

Legal Implications of the Uninhabited Combat Aerial Vehicle

by

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You've got to put a surrogate brain in that airplane. And that's not going to come cheaply or easily.

—General Ronald R. Fogleman¹

In 1944, Clarence "Kelly" Johnson, the legendary founder of Lockheed's Skunk Works and creator of the SR-71 and U-2, predicted that the future of military aviation would belong to Uninhabited Aerial Vehicles (UAVs).² That time is almost upon us. Currently, the United States Air Force, Army, Coast Guard, Marine Corps, and Navy possess and operate some type of UAV. These UAVs have been used during Operations DESSERT STORM, DENY FLIGHT, DELIBERATE FORCE, and ALLIED FORCE and continue to be used over the skies of Iraq, Bosnia, Kosovo, and Korea. Today's UAVs perform the traditional missions of reconnaissance and surveillance. The next generation of UAVs, the Uninhabited Combat Aerial Vehicle (UCAV), will perform an array of offensive and defensive operations to include Suppression of Enemy Air Defenses (SEAD), Close Air Support (CAS), Defensive Counter Air (DCA), Offensive Counter Air (OCA), and Interdiction.

The vision for UCAVs is an affordable weapon system to prosecute lethal strike missions by exploiting the design and operational freedoms of relocating the pilot outside of the vehicle.³ This paradigm shift will decrease aircraft cost, increase aircraft capabilities, and eliminate risk to aircrew. There are no technical miracles needed to make a UCAV work according to the Defense Advanced Research Project Agency. The challenge is integration – command and control and human-machine interface.⁴ However, integration is not the last hurdle. Before we develop, deploy, and employ UCAVs, the United States must address the legal issues involved. Specifically, the United States needs to address national and international flight operations, the Laws of Armed Conflict, and Rules of Engagement. If these issues are not addressed, the law may shoot down the UCAV before it ever sees combat.

Before the legal issues can be addressed, it is necessary to understand what a UCAV is and what are the operational plans for this evolution in military affairs. The Department of Defense (DoD) has on the drawing board or is testing UCAVs that can laser-designate targets, conduct SEAD, and attack heavily fortified, high-value targets with enough speed and stealth to survive.⁵ UCAVs are an extension of the UAV. UCAV and UAV development is driven by mission requirements – the ability to conduct effective air operations in any environment with minimum risk to aircrew. These operations must also be cost efficient. UCAVs will cost, on an average, one third less than current fighter and bomber aircraft. They are also comparatively very inexpensive to operate.⁶ UCAVs will range in wingspan from a few feet to 150 feet and will possess maneuver capabilities that far exceed the limits of the human pilot. UCAVs will have

sleek radar absorbing bodies, sophisticated on-board computer systems, and possess the capability to conduct offensive and defensive combat operations.⁷ By taking the aircrew out of the cockpit, the United States can avoid what is being called a Gulf War syndrome – a total intolerance of United States casualties. Uninhabited aircraft are part of the great American tradition of substituting technology for human beings.⁸ UAVs have taken on the reconnaissance and surveillance roles with UCAVs soon to follow in combat attack operations.

The first legal area the United States must address before it commits to building a wing of UCAVs is national and international flight operations. The major areas of concern for UCAV flight operations involve airspace procedures and command and control. Detailed coordination with the Federal Aviation Administration (FAA) and the International Civil Aviation Organization (ICAO) will be required before any UCAV flight operations can take place in the United States or internationally.

In the United States, there are limited procedures for the operations of UAVs in national airspace but no specific procedures exist for the use of UCAVs in civil or national airspace. The FAA restricts UAV flight operations to special use airspace and prohibits UAVs from flying over populated areas. UAV flight operations into uncontrolled airspace are regulated to perfect weather conditions and a 30-day notice to local air traffic administrators.⁹ These restrict UAV units' participation in training deployments and exercises. The DoD and the FAA are developing procedures for the integration of operational UAVs in national airspace.¹⁰ Advances in the civilian and commercial UAV market have helped the DoD in its negotiations with the FAA for less restrictions on UAV operations. During the past year, the FAA issued twenty authorizations to fly UAVs in civil airspace (outside military ranges).¹¹ This is beginning of a long-term precedence being set with the FAA in expanding UAV flights into civil airspace but unless discussions begin now the precedence will not include UCAVs.

