SAFETY ADVISOR

A DIVISION OF THE AOPA FOUNDATION

UAS IN THE USA
MANNED & UNMANNED AIRCRAFT FLYING TOGETHER SAFELY

IF YOU'D BELIEVE THE NEWS, YOU'D BE CONVINCED THAT SMALL, HOMEBUILT UNMANNED AIRCRAFT ARE HAPHAZARDLY OVERTAKING THE AIRSPACE WITHOUT ANY BOUNDARIES OR RULES.

The truth is far from that. Sure, there are innovative commercial designs making the news. But in reality, it takes more than a backyard, a gizmo, and a remote control to make the transformation from the design lab into the National Airspace System (NAS).

Public/Department of Defense (DoD) Unmanned Aircraft Systems (UAS) represent the majority of unmanned aircraft operations in today's airspace.
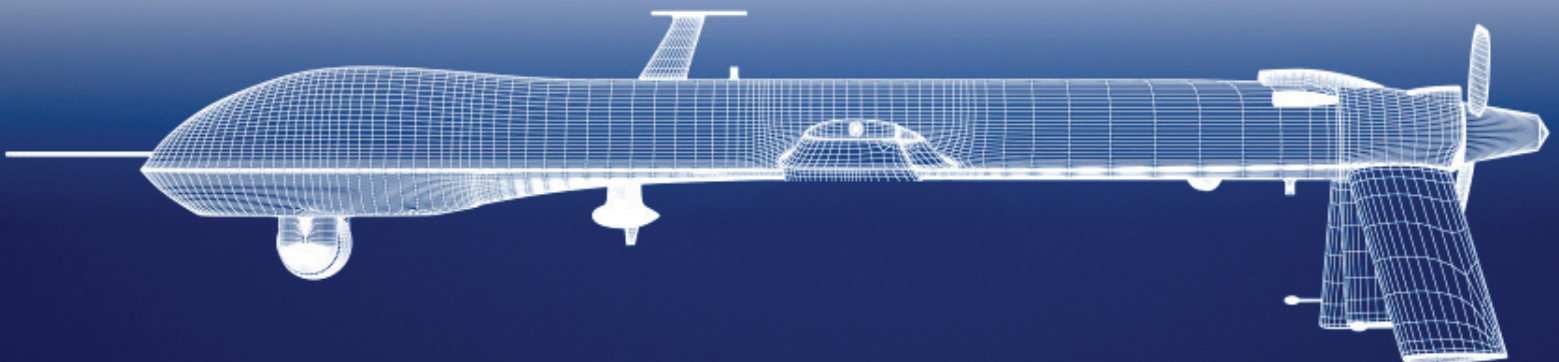
However, as civilian/commercial applications are in development and expected to emerge in the near future, it is anticipated they will follow a similar operational structure and share many similarities to public/DoD UAS discussed in this advisor and accompanying course **www.airsafetyinstitute.org/unmannedaircraft**.

UNRESTRICTED NAS ACCESS?

As numerous UAS return from combat in the Middle East, military training operations in the United States are expected to increase dramatically in the near future. And with this proliferation of UAS, unfettered NAS access—as opposed to expanding special-use airspace—would allow military UAS pilots to train and stay proficient.

But what are UAS and how will they impact general aviation (GA)? By definition, UAS are unmanned aircraft and their associated systems and equipment. They can be as large as a Boeing 737 or as small as a bird, and yet safely perform a wide range of functions, including military training, border patrol, and disaster relief, for example.

Can manned and unmanned aircraft safely share the airspace? Let's explore.

WHO'S IN CONTROL?

Currently, all UAS operations require specific FAA authorization to operate in unrestricted NAS areas. The type of authorization depends on whether the operation is public, which requires a Certificate of Waiver or Authorization (COA) or civil, which requires a Special Airworthiness Certificate-Experimental Category (SAC-EC):

Public UAS—Operations include the Department of Defense (DoD), Department of Homeland Security (DHS), Department of Justice (DOJ), Federal Bureau of Investigation (FBI), the National Aeronautics and Space Administration (NASA), National Oceanographic and Atmospheric Administration (NOAA), state and local agencies, and qualifying universities.

Civil UAS—Operations include all other uses, including commercial applications.

Note: Military aircraft operating in restricted airspace are exempt from the regulations under Title 10 of the U.S. Code, which defines the roles of the Armed Forces.

AIRCRAFT SPECS

So what do the aircraft look like and where do they fly? Take a look at these DoD representative aircraft models and specifications.

