International Regulation of Unmanned Aircraft Operations in Offshore and International Airspace

by Douglas M. Marshall*

I. *Introduction*

The introduction of unmanned aircraft and their supporting systems to the world of aviation really began well before the outbreak of World War II. "Drones," as they were called then, were used as targets for gunnery practice and some attempts were made to use them for surveillance. The Axis powers used versions of unmanned aircraft as weapons to deliver bombs to England. Unmanned aircraft have more recently been used as military assets and for scientific research. The challenge for the sector of the aviation community that is developing and attempting to deploy unmanned aircraft for civilian or non-military purposes is to understand or determine where their aircraft can be

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flown without violating national or international aviation regulations. Since there is no global body of regulations or laws that applies across borders to any category of unmanned aircraft, operators are left with navigating their way through the patchwork of national regulations and international standards that pertain to aviation. This article examines the international aviation regulatory system and how that system may apply to unmanned aircraft operations.

II. *What Is an Unmanned Aircraft?*

Unmanned aircraft, "drones," or "UAVs" are generic terms that describe a category or class of aircraft that has entered the common lexicon over the last two decades. Unmanned aerial vehicles (UAVs) have been widely used in combat operations since "Operation Desert Storm" in 1990. The broad category of unmanned aircraft includes a diverse collection of fixed wing, rotorcraft, and lighter-than-air flying machines, available in a wide variety of sizes and capabilities. The known technologies range from "micro" UAVs that are, in reality, flying robots designed to look and behave like a "bug," fit in the palm of one's hand and carry a high-resolution camera, to 25,000-pound turbojets with wingspans wider than a Boeing 737, which operate at or above 60,000 feet at speeds in excess of 530 miles per hour for over 35 hours at a time. Others designed for scientific research have flown as high as 100,000 feet and have stayed in the air for nearly three days without landing. They can be powered by reciprocating engines, turbojets, or electric motors. The designs vary from traditional airplane or rotorcraft configurations to exotics that resemble birds, insects, Frisbees, and "flying trashcans" or gigantic flying wings with 12 motors and solar-charged batteries. Some take off and land like manned aircraft or radio-controlled models, others can be "launched" like a paper airplane, while still others are catapulted off of a launching mechanism or a moving vehicle and are recovered by a controlled crash (during which the airplane may disassemble upon impact, but be capable of reassembly for another launch) or by flying into a suspended cable.

These remarkable contrivances are designed to serve many purposes and missions, perhaps the most newsworthy being their effective use by the military as "ISR" (Intelligence, Surveillance, and Reconnaissance) and weapons delivery platforms. What is common to all of them is that they are not unguided or uncon-

trolled, but instead navigate through the airspace like any other manned aircraft, using highly sophisticated avionics and navigation systems that provide for autonomous or nearly autonomous flights, programmed into on-board computers, or actuated by radio data downlinks. The aircraft intended for anything but recreational use carry some sort of camera or remote sensing device, and indeed their primary function is to serve as an aerial platform for these technologies, whether they are used to identify and prosecute a target in a war zone, to perform civilian tasks such as measuring cropland moisture content, or to fly into hurricanes to gather meteorological data for weather forecasting.

These systems are being developed and built in more than 50 countries, and more than 600 different makes and models are currently on the market or in development. However, UAVs or, as they are more appropriately known, unmanned aircraft systems (UASs), have also been successfully employed in forest fire suppression, border patrol and surveillance, natural disaster and search and rescue operations support, aerial photography, observation of marine mammals, and atmospheric and climate research, to name but a few. Unmanned aircraft have been developed for decades for military purposes, with stunning advancements over the past fifteen years, but this technology can offer tremendous opportunities for gathering environmental or scientific data in regions like the Arctic or Antarctica, where the risks and hazards to pilots and crew in traditional aircraft are such that the scientific community has begun to turn to unmanned aircraft to fill the role.

