THE CAMBRIDGE DICTIONARY OF SPACE TECHNOLOGY

The Cambridge Dictionary of Space Technology is a comprehensive source of reference on the most important aspects of this fast-developing field, from basic concepts to advanced applications. With some 2300 entries, it lists fundamental terms that will remain in common usage for the foreseeable future and includes a selection of historical and highly specific entries adding context and depth.

The unprecedented breadth of coverage ensures that there are entries on all major subject areas. While the emphasis is on defining the meaning of a word or phrase, entries have been written with the intention of enhancing the understanding of the subject, both for the practising specialist and the interested layman. To assist the reader in research on a given topic, related entries are highlighted in the text and other important entries are cross-referenced.

The Cambridge Dictionary of Space Technology will be indispensable to anyone with an interest in space activity.

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As a technical author, he has written some 250 articles on various aspects of space technology, and several dozen papers on subjects as diverse as space law, space education and space history. He is also the author of a student text, *The Communications Satellite*, and the editor of an international space industry magazine.

He enjoys sharing his interest in space technology with audiences at all levels, both at home and abroad, and is proud to have co-presented the 1983/84 IEE Faraday Lecture series, entitled 'Let's Build a Satellite'.

To my son, who could say ‘star’, ‘moon’ and ‘space’ before his second birthday. Here’s another couple of thousand words for you, Matthew!

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PREFACE AND USERS' GUIDE

Space technology covers a great many aspects of science and technology, and since its birth in the late 1950s, the subject has changed almost beyond recognition. This dictionary has been compiled with the aim of providing a convenient source of reference to some of the most important aspects of this developing technology.

One of the most difficult aspects of writing such a book is deciding what to put in and what to leave out. The basic premise was that it should be a dictionary rather than an encyclopedia. In other words, the emphasis is on defining the meaning of a word or phrase, and in some cases giving notes on its derivation and usage, rather than providing large amounts of background information. The entries have been written with the intention of enhancing the understanding of the subject, both for the practising specialist and the interested layman. To this end, the dictionary includes terms at all levels of sophistication: from the academic to the trivial; from the precision of engineering terminology to the frivolity of jargon.

The entries in this dictionary are arranged in alphabetical order. To assist the reader in research on a given topic, related entries are highlighted in the text and other important entries are included as a 'see also. . .'. Although every effort has been made to make the cross-references self-consistent, there may be cases where useful references have been omitted. I hope that they are few and far between.

In an attempt to cover the fundamentals of space technology, the dictionary includes material which can be placed under the following headings:

- Spacecraft Technology
- Communications Technology
- Propulsion Technology
- Launch Vehicle Technology
- Space Shuttle
- Manned Spaceflight
- Unmanned Spacecraft
- Materials
- Propellants
- Orbits
- Physics and Astronomy
- Space Centres and Organisations
- Miscellaneous

To facilitate the use of the dictionary, a classified list of all the dictionary entries under these headings is included at the end of the book. Owing to limitations on space and the intended nature of the book, the number of entries on specific spacecraft and space missions has been kept to a minimum.

A degree of judgement is implicit in the compilation of such a book, not only in what to include but also in the relative importance of the topics. It is inevitable that some readers will disagree with some of the entries, especially where preferred usage is under discussion. Where terms mean different things to different people, I have attempted to make this plain, but, for the sake of the novice, have indicated the most common usage.

This is a completely revised and expanded edition of a dictionary that was first published by Institute of Physics Publishing in 1990, since when the space community has witnessed many exciting new developments. The introduction of new terminology to accompany these developments is a continual process and, unfortunately, no book can hope to cover it all. For this reason, *The Cambridge Dictionary of Space Technology* concentrates on the fundamental terms expected to remain in common usage for the foreseeable future, adding a selection of historical and highly specific entries to add context and depth to the subject. Readers with any suggestions for additions or improvements are invited to contact the author through Cambridge University Press.

Mark Williamson
Kirkby Thore, Cumbria
April 2000

NOTE ON ACRONYMS AND ABBREVIATIONS

Many technical subjects are replete with acronyms and abbreviations, and space technology is one of the worst offenders. For simplicity, most people in the industry refer to all groupings of initial letters as 'acronyms', but this is not strictly correct. As a practical guide to usage of these terms, particularly regarding pronunciation, the following distinction has been made wherever possible in this dictionary:

an **acronym** is a grouping of initial letters, or similar contraction of words, that can be pronounced as a word: e.g. ESA ('eesa'), EGSE ('egsey') and ECLSS ('eecliss');

an **abbreviation** is a similar grouping which is usually pronounced as separate individual letters: e.g. EBU, EHT and EVA.

There are a few which can be pronounced in both ways (e.g. TWTA/'tweeta') and, where relevant, this is mentioned in the text.

ACKNOWLEDGEMENTS

Space technology draws heavily on a number of classical scientific disciplines including physics, chemistry, astronomy and, with the inclusion of manned spaceflight, biology. It is, however, the applications of these fundamental subjects that have expanded the field of space technology to the multidisciplinary subject it is today. Thus it includes aspects as diverse as orbital dynamics, communications, propellants and materials technology.

For this reason, in compiling the first edition of this work, I obtained the assistance of a number of friends and colleagues who specialised in one or other of these fields and asked them to review sections of the original manuscript covering their speciality. I am indebted to them for the time they gave so freely and would like to acknowledge them here. Although their contributions have improved the book, they are not of course accountable for the text as it appears – I have assumed editorial control and any errors are entirely my own responsibility!

I would particularly like to thank Alan Hutchinson, Ron Jones, Ron Cooper, Jehangir Pocha, Karen Burt, Geoff Statham and Dr W. Berry whose contributions were invaluable. I am also grateful to Tom Keates, Anthony Giles, Ian White and Paul Brooks for their helpful comments. Many thanks are also due to Claude Bonnet, Richard Barnett and Clive Simpson . . . and to Alan Burkitt for suggesting I write a dictionary of space technology in the first place.

Finally, I would like to thank my wife, Rita, for her helpful comments on the manuscript and her considerable efforts in putting the first edition into alphabetical order. The wonders of word processing software have made this second edition so much easier to compile and update, but I shall never forget the reams of paper involved in the production of the first edition.

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