Drones For Hire: Legal vs Illegal Commercial Drone Operations

Hank Perritt
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Note: The author appreciates idea incubation from his frequent collaborator, Eliot O. Sprague, who contributed to this article.

Operators are flying drones for hire all over the United States. Many are flying illegally, without having been granted the authority to do so by the governing body responsible for protecting the public from an onslaught of untrained and unskilled commercial drone operators. We all need drone rules. Without clearly defined guidelines someone might be seriously injured by an illegal commercial drone operator.

Those that have been granted FAA Section 333 exemptions, nearly 400 operators, are shooting motion pictures and television productions, supporting precision agriculture, gathering news, doing aerial surveys, inspecting utility infrastructure, and helping to sell real estate, legally.

Mostly, they're flying electrically powered multicopters with relatively short endurance – 15 or 20 minutes. The **DJI Phantom** is the most popular single model, with its **Inspire 1** a close second.

Last year operators and their customers yielded to temptation. They flew, captured imagery, and—with a wink and a nod– figured out compensation. No practical way to be legal existed. Frustration with the FAA grew as the promised end-of-2014 release of

a**Notice of Proposed Rulemaking ("NPRM")** approached and then receded behind them.

Now, enthusiasm is growing over the FAA's first steps to erect a sensible regulatory framework. The agency has released the NPRM, granted 397 Section 333 exemptions, with the number growing every week, and launched cooperative ventures with major users.

The NPRM surprised many by its commitment to risk-based regulation, the reasonableness of its limitations, and its embrace of some points that had been pressed by the drone community. It acknowledged the un-workability of traditional airworthiness and type certification and the perplexity of requiring traditional pilots' licenses. It proposes a new Part 107 in the **Federal Aviation Regulations (FARs)**, that allows anyone to fly a microdrone – one weighing less than 55 pounds—commercially, so long as he meets certain operator qualifications and obeys certain flight rules, both of which are tailored to the risks presented by microdrones.

Most of the Section 333 exemptions are "summary exemptions" that impose standard limitations, including line of sight, daytime only, and a PIC with at least a sport pilot rating. Notably, the exemptions do not specify any particular type of sport pilot's license. One can get a hot air balloon sport pilot rating with a total of only seven hours of flight time. Four-hundred exemptions is a substantial number–not enough to make a dent in the total demand, but enough to generate a body of experience-based data that can inform further regulatory development and business strategy.

At the **AUVSI** 2015 trade show in May, the FAA announced cooperative research and demonstration ventures with several large potential customers of drones in the television, railroad, and precision agriculture industries to develop data, best practices, and performance standards that would allow operations beyond those permitted by the Section 333 exemptions and the NPRM.

The FAA is being prodded by the Congress to move even faster. U.S. Senators Cory Booker (D-NJ) and **John Hoeven** (R-ND) have proposed a Commercial UAS Modernization Act. Senator Booker is on the Senate Aviation Subcommittee. Senator Hoeven is chairman of the **Homeland Security Committee**. They have released the bill, but it has not yet been introduced in the Senate. Major pro-drone groups and the National Association of Broadcasters have issued statements praising it.

Its release without introducing it signifies that it may be intended to serve as bargaining leverage with the FAA more than as legislation that actually would be enacted.

It would be effective only until the FAA promulgates its final sUAS rule. It would:

- require liability insurance
- require certification of vehicles by an FAA drone test center
- require a practical test of DROPs by a test center

If it is formally introduced, it still faces a number of steps before it becomes law. It must complete the committee process and be adopted by the full Senate; a companion bill must be enacted by the House; and the President must sign it. So it's not going to change anything right away–but it may result in the FAA adopting some additional procedures.

Drones are becoming domesticated, and rogues are being relegated to the sidelines. Now, operators who had been flying drones without FAA approval find their customers saying, "We'd like to do it again, but we've talked to our lawyers, and they say we can't do it with anyone who does not have a Section 333 exemption." As the insurance market begins to write drone coverage, insurance carriers are insisting on exemptions, as well. The result is channeling of microdrone entrepreneurship into the Section 333 process. As more 333 exemptions are granted, the level of compliant commercial drone activity increases and, as the barriers to irregular flight grow higher, the relative frequency of illegal commercial drone flight is diminishing. All this vastly increases safety, because it brings drones into the aviation community, which long had had a culture of safety.

Expansion of regulatory limits awaits better data on risks and mitigation techniques. The FAA may have gone as far as it is willing to go in the recent 333 exemptions. It believes it lacks the authority to eliminate altogether the requirement for an airman certificate. It has solved this problem in the NPRM by creating a new category of airman – sUAS operator—and solved it in the Section 333 summary exemptions by requiring only a sport pilot license – the lowest level of pilot certificate.

The agency takes the position that beyond line of sight operations must await more data and performance specifications for control and navigation systems. This is not an unreasonable position, and movement is occurring along this front. Most significantly, the FAA entered into a joint venture with CNN, BNSF railroad, and PrecisionHawk to explore specific mission profiles, in its "Pathfinder" program. CNN will investigate flight over populated urban areas for newsgathering with a type-certificated AirRobot, and use of Drone Aviation's WATT-200, a tethered drone that can hover for 8 hours. **PrecisionHawk** will explore **BLOS crop monitoring** in rural areas, using the terrestrial cellular network for the control link, equipping its vehicles with transponders and using low-altitude traffic management software. BNSF will fly 200-400 mile track monitoring missions.