The rationale for this technology becoming known as "unmanned aircraft systems" rather than "UAVs" or "drones" is that the devices consist of much more than simply the airframe and power plant. As previously mentioned, the primary function of these aircraft is to provide a platform for the transport aloft of some device intended for employment as a tool to look at an object or person or to measure something, such as air contaminants or temperature layers in the atmosphere. Since the aircraft cannot be flown safely without some mechanism to change direction and altitude, and to bring it back to its desired landing spot, there must be some level of autonomy. The pilot of a manned aircraft performs all the functions necessary to enable the airplane to leave the ground, to stay in the air, and to land, all without bringing harm to the pilot, his passengers, or people or property on the

ground. He must manipulate the controls, monitor and adjust the power settings for the engine, talk to air traffic controllers or other pilots, if required, and keep up constant vigilance for other aircraft so as to avoid a collision. The transfer of these functions to an unmanned aircraft requires a "system" of command, control, and communications that permits the aircraft to perform all the necessary elements inherent in aviation, as well as the requirements of the particular mission, without a pilot on board. The level of autonomy and system sophistication varies widely from a relatively simple hand held control "box" commonly seen in the radio-controlled model aircraft community to a complex (and very expensive) configuration of computers, monitors, radars, and communications devices that fill up a small room or mobile command center known as a "ground control station."

With this technological frame of reference in mind, we can move on to the issue at hand in this article, which is how and under what rules any of these systems can be operated in international airspace. This is of considerable importance to scientists and researchers who wish to use this technology to explore remote regions of the world such as the Arctic, to observe and monitor the habitat of marine mammals, to collect data on global warming and the melting of the polar ice caps, or to engage in any number of worthwhile scientific endeavors that have historically utilized piloted aircraft as essential tools. Others have flown these airplanes into hurricanes and other environments where manned aviation is too dangerous, such as near active volcanoes or in parts of the planet that are so remote and inhospitable that the risks to pilots and occupants of manned aircraft are deemed to be unacceptable.

So the scientist or researcher might ask: What is the problem? These remote and uninhabited regions of the planet are so far away from people and structures that it should not matter whether a science mission is flown by a manned aircraft or a remotely piloted air vehicle. The operator/scientist/developer of a UAS might argue that, once an airplane leaves the sovereign airspace of a nation (usually 12 miles off the coast), thus flying over international waters in international airspace, the local or domestic rules or aviation regulations that apply to operations in sovereign or territorial airspace no longer apply. If that is the case (without conceding for the purpose of this discussion that it is), then what rules do apply, if any? More succinctly, can a scientist

or science organization, or an aerial photographer or a sales representative for an unmanned aircraft manufacturer simply look at an aeronautical chart, pick out a block of international airspace that is not routinely occupied by other aircraft, and fly a UAS with impunity?

The answer to that question begins with a few basic definitions and a brief exploration of the Convention on International Civil Aviation[1] and the relevant Annexes thereto. Boiled down to the essentials, the issue of the operability of UASs in international airspace depends upon an understanding of what an "aircraft" is from a regulatory perspective, what the ICAO documents have to say about the subject airspaces, and what regulations, rules, or laws control the operation of a particular type of aircraft (unmanned) in those airspaces.

III. *A Brief History of ICAO*

As early as 1919 an international agreement[2] recognized that the air above the high seas was not as "free" as the water of those seas. In that Convention the Contracting States recognized exclusive jurisdiction in the airspace above the land territory and territorial waters of the states, but agreed to allow, in times of peace, innocent passage of the civil aircraft of other states, so long as the other provisions of the Convention were observed. States still retained the right to create prohibited areas in the interests of military needs or national security. During the course of the global hostilities of the 1940s, the United States initiated studies and later consulted with its major allies regarding further harmonization of the "rules of the road" in international airspace, building upon the 1919 Convention. The U.S. government extended an invitation to 55 States or authorities to attend a meeting, and in November 1944, an International Civil Aviation Conference was held in Chicago. Fifty-four States attended this Conference, at the end of which a Convention on International Civil Aviation was signed by 52 States. The Convention created the permanent International Civil Aviation Organization as a means to secure international cooperation and the highest possible degree of uni-

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1 The Convention on International Civil Aviation, opened for signature Dec. 7, 1944, 15 U.N.T.S. 295 [hereinafter Chicago Convention], created the International Civil Aviation Organization (ICAO).

