



# Integrating Drones Isn't Intuitive:

## *Practical Ways to Build this Critical Capability*

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Flying robots that identify their enemy, drop grenades, bring fires, or suicide themselves to destroy armored vehicles are commonplace in the Russia-Ukraine War. Drones have not only dramatically shaped that war, but they have also been used by Hamas to set conditions for their terror attacks on 7 October 2023, the Azerbaijan military to change the balance in the Nagorno-Karabakh War, and Iranian proxies in their attacks on U.S. naval and ground forces.<sup>1-3</sup> I pondered all of this as I watched firsthand one “battlefield” where drones were not having any impact — my battalion’s platoon live fires. This distressing fact was made apparent when the fourth straight platoon’s small unmanned aerial system (sUAS), a mini-helicopter called a Black Hornet, shakily lifted off, raised 10 feet in the air, and then smashed into the ground. It became even more clear when the second unit in a row reported that its company-level UAS system, a Raven, was unable to fly because of missing parts, an inexperienced operator, not having the restricted operating zone (ROZ) activated at the right time, or some combination of those factors. This was

*Above, Soldiers in the 2nd Battalion, 506th Infantry Regiment employ a commercial off-the-shelf quadcopter during a training exercise. (Photos courtesy of author)*

the moment that I fully understood that we had a problem and needed a new approach to integrating this critical asset into how we fight.

To frame the problem appropriately, I did not assess that our battalion was the anomaly in struggling to integrate drones. We have a great unit that is fortunate in the quality of its past and current officers and NCOs. However, something was stopping us from saturating the battlefield with sensors as the current and future battlefields demand.<sup>4</sup> So, what was the problem? Turns out there were many, and some we could affect, some we could not. We can’t control the number and type of UAS we are fielded — just as you use the night vision devices, shoot the weapons, and wear the body armor you are fielded. Many factors we could affect, however, and that is where we focused our energies. Our leaders struggled to visualize drone employment, our operators weren’t experi-

enced, and our training and resourcing systems didn't support the effort. During our quest to flood the zone with drones and radically increase our warfighting ability, I identified three key areas that demanded improvement: We needed to train and certify our leaders, provide hours and hours of flying repetitions and simple objectives for our operators, and integrate UAS into the battalion-level training and maintenance management systems.

### Visualizing the Battle

If you close your eyes, can you visualize swarms of drones in front of your forces conducting reconnaissance of routes, various positions, obstacles, and the enemy to identify their command-and-control locations, indirect fire assets, and anti-tank/machine-gun positions? Picture fire supporters making micro adjustments to their pre-planned targets before massing fires to overwhelm and destroy the enemy... or assault leaders and sappers pinpointing the location of the breach and the positions they will bound their elements to preserve their forces and close with and destroy the enemy. How about drone operators identifying a remaining enemy machine-gun position in a trench, dropping a 40mm round on it, and then reporting that key condition is met before the assault element advances? Lastly, visualize immediately after the attack, when transitioning to the defense, rapidly sending drones along the most likely avenues of the enemy's counterattack to enable indirect fires to disrupt and the now-rightfully placed antitank weapons and machine guns to destroy. Can you see the battle that way?

Well, I couldn't, nor could most of our leaders. We had to start with casting a shared — and easily understood — battlefield vision for the leaders in the battalion. Every element in the battalion would use drones: rifle, heavy weapons, scout, mortar, and distribution platoons as well as all command posts. Our drones would:

- 1) Recon our routes, positions, obstacles, and the enemy;
- 2) Deceive and disrupt the enemy;
- 3) Integrate fires and drop munitions; and
- 4) Secure our forces.

### Current UAS Training Resources

The Army has some helpful doctrine to direct the training and employment of drones. One source we used to determine offensive uses of drones was the Army's counter-UAS doctrine, Army Techniques Publication (ATP) 3-01.81, which was very helpful in defining missions, UAS groups, and the basic logic of their use.<sup>5</sup> However, not all the doctrine has kept up with the advances since the Russians escalated their attack deeper into Ukraine. My assessment is that Training Circular (TC) 3-04.62, *Small Unmanned Aircraft System Aircrew Training Program*, written in 2013, was developed for the fixed-wing sUAS (Raven), and the requirements for

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operator and program training, tracking, and currency seem too stringent and slow to keep up with the current commercial off-the-shelf (COTS) quad-copter variants.<sup>6</sup>

There are some helpful existing training and program-tracking systems. Ensuring operators use drones inside a ROZ and are trained on basic employment through the online basic unmanned qualification course is critical.<sup>7</sup> We also logged operators' flight hours inside the

sUAS manager to identify future master trainer candidates and help us track our proficiency. However, to make tangible gains in the employment of UAS in collective training, live fire, and situational tactical exercises, we needed to ensure we did not overdo UAS programming at the expense of actual combat capability. Fighting with drones is vitally important now; we cannot afford to overcontrol it to mitigate risk at the expense of real implementation.

