The world around us is abuzz with the discussion of drones as more and more uses for this diverse class of aircraft come to the forefront. The Federal Aviation Administration (FAA) is under siege to find ways to accommodate the large and small unmanned aerial vehicles (UAVs) and to do so in ways that are safe to all in the air and on the ground, as well as to protect the privacy of those who see UAVs as more threatening than the aircraft that came before. The authors think that all of this attention on UAVs has obscured a much more fundamental aspect of aviation operations – the future for general aviation flying as we know it today.

Older readers will remember that Laurel and Hardy (Stan and Ollie) of early motion picture fame would regularly lament the “fine kettle of fish that you’ve gotten us into” when confronted with a comic dilemma. The reference here is to the emerging situation posed by the proliferation of small UAVs that covet the lower altitudes and airspace that has historically been where general aviation (GA) pilots had free reign in a see-and-avoid, VFR-world. In the spotlight cast on the Class G and adjacent airspace where these small UAVs offer such commercial promise, FAA, NASA, and industry foresee the introduction of operational and technological ways and means to allow routine transit. A close reading of these plans reveals that they will also impose new restrictions on GA aircraft that would use that airspace. Said another way, the methods that would facilitate or accommodate safety between and among UAS in proximate airspace would also be imposed on the GA aircraft operating there.

The thrill of flying a small aircraft comes from the freedom afforded by the “wide open spaces” and the exultation that comes with being alone up there, in four dimensional control over the vehicle, with few or no concerns. This is the intoxication of flying that every pilot experiences, which brings her or him back again and again. Yet, with the possible exception of the Alaska “Bush Pilot,” general aviation pilots have come to recognize that for their own safety and the accommodation of other aircraft, the imposition of rules may be required. Such rules could bound their operation in time or spatial dimensions, and/or require them to communicate their position on a regular basis. In the simplest situation this means...
carriage of a VHF two-way (analog) radio. Then, depending on the aircraft or mission, they may elect to fly into airspace or at altitudes that require additional avionics, up to and including systems that mimic those of commercial carriers. For a myriad of reasons, including the cost of purchasing and installing this equipment, many GA aircraft are not equipped. The point of emphasis here is that at most low altitudes GA has wide latitude with regard to movement with little or no avionics.

And now along come the drones. No one at the FAA – nor anywhere else – anticipated the tidal wave of interest that came with the introduction of UAVs into the domestic environment. Certainly, some of us [the authors] thought the transition from the battlefield to the civilian environment would require the accommodation of the large UAV (e.g. Global Hawk, et al) in the National Airspace System (NAS) due to their flight characteristics, remote pilots, and the ability to carry avionics like other NAS users. Nevertheless, it was the low cost of acquisition and the innumerable configuration options that triggered the stampede to small vehicles. Now, with the benefit of hindsight we all can see these small UAVs have such broad appeal to individuals and to commercial interests that they will proliferate. Evidence of the market passion is found in the flood of applications for UAS operations in accordance with Sec 333 of the FAA Modernization and Reform Act of 2012.¹

The FAA is coping with this phenomenon as best they can but most observers, including the U.S. Congress, are frustrated with the lack of overall progress in NAS integration and it has become increasingly clear that Sec 333 authorizations lack key degrees of freedom that many – if not most – commercial operators will require.

Postulating that the FAA will create an environment where small UASs are free to operate broadly in the lower strata of the airspace (Class G), that scenario would require the following:

- Ubiquitous Position Location (i.e. GPS) + Broadcast requirements
- Independent small target surveillance in lieu of Line of Sight (LOS)
- Traffic management
- Protection of third parties

The trouble is that in order to make this airspace (and the underlying people and property) safe, it will require that small UAVs adhere to a set of requirements, including carriage of the aforementioned avionics. Requirements such as:

- Geographic limitations [aka privacy fences]
- Limits on photography or thermal imaging
- Noise and/or hover limits
- Enhanced sense and avoid capability
- Third party liability protection
- Altitude limits

Not only do we think that the aforementioned will eventuate, we offer as evidence that the big aeronautics firms do as well. We see the likes of Exelis, Lockheed Martin, Hughes, and even NASA (with their Unmanned Aerial System Traffic Management (UTM) project) working to facilitate these flights with better surveillance and airspace management schemes.
There is an irony here in that efforts to bring order to the airspace where the small UAVs are likely to predominate are casting light on the uneven landscape of safety regulations that have forever characterized FAA oversight of the NAS. By this we mean that there have long been different standards applied to GA and commercial aircraft and even different standards applied to the same class of aircraft when operating in a different geographical location (e.g. Alaska). In this instance it would appear that the FAA would not bring the UAVs down to the more permissive levels currently allowed for VFR GA but rather raise GA standards to be applied to these new standards for UAVs.

We think the logic is incontrovertible that GA aircrafts – which formerly had this airspace to themselves – will also be asked to adhere to the same requirements as the UAS if any safety criterion is to be meaningful. The prospect is that current uncontrolled airspace (Class G) will become controlled, which will set a precedent for UASs to further encroach upon Class E, C, D, and B airspace to carry out their missions. This latter conclusion is based on our prognosis that the flight paths of most potential commercial drone applications will need to touch controlled airspace in some way, and will likely increasingly need to operate in instrument meteorological conditions in performing some of their more critical missions. This will force the integration of drones with the more traditional manned aircraft, both general aviation and commercial aviation operations.

The current assertion by some that the FAA will need to “make the drone interface to the ATC system exactly the same as a manned aircraft” simply will not work. In order to replicate the manned aircraft interface, a UAS ground station manned with a certified crew would be required even for a 60 lb. drone that is delivering medical supplies. Consequently, we see that commercial drone interoperability will require that the drone become more autonomous.

The presence of autonomous drones intermixed with the more traditional manned aircraft is certain to add requirements to the manned aircraft and pilot certification, even if the drones are made responsible to see and avoid the manned aircraft. What pilot would want to fly their airplane in the case that any potential collision hazard from a surrounding drone will have the drone solely responsible for safe collision avoidance? Most drones on missions will be cruising in GA airspace territory – regardless of whether it is controlled or uncontrolled – thus, whether it’s Visual Flight Rules (VFR) or Instrument Flight Rules (IFR), general aviation will bear the brunt of the impact from the drone revolution, either through more airspace restrictions, more equipage to cope with the new drone neighbors, or tighter control from ATC as the drones and GA are intermixed in the airspace.

The obvious equity question raised is whether the legacy users of the airspace should have to bear the burden necessary to accommodate the new entrants. This might indeed be a fine kettle of fish we've gotten into this time.

Endnotes