2 Paris Convention for the Regulation of Aerial Navigation [Versailles Treaty], Oct. 13, 1919, 11 L.N.T.S. 173.

formity in regulations and standards, procedures, and organization regarding civil aviation matters. The Chicago Conference laid the foundation for a set of rules and regulations regarding air navigation as a whole, which was intended to enhance safety in flying and set the groundwork for the application of a common air navigation system throughout the world.

The constitution of ICAO is the Convention on International Civil Aviation that was drawn up by the Chicago conference, and to which each ICAO Contracting State is a party. According to the terms of the Convention, the Organization is made up of an Assembly, a Council of limited membership with various subordinate bodies, and a Secretariat. The chief officers are the President of the Council and the Secretary General.

ICAO works in close cooperation with other members of the United Nations family such as the World Meteorological Organization, the International Telecommunication Union, the Universal Postal Union, the World Health Organization, and the International Maritime Organization. Non-governmental organizations that also participate in ICAO's work include the International Air Transport Association, the Airports Council International, the International Federation of Air Line Pilots' Associations, and the International Council of Aircraft Owner and Pilot Associations.[3]

IV. *What Is an "Aircraft" Under ICAO's Rules?*

An "aircraft" is "(A)ny machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.[4] An "aeroplane" is "a power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions to surfaces which remain fixed under given conditions of flight."[5] Under either of these definitions even a radio-controlled model aircraft (fixed-wing or helicopter) purchased off-the-shelf from the local hobby shop would be included. There is no definition anywhere in the Convention

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3 *See* International Civil Aviation Organization, *http://www.icao.int/.*

4 *See* ICAO, Annex 2 to the Convention on International Civil Aviation: Rules of the Air, ch. 1 (10th ed. July 2005) [hereinafter Annex 2] (incorporating all amendments adopted by the ICAO Council prior to Feb. 24, 2005).

5 *Id.*

or the Annexes of an unmanned aircraft. However, Article 8 of the Chicago Convention states that:

> No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a Contracting State without special authorization by that State and in accordance with the terms of such authorization. Each Contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.[6]

This provision only applies to pilotless aircraft being flown over the territory of a Contracting State without the State's permission, and each Contracting State agrees that pilotless aircraft will not be flown in a manner that endangers civil aircraft. This Article was included in recognition of the destruction of persons and property precipitated by Nazi Germany's deployment of guided missiles and bombs over England during the war that was still raging over Europe and the Pacific at the time that the Convention participants first met.

Article 3 of the Convention states that:

> a) This Convention shall be applicable only to civil aircraft, and shall not be applicable to state aircraft.
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> b) Aircraft used in military, customs and police services shall be deemed to be state aircraft.
>
> c) No state aircraft of a Contracting State shall fly over the territory of another State or land thereon without authorization by special agreement or otherwise, and in accordance with the terms thereof.[7]

It is thus clear that the ICAO definitions of aircraft that are subject to its Articles, Annexes, and Supplementary Agreements include any man-made contrivance that is capable of sustained flight above the immediate surface level of the Earth (which would exclude a toy airplane or Frisbee or some similar object that "flies" but only because it has been thrown). An "aeroplane" is defined as a powered aircraft. There is no minimum size described, so even a radio-controlled model aircraft would be covered under a literal definition, and there are no legal authorities

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6 Chicago Convention, *supra* note 1, art. 8.

7 *Id.* art. 3.

that state otherwise. In the ICAO regulatory scheme, no distinction is made between manned and unmanned aircraft.

V. *Are Contracting States Bound by ICAO Definitions of Aircraft and Aeroplanes?*

Another way of framing this question is to ask if Contracting States are free to create their own definitions of airplanes or aircraft and, if so, whether they can impose those definitions and any rules or regulations that may apply on operations in ICAO-defined international airspace. On April 13, 1948, the ICAO Council adopted a resolution inviting the attention of Contracting States to the desirability of using in their own national regulations, as far as practicable, the precise language of those ICAO Standards that are of a regulatory character and also of indicating departures from the Standards, including any additional national regulations that were important for the safety or regularity of air navigation. It was noted that, wherever possible, the provisions of Annex 2 were written in such a way as would facilitate incorporation, without major textual changes, into national legislation.

