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Minimum Operational Performance Standards (MOPS) for Airborne ILS Localizer Receiving Equipment Operating Within the Radio Frequency Range of 108-112 MHz

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F O R E W O R D

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1.0 PURPOSE AND SCOPE

1.1 Introduction

This document contains minimum operational performance standards for airborne ILS localizer receiving equipment. These standards specify system 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 operations.

Any regulatory application of this document is the sole responsibility of appropriate governmental agencies.

Section 1.0 provides information needed to understand the rationale for equipment characteristics and requirements stated in the remaining sections. It describes typical equipment applications and operational goals and establishes the basis for the standards stated in Sections 2.0 through 4.0. Definitions and assumptions essential to proper understanding of this document are also provided in Section 1.0.

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 bench test 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 bench testing.

Section 4.0 describes the operational performance characteristics for equipment installations and defines conditions that will assure the equipment user that operations can be conducted safely and reliably in the expected operational environment.

This document considers an equipment configuration consisting of: Antenna system(s), transmission lines, radio receiver, localizer circuitry and a course deviation indication display. Additional functions and components that refer to expanded equipment capabilities are identified as optional features.

The word "system" as used in this document refers to the ILS localizer system. It includes all portions of both the ILS localizer ground transmitter and the ILS localizer airborne equipment.

The word "equipment" as used in this document includes all components and units necessary for the system to properly perform its intended function. For example, the "equipment" may include an antenna, a receiver unit, localizer circuitry, course deviation indicator, a shock mount, etc. 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 airborne localizer receiving equipment design will necessarily include all of the foregoing components or units. This will depend on the specific design chosen by the manufacturer.

If the equipment implementation includes a computer software package, use the guidelines contained in RTCA/DO-178A, "Software Considerations in Airborne Systems and Equipment Certification."

1.2 System Overview

The localizer system consists of the airborne localizer receiver and ground station transmitter. There are forty localizer channels between 108.10 MHz and 111.95 MHz.

The ground station transmits an RF signal, which is divided into two beams. One beam is amplitude modulated by a 90 Hz sine wave while the other is amplitude modulated by a 150 Hz sine wave. The pattern of the antenna is such that when an aircraft is centered on the runway approach centerline, equal amounts of 90 and 150 Hz tones are received. The localizer ground station also transmits a 1020 Hz Morse Code identification tone for positive identification of the station.

The airborne receiver receives and detects the localizer signal. This guidance information is then presented to the pilot on a CDI, HSI or EFIS display. The display operates such that when the aircraft is to the right of the approach centerline, mostly 150 Hz modulation is received and the pilot gets a fly left command. When the aircraft is to the left of the centerline, mostly 90 Hz modulation is received and the pilot gets a fly right command.

1.3 Operational Applications

The localizer system is used for both precision and non-precision approaches. For a precision approach the localizer is used with an associated glide slope transmitter. These two systems together make up a precision landing system and give both vertical and horizontal guidance to an aircraft.

For a non-precision approach, no glide slope transmitter is available and only localizer horizontal information is supplied. In the non-precision approach, another nav-aid such as a VOR, ADF or Marker Beacon is typically used in conjunction with the localizer to identify the final approach fix.