Internationally, the ICAO and other nations are operating under many of the same lack of procedures as the FAA and the United States when it comes to UAVs and UCAVs. In 1998, the ICAO and civilian UAV community made history when the UAV Aerosonde "Laima" made the first transoceanic flight from Canada to Scotland in less than 27 hours.¹² No such progress is being made with regard to military uninhabited vehicles. UCAVs, which are military aircraft, should be treated as state aircraft in accordance with the Chicago Convention. Although the convention does not define "state" aircraft, it does suggest the term is determined functionally by use of aircraft such as those in military, customs and police services.¹³ As the development of UCAVs progresses, UCAVs will be able to fly directly from the United States to the contingency operation. The ICAO needs to codify its 'due regard' procedures for uninhabited aircraft flying in international airspace. This step is important for both civil safety and military operations.

The Chicago Convention codified the principle that each nation maintains full sovereignty in its airspace.¹⁴ Therefore, it is understood that flight operations into a nation's sovereign airspace requires approval by that nation. The United States needs to engage potential coalition partners and develop agreements for the use of UCAVs in their national airspace as soon as possible. These procedures need to include airfield operations, training operations, and combat operations. If procedures are not in-place prior to the start of a contingency, any delay in deployment and employment of UCAVs may have grave consequences on the outcome of the operation.

One final area of concern for both national and international flight operations is command and control procedures for UCAVs. Command and control procedures involve the type of control the ground operator (controller) has over the machine (UCAV). It does not involve the technological aspects of how the controller communicates with the UCAV. Command and Control procedures can be broken down into three types: autonomous; semi-autonomous; and ground-controlled. Autonomous command and control procedures only require direct ground control during take-offs and landings. The UCAVs routing is preprogrammed and the on-board computers take care of all combat operations. Semi-autonomous command and control requires ground input during critical portions of flight such as take-off, landing, weapons employment, and some evasive maneuvers. Full ground command and control requires continuous ground input during all phases of the UCAVs flight. In the United States, the FAA requires that all UAVs operating outside of special restricted areas have certified pilots at the controls and that the UAVs be under semi-autonomous to full ground control.¹⁵ The ICAO and coalition partners may impose similar restrictions. These conflicts need to be resolved prior to deployment and should be considered in the development of the UCAV.

A second and more critical portion of command and control for UCAVs is a safe mode. During at least half of its flight profile, a UCAV will be carrying some type of weapon. Procedures need to be developed and legal arrangements agreed to regarding emergency operations of UCAVs. In the event of engine problems, loss of command and control signal, or weapon malfunction, the UCAV must be programmed with precise instructions and procedures to follow. These instructions or procedures may include a pre-planned orbit point to regain control, a pre-planned self-destruct point, or an autonomous recovery and landing option. The potential for loss of life increases significantly when you arm an aircraft and then remove the pilot. These issues are being addressed at the UAV Battlelab at Eglin Air Force Base.¹⁶

Once the legal issues concerning national and international flight operations have been resolved, the United States needs to resolve potential conflicts with the Laws of Armed Conflict (LOAC). The Laws of Armed Conflict, also known as Law of War, have two main sources: customary international law and treaty law.¹⁷ UCAV operations have potential conflicts with two LOAC principles: Discrimination and Humanity.

The Principle of Discrimination (Protocol I of 1977 to the Geneva Conventions of 1949, Article 48) requires the parties of the conflict to: distinguish between civilians and combatants; distinguish between civilian objects and military objectives; and direct operations against military objectives only.¹⁸ Therefore, an attacker must not attack employ weapons that would cause excessive collateral damage. There is a growing perception throughout the world that technological advancements legitimize precision warfare and criminalize collateral death and destruction resulting from the use of lethal force.¹⁹ This leads to the assumption that the law places limits on using any system that could deliver lethal force. A lethal, and as of yet unproven, UCAV with autonomous or fully adaptive controls poses significant accountability problems. Prior to the first employment, extensive testing must be conducted and documented to the world proving the accuracy and reliability. Each UCAV weapon system must undergo this type of scrutiny until UCAV weapon systems as a whole are acceptable by the world as a discriminating weapon.

