



PROLIFERATED DRONES

A Perspective on Singapore

*By Ambassador Barry Desker and
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Introduction

Singapore has been described as an “enthusiastic user” of unmanned aerial vehicles (UAVs).¹ In total, Singapore’s military possesses around 100 drones of all kinds. The air force operates most of these under its UAV Command, which became operational in May 2007 and includes an Operations and System Development Group and a UAV Training School. The Singapore army has several units equipped with mini-UAVs, while the navy has acquired and is testing at least one sea-based UAV with one of its corvettes.

In addition to the military deployment of drones, Singapore’s Ministry of Transport leads a multiagency Unmanned Aircraft Systems (UAS) Committee that promotes the innovative use of unmanned aircraft by public-sector agencies while facilitating commercial use. Attention is being given to security risks and public safety issues arising from the deployment of drones. To this end, the Singapore government proposed legislation aimed at providing clear rules on the use of drones and at facilitating their safe and responsible operation. The Unmanned Aircraft (Public Safety and Security) Bill 2015 was approved by Parliament and took effect on June 1, 2015. The bill aims to address “the threat and risk to security and public safety that the operation of unmanned aircraft, in particular RPAs [remotely piloted aircraft] and their systems, poses in Singapore’s domestic airspace.”²

Technology

The country's armed forces operate several types of UAVs, ranging from tactical mini-UAVs to medium-altitude long-endurance (MALE) drones. The military acquired its first UAV – Israel Aerospace Industries' (IAI) Scout – in the 1980s, followed by the IAI Searcher II drone in the mid-1990s. Both the Scout and Searcher II are small, light UAVs (carrying 40- to 70-kilogram payloads) with limited endurance (no more than 18 hours of flight) that are generally employed as tactical (i.e., battlefield) reconnaissance platforms. Singapore's military possesses roughly 40 Searcher IIs and 60 Scouts (in reserve).³



Recently, the military has also acquired MALE drones. It operates two Heron UAVs, again purchased from IAI, that carry a 250-kilogram payload and can operate for up to 52 hours at an altitude of 35,000 feet. The Heron can carry an array of sensors, including electro-optical systems, an infrared camera, and systems for communications intelligence (COMINT) and electronic intelligence (ELINT). More recently, the Singapore military acquired five IAI Hermes 450 MALE drones, a medium-size multipayload UAV intended for tactical long-endurance missions that is capable of operating for 20 hours with day/night video capabilities (electro-optical by day, infrared at night). The Hermes can also carry out a variety of other missions, including COMINT/ELINT, jamming, and communications.⁴

In addition to buying drones from Israel, the government-linked corporation Singapore Technologies Aerospace (STAE) has developed the Skyblade family of mini-UAVs for the Singapore army. The current Skyblade III and Skyblade IV drones are close-range tactical UAVs with a takeoff weight of 50 kilograms and a 12-kilogram payload, driven by a pusher-prop piston engine with an endurance of up to 12 hours and a range of up to 100 kilometers. The vehicle is catapult-launched and recovered via a parachute or catch-nets. The Skyblade mini-UAV is equipped with an electro-optical and infrared sensor system, and STAE is reportedly developing a miniaturized synthetic aperture radar for improved ground surveillance. The Skyblade can perform a variety of missions, including surveillance, reconnaissance, fire-support, and battle damage assessment.

Singapore's navy has begun to deploy the Boeing-built ScanEagle UAV aboard its Victory-

class missile corvettes. The ScanEagle is a small, catapult-launched drone intended for long-endurance sea surveillance. The navy's first ScanEagle was put into service in 2012.

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Singapore is also using drones for a number of non-military tasks. The Maritime and Port Authority will soon deploy drones from its patrol boats to assess oil spills at sea. The Ministry of Home Affairs is looking at using drones to enhance the response of its agencies during emergencies and crisis incidents. Other drone uses being explored by the government include safety inspection of cranes at worksites and monitoring of state land, bodies of water, pipelines, and offshore structures.⁵

The UAV legislation approved earlier this year notes the development of an increasing number of unmanned aircraft with greater range and an enlarged scale of operations, with many and varied applications in the civilian sector. It cites traffic control, surveying, pesticide application to crops, and firefighting as examples of possible uses. In introducing the legislation, the minister for transport noted that there had been close calls involving drones, with more than 20 incidents reported in the past year. Indeed, in April and May 2015, drones twice fell onto the tracks of the Singapore subway system, though "no services were disrupted nor damage caused to the tracks."⁶

Strategic Implications

Singapore's strategy toward drone usage is closely tied to the ongoing "third-generation"

(3G) transformation of the armed forces. Basically, Singapore's defense doctrine is "to inflict intolerable costs on potential enemies and outlast attackers in the event of a conflict," commonly referred to as the "porcupine" defense.⁷ In recent decades, this strategy has been modified to reflect a "smart defense" approach, guided by three perceptions:⁸

- A perception of new unconventional threats – such as terrorism, piracy, insurrection, and destabilization in neighboring regions – resulting in new types of warfare, such as urban warfare and the protection of key installations.
- Singapore's traditional strategic weaknesses, particularly its lack of strategic depth and a small and aging population.
- Singapore's economic and technological advantages, particularly its highly educated workforce and its strengths in information technologies.

