RTCA, Inc.
1140 Connecticut Avenue, NW, Suite 1020
Washington D.C. 20036
USA

Portable Electronic Devices Carried Onboard Aircraft

RTCA DO-233
August 20, 1996

Prepared by: SC-177

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 Committee177 (SC-177) and approved by the RTCA Technical Management Committee (TMC) on August 20, 1996.

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 basis 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.

This page intentionally left blank.

Table of Contents

Appendices

Table of Figures

Table of Tables

Executive Summary

In response to an FAA request, RTCA Special Committee 177 (SC-177) was formed in 1992 to investigate and determine the causes of the potential interference to installed aircraft electrical and electronic systems from portable electronic devices (PEDs) carried aboard aircraft by passengers. While a small list of suspected incidents of such interference from PEDs had been generated over time, interference from a PED could not be duplicated under controlled conditions.

Government and industry personnel contributed their efforts to defining the potential interference phenomena, devising test procedures for both PEDs and aircraft and attempting to assess the risk potential from such interference events. A variety of common consumer PEDs were tested for spectral emissions in commonly used modes. This test procedure was specially devised to reflect the unique PED/aircraft interface, using test methods from FCC, CISPR, MIL Standard 462 and RTCA DO-160C test procedures. Similarly, test methods were devised to determine the path loss factors of low level signals radiated within aircraft cabins. These procedures were then used in determining the potentially interfering signal's path loss in a variety of transport category aircraft. Finally, the susceptibility to interference of installed avionics systems was tested and threshold levels determined. After analysis, the above activity yielded the information necessary to determine the probability of interference to aircraft systems from PEDs.

The intent of these activities was to provide government agencies and aircraft operators with the test methods needed to determine whether a potential for interference exists for certain PEDs, aircraft, and combinations thereof.

This work of the special committee was not to test exhaustively combinations of PEDs and aircraft systems for interference. However, sufficient data was obtained to make provisional inferences regarding the probability of interference from PEDs not designed to intentionally radiate electromagnetic energy. Test facilities available to the committee were inadequate for purposes of testing intentional radiators. However, since the intended emissions are well characterized in terms of frequency and power level, the radiated signal levels were easily derived and were used for purposes of assessing the risk of interference.

Those findings indicated that the probability of interference to installed aircraft systems from PEDs, singly or in multiples, is low at this time. However, the possibility of interference to aircraft navigation and information systems during critical phases of flight, e.g., takeoff and landing, should be viewed as potentially hazardous and an unacceptable risk for aircraft involved in passenger-carrying operations. Therefore, the committee recommends that the use of PEDs be restricted during certain critical phases of flight.

Another important factor to be taken into account is the recognition that new civil aviation system elements include satellite system capabilities. Aircraft receivers for these systems, such as those of the GPS, necessarily operate at a