UAS Groups	Maximum Weight (lb) (MGTOW)	Normal Operating Altitude	Speed (Knots)	Representative UAS	
Group 1	0-20	<1200 AGL	100	Raven (RQ-11) WASP	
Group 2	21-55	<3500 AGL	<250	ScanEagle	
Group 3	<1320	< FL 180		Shadow (RQ-7B) Tier II/STUAS	
Group 4	>1320		Any Airspeed	Fire Scout (MQ-8B) Predator (MQ-1B) Grey Eagle (MQ-1C)	
Group 5		> FL 180		Reaper (MQ-9A) Global Hawk (RQ-4A/B) Triton (MQ-4C)	

STRUCTURE

Pilots or operators fly the aircraft remotely via control links from Ground Control Stations (GCS). A GCS may be a portable station—often used for smaller aircraft launching from a field—or a fixed station used to fly larger aircraft such as the Predator and Global Hawk.

A VIEW INSIDE THE GROUND CONTROL STATION OF AN MQ-9 DURING A TRAINING MISSION.

Because UAS operations in the NAS must meet "see and avoid" requirements, observers assist pilots when the flight is conducted during visual line-of-sight operations. At times **observers may use moving vehicles, boats, or chase aircraft to satisfy "see and avoid" obligations.** Additionally, the aircraft may use forward or side-looking sensors along with ground-based or airborne sensors, and occasionally, Temporary Flight Restrictions (TFRs) may be established.

With the exception of Class A airspace, which requires an Instrument Flight Rules (IFR) flight plan, operations are typically conducted under Visual Flight Rules (VFR).

PILOT/OPERATOR

Can just anyone operate a UAS control console and fly the aircraft in the NAS? Not a chance. Even if you've successfully flown a simulator or remote-controlled model aircraft, you'll need specific credentials to qualify as an unmanned aircraft pilot or operator.

For example, the DoD UAS training equivalent typically exceeds FAR Part 61 civilian training standards. To fly a civil/commercial unmanned aircraft you'll need at minimum an FAA private pilot certificate and a valid second-class airman medical certificate.

UAS Aviation Rulemaking Committee (ARC)
AOPA is a member of the panel, which includes representatives from DoD, NASA, and other airspace stakeholders. The committee also has members from the unmanned aircraft industry. **www.faa. gov/regulations_policies/rulemaking/committees/ documents/media/UAS.ARC.Cht.20110617.PDF**

In addition, UAS pilots and operators must specifically train to obtain knowledge and operating skills for the aircraft and airspace they will fly in, and be current and proficient to fly. To meet those requirements, military UAS pilots are subject to stringent periodic examinations prescribed by the military service regulations; civil operators must have a flight review and maintain currency in manned and unmanned aircraft.

OBSERVER

I've got an eagle's eye and am a student pilot. Surely I could qualify as an observer?

Not so fast! Observers are responsible for having the aircraft in constant sight. They relay potential collision hazards, including conflicts with aircraft, clouds, obstructions, and terrain and need specific training to carry out the job. At minimum you'll need to hold a private pilot certificate or military equivalent—or you must have completed FAA-endorsed or military observer training. In addition, you need a second-class medical (or appropriate equivalent).

SAFETY SPECIFICS

Okay, so we know that the pilots/operators and observers are specifically qualified to operate unmanned aircraft. The aircraft must be airworthy and operations must comply with the FARs or military equivalent standards.
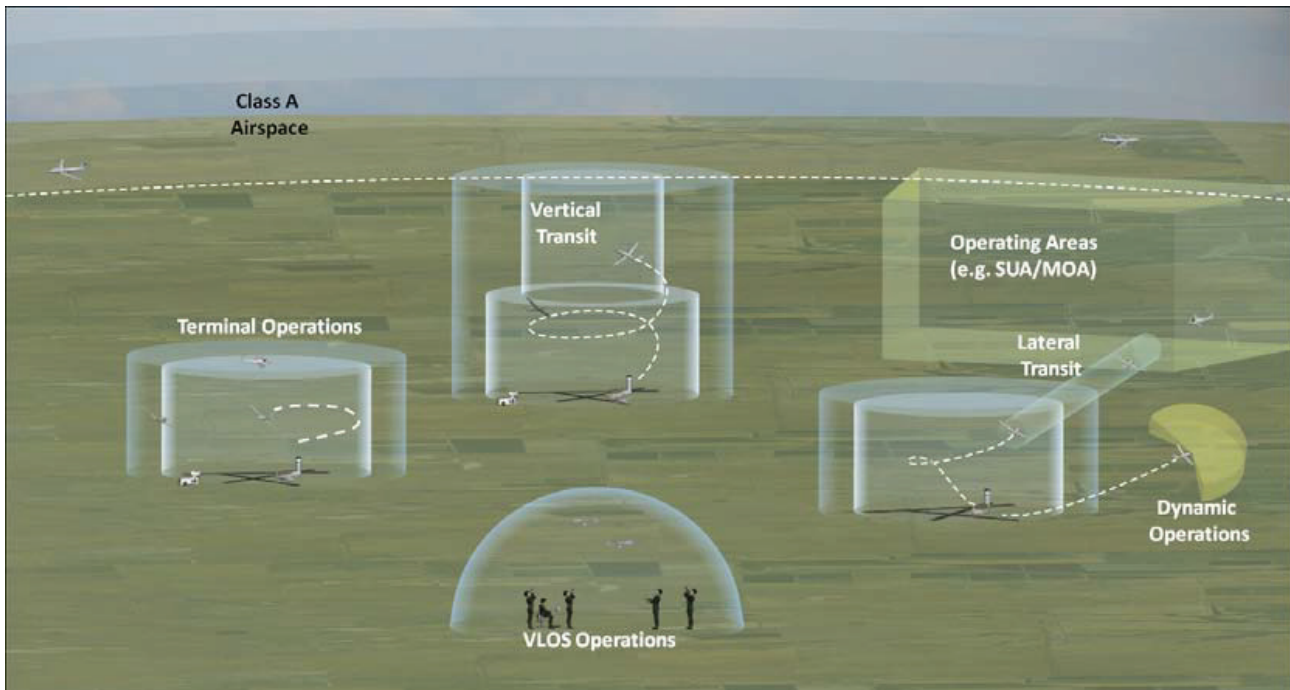
But what about safety concerns? **Will you see a UA enter the traffic pattern while you're practicing touch and goes? The answer is NO.** Unmanned aircraft will launch from a pre-established area and fly a predictable training profile. This predictability is key to safe operations. The DoD has developed several airspace access profiles, otherwise known as UA Zones, that allow unmanned aircraft to enter the NAS and transition to and from UA operations areas.