The market for ENG drones is beginning to crystallize. But a number of questions remain:

- Will customers embrace "DIY"—doing it themselves, or will they contract out? CNN is contracting with specialized drone operators. BNSF is doing it, itself.
- What will the testing and training infrastructure look like? Will the FAA write the standards for the new sUAS operator rating and implement application processes quickly or should these responsibilities be delegated to private entities, such as the Booker-Hoeven Bill proposes?
- Will autonomous safety features already built in to the most popular models become mandatory? Already, the most popular models can be programmed not to fly above certain heights or beyond a certain distance, and they autonomously return to home or land immediately if something goes wrong. They know where airports are and stay away from them. These features obviously enhance safety, but how can they be

required without subjecting manufacturers and operators to the stifling and ruinously expensive traditional airworthiness and type certification? CNN believes that some kind of vehicle airworthiness and type certification may be appropriate to cross the BLOS barrier, and its contractor AirRobot has announced his intention to seek airworthiness and type certification for its sUAS to fly up to 18,000 feet. It remains to be seen whether the FAA can craft a type certification process that will not take years, cost a fortune, and result in obsolete technology being certified–as happened with Amazon's request for a special airworthiness certificate. Although traditional airworthiness and type certification is not likely to be workable for most small drone vendors, the experience gained in processing AirRobot's application will yield useful results, both in terms of improving the certification process, and in terms of developing more concrete performance standards for sUAS subsystems.

- Is one regulation for all microdrones the right approach, or should there be different rules for different sizes, such as those at the low-end of the 55 pound weight range for the FAA's small UAS category? UAS America Fund proposed a micro-sUAS category, and the FAA discussed it in the NPRM. A micro-sUAS rule could be issued before the final rule. It would allow microdrones weighing less than 4.4 pounds to be flown in Class G airspace, below 400 feet, by operators who would self-certify and not be subjected to any formal testing. Adoption of the micro sUAS proposal would privilege smaller, Phantom-sized drones, because its 4.4 pound weight limit would exclude even the DJI Inspire. Its limitations may, however, prove unattractive for most commercial operations except for those in rural areas.
- What are the right airspace management strategies for BLOS operations? Transponders and clearances from air traffic control, or autonomous navigation and traffic avoidance?
- What business models will prove sustainable? Not all of the certificate holders will use their certificates to fly commercial missions; in many cases the petition for an exemption was motivated more by fantasies of starting a drone business, not backed up by any concrete understanding of markets or customers, or business strategies for making money. Nevertheless, a significant fraction of the certificate holders already are flying commercially, and their experience over the next 6 to 12 months will teach everyone more about safe practices, risks, and economics. How much investment capital is required? Who is willing to invest? What kind of support infrastructure is required to

keep customers happy? What are the appropriate pricing points? Will premiums be affordable for insurance coverage that customers require?

- How will the political dynamics develop? At the federal level, pro-drone voices are clearly being heard. But state legislatures and city councils are falling all over themselves to adopt poorly thought-out restrictions. Traditionally, local regulation of aviation has been broadly preempted by federal law, but it may be difficult to sustain preemption all the way down to one centimeter over the grass of someone's backyard.
- What will macrodrones look like, how will they perform, and how much will they cost? Everyone knows what microdrones look like—they're being sold by the tens of thousands at prices ranging from a few hundred to a few thousand dollars. Their mission capability, mainly their high definition gimbaled video cameras, are seductive. But what about bigger ones—macrodrones—that can fly for hours at higher altitudes, for hundreds of miles? Larger drones are in the works. Reference Technologies' Hummingbird is a hybrid with a gasoline engine that drives a generator that, in turn, drives a main ducted fan and 6 outrigger ducted fans. It hopes to deliver its 120-pound gross weight and 20-pound payload capability to a major US utility for deployment late in 2015. The big issue for macrodrones is cost. They are far more likely than microdrones to be subjected to the full panoply of FAA regulations: airworthiness and type certification; traditional pilot requirements; operating rules for traffic separation; and additional technology requirements for traffic separation. They may end up costing so much that no civilian market develops. Adaptations of military models cost hundreds of thousands to millions of dollars. One can buy a helicopter for less than a million.

I will explore these and other questions in coming issues of DronesX.

Hank Perritt

Henry H. Perritt, Jr. ("Hank") is a Professor of Law and former dean of Chicago-Kent College of law, the law school of Illinois Institute of Technology. He has written nearly a hundred articles and more than a dozen books on law, economics, policy, and technology. He represents drone entrepreneurs before the Federal Aviation Administration and recently succeeded in obtaining a section 333 exemption for one of

them. He is a private helicopter and airplane pilot. He has a bachelor's degree in aeronautical engineering from MIT, a master's degree in management from MIT's Sloan School, and a law degree from Georgetown. He is a member of the bar of Illinois, Maryland, Pennsylvania, the District of Columbia, Virginia, and the Supreme Court of the United States. Earlier in his career he worked on the White House Staff and as Deputy Under Secretary of Labor. He co-founded and now runs Modovolate Aviation, LLC, a public education, consulting, and training company.