

Land-Based Joint Precision Approach and Landing System (JPALS)

ARINC provides a complete range of services—from requirements development and modeling and simulation through test and demonstration—for ultra-sophisticated, sea- and land-based automated aircraft navigation and landing systems.

Contracted by the U.S. Air Force to develop the functional and performance requirements for the Land-Based Joint Precision Approach and Landing System (JPALS), ARINC has conducted test and demonstration events, developed end-to-end computer simulations and models to assess system performance, conducted performance analyses necessary to mature critical technology elements, and developed, documented and validated system-level performance requirements.

Land-Based JPALS

Land-Based JPALS will use differential GPS technology to provide an automated, rapidly deployable, all-weather precision approach and landing capability for both mobile and fixed-base applications. Mobile systems will be used to support tactical operations from allied air bases and special missions operating out of austere airfields worldwide. Fixed-based systems will be installed at every military air station operated by U.S. forces to provide precision instrument-approach capability for military and civilian aircraft.

Technology Development

As the Increment 2 technology development prime contractor for Cat I (200 ft. Decision Height and 1/2 mile visibility) Land-Based JPALS, ARINC developed modeling and simulation tools used to assess Land-Based JPALS performance. As part of this effort, ARINC collected, analyzed, and processed laboratory, field and flight test data using different GPS anti-jam technologies to provide algorithms and inputs to JPALS modeling and simulation tools. ARINC continues to support technology development for Cat II (100 ft. Decision Height and 1/4 mile visibility) and Autoland operations, slated for Increment 3.

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DEDICATION BEYOND EXPECTATION



Quick Facts

- ▶ Unmatched experience with civil and military GPS navigation technology
- ▶ Wide range of experience in real-world aircraft and ship operations
- ▶ Dedicated systems engineering, software development, and field test teams
- ▶ Proven program management expertise
- ▶ Multiple contract vehicles



Increment 3 development includes analysis, testing and characterization of GPS sensors, development of threat detection/mitigation techniques, and assessment of updated Land-Based JPALS algorithms. Using modeling and simulation tools, test results and characterization data, ARINC is identifying and validating JPALS Increment 3 performance requirements.

Modeling & Simulation

ARINC developed performance and availability models for the JPALS programs that allow in-depth analysis of system performance using candidate functional system architectures. The JPALS Performance Model, which allows ARINC to assess the performance capabilities of various candidate JPALS architectures and test navigation and integrity algorithms, consists of an offline, end-to-end simulation of GPS constellation, GPS antenna/receiver and INS components.

The JPALS Availability Model, which allows ARINC to verify the ability of the candidate architecture to meet specified availability and guidance quality requirements under clear air and jamming conditions, consists of a series of detailed models of the different error sources present in various candidate JPALS architectures. Model development and validation using field test data is complete. Because of their modular nature, the models can be modified to assess the functional performance of other GPS-based navigation systems.

Requirements Development

ARINC provides critical support to the U.S. Air Force to develop, validate and document Land-Based JPALS performance requirements. We conducted numerous trade studies to characterize sensor performance, develop error allocations, and assess the impacts of requirements changes. We also worked closely with U.S. Air Force JPALS personnel to research capabilities of existing systems and coordinate inputs from other JPALS stakeholders.

JPALS Man Pack

ARINC has developed and flight tested for the U.S. Air Force a proof-of-concept Ground Base Augmentation System (GBAS) for aircraft landing and guidance titled Man Pack. The Man Pack system demonstrates the future capability of a small military unit to setup and operate an aircraft guidance and landing control system in a forward area by integrating the capabilities of current civilian GBAS installations, military receiver technology, and tactical portability to provide a vision of the future for the Air Force today.

Test & Demonstration

ARINC conducted several Land-Based JPALS test, demonstration, and data collection events, in clear air and jamming conditions, using system components from multiple vendors and subcontractors. Collected data were analyzed using the Performance and Availability Models to determine error budgets and system performance requirements, and assess maturation of critical technology elements.

ARINC has been supporting JPALS, N-UCAS, and other GPS-based navigation systems for the past 12 years. Whether your navigation system requirements involve air or sea transport, or manned or unmanned systems, ARINC has the dedication and expertise needed to meet your most challenging specifications.

ARINC Incorporated, a portfolio company of The Carlyle Group, provides communications, engineering and integration solutions for commercial, defense and government customers worldwide. Headquartered in Annapolis, Maryland with regional offices in London and Singapore, ARINC is ISO 9001:2008 and AS9100 certified.

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