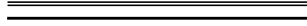


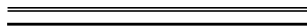
**The Bill Blackwood
Law Enforcement Management Institute of Texas**



**The Use of Small Unmanned Aircraft Systems (sUAS) in
Law Enforcement**



**A Leadership White Paper
Submitted in Partial Fulfillment
Required for Graduation from the
Leadership Command College**



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ABSTRACT

In 1929, law enforcement aviation was born in America by the New York Police Department (Solosky, 2008). After reviewing the research, according to their tenure, one would conclude that aviation units have been around for quite some time; therefore, it is obviously a successful program. Large law enforcement agencies use traditional aviation units, using helicopters and fixed wing aircraft which are cost inhibitors for smaller agencies.

Since the inception of aviation units, technology has advanced exponentially. There is a smaller, more cost efficient and faster deployment option available. The use of a small unmanned aircraft system is an option which could benefit large and small law enforcement agencies and should be used to enhance as well as implement aviation units.

There are numerous uses for a sUAS in a law enforcement agency. The small size of a sUAS allows them to be transported and stored in the back of any police vehicle. With the fast deployment capability, a sUAS, it would be such a time saver when conducting a search for missing persons, especially critically missing like the young or elderly individuals. Officer safety in hostage negotiations, bomb threats, and fugitive search and apprehension, are other issues that can be resolved by gaining the ability to observe, gather intelligence and maintain a safe distance from the threat. During emergency management scenarios, such as natural disasters, the sUAS could be deployed to look for survivors, egress and ingress routes, while keeping the first responders from otherwise unseen dangers and hazards. Therefore, all law enforcement agencies should take advantage of the use of sUAS.

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INTRODUCTION

Today is a day of technology. In this day and time, technology is evolving at a phenomenal rate. It is not uncommon to purchase a computer or smart phone only to find out that a more developed model is being sold six months later.

Law enforcement is trying to stay in touch and up to date with new technologies. Of course, technologies can be an expensive investment, only to be soon outdated. A valuable technological tool for law enforcement, which can be implemented, is the small unmanned aircraft system (sUAS). The sUAS combines and uses technology that has been in law enforcement for years; it is an aviation unit and a camera system. The sUAS can be a valuable, cost saving tool for law enforcement operations.

Traditional police aviation units can deplete a department's budget. Even if a department could acquire a military surplus aircraft, the maintenance would be extremely costly. Aviation costs would vary greatly depending on whether the department is using a fixed wing or rotary wing aircraft.

A sUAS can be quickly deployed to assist in the search or for search and rescue for critical missing persons, such as elderly or the young. A trained operator can deploy a sUAS, which is capable of being kept in the back of a police vehicle, in a matter of minutes. This would save several minutes, if not hours, of trying to locate, allocate, and deploy assets on scene and make those assets a functional part of the operation.

Fugitive search and apprehension is another dangerous and sometimes costly endeavor when dealing with the manpower involved in search teams. These types of police missions can be extremely difficult, time consuming, and manpower draining tasks, especially in rural areas. Pennsylvania State Representative Garth Everett said,

“I can tell you that aviation is a force multiplier” (Wilson, 2012, para. 9). Everett, a former Lieutenant Colonel in the U.S. Air Force, further stated, “that’s how we can get around in an area where the roads don’t all hook up to each other and where the weather can be bad (Wilson, 2012, para. 9). Even though Everett was referring to helicopters, he was describing the advantages of aviation, which would include the use of an sUAS.

The sUAS would be a valuable resource on high risk police missions. A traditional method of getting information needed for a search warrant on a target location is the “slow roll” past the target location. The “slow roll” is used to obtain a multitude of information, including but not limited to: a description of the location, to see if the subject of the search warrant is at the location, as well as to see if there are other people of interest or additional threats to the mission at the location. A sUAS can be used to provide overhead observation for intelligence needed prior to the execution of search warrants. In fact, a single fly over with the sUAS can provide numerous high definition still photographs for analyzing and getting the description of the residence. In addition to the preparation of the search warrant, execution of the search warrant is also critical. The use of a sUAS can provide additional and valuable real time vision of the area just prior to and during the execution of the search warrant.

Hostage negotiations or planted bomb threats is a major concern for officer and civilian safety. Distance in either of these situations is a major necessity for safety. A sUAS can be used to obtain intelligence, property layout, and situational awareness from a distance to reduce dangers to officers, victims, and innocent bystanders.

