FOREWORD

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Quote: " ... operational attention to human factors can raise efficiency, effectiveness, and safety in aviation environments. That translates to cost control and continuing safety. "

The term "human factors" conjures many and varied definitions in the aviation industry. Traditional activities like cockpit design, crew resource management, and team "sensitivity" discussions are often characterized as aviation human factors. However, those activities constitute only a small percentage of aviation-related human factors.

Human factors is the study of the human as a central part of any system. Human factors identifies the capabilities and limitations of humans and, then, adapts the human or the system components accordingly. The science of Human Factors can quantify human performance with measures like time, units of work, safety, error, and, sometimes, attitudinal change. Such measures help to design or modify systems for optimal human performance. Therefore, operational attention to human factors can raise efficiency, effectiveness, and safety in aviation environments. That translates to cost control and continuing safety.

"Give me a human factors reference that I can understand and use."

Industry participants involved with the Office of Aviation Medicine's Human Factors in Aviation Maintenance research program have asked for practical human factors guidance that can be used on the shop floor. Maintenance managers cannot call in the company Ergonomist or an outside consultant every time an apparent human factors issue arises. Instead, managers want a Guide that can provide ready reference and information either to make a decision or to elicit additional help.

The Human Factors Guide for Aviation Maintenance is designed to be used in aviation maintenance environments. The *Guide* is written for maintenance management, but it contains information and guidance that can be used by people with various responsibilities within maintenance organizations. The *Guide* addresses traditional human factors topics, such as workplace design, safety, etc., as well as at least two topics not typically considered within the scope of traditional human factors. These two topical areas, sexual harassment and personal/job-related factors, are included at the request of industry representatives. While not traditional human factors topics, these two subject areas are known to affect (dramatically, in

some cases) the ability of people to work safety and efficiently. In this regard, we believe it is appropriate to address them in a Guide concerned primarily with performance-related issues.

The contents of each chapter are based on laboratory research and best practices in aviation and other industries. The chapters are all written in a straight-forward, readable format. For readers requiring greater detail, additional references are always provided.

Chapter Layout

All chapters have the same layout. With this design the user can easily become familiar with the *Guide* and always know what kind of information is available. Each chapter stands alone, with its own table of contents, index, and list of references. Each chapter includes the following sections:

Introduction: This section is a quick overview of the chapter explaining why the chapter is included and what's in it.

Background: This section contains more details about the topic than the introduction. In most cases this section provides a perspective of how the topic chapter emerged as an important topic to be included in the *Guide*.

Issues and Problems: The most common or severe performance issues related to the chapter's topic are explained in this section. For example, the Aloha Airlines accident made it very clear that training and adherence to procedures is a critical component of the overall "safety chain."

Regulatory Requirements: Since aviation maintenance and industry in general is driven by regulations, this section is important. When there are specific regulatory requirements related to the chapter's topic they are stated very explicitly .

Concepts: This sections contains straight-forward explanations of the basic principles affecting the chapter topic. In most cases, concepts are related to aviation maintenance examples.

Methods: The human factors methods applicable to the chapter are included here.

Reader Tasks: Often, there are human factors-related tasks that can be performed by maintenance management. This section describes such tasks and also suggests the kind of tasks that require the help of internal or external human factors professionals.

Guidelines: This section is a straight-forward listing of suggested guidelines appropriate to the chapter's topic. Guidelines are tied to the Reader Tasks described in the preceding section. This tends to be the most direct and informative section of each chapter.

Further Reading: The *Guide* presents information that has been derived and condensed from many services. This section provides a list of documents, books videotapes, etc., that readers can consult for detailed discussion of the topics addressed in the chapter.

Where to Get Help: This section is like a Human Factors Yellow Pages.

Example Scenarios: The scenarios presented in each chapter represent some typical kinds of human factors tasks that one can expect to encounter in the workplace. For each scenario, we describe how the issues raised in the scenario can be resolved.

References: The *Guide* is written to avoid scientific, engineering, and psychological jargon. The authors of the *Guide* went to the literature to derive the important facts and converted them to practical information. This section provides the primary scientific and/or regulatory references for further information.

Credit to the authors/developers

Design, writing, and production of a practical guideline for human factors in aviation maintenance is a monumental task. It requires true expertise to explain complex issues in a straight-forward manner. A multi-disciplinary team created the *Guide.* Many aviation industry and government representatives selected the initial 12 chapters and created a list for future editions.

William Shepherd and Jean Watson, FAA Office of Aviation Medicine, identified the industry need for the *Guide* and obtained the FAA commitment to embark on and continue the significant work of creating and supporting the *Guide*. The primary author of The *Human Factors Guide for Aviation Maintenance* is Michael Maddox, of Sisyphus Associates. Other contributing authors are Colin Drury, State University of New York at Buffalo; James Burnette, Ergonomist; and Lawrence Rifkind, Georgia State University.

The project was headed by Galaxy Scientific Corporation, which provided selection and coordination of authors, editorial support, graphics design, and development of all digital multimedia for the *Electronic Guide.* Galaxy personnel included Suzanne Morgan, Sheldon Kohn, Kiki Widjaja, Julie Jones, Donna Clemons, and William Johnson. Joel Dickerson, Dickerson Design, provided assistance with the graphical design. The project's foundation and initial planning were done by James Parker from BioTechnology, Inc. Numerous industry personnel and human factors professionals have provided essential reviews and guidance to ensure the quality of this document.

The 1996 revision project added Chapters 13, 14, and 15 authored by Lawrence Rifkind, Georgia State University; James Reason, University of Manchester, UK; Michael Maddox, Sisyphus Associates; and Prasad Prabhu, Galaxy Scientific.

The 1998 revision project was headed by Galaxy Scientific Corporation, with Michael Maddox of Sisyphus Associates as editor. Michelle Robertson of the University of Southern California authored Chapter 16 on MRM, and Terrell Chandler of Galaxy Scientific rewrote Chapter 7 on Training. Galaxy personnel included William Johnson, Julie Jones, Terrell Chandler, Phyllis King, Paul Uzee, Linda Mangis, Veronica Danley, Heather Barker-Church, Ben Sian, and Charlena Kunkler.