RTCA, Inc.
1140 Connecticut Avenue, NW, Suite 1020
Washington, DC 20036-4001 USA

Minimum Human Factors Standards for Air Traffic Services Provided Via Data Communications Utilizing the ATN, Builds I and IA

RTCA DO-256
June 20, 2000

Prepared by: SC-194

Copies of this document may be obtained from

RTCA, Inc.

Telephone: 202-833-9339
Facsimile: 202-833-9434
Internet: www.rtca.org

Please visit the RTCA Online Store for document pricing and ordering information.

Foreword

This report was prepared by Special Committee 194(SC-194) and approved by the RTCA Program Management Committee (PMC) on June 20, 2000.

- 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.

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.

This Page Intentionally Left Blank

Table of Contents

Appendices

List of Figures

List of Tables

1.0 Purpose and Scope

1.1. Introduction

This document defines minimum human factors requirements and guidelines for air traffic services (ATS) data link communications between an air traffic specialist and a pilot utilizing the Aeronautical Telecommunications Network (ATN). The scope is the initial Controller-Pilot Data Link Communications (CPDLC) capabilities which comprise the Build I and Build IA phases of the United States (US) implementation path.

In the US, initial CPDLC capabilities will be implemented in Air Route Traffic Control Centers (ARTCCs) and available to support ATS in the contiguous domestic en route airspace radar environment. CPDLC communications will generally encompass the transition and cruise phases of flight. The initial CPDLC capabilities, discussed in this document, will not be available in US en route oceanic airspace. An early (non-ATN compatible) CPDLC service has been available in US oceanic airspace since 1995. A later phase of the US CPDLC implementation path will field an interoperable CPDLC service in domestic and oceanic en route airspace.

The operational ATS CPDLC system includes an Aeronautical Telecommunications Network (ATN) interface, the Context Management Application (CMA), and CPDLC service requirements. CPDLC message assurance and addressing requirements are supported by the ATN protocols and the CMA, respectively. Key assumptions regarding the operational environment, the role of the ATN, the CMA application, and the CPDLC services in supporting the human factors requirements are presented in the following section.

Human factors considerations are an important element of ATS CPDLC system performance. As illustrated in Figure 1-1, human factors requirements address many aspects of aircraft and ground system equipment, training, and procedures. From a human factors perspective, it is critical that CPDLC ATS messages be checked for reasonableness and implications to flight safety. Moreover, because the system is expected to be used often during controller and pilot operations, the process of interacting with the ATS CPDLC system must be as simple and as easy as possible to reduce the total number of keystrokes that must be made and the amount of attention that must be paid to CPDLC operations. This document therefore contains minimum human factors requirements and guidelines needed to address CPDLC safety, error protection, ease of use, and user acceptance. These requirements will be used by designers, manufacturers, installers, and operators of the CPDLC flight deck and ground system equipment. To facilitate understanding and use of this document by these categories of readers, the requirements and guidelines are grouped into two sections: flight deck and ground system.

Compliance with these requirements is recommended as one means of assuring that the human-computer interface component of the equipment performs its intended functions satisfactorily under all conditions normally encountered in routine aeronautical operations. Any regulatory application of these standards is the sole responsibility of the appropriate governmental agencies.

Section 1.0 provides information on purpose and scope needed to understand the rationale for equipment characteristics and standards stated in the remaining sections. It describes typical