During times of emergency management due to natural disasters, the use of a sUAS can easily be seen. A sUAS can be deployed to search for stranded survivors, analyze possible entry and evacuation points for survivors, and gain situational awareness all while keeping officers and other first responders out of harm's way. The sUAS can even be used to get food to trapped survivors during natural disasters when first responders are unable to access them.

Visual documentation of crime and crash scenes could be enhanced from a 360-degree view to a 540-degree view by adding the sUAS in the photography portion of scene documentation. Lahmann (2015) wrote, "the use of drones for crime and accident scenes has been taken to a whole new dimension...3 dimensions! With the advent of 3D mapping software, drones can be used to fly scenes with the end result of producing one large, three-dimensional map" (para. 5).

The sUAS is a valuable tool as an aviation unit in law enforcement. Aviation units in law enforcement for the agencies who could afford the fixed wing and rotary wing aircraft have had great success. Agencies and the law enforcement world as a whole should select and implement the use of the sUAS as a valuable, safe, and productive aviation tool to support a variety of police missions and operations.

POSITION

Law enforcement aviation in America was born in 1929 by the New York City Police Department (Solosky, 2008). It would seem, for aviation to be in existence for such a long time that it has to be successful. The main issue that hampers the growth of aviation units has been cost. In a report by the U.S. Department of Justice (Langton, 2009), the "Median expenditures were higher per helicopter than per plane. Helicopter-

only units spent a median of \$132,000 per helicopter in 2007” (p. 4). There is now an alternative to paying over \$100,000 to purchase an aircraft to assist in police missions and operations. Technology has given law enforcement an opportunity to add growth to the aviation units for law enforcement. It has come such a long way in the past decade. Use of technology is such a common place occurrence that the cost has been driven down to reasonable prices. The Mesa County Sheriff’s Department in Colorado has been using the small unmanned aerial vehicle since 2010. They have flown more than 82 missions with a combined 300 plus hours of flight time. They have estimated the cost to be at approximately \$25.00 per hour (“Unmanned Aerial,” n.d.).

The sUAS is an asset to use in several police missions. It is a tool to be used to provide situational awareness while keeping officers out of harm’s way. The sUAS can be a one or two man operation. It can be operated by one person who, pilots the sUAS, as well as controls the camera operations. There is also the capability to use dual controllers as well. One person would pilot the sUAS, while at the same time, a second person using a second controller can operate the camera to control what the camera is able to capture.

Training for the sUAS is a simple process. For example, DJI, a sUAS manufacturer offers an academy that is offered at no cost to the purchaser, if the purchaser goes to DJI. Training at the DJI academy includes the following: introduction to the pre-flight checklist and safe operation procedures, basic flight control maneuvers, and post-flight briefing (“DJI GO,” 2016).

There are numerous safety concerns for aviation units in law enforcement (“How do intelligent,” 2015). One of the big concerns is loss of control or engine failure. The

industry standard in the sUAS is the GPS systems installed in nearly all of the professional grade sUAS. At the time of starting the sUAS, the takeoff GPS position is downloaded into the GPS receiving unit in the sUAS. If, while piloting the sUAS and the unit is somehow flown out of range of the controller, the sUAS will automatically default to the takeoff position and return to and land where the sUAS took off. There is also a manual return home button on the controller. If, by chance, the pilot loses sight of the sUAS, rather than flying blindly and chancing crashing into something, the pilot can press the return home button and the sUAS will return and land at the takeoff position ("How do intelligent," 2015). There is another safety feature that is connected with the battery strength of the sUAS. While in flight, the sUAS smart battery will monitor the battery useage and flight time. During the flight, the battery will calculate with the GPS for how long it will take to get back to the takeoff position. The sUAS will automatically return to the takeoff point before the battery is too low to return ("How do intelligent," 2015).

The Federal Aviation Administration (2015) has added requirements to also enhance the safety of flying the sUAS. One of these safety standards is for the sUAS to be flown by visual line of sight. This requires the sUAS to be in visual line of sight of the pilot during flight operations (Federal Aviation Administration, 2015, para. 2).

COUNTER POSITION

The cost for an agency considering implementing an aviation unit could be a budget intimidator. A typical aviation unit consisting of an airplane or helicopter is generally an investment for the larger police agencies or federally funded agencies.

Medium and smaller law enforcement agencies often would not consider the option of an aviation unit due to the cost.

There are variable costs involved in the hourly operation cost of each type aircraft. Conklin & de Decker Aviation Information estimated the hourly variable cost rates for the following aircrafts: the Cessna 172 Skyhawk, a smaller fixed wing aircraft, is estimated to cost \$150.00 an hour. On the other hand, a Bell 505 Jet Ranger, a rotary wing aircraft, has a variable cost at \$672.00 an hour. Variable costs include the following: fuel, airframe maintenance, labor and parts, engine restoration and miscellaneous costs ("Aircraft Cost Evaluator," n.d.).