In November of 1972, when adopting Amendment 14 to Annex 2 relating to authority over aircraft operating over the high seas, the Council emphasized that the Amendment was intended solely to improve safety of flight and to ensure adequate provision of air traffic services over the high seas. The Amendment was in no way intended to affect the legal jurisdiction of States of Registry over their aircraft or the responsibility of Contracting States under Article 12 of the Convention for enforcing the Rules of the Air.[8] Thus, Contracting States are free to create their own definitions and categories of aircraft, and to the extent that those States retain jurisdiction over aircraft registered in their State even if they are operating in international airspace, the States' own laws and regulations apply.

The issue then becomes whether the aviation laws, rules and regulations of a Contracting State apply to operations in international airspace for which the Contracting State provides flight information or air traffic control services.

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[8] Annex 2, *supra* note 3, at v ("Foreword").

VI. *The "Rules of the Road" in International Airspace*

The Articles in Chapter 1 of the 1944 Convention (similar to the Articles in the U.S. Constitution) describe the framework of the Convention and establish the parameters for the regulatory scheme. Article 1 states that: "The contracting States recognize that every State has a complete and exclusive sovereignty over the airspace above its territory." Article 2 provides that: "For the purposes of this Convention the territory of a State shall be deemed to be the land areas and territorial waters adjacent thereto under the sovereignty, suzerainty, protection or mandate of such State." All other airspace not defined as falling within the sovereign protection of a State (and not necessarily a Contracting State) is common, or international airspace.

The Foreword to Annex 2 to the Convention states:

> Applicability. The Standards in this document, together with the Standards and Recommended Practices of Annex 11, govern the application of the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) and the *Regional Supplementary Procedures* — Rules of the Air and Air Traffic Services, contained in Doc 7030, in which latter document will be found subsidiary procedures of regional application.[9]

Chapter 2 of Annex 2 sets forth the territorial application of the rules of the air:

> 2.1.1 The rules of the air shall apply to aircraft bearing the nationality and registration marks of a Contracting State, wherever they may be, to the extent that they do not conflict with the rules published by the State having jurisdiction over the territory overflown.
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> *Note.— The Council of the International Civil Aviation Organization resolved, in adopting Annex 2 in April 1948 and Amendment 1 to the said Annex in November 1951, that the Annex constitutes* Rules relating to the flight and manoeuvre of aircraft *within the meaning of Article 12 of the Convention.*

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9 *Id.*

> *Over the high seas, therefore, these rules apply without exception.*
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> 2.1.2 If, and so long as, a Contracting State has not notified the International Civil Aviation Organization to the contrary, it shall be deemed, as regards aircraft of its registration, to have agreed as follows: For purposes of flight over those parts of the high seas where a Contracting State has accepted, pursuant to a regional air navigation agreement, the responsibility of providing air traffic services, the "appropriate ATS authority" referred to in this Annex is the relevant authority designated by the State responsible for providing those services.
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> *Note.— The phrase "regional air navigation agreement" refers to an agreement approved by the Council of ICAO normally on the advice of a Regional Air Navigation Meeting.*[10]

The Rules of the Air developed by ICAO, which consist of general rules, visual flight rules, and instrument flight rules, apply to all aircraft bearing registration marks of a Contracting State, regardless of where the aircraft is flying, and apply without exception over the high seas, and over national territories to the extent that they do not conflict with the rules of the State being overflown. The pilot-in-command of an aircraft is responsible for compliance with the rules of the air. Regardless of the type of flight plan, the pilots are responsible for avoiding collisions when in visual flight conditions, in accordance with the principle of see-and-avoid. Flights operating under instrument flight rules are either kept separated by air traffic control units or provided with collision hazard information by the appropriate air traffic service (ATS) authority.