UA ZONES

Let's take a look at the various UA zone profiles and what they'll accomplish:

Visual Area—Observers maintain visual line-of-sight of the aircraft, other traffic, obstructions, and weather. They communicate directly with the pilot or operator.

Terminal Area—When UAS operate in confined areas near terminal or restricted airspace, ground-based observers or sensors scan beyond the confined area to

Class A Airspace

Vertical Transit

Terminal Operations

Operating Areas (e.g. SUA/MOA)

Lateral Transit

Dynamic Operations

VLOS Operations

alert the pilot or operator of approaching traffic. ATC may also participate in UAS operations near terminal airspace areas.

MOA/Restricted Areas—Sometimes UAS need to transit to Special-Use Airspace (SUA) or Military Operations Areas (MOA) for training, and to Temporary Flight Restrictions (TFRs) for disaster relief support or special security activities.

Contingency Ops—There are pre-established lost-link procedures that should take over if a control link were to fail. These involve squawking a designated transponder code (if transponder-equipped) and recovering the link; alternatively, autonomous control should divert the aircraft to a pre-planned recovery point.

HOW DOES ATC FIT IN?
Anytime unmanned aircraft fly in controlled airspace, they are subject to two-way radio communication and transponder requirements. A landline provides backup in case of lost communications between the UAS pilot and ATC.

And, ATC can also advise you of any UAS activity affecting your flight in controlled airspace.

NOTICES TO AIRMEN
A word to the wise: Pay close attention to notams on when and where to expect UAS operations. If there's a UAS TFR pay close attention to the location and boundaries. If there's no TFR and operations are conducted outside of controlled airspace, make sure to note times and altitudes.

Note: FSS or ATC will not automatically provide UAS notams, so ask for them!

By the end of 2012, the FAA expects to release a proposed rule that will establish policies, procedures, and standards for a wide spectrum of users in the small UAS community. This class of UAS will likely experience the greatest near-term growth in civil and commercial operations because of their versatility and relatively low initial cost and operating expenses.

AVIATE, NAVIGATE, AND COMMUNICATE

To summarize:

» Unmanned aircraft operations follow stringent guidelines and safety standards on par with manned aircraft ops

» UA must remain clear of, and avoid collision with, other aircraft

» The aircraft are typically flown in visual meteorological conditions by qualified pilots/operators who are assisted by ground-based and airborne observers and technology

» When UA operate in controlled airspace they are subject to ATC equipment and communication requirements

» Get notams

» Use ATC to your advantage—ask about UAS activity when flying in controlled airspace

» Handle potential conflict situations with the same response you would with a manned aircraft

LEARN MORE

Check out the accompanying free interactive online course, Unmanned Aircraft and the National Airspace System
www.airsafetyinstitute.org/unmannedaircraft

Additional resources:
DoD UAS Airspace Integration Plan
www.acq.osd.mil/sts/docs/DoD_2011_UAS_Airspace_Integration_Plan_(signed).pdf

DoD UAS Roadmap
www.defenseinnovationmarketplace.mil/resources/ UnmannedSystemsIntegratedRoadmapFY2011.pdf