The Principle of Humanity or Unnecessary Suffering prohibits the employment of any kind or degree of force that is not necessary for the purposes of war.²⁰ Listed under the Principle of Humanity are examples of lawful and unlawful weapons. The legal status of UCAVs as a lawful weapon comes under scrutiny due to the 1988 Intermediate-range Nuclear Force (INF) Treaty signed by the United States and the Soviet Union. The INF treaty prohibits the United States and former Soviet republics from deploying ground-launched cruise missiles with ranges of between 500 km and 5,500 km.²¹ Some critics feel UCAVs could be considered cruise missiles or nuclear-capable launch vehicles specifically prohibited under the INF Treaty. If the United States developed a ground-launched UCAV that was not expected to return to base, it could be considered a cruise missile and prohibited by the INF Treaty. The Israelis developed and employed a UCAV called the Harpy during Operation ALLIED FORCE. It was essentially a cruise missile with a 32 kg warhead and range of up to 600 km.²² The United States could not have used this UCAV due to INF Treaty restrictions. Due to their flight profiles, current and projected UAVs and UCAVs cannot be characterized as cruise missiles. DoD is currently investigating the legal status of UCAVs in respect to the INF Treaty and Strategic Arms Reduction Treaty (START).

Another potential problem for the United States and its coalition partners is an international law that bans the exportation of UAVs. Under a voluntary agreement between 33 nations, the export of uninhabited aerial aircraft and the missile technology control regime is prohibited.²³ This would require the United States to be the sole operator of UCAVs if the other coalition partners did not possess the technology.

The final legal issue that must be addressed before deployment and employment of UCAVs is Rules of Engagement (ROE). The effective use of force requires the establishment and understanding of common ROE. ROE provides guidance for the application of force. Standing ROE (SROE) is approved by the National Command Authority and maintained by the Joint Chiefs of Staff.²⁴ Each CINC augments SROE as necessary to authorize certain actions or place limits on the use of force. Specific ROE needs to be written regarding the use of UCAVs. The most critical area that must be addressed is authorization to release.

During combat, pilots must meet a specific list of criteria before employing weapons on a target. Some of these criteria include: a positive identification of the target; minimized collateral damage; and no known malfunctions with the aircraft or the weapon that would preclude it from functional normally. The pilot makes the final choice in a rapidly changing environment and is ultimately responsible for the result. The American public and the international community hold individuals and organizations accountable for decision to use force.²⁵ The same will be true for UCAVs.

As discussed earlier, there are three types of command and control for UCAVs – autonomous, semi-autonomous, and full ground control. The fully autonomous mode presents the most problems legally due to a lack of a human-in-the-loop. The UCAV must be sophisticated enough and reliable enough to assess the situation, apply the current ROE, and deliver the weapon. The last two pose little problems by maintaining a human-in-the-loop for authorization to release. The human controller makes the decision to release the weapon based on the current ROE and situational awareness gained from on-board systems as well as an integrated air and ground

picture. The UCAV and weapon are controlled through impact. Full accountability rests on the ground controller and, potentially, the ground control team. Legal and moral issues arise when the UCAV malfunctions and collateral damage occurs. A chain of accountability must be in place for these instances. This chain may lead all the way back to the initial operational test and evaluation. The public will question the reliability of the system and, in the end, the use of all UCAVs in future wars. It is imperative that the leap to UCAVs be cautious. The United States should begin with total ground control and progress to a fully autonomous mode. The selection on types of missions and types of targets is critical in the beginning stages of UCAV development. The United States needs to build confidence that a robot airplane would have the same caution about dropping ordnance in the right place as a human being.²⁶ As the system matures, technology should allay fears and cultural opposition.²⁷ ROE can be modified as world opinion and cultural bias become accustomed to automated warfare.

The United States must lay the legal groundwork now for the future employment of UCAVs. It must address national and international flight operations and how the DoD can integrate UCAVs into the national and international airspace. The United States must legally and operationally prepare its coalition partners for UCAV operations. Before employment, the United States must ensure UCAV operations meet all the principles of the LOAC as well as any treaties the United States or our coalition partners may be signatories to. Finally, ROE must be developed specifically for UCAVs. The ROE must be very conservative until the system matures. If these areas are not specifically addressed, the UCAV may never see combat regardless of its life and cost savings benefits.

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