The world's airspace is divided into a series of contiguous flight information regions (FIRs) within which air traffic services are provided. In some cases, the flight information regions cover large oceanic areas with relatively low air traffic density, within which only flight information service and alerting service are provided. In other flight information regions, large portions of the airspace are controlled airspace within which air traffic control

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[10] *Id.* ch. 2.

service is provided in addition to flight information and alerting services. Flight information service is provided to aircraft operating in controlled airspace and to others known to the air traffic services units. The prime objective of air traffic services, as defined in Annex 11, is to prevent collisions between aircraft. This Annex also describes ways to expedite and maintain an orderly flow of air traffic and to provide advice and information for the safe and efficient conduct of flights and alerting service for aircraft in distress. To meet these objectives, ICAO provisions call for the establishment of flight information centers and air traffic control units.[11]

Most of the airspace in Oceanic FIRs/CTAs (control areas) is high seas airspace within which the ICAO Council has resolved that rules relating to flight and operations of aircraft apply without exception. The majority of the airspace is also controlled airspace, and instrument flight rules (IFR) apply to all flights in oceanic airspace when at or above FL060 (flight level 6000 feet) or 2000 feet (600 m) above ground level (AGL), whichever is higher, even when not operating in instrument meteorological conditions (IMC).

VII. *Can Unmanned Aircraft Comply With ICAO Rules of the Air?*

It can be argued that, before unmanned aircraft can be allowed to operate in international airspace, they must be able to comply with the rules of the air set forth in Annex 2 to the Convention. As noted above, Annex 2 requires that those rules apply to aircraft bearing the nationality and registration marks of a Contracting State. What standards apply if the Contracting State that provides flight information, alert or air traffic control services in the international airspace sector of a Flight Information Region has no specific rules or regulations that address the unique characteristics of unmanned aircraft?

Regardless of whether the flight in international airspace is being conducted under visual or instrument flight plans, the pilot in command is responsible for avoiding collisions when in visual flight conditions, in accordance with the principle of see-and-

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[11] *See generally* ICAO, The Convention on International Civil Aviation: Annexes 1 to 18, *available at http://www.icao.int/icaonet/anx/info/annexes_booklet_en.pdf.*

avoid.[12] Flights operating under instrument flight rules are either kept separated by air traffic control units or provided with collision hazard information. An aircraft shall not be operated in a negligent or reckless manner so as to endanger life or property of others.[13] An aircraft shall not be operated in such proximity to other aircraft as to create a collision hazard.[14]

In the U.S., the Federal Aviation Regulations (FARs) contain two sections that address the basic see-and-avoid obligation:

> § 91.111 Operating near other aircraft.
>
> (a) No person may operate an aircraft so close to another aircraft as to create a collision hazard.
>
> (b) No person may operate an aircraft in formation flight except by arrangement with the pilot in command of each aircraft in the formation.
>
> (c) No person may operate an aircraft, carrying passengers for hire, in formation flight.[15]
>
> § 91.113 Right-of-way rules: Except water operations.
>
> (a) *Inapplicability.* This section does not apply to the operation of an aircraft on water.
>
> (b) *General.* When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.
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> (c) *In distress.* An aircraft in distress has the right-of-way over all other air traffic.

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12 "The pilot-in-command of an aircraft shall, whether manipulating the controls or not, be responsible for the operation of the aircraft in accordance with the rules of the air, except that the pilot-in-command may depart from these rules in circumstances that render such departure absolutely necessary in the interests of safety." *Id.* ch. 3, sec. 3.2.

13 *Id.* ch. 3, sec. 3.1.1.

14 Annex 2, *supra* note 3, ch. 3, sec. 3.2.1.

15 14 C.F.R. § 91.111.

> (d) *Converging.* When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so), the aircraft to the other's right has the right-of-way. If the aircraft are of different categories—
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> (1) A balloon has the right-of-way over any other category of aircraft;
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> (2) A glider has the right-of-way over an airship, powered parachute, weight-shift-control aircraft, airplane, or rotorcraft.
>
> (3) An airship has the right-of-way over a powered parachute, weight-shift-control aircraft, airplane, or rotorcraft.
>
> However, an aircraft towing or refueling other aircraft has the right-of-way over all other engine-driven aircraft.
>
> (e) *Approaching head-on.* When aircraft are approaching each other head-on, or nearly so, each pilot of each aircraft shall alter course to the right.
>
> (f) *Overtaking.* Each aircraft that is being overtaken has the right-of-way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.
>
> (g) *Landing.* Aircraft, while on final approach to land or while landing, have the right-of-way over other aircraft in flight or operating on the surface, except that they shall not take advantage of this rule to force an aircraft off the runway surface which has already landed and is attempting to make way for an aircraft on final approach. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right-of-way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land or to overtake that aircraft.[16]

It should be noted that Title 14, Code of Federal Regulations, Part 91.113 excludes operations on water, and international air-

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[16] *Id.* § 91.113.

space, by definition, is over the high seas, or over water, so the section may not apply.

