

Spacecraft Thermal Control Handbook

Volume I: Fundamental Technologies

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Editor

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Preface

In keeping with its goal of strengthening its relationship with customers and industry, The Aerospace Corporation has prepared this handbook, a compendium of corporate knowledge and heritage in the field of thermal control of uncrewed spacecraft. The objective of this effort was to develop a practical handbook that provides the reader with enough background and specific information to begin conducting thermal analysis and to participate in the thermal design of spacecraft systems. It is assumed that the reader has had at least one introductory heat-transfer class and understands the fundamental principles of conductive, radiative, and convective heat transfer.

The handbook is written in such a way as to be useful to thermal engineers of all experience levels. The first two chapters provide a general overview of uncrewed spacecraft systems and space flight thermal environments. Chapter 3 describes a number of actual spacecraft and component thermal designs to familiarize those new to the field with some historical design approaches. Subsequent chapters discuss, in detail, thermal control hardware and the thermal design and testing process. The final chapter provides an overview of emerging thermal technologies for the future.

This book is actually a revised and updated edition of *Satellite Thermal Control Handbook*, published by The Aerospace Corporation in 1994. The name change reflects the expanded scope of this work, which now includes thermal environments and design techniques for interplanetary spacecraft, in addition to the Earth-orbiting satellites that were the focus of the original handbook. The reader will now find an updated characterization of the thermal environment in Earth orbit, new material documenting the environments of interplanetary missions, more detailed information about each of the thermal control hardware elements found in the first edition, and presentation of some newer technologies such as heat switches and precision temperature control techniques.

Two additional volumes of this handbook are planned. Volume 2, devoted to cryogenics, is expected to be published late in 2003. Volume 3, covering heat pipes, loop heat pipes, and capillary pumped loops, is planned for a later date.

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