

## **A Position Paper from the AIAA General Aviation Technical Committee: A General Aviation Proposal**

### **Introduction**

The air traffic control system was essentially created based on the needs of the airlines with a secondary accommodation for General Aviation (GA) aircraft of the era of the 1940s and 1950s. If GA is to expand and become more utilitarian, it is the opinion of the General Aviation System Technical Committee that this needs to change with simplified operating procedures and much lower cost aircraft. The NASA Small Aircraft Transportation System (SATS) initiative started with similar goals, and though producing a valiant effort with many other successes, ultimately failed to achieve either simplified operating procedures or a lower cost aircraft. If neither of these is achievable or desired, then GA will never be a mainstream transportation system and will merely fill the special niches such as Emergency Medical Services (EMS), government/police/utility surveillance, airborne limos for the elite, airborne applications (agriculture/forestry), and toys for dilettantes. These are all useful niches, but are they adequate to sustain a healthy GA industry? Does GA need to become a mainstream transportation system for personal transportation? The answers to these two questions will determine if this proposal is useful. Even if the answer is that it would be useful, the decision still needs to be made to determine if we are tilting at windmills and want to proceed given the existing barriers to implementation. Based on the following proposal, it is the collective opinion of the AIAA General Aviation Technical Committee that a move toward a distributed personal mainstream transportation system using GA would be most beneficial to the United States as a whole.

### **A General Aviation Proposal:**

The Goal of General Aviation becoming a mainstream transportation system in the United States entails the following objectives. First, the procedures and equipment to allow an average individual to aviate, navigate and communicate essentially anywhere in the country must be developed. Next, the implementation must include a wide range of **benefits**, to include:.

- For the country (e.g., create increased GDP, higher employment in a high tech sector, and reduced pressure on an over utilized highway infrastructure which has been repeatedly demonstrated cannot be achieved with increased pavement)
- For the industry (e.g., create a vibrant manufacturing sector employing many thousands of people in all capacities producing one aircraft for every 1,000 automobiles that is currently manufactured)
- For academia (e.g., create an increased spread of aeronautical knowledge with innovative technical designs)
- For the individual (e.g., in the age of increased teleworking still be able to conveniently make those important face-to-face meetings when needed, and allow easier, less time consuming transportation to leisure and recreational sites - this transportation should not be confused with sport aviation.)

If these benefits are not substantially achieved and General Aviation does not become a mainstream transportation system, it is expected there will be a continual overall declining trend for the General Aviation industry and access to convenient personal air transportation.

### **Needed to achieve the General Aviation Proposal:**

There are three encompassing fundamental events needed to achieve the benefits outlined in the General Aviation proposal. They are:

- Operational procedure development.

- Mass production of low cost aircraft.
- Simple short term operator training.

The operational procedures developed should be simple to follow rules for separation and sequencing. They cannot be an IQ test requiring memorization of a long sequence of complex instructions. These procedures should capitalize on the capabilities of these new aircraft with control authority generally distributed rather than centralized as it is now. Many of these procedures may follow the same format as those now being developed for Unmanned Aerial Systems (UAS). The procedures need not only to be safe, but efficient. Remember, (the ultimate safety for aviation is to keep everyone on the ground. The Government's role shifts more toward assuring all are following the rules rather than directing the aircraft. It is expected these operational procedures will address the inclusion of many additional small landing facilities, private and community owned into the system.

New innovative, easy to operate aircraft need to be designed and competitively mass produced. Capabilities of these aircraft need to be defined as a class, e.g., max of 4 times highway speeds, 1200 nmi range and 4-6 usable seats with full fuel and baggage. Operation of the aircraft needs to be standardized across the class, allowing easy, nearly transparent, transition between manufacturers and models. Target retail price of one of these aircraft new, including all systems and avionics, should be not more than a luxury car. This development and cost control efforts must include the required new engines, fuels and airframes. Manual maintenance functions and checks need to be reduced to an absolute minimum, both in frequency and complexity. Again, much of this development can parallel of borrow from that of UAS.