Part 91.1(b) requires that civil aircraft must comply with ICAO Annex 2 when operating over the high seas.[17] Annex 2 requires that "Aircraft shall be equipped with suitable instruments and with navigation equipment appropriate to the route being flown." Also, Annex 6, Part II requires that an aircraft operated in international airspace be provided with navigation equipment which will enable it to proceed in accordance with the flight plan and with the requirements of air traffic services.[18]

Any operation conducted in international oceanic airspace on an IFR flight plan, a VFR controlled flight plan, or at night, as continued beyond the published range of normal airways navigation facilities (NDB, VOR/DME) is considered to be a long-range Class II navigation operation. Long-range Class II navigation in ICAO Controlled Airspace (CTA) requires the aircraft to be navigated within a degree of accuracy required for air traffic control (follow the centerline of the assigned route, maintain assigned altitude and the speed filed or assigned.)

All requirements of Annex 2 (as supplemented by Regional Supplementary Procedures, Document 7030 and Annex 6) are incorporated in 14 CFR 91.1 for those aircraft operating under U.S. civil certifications in international oceanic airspace.[19]

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17 (a). Except as provided in paragraphs (b) and (c) of this section and §§91.701 and 91.703, this part prescribes rules governing the operation of aircraft (other than moored balloons, kites, unmanned rockets, and unmanned free balloons, which are governed by part 101 of this chapter, and ultralight vehicles operated in accordance with part 103 of this chapter) within the United States, including the waters within 3 nautical miles of the U.S. coast;

(b). Each person operating an aircraft in the airspace overlying the waters between 3 and 12 nautical miles from the coast of the United States must comply with §§91.1 through 91.21; §§91.101 through 91.143; §§91.151 through 91.159; §§91.167 through 91.193; §91.203; §91.205; §§91.209 through 91.217; §91.221; §§91.303 through 91.319; §§91.323 through 91.327; §91.605; §91.609; §§91.703 through 91.715; and §91.903; (c) This part applies to each person on board an aircraft being operated under this part, unless otherwise specified.

14 C.F.R. § 91.1.

18 Chicago Convention, *supra* note 1, annex 6, pt. III.

19 *Id.*; 14 C.F.R. § 91.1.

The ICAO Regional Supplementary Procedures (SUPPS) form the procedural part of the Air Navigation Plans developed by Regional Air Navigation (RAN) Meetings to meet those needs of specific areas which are not covered in the worldwide provisions. They complement the statement of requirements for facilities and services contained in the Air Navigation Plan publications. Procedures of worldwide applicability are included either in the Annexes to the Convention on International Civil Aviation as Standards or Recommended Practices, or in the Procedures for Air Navigation Services (PANS).

The Regional Supplementary Procedures do not have the same status as Standards and Recommended Practices. The PANS are recommended to Contracting States for worldwide use, while the SUPPS are recommended to Contracting States for application in the groups of flight information regions to which they are relevant.

PANS originally were developed from common recommendations of regional meetings and were given worldwide application by the ICAO Council after action thereon by ICAO Divisions. Subsequently, there has been a gradual evolution of procedures from the regional to the worldwide category as ICAO Divisions have been able to adapt regionally developed procedures to worldwide requirements. Concurrently, some of the worldwide procedures have been found suitable for classification as Standards or Recommended Practices and therefore are gradually being incorporated into the Annexes to the Convention.[20]

In summary, Contracting States that provide air traffic control or information services in international airspace Flight Information Regions can, through these supplementary agreements, establish additional rules or procedures for aircraft entering and transiting that airspace and for which the Contracting States choose to provide services. Whether those States can impose their own domestic aviation regulations on aircraft and pilots operating in those FIRs depends upon whether those local regulations conflict with ICAO's Rules of the Air and other Annexes to the Convention. Examples can be found in Canada, Denmark, and Iceland, three nations that control or provide services in North Atlantic, North American, and Arctic airspace. All three require that pilots and aircraft be IFR (instrument flight rules)

