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Basics of Space Flight Learners' Workbook

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Advanced Mission Operations Section

Multi-team Training Module

Basics of Space Flight Learners' Workbook

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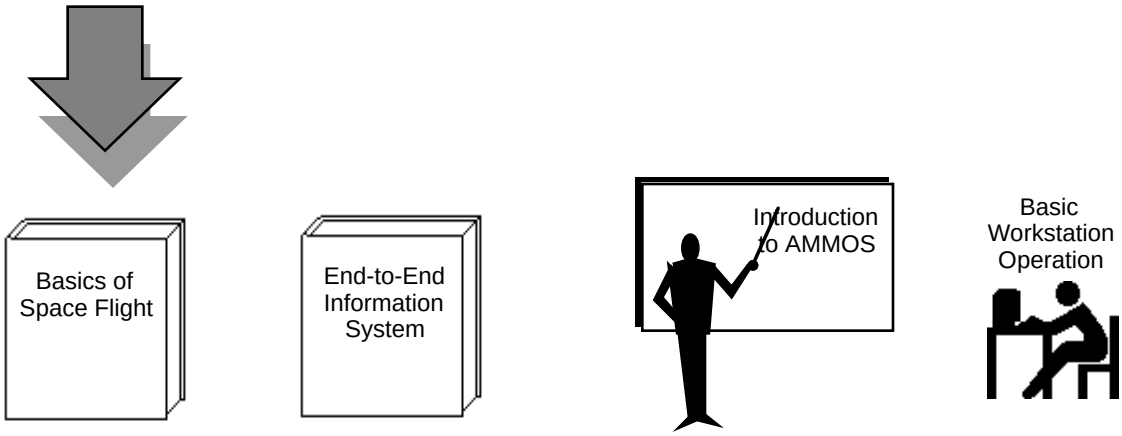
INTRODUCTION

Since Caltech's Jet Propulsion Laboratory (JPL) manages NASA projects that probe the deep space (translunar) environment of our solar system, operations people need to have an understanding of the basics of space flight in order to perform effectively at JPL. This training module introduces concepts associated with these basics to employees new to the space flight operations environment.

This module is the first in a sequence of training modules that pertain to space flight operations activities. (See diagram below). There is no prerequisite. This module is a prerequisite for the next in the sequence, "End-to-End Information System."



The goal of this training module is to provide an aid for identifying and understanding the general concepts associated with space flight in general and deep space missions in particular. It offers a broad scope of limited depth, presented in 17 chapters. Specific learning objectives are listed at the beginning of each chapter in terms of what you are expected to be able to do upon finishing the chapter.

Acknowledgements

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Learning Strategy

As a participant, you receive your own copy of this self-administered workbook. It includes both learning materials and evaluation tools. The chapters are designed to be used in the order presented, since some concepts developed in later chapters depend on concepts introduced in earlier ones. It doesn't matter how long it takes you to complete it. What is important is that you accomplish all the learning objectives.

You evaluate your own progress in this training module. You are probably eager to learn about the subject and so will want to evaluate your progress as you go. Accomplishing the objectives will be especially important if you plan to participate in the next training module in the sequence, "End-to-End Information System." (Note: The End-to-End Information System module is intended for JPL internal use only.)

The frequent "Recap" (short for recapitulation) sections throughout this workbook will help you reinforce key points and help you evaluate your progress. They require you to fill in blanks. Please do so either mentally or in writing. Answers from the text are shown along the bottom of each Recap.

On page 144 of this book you will find a blank certificate of completion. When you have finished this training module, and you are satisfied that you have met the learning objectives stated in each chapter, please fill in the certificate, sign it, and give it, or a copy of it, to your supervisor for inclusion in your personal file.

Online Availability

This training module is also available on the World Wide Web at

http://www.jpl.nasa.gov/basics

In addition, this site has a link to a .pdf (for portable document format) file, readable and printable using Adobe™ Acrobat™ Reader. Acrobat Reader is available free from Adobe's Web site, to which there is also a link.

Printed Copies for the General Public

Printed copies are available for purchase by the general public from JPL's Library, Archives, and Records Section. Contact elizabeth.a.moorthy@jpl.nasa.gov or phone (818) 397-7952.

Feedback or Questions

Feedback from participants is especially valuable to improving any self-administered training. To contribute your ideas to the next edition of this module or to ask a question about any of the material in this workbook, please contact the primary author at david.f.doody@jpl.nasa.gov .

A Note on Abbreviations

Except for units of measure, all terms are spelled out completely the first time they are used, with abbreviations following in parentheses, when applicable. Thereafter, the abbreviations are generally used alone. Units of measure, used without such introduction, are listed below. Refer to the Glossary in the back of the workbook for further help. As with any study endeavor, the participant should also have a good English dictionary at hand.

bps	bits per second
G	Giga (billion, i.e., 10^9). Note that in the U.S., a billion is 10^9, while in other countries using the metric system a billion is $10^{12.}$ However, "Giga" means 10^9 everywhere.
g	Gram
Hz	Hertz
k	kilo (thousand)
m	meter (USA spelling; elsewhere, metre)
M	mega (million)
N	Newton
W	Watt

Metric to English Conversion

Throughout this module, measurements are expressed in metric units. If you have a need to convert them into English units, use the following equivalents:

Millimeters to inches:	mm	x	0.04	=	in
Centimeters to inches:	cm	x	0.4	=	in
Meters to feet:	m	x	3.3	=	ft
Meters to yards:	m	x	1.1	=	yds
Kilometers to miles:	km	x	0.6	=	mi
Grams to ounces:	g	x	0.035	=	oz
Kilograms to pounds:	kg	x	2.2	=	lbs