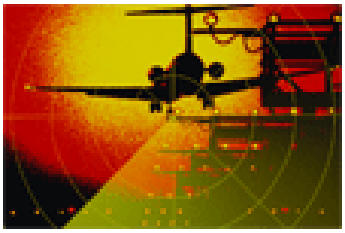
Flight Controls

General aviation and commercial aviation are related in many ways. Security may be the least common denominator.

by Greg Wagner & Rick Waddell



General aviation, to date, has a far better record than do the commercial airlines. As a result, although ideas like Free Flight and SMA have been tested, the government has done very little to change its security standards.

What they have accomplished is to develop and implement a program for Federal Aviation Regulation 135 (charter) operators called the 12-5 program. This program requires that operators that use aircraft weighing more than 12,500 pounds adhere to a new set of rules instituted by the Transportation Security Administration (TSA).

These new rules require all employed pilots to be fingerprinted and to undergo a rigorous background check against criminal databases. Furthermore, each charter organization is required to obtain information on each potential passenger and compare that information to the TSA No-Fly-List, a compilation of those names of people whom the TSA and the Federal Aviation Administration (FAA) have deemed to be a threat against any U.S. registered aircraft. The fact that just anyone can charter an aircraft and thereby have access to an aircraft that has the capacity to be used as a tool for terrorist activity made the TSA recognize and put a band aid on the one gaping hole in general aviation security.

New Wrong

But a new breed of charter organizations known as “per-seat, on-demand jet service” plans to use very light jets (VLJs), which weigh less than 12,500 pounds. Editor’s note: See “Waiting Games” in the October 2006 issue of BTE for background on VLJs.

There are several immediate concerns that arise from this new breed of aircraft and operators. The first concern from the aircraft side of the equation is that while a VLJ will be considered an economical means of owning and operating an aircraft, it may also attract a sector of wealthy individuals who will find this an attractive alternative to the airlines and chartering. The concern here would be that, in the past, wealthy individuals who have owned and operated their own aircraft have not had a very good safety record. With this in mind, the FAA and the National Business Aircraft Association (NBAA) have jointly drafted regulations that will govern the training required of those owner/operators of these new aircraft.

The second concern, if these new aircraft become the next trend in aviation, is the resulting potential for congestion of the National Airspace System (NAS). VLJs are intended to be operated at the same altitudes and flight regimes as those aircraft belonging in the commercial aircraft category as well as those in the general aviation category. A combined production forecast envisions 155 VLJs in U.S. skies in 2007, 350 in 2011. With a production forecast of this magnitude, implementing a technological standard to all manufacturers will help ensure VLJs’compatibility with other aircraft currently using the airway system.

A technological standard is an important step in keeping pace with the ever-changing airspace in which we fly. There are many ongoing redesigns in the continuing effort to stay abreast of the increasing air traffic congestion. This ongoing quest to improve the airspace we fly in involves advanced technology on the part of the user (aircraft) and the provider, Air Traffic Control (ATC).

Developing the technology is very complex. Many factors must be considered when a program is developed to advance the NAS. The technology must be affordable to the user (airlines, corporations, charter operators and private operators). Interchangeability is also essential so that manufacturers will find an incentive in developing the technology. Interchangeability means that one manufacturer might develop a digital radio capable of Automatic Detection Surveillance (ADS) and another manufacturer might develop its version of the same product. Each product must be interoperable with the airspace infrastructure technology being developed.

Less Talk, More Safety

Technology developed by ATC must be coordinated with technology developed by aircraft manufacturers and systems developers. This technology advancement is currently being developed in the areas of communications, navigation and surveillance (CNS). Simplifying communications benefits both the controller and the pilot. New digital radios will allow preprogrammed response capabilities that will decongest the frequencies and provide more dedicated capability in the event of an emergency or abnormal situations caused by weather or special use airspace.

Communications goes hand in hand with surveillance. New technology incorporates advancements in transponders which allow controllers to monitor (survey) aircraft. This new technology allows the transponder to provide more than just where (position and altitude) the aircraft is in space, but also the aircraft's future intention (based on airspeed, rate of descent or climb and track). This technology is ADS.

A more advanced form of ADS is ADS-B, where B means broadcast. ADS-B allows other aircraft to also know the position and future intentions of aircraft around them. In addition, ADS-B allows ATC to access flight parameters of aircraft on demand. This technology will soon replace radar and will be of most benefit in surveillance and communications of oceanic traffic where radar is non-existent. (Some oceanic traffic does have radar; it extends roughly 100 to 200 miles from the coast and in the northern tracks you might find yourself in a radar environment near Greenland and Iceland with the same limitations. Outside of these boundaries, radar is not available for any traffic.) Navigation is predominately by Global Position Satellite (GPS) controlled by Flight Management Systems (FMS) in the aircraft cockpit. With precise navigation and surveillance along with improved communications, the skies are safer and flights are more efficient.

The National Aeronautic and Space Agency (NASA) has advanced programs in cooperation with the FAA. These programs are normally for a period of 5 years and are funded by the General Accountability Office (GAO). Private organizations typically become involved in developing a technology to accomplish the goals of these programs. At the end of the program (historically), the pluses and minuses are evaluated; "what works" is retained and the rest is typically left behind.