Once we understood our current situation, envisioned future, and resources available, it was time to act and build a real, lethal, and lasting drone capability.

### Training Leaders

We had to train our company- and platoon-level leaders on the new vision of the battlefield. Our platoon leaders and sergeants balance many things early in the Army. Integrating and synchronizing the foundations of a rifle platoon, its machine guns, anti-tank systems, rifle squads, and external mortars is challenging enough. Now they must rapidly learn to employ the awesome, but complicated, integrated tactical network (ITN) to populate their position location information and receive, make, and rapidly disseminate digital graphics on their end user device through the android team awareness kit (ATAK). Our digital fires systems also allow quick integration of artillery and adjacent unit mortars into their operations. Throw drones on top and even our most talented young officers and NCOs will struggle without deliberate training.

To train our platoon-level leaders, we found that starting with a white board to sketch out the drone battlefield vision helped them share that understanding. Giving them simple tactics, techniques, and procedures (TTPs) was important. For example, treat the UAS operator as a member of the platoon headquarters element, same as their radio-telephone operator (RTO), forward observer (FO), and medic. That way the operator can move back and forth between the platoon leader and platoon sergeant based on aspects of the operation while maintaining the right leader oversight of the drone employment. Lastly, we trained our leaders by providing a mental model of when to employ the drone and how that fits within the normal stages of executing an operation (for example, at the objective rally point, before reaching the assault position, immediately after reaching the limit of the advance of the attack, etc.).



**Platoon headquarters elements consisting of a platoon-level leader, radio-telephone operator, forward observer, and unmanned aerial system operator work together to command and control the platoon.**



Our Army is great at integrating and echeloning indirect fires. Fire supporters and our maneuver leaders are trained on this critical task through fire support team certifications, call-for-fire trainers, collective training, and fire support coordination exercises. Based on the depth of knowledge of the mental model of echeloning fires, we trained our leaders to integrate UAS using the same structure. Doing so during planning and rehearsals was critical to ensuring UAS were built into indirect fires planning as a tool for observers to initiate the various artillery and mortars.

During the planning phase, our leaders identified the right locations to launch the various drones. For example, drones such as Skydios and DJI Maviks can be launched from 2-3 kilometers away, fly a deceptive route, and conduct their recon mission, all while the platoon is still moving

towards the objective to then receive the drone at a different landing location. Once closer to the enemy, the platoon can fly its Soldier Borne Sensor (SBS) Black Hornet using the quick “periscope” method of rising above the tree line to gain a final assessment of the enemy while our forces remain behind cover. Finally, before or during the assault, DJI Maviks or Skydios with fabricated munition droppers attached can execute precision attacks on enemy fighting positions or trenches where direct fire weapons struggle to achieve lethal effects. Simple engagement criteria to operators enables initiative (for example, find antennas or machine guns and kill them). Once our leaders visualized drone integration into the battle using the model of echeloning fires, we were able to effectively account for them during planning and execution.

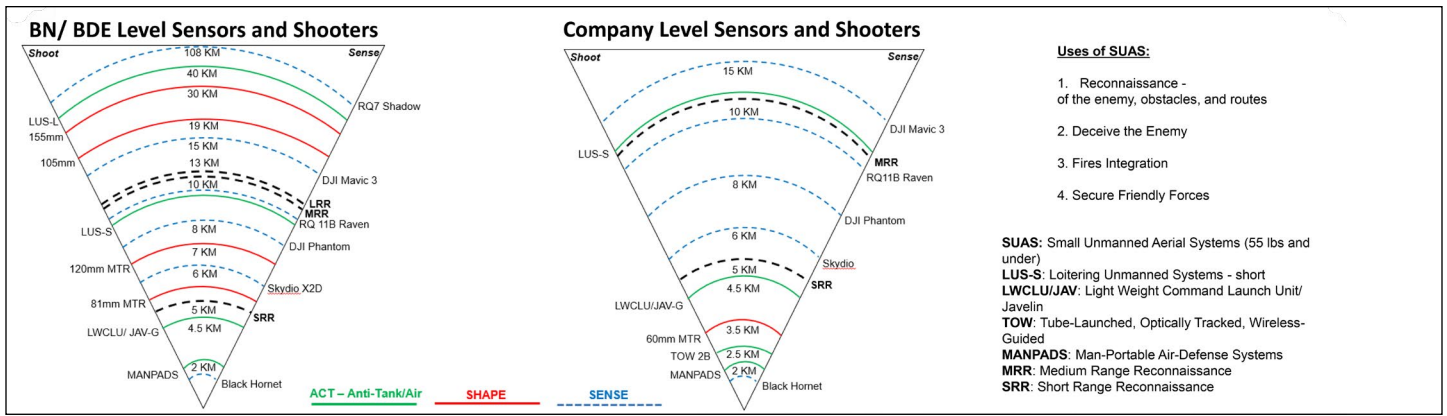


Figure 1 — Echeloning the Employment of Indirect Fire, UAS, Anti-Tank, and Air Assets

### Training Expert Operators

Nearly 2,500 years ago, Archilochus was probably not talking specifically about flying robots to recon and drop bombs on the enemy, but his words hold true: “We don’t rise to the level of our expectations, we fall to the level of our training.” Leaders understanding how to employ drones is not enough without trained, confident, and knowledgeable UAS operators. Repetition, repetition, repetition — it’s the key in bowling, shooting a basket, running a maintenance meeting, crewing a machine gun, and yes, flying drones.

