

NRA Workshop AATT Project Office

March 23, 1999

Task Order 18

**ADS for Rotorcraft Operations in a
Low Altitude, Non-Radar Environment**



ARINC

Project Overview

Task Order 18

**Title: ADS for Rotorcraft Operations in a
Low Altitude, Non-Radar Environment**

Contractor Team: SAIC/ARINC

Period of Performance: 11-11-98 to 7-9-99

Task Order Value: \$200K

Completion (through 3/5/99): \$61.8K (31%)

NASA Project Manager: George Tucker

SAIC Project Manager: Ed McConkey

ARINC Project Manager: Rick Stead

Project Staffing Plan



Schedule



Background

Rotorcraft often operate in areas that have few or no NAS CNS facilities

- **Low altitude beneath CNS coverage**
- **Offshore in Gulf of Mexico**

New technologies permit alternative CNS solutions

- **GPS for navigation**
- **Digital terrestrial and satellite communications**
- **Automatic dependent surveillance**
 - ◆ **Air-to-air for improved situational awareness**
 - ◆ **Air-to-ground for improved surveillance**
 - ◆ **Ground-to-air provides traffic and flight information to flight crew**

Objective

Assist NASA in developing a flight research capability to address the use of ADS for rotorcraft

Ground Rules

- **Use the offshore operations in the Gulf of Mexico as the primary operational scenario**
- **Select avionics/airborne systems typical of candidate aircraft**
 - ◆ **Sikorsky UH60 Blackhawk (typical medium/large helicopter)**
 - ◆ **Bell OH58 (typical small helicopter)**

Technical Approach

System requirements

- Survey available reports
- Interview government/industry representatives
 - ◆ FAA
 - ◆ Gulf helicopter operators
 - ◆ CNS avionics manufacturers
- Participate in RTCA ADS committee (SC186)

Define potential avionics suites

- Review existing alternatives
- Identify candidates suitable for rotorcraft
- Identify shortfalls in existing solutions
- Work with avionics manufacturers to overcome shortfalls

Technical Approach (continued)

Functional integration of avionics

- **Acquire and review information on NASA aircraft**
- **Develop functional block diagrams linking current aircraft systems with candidate avionics**
- **Identify physical and electrical interfaces**
- **Identify message data content and formats**

System acceptance

- **Identify bench tests and installed tests to assure correct operation of components and subsystems**

Preliminary Results

Related ADS activities

- **Ongoing ADS projects**
 - ◆ CAA Ohio Valley tests
 - ◆ Operation Capstone in Alaska
 - ◆ European tests
- **Current tests involve primarily transport category fixed-wing aircraft**
- **Little ongoing general aviation testing**
- **Ongoing RTCA activities**
 - ◆ ADS-B MASPS published
 - ◆ Guidance material for CDTI published
 - ◆ Additional MOPS efforts underway

Preliminary Results (continued)

Rotorcraft requirements - offshore

➤ Primary operational requirements

- ◆ Highest priority - improved situational awareness to ensure greater safety
- ◆ Second priority - improved air-ground surveillance to support reduced separation in IFR operations
- ◆ Lower priority - flight information and traffic information via data link
- ◆ Helicopter operators highly sensitive to system costs

Preliminary Results (continued)

Candidate avionics suites

- **Few general aviation options available**
- **Data link options**
 - ◆ VHF Data Link (VDL) (VDL Mode 2 and 3) (US pursuing)
 - ◆ VDL Mode 4 (Europeans pursuing)
 - ◆ Universal access transceiver (UAT) (Mitre-developed)
 - ◆ Mode S with extended squitter message
- **Mode S with extended squitter probably best option for rotorcraft**
- **General aviation Mode S transceivers available**
 - ◆ Availability of extended squitter is under investigation
- **General aviation GPS receivers available**

Preliminary Results (continued)

Functional integration issues

- **Mode S transceiver must retain basic functional and performance capability plus have extended squitter capability for transmitted signal**
- **Mode S squitter must be transmitted/received from both top and bottom of aircraft for omnidirectional air-to-air capability**
- **Mode S 1090 MHz airborne receiver required**
 - ◆ **Must be able to process extended squitter message**
 - ◆ **Availability of receiver is under investigation**
- **General aviation GPS receivers do not have standard (or certified) digital data outputs**

Project Deliverables

Project Status Briefing - Scheduled 4-8-99

Final Report - Draft 6-11-99, Final 7-9-99

- **Introduction**
- **System requirements**
- **Airborne avionics requirements**
- **Ground equipment and infrastructure requirements**
- **Avionics integration and testing**
- **Conclusions**
- **Recommendations**