A sUAS is a very reasonable investment on the possible returns. In this case, the returns being in the form of officer safety, a force multiplier, and a visual documentation enhancement. A sUAS can be purchased through several companies that distribute various makes and models. One company is common among law enforcement purchased sUAS. DJI is a company specifically for the production and sale of high grade, professional quality "drone" equipment. A law enforcement agency could purchase a DJI Phantom 3 professional series for \$1,259.00 ("Phantom 3 professional," n.d.). The DJI Inspire, another professional grade "drone" with dual operator capability, can be purchased for \$3,099.00 ("Inspire 1 specs," 2016). There are several other companies with professional grade sUASs, which can cost up to \$10,000.00. This is still substantially cheaper than the cost of traditional aircraft.

The sUAS has a nearly cost free variable cost. There is no fuel cost because the sUAS is battery powered. The maintenance is simplistic. New rotors can be replaced in a matter of about one minute. There is no hangar cost as the sUAS can be kept in

the back of a patrol vehicle. The hourly cost would only vary depending on the hourly salary rate of the sUAS operator.

One of the main reasons a law enforcement agency may be reluctant to utilize a sUAS is the opinion of the public. Many law enforcement agency administrators may have some of the same preconceived perceptions as the public, like “Drones are spying on us.” A Bloomberg news article featured police agencies in the San Francisco bay area deploying drones for the first time. According to the article, this provoked concerns from area leaders and activists in the area. Jesse Arreguin, who is a Berkeley city council member, said, “Berkeley and the Bay Area have a long history of political discussion, protests and debate, and there’s a real concern around the use of these drones under those circumstances, and the broader privacy issues” (Vekshin, 2015, para. 2).

An American Civil Liberties Union article about domestic drones had even claimed “Interconnected drones could enable mass tracking of vehicles and people in wide areas” (Fulton, 2014, para. 5). Claims and fears of the public, that sUAS are able to “mass track vehicles and people,” may lead to the perception of the American people as to what a mid to small size law enforcement agency would use it for. Most people when they hear or think of a “drone,” think of the military type drone that has been seen on numerous media outlets, covering military missions around the world. The MQ-1B Predator drone is 27 feet long, has a wingspan of 55 feet and weighs 1,130 pounds. The fuel capacity is 100 gallons with a range of 770 miles. The MQ-1B Predator drone carries a payload of 450 pounds with a flight ceiling of 25,000 feet (“U.S. Air Force,” 2015). This is hardly what the mid or small size law enforcement agency would be

operating. Comparing the MQ-1B predator to the previously mentioned DJI Inspire, a drastic difference in the capabilities is apparent. The Inspire weighs 6.4 pounds and has a flight time of approximately 15 minutes (“Inspire 1 specs,” 2016). This is hardly enough time to mass track vehicles or people.

The use of aircraft in law enforcement as well as the use of cameras in law enforcement or the combination is not a new or novel idea. This is merely using an aerial observation platform for carrying a camera. Aviation units have been using cameras for years. The use of the sUAS is just a new idea of how to do what has been done for years.

People claim there needs to be laws to govern the use of the sUAS. The Fourth Amendment has been in place since the beginning of this country. The Fourth Amendment is a guideline in the use of the sUAS. Since the inception of aircraft in law enforcement missions, there have only been a few challenges in their privacy violations. Even though the U.S. Supreme Court has not addressed the privacy issues with the sUAS, there are cases involving the use of aircraft.

In *California v. Ciraolo* (1986), the Santa Clara Police Department had received a tip about Ciraolo growing marijuana in his back yard. The backyard was shielded by fences from view at ground level. The officers used a private airplane to fly at 1,000 feet and were able to identify and photograph marijuana plants growing in the backyard, which resulted in the issuance of a search warrant (*California v. Ciraolo* 476 U.S. 207, 1986). The law enforcement agency seized the plants and arrested Ciraolo. Ciraolo pleaded guilty. On appeal, the Supreme Court ruled to uphold the trial court ruling. The ruling cited that the Fourth Amendment was not violated by the naked-eye aerial

observation of respondent's backyard. In *California v. Ciraolo* (1986), it was noted that the "respondent's expectation of privacy from all observations of his backyard was unreasonable. That the backyard and its crop were within the "curtilage" of respondent's home did not itself bar all police observation" (p. 207). Furthermore it was stated that any citizen "could have seen everything that the officers observed. The Fourth Amendment simply does not require police traveling in the public airways at 1,000 feet to obtain a warrant in order to observe what is visible to the naked eye" (*California v. Ciraolo*, 1986, p. 208). The Supreme Court further cited that the police were able to see the plants, which were visible to the naked eye, and it was irrelevant that the observation from the airplane was directed at identifying the plants and the officers were trained to recognize marijuana (*California v. Ciraolo*, 1986).