Above all, Singapore and its armed forces see technology – especially information technologies – as a critical force multiplier. Consequently, Singapore's 3G military emphasizes the development, acquisition, and integration of technologies for command and control; intelligence, surveillance, and reconnaissance (ISR); and precision strike.⁹ UAVs obviously play a critical role in these efforts. In this regard, the military primarily employs its drones for ISR missions, such as reconnaissance, battlefield surveillance, search and rescue, artillery fire support, target tracking, and maritime and coastal patrol. Some drones, such as the Hermes 450, can theoretically be used for target acquisition and artillery adjustment, although it is not certain whether the Singapore military uses them in this capacity.¹⁰

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The military would be most likely to use its drones for extremely localized missions (i.e., defending the Singaporean homeland). Since any conflict directly threatening the Singaporean state would entail a forward defense, drones would almost certainly be

employed beyond the country's frontiers (i.e., cross-border operations into an adversary's territory). Smaller air force drones and mini-UAVs in service with the army would provide tactical reconnaissance and surveillance, while larger drones, such as the Hermes 450, would likely be employed for long-endurance, theater-wide intelligence-gathering.

That said, Singapore's military has employed UAVs in overseas deployments – for example, in Afghanistan. In this situation, drones (in this particular case, Searcher II UAVs) “supported the International Security Assistance Force by providing surveillance over key roads and identifying improvised explosive device (IED) threats.”¹¹ However, while Singapore is prepared to use drones in contingency and stabilization operations, peacekeeping operations, etc., their primary purpose is to defend Singapore proper.

At this point, Singapore has not indicated any interest in acquiring armed drones, such as the Reaper UAV, which can be armed with Hellfire air-to-ground missiles, laser-guided bombs, or the Joint Direct Attack Munition (JDAM). However, it is certainly not inconceivable that the government may decide to in the future. The Hermes 450 has reportedly been converted into an assault UAV by the Israel Defense Forces, so Singapore's military already possesses a possible platform, as well as the munitions, for an armed drone. That said, the Singaporeans will likely be loath to rush too quickly into acquiring armed drones, in part because of the negative political impact of being the first to introduce such weapons into the region. However, should neighboring countries deploy or threaten to deploy such systems, Singapore could quickly obtain an armed UAV.

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As drones currently carry out only limited (i.e., mainly ISR) functions within the Singapore military, they can be seen more as adjuncts or supplements to traditional,

human-inhabited aircraft. In Singapore's case, UAVs free up manned aircraft, particularly fighter jets, for combat missions. Additionally, drones would be more likely to replace manned aircraft if the mission was particularly high-risk or if use of manned aircraft would be impractical or politically difficult (such as an overseas deployment). It is difficult to ascertain how Singapore would react if one of its drones, ostensibly on an intelligence-gathering mission over neutral territory (such as international waters) or operating as part of an international coalition operation, were shot down. Most likely, the reaction would be muted. Since Singaporean drones are not (yet) armed, that particular complication would be moot. However, if Singapore were to get drawn into a major conflict, it would likely involve the defense of the homeland and therefore invoke a significant mobilization of its armed forces. In that case, concerns over how drones were used or treated in combat would likely be inconsequential.

Likewise, it is difficult to speculate how Singapore might react to another country's UAVs intruding on Singaporean airspace. Since the Singapore Strait is rather narrow (16 kilometers wide), it would not be difficult to accidentally enter this area. Singapore would most likely react to an intrusion by a foreign UAV the same as it would similar actions taken by any foreign manned military aircraft – that is, by scrambling Singapore's fighter aircraft to intercept, identify, and shoo away trespassers. One or a couple of such intrusions might be forgiven, but a pattern of deliberate efforts to infringe on Singapore's national airspace would probably result in an attempt to shoot down a foreign drone. In this case, Singapore would likely be more prepared to shoot down an unmanned vehicle (armed or not), as compared with a traditional human-inhabited aircraft. This would permit Singapore an opportunity to “make an example” of the intruder without the fear of exacerbating the situation by killing human beings.



Nevertheless, the recently enacted amendments to the Air Navigation Act will make a person who flies or operates a drone from outside Singapore liable for offenses under the act, as if the person had been in Singapore when committing the offense. The minister for transport will publish in the government Gazette a list of security-sensitive areas designated as protected areas. Examples of such locations mentioned by the minister include iconic landmarks such as the Istana (the president's official residence), the Supreme Court, the Jurong Island industrial complex, and military camps and bases. Flights of drones over these areas are prohibited, as are the

photographing of these protected areas by drones, unless a permit is obtained. The amendments also prohibit a drone from carrying arms, explosives, munitions, and biochemical, nuclear, or hazardous substances, as well as prohibit the discharge of any substance without a permit.¹²

