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Preface

ONCE, when I was writing a paper on a spacecraft power source for an editor of a non-aerospace journal, the editor informed me that out of curiosity he had asked several of his colleagues and friends where spacecraft got their power. He said the answers were amazing and even included guesses about the use of long extension chords. Like propulsion and structures, power is one of those "utilities" that many people take for granted. And like propulsion and structures, if we investigate spacecraft electrical power systems we will find a rich and diverse set of technologies that can make the lives of spacecraft designers and users much easier if we know how to use them. In fact, the technologies are available now to cut the masses of most spacecraft state-of-practice electrical power systems in half! Such mass savings can be used in a number of ways, including adding more payload and/or reducing the overall mass of the spacecraft so that smaller, cheaper launch vehicles can be used. Studies have shown that spacecraft electrical power systems can work synergistically with on-board propulsion systems (both electrical and chemical) for the overall benefit of the spacecraft community.

In several respects this is an exciting time for people working in spacecraft electrical power. Technologies such as advanced solar cells, lower mass solar arrays, improved batteries, and lightweight solid-state power management components that were often seen as laboratory curiosities a few years ago are now finding application in the new generation of spacecraft. And it is not just government-funded spacecraft that are turning to these new technologies. Many of the new commercial ventures in space have seen the performance advantages of these new power technologies and many of the so-called "laboratory curiosities" are rapidly becoming flight hardware. This upsurge in commercial interest is reflected in the increased number of commercially oriented papers presented at this year's Intersociety Energy Conversion Energy Conference, which is jointly sponsored by AIAA and five other professional societies. Perhaps of most interest to planners and designers of future space missions is that the demand to take existing technologies out of the laboratory and put them on spacecraft is putting pressure on the technologies to develop ever more improved power components with an eye toward the spacecraft of the next millennium.

As a result, over a year ago, several of us in the Aerospace Power Systems Technical Committee thought it would be useful to provide the technical community with a status report on some of the exciting technologies available or soon to be available. This issue of the *Journal of Propulsion and Power* is the first in what we hope will be more snapshots of this developing field. Two overview papers are presented first to set the stage for the thirteen specialized papers that follow. These papers are organized according to the following themes or power subsystems: solar power, chemical power, and nuclear power. The papers provide references to further work in their respective areas.

Many individuals have contributed directly and indirectly to the development and content of this Special Issue. A large debt of gratitude is owed to all of the authors for their expertise, hard work, and cooperation in bringing this volume to fruition. Dr. R. H. Woodward Waesche, the editor-in-chief of the *Journal of Propulsion and Power*, was very supportive and in a number of ways was personally responsible for the germination of the idea of a Special Issue devoted to aerospace power systems. Moreover, Dr. Waesche reviewed each of these fifteen papers, giving the authors valuable comments that improved the quality of the papers. The reviewers themselves had a significant impact on the quality of the papers and their willingness to take the time to review these papers is deeply appreciated.

Behind the scenes, of course, are the people who really make a volume like this happen. Specifically, I would like to thank Jason Peak of AIAA who started this volume with me and Adrian Chindgren of AIAA who came in at half time and brought this work to successful completion.

Gary L. Bennett
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