Free Flight Tests

Free Flight was one of the first examples of an effort by the FAA to explore technological advancement and airspace improvement. This was a limited project conducted in Alaska and the Ohio Valley. The goal was to allow pilots to "freely" flight-plan a route that was efficient and safer in terms of traffic separation. The technologies utilized were ADS-B, which allowed Controller Pilot Data Link Communication (CPDLC), as well as development of planning tools used by the controllers which allowed sharing of information with airlines and other flying managers. Some of these tools included:

• URET CCLD (User Request Evaluation Tool) — alerts controllers of potential traffic conflicts up to 20 minutes ahead.

• CDM (Collaborative Decision Making) — provides the FAA and airline operations with real time access to NAS status, which allows the FAA and users to manage NAS traffic.

• SMA (Surface Mover Advisor) provides information to ramp flow managers to efficiently plan gate arrivals coordinated with departures.

Although the GAO no longer funds this program, the benefits remain as seeds. These developing tools and technology are continuing to evolve into safer and more efficient use of the National Airspace System. ADS-B, CPDLC, CDM, SMA and URET (as well as other tools) are in use, particularly in the North Atlantic Track System (NATS), which all traffic to and from Europe must cross.

Small Aircraft Transportation System (SATS) was a 5 year program developed with cooperation of NASA, the FAA and the National Consortium for Aviation Mobility (NCAM). "The SATS concept of operations uses small aircraft for business and personal transportation, for on-demand, point-to-point travel between smaller regional, reliever, general aviation and other landing facilities, including heliports," explains NASA Facts Online. "The SATS architecture contemplates near-all-weather access to any landing facilities in the U.S. SATS would leverage Internet communications technologies for travel planning and scheduling, which would also minimize user uncertainty regarding destination services. It would operate within the National Airspace System, initially about 5,400 existing public-use-landing facilities (scheduled air carriers serve only about 660 of these facilities)."

The goal of the project was to develop four capabilities that would enable the system to work:

• On-board computing;

• Advanced flight controls;

• Highway-in-the-Sky displays;

• Automated air traffic separation and sequencing technologies.

This program concluded with a proof-of-concept fly-in at Danville, Va., on June 5-7, 2005. This demonstration proved that the system could enable safe and affordable access to virtually any runway in the nation in most weather conditions.

Although the funding is depleted and the program is ended, the system proved to work well and the technology is available. This particular program might prove to be the answer for the congestion forecast by increasing numbers of small aircraft and jets in our skies.

High Altitude Redesign

The FAA is currently implementing a program called the High Altitude Redesign (HAR). This is part of the National Airspace Redesign (NAR) program, which is included in the FAA's program called Flight Plan 2007-2011. The HAR's focus is to change the navigation structure and operating methods for en-route operations in the high altitude airspace environment. The restructuring will ultimately allow point-to-point navigation, which will provide more freedom to users who have the required navigation equipment and capability. The capabilities required will be Required Navigational Performance (RNP), Area Navigation (RNAV) and point-to-point navigation. They will replace the present jet-route structure in the higher altitudes.

The FAA implemented Domestic Reduced Vertical Separation Minimum (DRVSM) on Jan. 20, 2005. What this means is that the prior 2000-foot separation between usable flight levels FL290 and FL410 (inclusive) has been reduced to 1000 feet. This might explain why business travelers see more aircraft (and they seem to be closer) from their seat windows. This reduction in separation allows for more traffic to fly in this airspace, reducing delays that were created by airspace congestion. Aircraft that are not equipped and certified for RVSM are not permitted in this airspace. Europe and most of the world have operated with RVSM for several years.

Building On Success

What's next? The future of our airspace development is projected in the FAA's Flight Plan 2007-2011. Flight Plan is a 5-year program that presents goals and a strategic plan to reach those goals. These goals are focused on safety, efficient use of the airspace and advancement of the technology used by the NAS controllers and managers and the users (aircraft).

Flight Plan points out successful accomplishments in the last 3 years. Some of these accomplishments include:

• Reduction of general aviation and Alaska accidents.

• Six new runways have been commissioned allowing an increased capability of 1,025,000 operations per year.

• Emergency and disaster response during Hurricane Katrina — air traffic control was back on line within 48 hours in spite of the devastation caused by the hurricane.

• Runway safety has been improved with the reduction of runway incursions.

• Reduced Vertical Separations Minimum (RVSM) increased the total number of aircraft that can fly safely at one time.

• A 10–year controller hiring plan which projects 12,500 new controllers hired from 2004 to 2014.

The future vision of Flight Plan 2007 is the reduction of the congestion in the NAS. Next Gen is a program that is being expanded to accomplish this goal. "The Next Generation system recognizes that air traffic demand will double to triple over the next 20 years," says an FAA report. "It anticipates handling new aircraft types, ranging from low-orbit spacecraft such as SpaceShipOne, to tilt-rotor aircraft, to very light jets being used as air taxis and unmanned aircraft, and all must have room to fly."

Next Gen will utilize and improve technologies and procedures such as RNP and ADS-B to transform the NAS over the next two decades. This plan also focuses on more effective use of the largely untapped

capabilities of more than 2,800 small airports throughout the nation.

As the forecast of congestion in our skies becomes a bigger and bigger concern for business travelers, the answers are partially in place and are currently being evolved and developed. By 2025 our NAS will certainly look different than it does today. It may even be possible for travelers to jump into their own aircraft, push a few buttons and (safely) find themselves at their destination.

Send questions or comments to jferring@askBTE.com. ■