Officials implementing the legislation – such as safety inspectors authorized by the Civil Aviation Authority of Singapore, senior police officers, or auxiliary police officers authorized by the commissioner of police – may order the operator of an unmanned aircraft to (1) end the flight, (2) land the unmanned aircraft, or (3) fly the unmanned aircraft in an authorized manner if it is instead being operated in a manner that poses a serious and imminent risk to public safety. The enforcers of this legislation are also given powers to assume control of an unmanned aircraft in order to either down it or land it safely, and to detain it or any component of the unmanned aircraft system.¹³

During debate on the proposed legislation, members of Parliament highlighted the need to balance security and the minimization of risk with the need to permit technological innovation. They also recognized the concern of the public with the possible invasion of privacy. “But while MPs said the new law is timely,” The Straits Times reported, “they also cautioned it must not be too onerous that it stifles the creative and innovative use of drones.”¹⁴ The minister for transport and second minister for defense at the time, Lui Tuck Yew, agreed that a “judicious balance” was needed between innovation and security.¹⁵ As MPs from the ruling party and opposition supported the draft legislation, the bill passed without a vote. The bill received the assent of the president of Singapore and took effect on June 1, 2015.

Constraints

Perhaps the greatest constraint on the armed forces when it comes to drones is cost-driven. The acquisition of UAVs must compete for priority with other procurement programs within a finite defense budget. This predicament would likely only increase should the military decide to obtain armed drones, which would likely cost more to buy and to operate. In addition, armed UAVs would be much more complicated to operate and therefore more daunting, likely involving new munitions, new and expanded training,

new rules of engagement, and new concerns over the potential loss of such a high-value piece of equipment. It is very possible that the armed forces may acquire larger, better, and more versatile (i.e., armed) drones in the future, but Singapore is likely to tread gingerly in this regard.

However, in light of the manpower constraints facing the military with Singapore's rapidly aging population and low fertility rates, and the presence of a well-educated population supportive of technological innovation, it is likely that drones, both armed and unarmed, will play an increasing role in military and other applications.¹⁶ The broad policy perspective in Singapore is to regard drones as a means of transforming the way that jobs are done in many industries. In introducing the proposed legislation, the minister for transport noted that drones have "the potential to increase productivity and efficiency, and enhance the effectiveness of [Singapore's] services and operations."¹⁷ Given Singapore's busy airspace and densely populated environment, operators will need to ensure that they can fly the drones safely and responsibly. This will be a constraint on the armed forces' use of armed drones over Singapore as well as a cause for restrictions on commercial applications.

Conclusion

Singapore will continue to look to drones as a force multiplier in defending its homeland. It will likely expand up the "UAV evolutionary chain" to acquire longer-endurance and perhaps even armed drones, and it will also likely obtain additional mini-UAVs that can be used by small military units. Drones will likely have growing civilian and commercial use as well.

At the same time, Singapore will proceed cautiously to ensure that drones do not pose a safety hazard, especially given the country's tight airspace. However, the overall benefits of drones in both military and commercial practices are too apparent to be overly restricted, and their use should both continue and expand.



Response: Indonesia Perspective

By Natalie Sambhi

In their essay “A World of Proliferated Drones: A Perspective On Singapore,” Barry Desker and Richard A. Bitzinger outline the strategic rationale behind Singapore’s embrace of unmanned aerial vehicle technology, the various uses of the country’s UAVs, and related policy challenges.

Indonesia is most likely to view Singapore’s production, acquisition, and use of drones with ambivalence. On the one hand, Indonesia will be able to observe and learn from Singapore’s experiences in operating UAVs. Under President Joko Widodo, there has been a sharper focus on sovereignty and maritime security-related issues. With a military and coast guard in dire need of funding and upgrades, drone technology could be a critical force multiplier, allowing more effective surveillance of the vast archipelago for a range of issues, including combating piracy and illegal fishing, improving search and rescue capabilities, detecting environmental disasters, interdicting fuel smuggling, and monitoring disputed territories. As Desker and Bitzinger highlight, thorny issues related to policy development and legislative requirements governing the commercial use of drones must be resolved. Thus, Singapore’s experiences could provide useful precedents and inform policy creation in other Southeast Asian states as well as encourage a conversation in the Association of Southeast Asian Nations (ASEAN) about the civilian application of drone technology.

On the other hand, the main function of Singapore’s UAV fleet is defense of the homeland. Historically viewed as a potential strategic threat by Singapore, Indonesia could view its neighbor’s acquisition of drones with suspicion. As mentioned earlier, the Jokowi

administration's heightened sensitivity to sovereignty issues means that encroachment into Indonesian airspace – accidental or otherwise – would likely draw a pointed response, if not a scrambling of fighter jets as a show of pride. Amid regional drone proliferation, Indonesia might be encouraged to further invest in UAVs for military purposes. As ASEAN states move toward a more integrated community, careful diplomacy around these issues at both the bilateral and multilateral level will be needed to keep misperceptions at bay.

Overall, Indonesia will be watching Singapore drone developments with interest.

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Endnotes

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Republic of Singapore Air Force IAI Searcher II: U.S. Army photograph by Jeff
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