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Minimum Operational Performance Standards (MOPS) for Strapdown Attitude and Heading Reference Systems (AHRS)

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FOREWORD

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- 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

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1.0 PURPOSE AND SCOPE

1.1 Introduction

This document contains minimum operational performance standards for Strapdown Attitude and Heading Reference Systems (AHRS). This document is intended for equipment that does not use gimbaled sensors. This document is intended for equipment that outputs attitude (pitch and roll). It also addresses functions of heading, turn, slip, and the display of this information. This document does not specify the format of data outputs. These standards specify equipment characteristics that should be useful to designers, manufacturers, installers and users of the equipment.

Compliance with these standards is recommended as one means of assuring that the equipment will perform its intended function(s) satisfactorily under all conditions normally encountered in routine aeronautical operation. Any regulatory application of this document is the sole responsibility of appropriate governmental agencies.

Section 1.0 of this document provides information needed to understand the rationale for equipment characteristics and requirements stated in the remaining sections. It describes typical equipment applications and operation goals, as envisioned by the members of Special Committee 219, and establishes the basis for the standards stated in Sections 2.0 through 3.0. Definitions and assumptions essential to proper understanding of this document are also provided in this section.

Section 2.0 contains the minimum performance standards for the equipment. These standards specify the required performance under standard and environmental conditions. Also included are recommended laboratory and manufacturer flight evaluation procedures necessary to demonstrate equipment compliance with the stated minimum requirements.

Section 3.0 describes the performance required of the installed equipment. Tests for the installed equipment are included when performance cannot be adequately determined through laboratory testing.

Appendix A discusses demonstrating equipment performance using simulation in lieu of flight evaluation.

This document considers an equipment configuration consisting of an Attitude and Heading Reference Unit (AHRU) with complementary peripheral equipment specified by the AHRS manufacturer.

Operation performance standards for functions or components that refer to equipment capabilities that exceed the stated minimum requirements are identified as optional features.

The word “equipment” as used in this document includes all components and units necessary for the system to properly perform its intended function(s). For example, the “equipment” may include an AHRU, an associated mounting tray, and a magnetic sensing unit. In the case of this example, all of the foregoing components and units comprise the “equipment.” It should not be inferred from this example that each AHRS equipment design will necessarily include all of the foregoing components or units. This will depend on the specific design chosen by the manufacturer.

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1.2 System Overview

As shown in Figure 1-1, the AHRS system may consist of:

1.2.1 Attitude and Heading Reference Unit (AHRU)

The AHRU includes:

- Inertial sensing unit which includes a series of angular rate sensors, accelerometers and/or inclinometers.
- Electronics package that processes the sensor data into a usable output format.
- Integral power supply assembly.
- Mechanical housing, in which the above components are embedded, which is "strapped down" (not gimbaled) to an aircraft frame.

1.2.2 Magnetic Sensing Unit (MSU)

1.2.3 Option(s):

- Mounting tray to assist in precision alignment to aircraft axis
- Memory device(s) which preserve critical alignment data, as well as other information
- Installation hardware, connectors, fasteners, etc.

1.2.4 Complementary aiding devices:

- Air data
- GPS
- Etc.

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