

Thermal & Propulsion Engineering

JPL Section 353

Tim O'Donnell

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Thermal & Propulsion Engineering Section 353

- Size of Section (approx. 140 total)
 - In addition to above personnel, Division 35 Engineering Support contract personnel, as Category X personnel, are book kept within this Section
- FY '02 Business Base (Section 353 cognizant approved plans)
 - \$32.6M (\$20.5M is MER funding) total
- Future Business Base
 - Probably decreased in short run: in the range of 15% down for FY 03
 - Level of competition activities is increasing significantly
 - Need to outsource heavily dependent on JPL proposal success rate
 - Discovery, Mars Scout, Frontier, MIDEX, ESSP, NRA's

Thermal & Propulsion Engineering Section 353 (cont.)

- Main Areas of Flight Project Work
 - **Thermal Engineering: Design, Analysis, Test and Operations**
 - **Chemical** and Electric Propulsion: **Design, Analysis, Test and Operations**
 - Materials Development
 - **Contamination Control**
- Special Functions and Technology Work
 - Examples of Service Centers or labwide support functions: Analytical Chemistry Lab and a Materials Lab
 - R&D/Technology activities: Micropropulsion, Light weight Chemical Propulsion components, Miniature Ground-Penetrating Radar, Chemical Diagnostic Instrument Development, Gossamer Structures, Ion Engine Development, DOD work, Composites, Multiphase Flow Modeling
- Major Facilities
 - Electric Propulsion R&D, Chemical Propulsion Testing and Integration, Materials Test Lab, Analytical Chemistry Lab, Advanced Thermal Technology Labs

The Need for Contamination Control

- Particulate and Molecular Contamination may adversely affect the performance of scientific instruments, and sensors such as star trackers, navigation cameras, mechanisms, and the performance of thermal control surfaces and solar arrays.
- The contamination and cleanliness requirements reflect both the susceptibility of sensitive surfaces to contamination as well as the possibility of cross-contamination between surfaces.
 - Many systems, especially, visible-IR-UV optics and cryogenically-cooled sensors, are particularly susceptible, thus, nominal standards for “space-rated” materials may be insufficient to prevent contamination-induced degradation
- The sources of contamination and the migration mechanisms vary across the hardware phases of the project.
 - Manufacturing, integration, testing and mission operations each present unique contamination environments and constraints.
 - Environmental testing (e.g., thermal-vacuum, acoustic, random vibrate) presents a significant opportunity for contamination of sensitive hardware

Section 353 Images

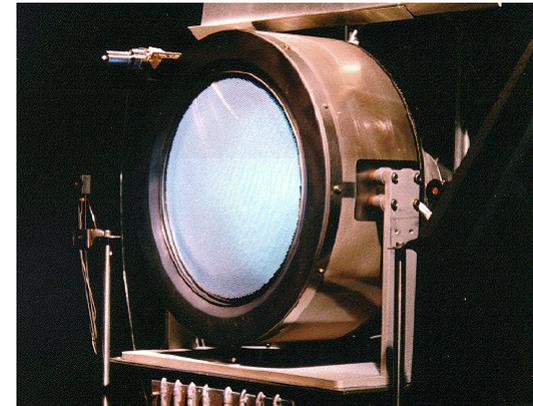
Developed composites for Sojourner and MER



Adjustable Liquid Regulator (chemical propulsion systems)



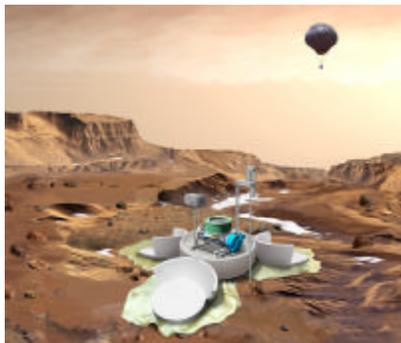
Ion Engine (NSTAR)



Contamination Analysis Chamber



Support Balloon Materials Development



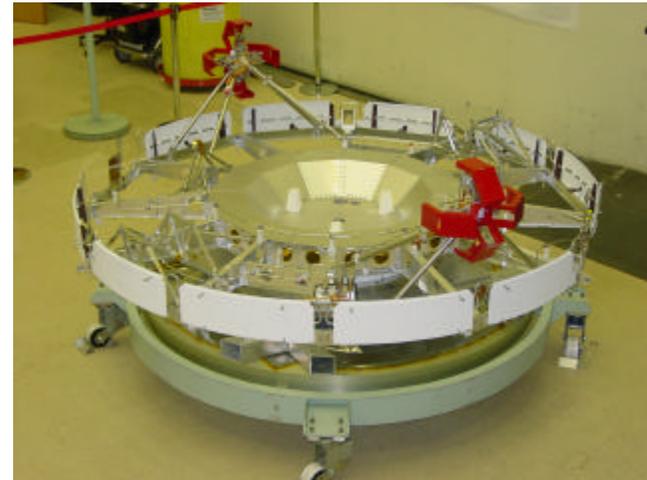
MER Heat Rejection System Pump Assembly



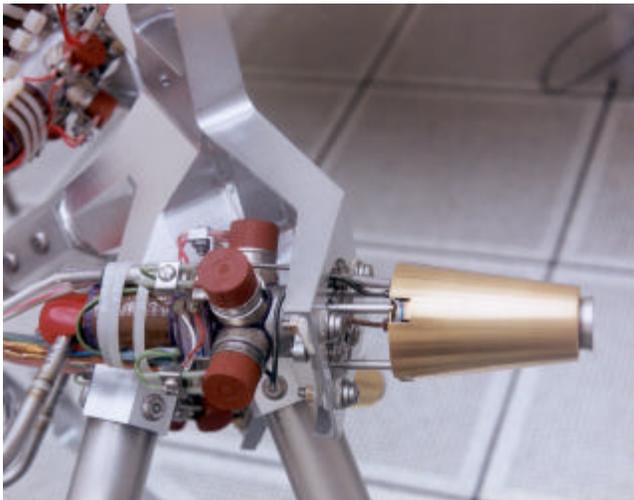
Section 353 Images (cont.)



MER Ultralight Tank



MER Cruise Stage (w/o tanks)



Thruster



Pathfinder Cruise Stage

Examples of CWOs in last year Section 353

- Thermal test and data acquisition support
- Review of propulsion documents related to propellant loading and offloading
- SolidsWorks design support for new thruster development
- Reaction Control Subsystem Review support
- Assessing Contamination Control Requirements for a new mission