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HUMAN ENGINEERING GUIDANCE

FOR DATA LINK SYSTEMS

RTCA/DO-238

Prepared by SC-169

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Foreword

This report was prepared by Special Committee 169 (SC-169) and approved by the RTCA Technical Management Committee (TMC) on April 2, 1997.

- RTCA, Incorporated is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal Advisory Committee and develops consensus based recommendations on contemporary aviation issues. RTCA's objectives include but are not limited to;

- coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;

- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;

- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and

- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other appropriate international organizations can be based.

The organization's recommendations are often used as the bases for government and private sector decisions as well as the foundation for many Federal Aviation Administration Technical Standard Orders.

Since RTCA is not an official agency of the United States Government, its recommendations may not be regarded as statements of official government policy unless so enunciated by the U.S. government organization or agency having statutory jurisdiction over any matters to which the recommendations relate.

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1.0 Purpose and Scope

This document sets forth general, functional, procedural, and design criteria and recommendations concerning human engineering of data link systems. The recommendations are based on evidence from empirical and analytic studies of simulated data link communication, and on limited experience from operational tests and actual use of data link. However, because data are not yet available to support recommendations on all potentially critical human engineering issues these recommendations necessarily go beyond the data link research and include requirements based on related research and human factors engineering practice. It is also recognized that evolution of these recommendations will be appropriate as experience with data link accumulates and new applications are implemented.

This document focuses primarily on recommendations for data link communications between an air traffic specialist and a pilot, i.e., air traffic services communications, although some recommendations address use of data link for flight information services. Unless otherwise specified within the text, all recommendations apply to both flight deck and ground-based data link systems.

This document is intended as a guide for development and evaluation of data link systems. Some of these guidelines may not apply for a given data link system implementation. Human engineering considerations are an important element of data link system performance. As illustrated in Figure 1, human engineering recommendations address many component functions required for effective data link communication services in the operational environment. For presentation purposes, the recommendations are divided into five sections: General, functional, procedures, flight deck/air traffic service (ATS) workstation integration, and human-computer interface.

To facilitate understanding and use of this document appropriate cross-references to interrelated recommendations appear in parentheses throughout the text.