[20] ICAO, NAT Regional Supplementary Procedure, ICAO Doc. 7030(5th ed. 2008).

rated for trans-oceanic flight, regardless of the altitude to be flown, making no distinction between high-flying airliners and lower-flying general aviation aircraft. However, other North Atlantic States allow Visual Flight Rules flight at or below FL055 (5500 feet above the surface), which means that no services such as navigation vectors or separation between aircraft are provided.[21]

The "see-and-avoid" requirement that is both implied and stated in the Annexes to the Convention presents a unique challenge to those wishing to operate unmanned aircraft in international airspace. An unmanned aircraft by definition has no human on board to provide the see-and-avoid capability that a pilot brings to manned aviation, which is the ability to look for and see another aircraft, process the information as only a human can, and then take the necessary actions to avoid a collision. Although many UASs are equipped with some sort of camera or visualizing device, the equipment is generally used for surveillance or observing whatever the aircraft has been deployed to observe. Others carry remote sensing apparatus that have no camera at all and are navigated through the air autonomously via pre-programmed flight plans that rely upon Global Positioning System technology and other sensors that monitor the aerodynamic performance and system health of the aircraft. Although some UASs (generally for military use) can be flown by remotely situated pilots using a combination of computerized navigation systems, synthetic vision, and on board forward-looking cameras, there is no airborne "see-and-avoid" system that has been certified by any civil aviation authority as being capable of replacing the ability of a human pilot on board the aircraft to provide the see-and-avoid capability that is required for flight in international airspace.

Contracting States retain the right to publish exceptions to ICAO standards, recommended practices, and procedures as set forth in the Annexes and Supplementary documents.[22] This in essence acknowledges that ICAO's regulations apply without exception to international airspace, and in territorial airspace to the extent that they do not conflict with the regulations of the Contracting State. In the U.S., the Federal Aviation Administration (FAA) publishes and keeps current an extensive list of exceptions

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21 *Id.*

22 Chicago Convention, *supra* note 1, arts. 1–2.

to ICAO's Annexes. There are no exceptions published by the FAA that address the operation of unmanned aircraft in international airspace or airspace in which the U.S. provides air traffic services. The Regional Supplementary Procedures document published by ICAO sets forth all procedures that have been developed by each Contracting State for the Flight Information Regions or Control Areas for which their Air Traffic Service units provide service. None of the regional agreements address flights of unmanned aircraft in their control or information areas.

VIII. *Conclusion*

An official of an Arctic nation's civil aviation authority who shall, for obvious reasons, remain anonymous, has publicly declared that ". . .what is not prohibited is allowed," a sentiment that best describes the regulatory environment for the operation of unmanned aircraft in international airspace. If a Contracting State's own civil aviation regulations do not prohibit or restrict unmanned aircraft operations in international airspace falling under its jurisdiction, and there is nothing in any of the relevant ICAO documents that prohibits such operations, then it can reasonably be argued that they are allowed, so long as the operators can safely fly the aircraft in the airspace without creating an unreasonable risk of collision with manned aircraft or damage to persons or property that may underlie that airspace. Until ICAO promulgates Recommended Practices and Standards for the certification and operation of unmanned aircraft, or addresses the issue through the Annex amendment process, civil operators of UASs desiring to fly their aircraft at altitudes near the surface of the ocean in international airspace—or at altitudes that do not interfere with traditional commercial operations—currently face no regulatory barriers that would prevent such activity. Contracting States can be expected to assert regulatory power over all aviation activity in the international airspace for which they provide services, which would include the authority to ban or cease operations of unmanned aircraft, even for legitimate humanitarian or scientific purposes, but until those States can establish a comprehensive set of rules for that category of aircraft, enforcement may be problematic, especially for operations at low altitudes that pose no serious threat to commercial airline traffic or other high altitude aviation traffic. Operators of unmanned aircraft seeking access to remote and sparsely traveled international

airspace should be mindful of applicable ICAO rules of the air, but may find the process of seeking authority for those activities to be fraught with ambiguity and inconsistency between States and across flight information region boundaries.