The training necessary for an average individual to be capable of operating this new class of aircraft needs to be achieved in 1-2 weeks to safely operate in the equivalent environment currently relegated to a private pilot with instrument rating.

### **Potential Impediments to the General Aviation Proposal:**

There are many significant impediments to achieving this General Aviation Proposal. Surmounting any one, much less all, will require a concerted, coordinated effort. The impediments can be roughly categorized as Regulatory, Bureaucratic, Competing Industries, and Owner's of existing aircraft.

- Regulatory
  - Aircraft/engine/avionics certification.
    - Current regulatory and certification process is not geared toward mass production, design flexibility and modernization.
  - Aircraft maintenance.
    - Current aircraft maintenance requirements will not be able to support a large number of aircraft in operation by the general public.
  - Procedure development.
    - Current evolution of operational procedures by committee is archaic and moves at a glacial pace that will not support the rapid change needed.
  - Training.
    - Current methods of pilot training taking months of intense training for a private pilot with an instrument rating will discourage most from becoming involved.
  - Security.
    - Current over zealous ineffective security measures against General Aviation will stifle its usefulness as a transportation system.
- Bureaucratic
  - New procedure implementation

- Air traffic controller union resistance to procedures that could be incorrectly perceived to reduce their role.
    - Reluctance to discontinue a Privatized Fee for "Service" cash stream reduction for services not needed or wanted under new General Aviation procedures.
  - Perception of less control over movements of the populace under misguided concepts of national security.
- Competing industries
  - Airlines
    - They perceive a further erosion of ridership, especially on short haul flights, when people are not forced to take mass transit.
  - Air Carrier manufacturers
    - They perceive their market to Airlines in the United States reduced with the potential of declining airline ridership.
  - Limited production old style General Aviation manufacturers (airframe and propulsion)
    - They see part of their potential market subsumed by the advent of new lower cost, more reliable aircraft..
- Owners of old style General Aviation aircraft.
  - They see the value of their aircraft decreasing with the advent of new lower cost aircraft.

### **Recommendations from the General Aviation Technical Committee pursuant to the General Aviation Proposal:**

The General Aviation Technical Committee recommends the following two actions be taken in the United States to achieve the aforementioned benefits.

- Create a new class of aircraft with a commensurate operating licensing.
  - Precedence would be the recent Sport Aircraft and Sport Pilot License.
- Create the regulatory and procedural infrastructure in which that class of aircraft can operate.

In support of the overall proposal goals and needs the General Aviation Technical Committee will write a series of white papers which give technical guidance on what is needed in the following areas to make the proposed initiative successful. It should be understood that these functional areas of these white papers are not independent, but must be integrated as a system of systems.

- Propulsion
  - Expound on the new engine technology, including alternative fuels, low noise requirements and low maintenance for both the operator and mechanic, that will be needed
  - Discuss the possibility of implementing alternative fuels more quickly for GA than for automobiles
  - Outline an efficient engine certification process that will allow low cost and the ability to readily integrate new technology
- Airframes
  - Expound on the airframe structures needed to safely operate at the speeds, altitudes and weights of the proposed new class of aircraft
  - Discuss the airframe requirements needed to operate in the atmospheric environment proposed, including icing and lightning while providing an aircraft cabin environment that is at least as comfortable as a luxury car

- Outline an efficient airframe certification process that will allow low cost and the ability to readily integrate new technology while providing a high level of safety even under emergency operations
- Avionics
  - Expound on the communications, navigation and surveillance avionics needed for ease of operation of this class of aircraft including any autopilots and automation systems necessary to implement new procedures
  - Outline the reliability and availability levels of all the required avionics as well as a certification process to assure safety while maintaining low production cost
- Procedures
  - Expound on the operational concept and the procedures required to operate a vast number of aircraft
  - Discuss the simulations that need to be done to validate the operation concepts and procedures with this number of aircraft without causing airborne gridlock
  - Outline how these aircraft and procedures can be integrated into an evolving National Airspace System.
- Infrastructure
  - Elaborate on the hopefully minimal infrastructure that will be required to support these aircraft and procedures where they need to operate