In 1989, a mere three years after *California v. Ciraolo* (1986), the U.S. Supreme Court was asked to determine another case, *Florida v. Riley* (1989). In the case of *Florida v. Riley* (1989), a Florida county sheriff's office had received a tip of Riley growing marijuana on his property. The investigating officer found he could not observe the contents of the green house from ground level. The green house was enclosed on two sides and obscured from view on the other sides. The officer circled over the property two times at a height of 400 feet in a helicopter and observed, through openings in the greenhouse roof and open sides, marijuana growing in the greenhouse. (*Florida v. Riley*, 1989, p. 445). A warrant was issued based on the observations and the respondent was charged with possession of marijuana. The trial court granted the motion to suppress the evidence.

The U.S. Supreme Court reversed the trial court finding. Justice White, joined by the Chief Justice Scalia and Justice Kennedy, concluded the Fourth Amendment does not require the police traveling in the public airways at an altitude of 400 feet to obtain a warrant in order to observe what is visible to the naked eye (*Florida v. Riley*, 1989, p. 455). The Supreme Court Justices cited that “a naked-eye police inspection of the backyard of a house from a fixed-wing aircraft at 1,000 feet was not a "search" (as cited in *California v. Ciraolo*, 1986, p. 207). The ruling further stated that the “respondent could not reasonably have expected that the contents of his greenhouse were protected from public or official inspection from the air, since he left the greenhouse's sides and roof partially open” (*Florida v. Riley*, 1989, p. 445). The Justices further defended the use of a helicopter based on the flight of fixed wing and helicopters as routine, stating, “the fact that the inspection was made from a helicopter is irrelevant, since, as in the case of fixed-wing planes, private and commercial flight by helicopter is routine” (*Florida v. Riley*, 1989, p. 445). As stated in these two U.S. Supreme Court rulings, the use of aircraft and photography in public airspace to view suspected criminal activity not blocked from public view is not a violation of the Fourth Amendment.

RECOMMENDATION

The sUAS is a much needed asset for mid-size and large law enforcement agencies around America. A sUAS can be deployed for search and rescue missions, tactical support, hostage negotiations, bomb threats, and natural disasters while keeping first responders out of harm's way. In order to create and have an aviation unit capable of assisting police ground operations, the cost factor is a huge contemplation for many agencies. However, an agency can purchase a small, capable unmanned

aircraft, rather than the purchase of a traditional aircraft, which can cost from \$300,000 to well over \$1,000,000.

Public opinion is a huge deciding factor and could hamper the efforts of an agencies purchasing and implementing a sUAS aviation unit. Aviation units in the United States have been around since 1929 with the implementation of the aviation unit in New York City. Since this time, the aviation units have had great success. The Fourth Amendment has been used as the guiding light in the aviation units and has not been abused nor have they been used to spy on the American public. As in the cases of *California v. Ciraolo* (1986) and in *Florida v. Riley* (1989), aircraft have a right to be in public airspace. The Federal Aviation Administration has implemented guidelines as well. Of these guidelines, an agency would need to apply for and obtain a certificate of air worthiness (COA) before using the sUAS. This process has been streamlined and a COA can be obtained in just a couple of months (Federal Aviation Administration, n.d.).

As the sUAS are introduced more into law enforcement, it becomes imperative to educate the public. Law enforcement agencies will have to develop policy to ensure the personnel are following state and federal laws as they apply. In order to gain the trust of the community they try to protect with the sUAS, educating the public is a huge issue. An agency could introduce the sUAS to the public with an open demonstration with questions and answers. A demonstration of the flight capabilities would allow the public to see how the sUAS would perform and how it could be a benefit to the public as well as the department. An agency should strive to be transparent in the use of an aviation unit. As a portion of the aviation unit policy, it should include documentation of the aviation activity. This documentation should include, but not be limited to the following:

training with the sUAS, mission type, mission time, and results of each mission.

Therefore, it is the responsibility of every agency to implement a small unmanned aircraft system policy to better protect their officers and their community.

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