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Introduction: Small Aircraft Transportation System High Volume Operations

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THE small aircraft transportation system (SATS) project (2000–2005) was the follow-on effort to the successful and groundbreaking advanced general aviation transport experiments (AGATE) program of the late 1990s. Together, AGATE and SATS comprise the first major new paradigm in general aviation operations in at least 50 years. They were devoted to defining and developing technologies that would enable reliable, safe, scalable, affordable, on-demand air access to the more than 3400 small, underused community airports in a nontower/nonradar environment, in near all-weather conditions. In the longer term, the SATS vision provokes advances in mobility in the form of greatly increased radius of action of daily life [1]. SATS was not only a research project, it was a demonstration project. A multiple aircraft flight demonstration of SATS was conducted on 6–7 June 2005 in Danville, VA. In this public demonstration, six aircraft in the vicinity of a SATS capable airport were all landed within 30 min, under simulated instrument meteorological conditions, without any assistance from air traffic control. The SATS project was a cost-shared public–private partnership between NASA Langley Research Center, the Federal Aviation Administration, and the National Consortium for Aviation Mobility.

The special section of the *Journal of Aircraft* is sponsored by the AIAA Atmospheric Flight Mechanics Technical Committee. It contains nine papers selected from the SATS invited sessions at the 2005 AIAA Aviation, Technology, Integration, and Operations Conference, Arlington, VA, 26–28 Sept. 2005. One paper was presented at the 2005 Digital Avionics Systems Conference, 30 Oct.–3 Nov., Arlington, VA. Each of these papers address one or more technical challenges pertaining to SATS high volume operations.

The special section starts with a paper by Baxley, who introduces the SATS concept of operations and provides an introduction to the SATS goals and methods. Viken, Brooks, and Johnson then provide an overview of the four enabling operating capabilities for SATS, which consist of high volume operations, en route integration, lower landing minimums, and enhanced single pilot performance. SATS achieves much of its safety and performance benefits through improved conflict prevention and separation assurance. A paper by Consiglio, Carreno, Williams, and Munos describes these methods. Next, Consiglio, Williams, Murdoch, and Adams validate the SATS high volume operations concept in a simulator environment, followed by a paper by Williams which details the SATS flight experiment. New display technologies integrated with a pilot advisor capability are a central feature of the SATS functionality. The technique of automated flight segment identification is presented in a paper by Kelly and Painter, and a paper by Davis presents the results of a detailed piloted simulation experiment on situational awareness, using a primary flight display with a highway in the sky. Performance improvements in sequencing and separation are possible by modifying certain margins, and these are proposed and evaluated in a paper by Helbing, Spaeth, and Valasek. The special section is concluded with a paper by Newman, Britcher, Kassaye, Roy, Krizansky, and Acheson, which discusses methodology for construction and implementation of in-flight trajectory management systems for vehicles participating in a SATS environment.

It is worth noting that the substantial research investment and verification flight test as presented in this set of papers demonstrate that SATS is technically feasible. Whether or not SATS or a successor concept sees wide acceptance and use will ultimately depend upon cost, cultural, and certification factors.

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Reference

[1] Holmes, B., Durham, M. H., and Tarry, S. E., "Small Aircraft Transportation System Concept and Technologies," *Journal of Aircraft*, Vol. 41, No. 1, Jan.–Feb. 2004, pp. 26–35.

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