (CVCM) <0.1%
- All nonmetallic materials used in the spacecraft and in the Instruments shall be reviewed by SOR for outgassing properties.
- Any material that does not meet the requirement shall be reviewed regarding the outgassing properties to determine whether a bakeout is necessary before incorporating into the subsystem.

PURGING

- During spacecraft integration & testing at APL, purge gas source will be vaporized LN_2 as boiloff from SSL storage tank.
- During spacecraft integration & testing at GSFC and VAFB, purge gas source will be vaporized LN_2 as boiloff and tested via in-line gas analyzer.
- Purge gas will be distributed to instruments using spacecraft manifold.



TIMED

Thermosphere • Ionosphere • Mesosphere • Energetics and Dynamics

CLEANROOM REQUIREMENTS

- The TIMED spacecraft surface cleanliness shall be tested before the beginning of integration and every week thereafter with black and white light and tape lift samples.
- The spacecraft will be cleaned by SOR as necessary. Verification will be made by black and white light and tape lift testing to insure the proper level of contamination has been reached. Only NASA approved cleaning procedures and solvents shall be used.

HANDLING AND PROTECTION OF ELECTROSTATIC SENSITIVE (ESD) ITEMS

- ESD is an interrelated issue with Contamination Control due to material selection, use and handling.
- When handling ESD sensitive materials and Instruments, air ionizers shall be turned on.
- Static field meters shall be used to locate and quantify the levels of ESD.
- Working area surfaces shall be checked for conductivity with a surface resistivity meter.

TIMED Program Facility QA Requirements (JHU/APL, GSFC, VAFB)

- Monitor particle count, air flow, temperature and humidity.
- The specifications for the cleanrooms are as follows:
  - Particle counts: 100,000 or lower of >0.5 microns per FED-STD-209E
  - Air flows: 100 feet per minute or greater
  - Humidity: 45 ± 5%
  - Temperature: 70 ± 5°F

THERMAL VACUUM BAKE-OUT

- All S/C hardware (e.g. electronic boxes, wire harness, and associated hardware, connectors, fittings, thermal blankets, mechanical structures and assemblies, brackets, etc.), shall be subjected to a vacuum bake-out in accordance with the APL Vacuum Bake-out Procedure 7304-9430 unless by analysis, it is determined that bake-out is unnecessary. Any analysis must be approved by the TIMED Test Review Board.
- If rework or repair is required after bake-out, the TIMED Test Review Board will determine if another bake-out is necessary.

GSFC and VAFB FACILITIES

Prior to the arrival of the spacecraft, the facilities shall be monitored and verified to be Class 100,000 or cleaner with the coordinated efforts of GSFC, VAFB and JHU/APL representatives. The facilities shall be operated and maintained in accordance with FED-STD-209E.

Contamination, such as particle fallout levels and nonvolatile residue levels (NVR) shall be measured using JHU/APL provided or approved equipment and reported periodically. All non-conformance to the contamination requirements shall be addressed in a written report.