You probably heard, as I did, that our Soldiers, especially the gamers, will instinctively pick up the flying of these drones. I found that 100-percent false. As with anything, time

varies by Soldier, but our rough estimate is operators need to fly around 10 hours to not be a liability in the operation and around 15 hours before they seamlessly integrate the UAS into the platoon’s operation. Adding a ROZ in every event and creating frequent flying opportunities for our operators were both critical to building their experience and confidence.

Just as we needed a shared vision for employment by leaders, the same was true for our operators. Creating plain speak — jargon and acronym free — training objectives and rules for our Soldiers provided them a knowable training path (see Figure 3). For example, placing the drone into operation, developing a simple flight path, and using identifiable terrain features to quickly deconflict air space with other drones gave tangible actions for our operators. This also helped

Figure 2 — Example Exercise with COTS Drones Employing Reconnaissance and Precision Attack Capabilities



**Endstate:** How we identify, deceive, and kill the enemy, confirm our routes, and secure our positions and personnel is radically altered to make us more lethal and survivable using drones.

**Specific Training Objectives for Our UAS Operators:**

1. Understand basic air-space de-confliction and how to safely employ UAS.
2. Aggressively pursue hands on and classroom training on numerous UAS Platforms.
3. Understand the various distances and capabilities of UAS Platforms and know how they are employed in a phased manner to conduct reconnaissance, indirect fire employment, and security operations.
4. Understand how to secure, account for, charge, place into operation, and recover numerous UAS Platforms.
5. Know how to read a map to understand where the enemy is located, plot a course to fly from your location to the enemy to observe them in a manner least likely to get your drone identified and destroyed.
6. Understand how to receive an enemy situation briefing, plan out a reconnaissance or indirect fire attack mission, and then fly your drone to identify your high payoff targets to either report on their status or call-in indirect fire to destroy the enemy.
7. Develop the system to rapidly employ your UAS, in trees, and in a manner that you can quickly and quietly communicate what you are observing to the right leader to enable your platoon, company, or battalion mission (confirm enemy situation (machine guns, forces, indirect fire assets, command and control nodes, counter-attack forces), employ and adjust indirect fires, confirm breach location, confirm assault positions & directions, and the most likely limit of advance).
8. Know how to send a clear enemy spot report.
9. Know how to partner up with multiple UAS Pilots, do basic flight de-confliction planning, take-off, fly a route, and observe the enemy together to disrupt the enemy and bring multiple indirect fire attacks simultaneously.
10. Know how to coordinate with a UAS Pilot in a separate area, and then launch, fly, and hand-off your drone to that pilot.

**SUAS Rules Driving Training, Experimentation, and TTPs**

1. Understand the performance capabilities, physical limitations, and weather limitations of the SUAS platform you are flying.
2. Do not fly a drone over people that are not directly involved in the operation.
3. Ensure a ROZ (restricted operating zone) has been submitted, approved, and you fly within the approved boundaries. Do not fly over restricted areas.
4. You cannot be a pilot for more than one SUAS operation at a time.
5. Always avoid manned aircraft and moving obstacles.
6. Ensure a DRAW (deliberate risk assessment worksheet) is approved for your training event that covers SUAS operations.
7. Operate SUAS with someone that has completed a form of SUAS training instructed by a Master SUAS Trainer.
8. Log your flight hours and any notes or lessons learned in SUASMAN (Small Unmanned Aircraft System Manager) upon completion of your training event.
9. Understand the emergency, loss of link, and recovery procedures prior to flight operations starting. Do not disable GPS functions.
10. Maintain the capability to charge the SUAS system for the duration of your operation.

**Uses of UAS:**

1. Reconnaissance of the Enemy, Obstacles, & Routes
2. Deceive the Enemy
3. Fires Integration
4. Secure Friendly Forces

**Resources:**

- [2-506 SUAS Platforms and Capabilities](#)
- [TC 3-04.62](#) – Small Unmanned Aircraft System Aircrew Training Program
- [AR 95-1](#), Appendix D – Flight Regulations
- Grafenwoehr Training Area [Aviation Map](#)
- Grafenwoehr [Redline Brief](#)
- [SUASMAN](#)

**Figure 3 — Plain Speak UAS Operator Training Guidance and Rules**

reinforce proper use by leaders. As in most of our war-fighting training, hands-on training using simple guides was more effective than the hours of an online basic unmanned qualification course or in-person classroom instruction using PowerPoint.

Manning a machine gun or a tank is a team sport; the same applies for launching robots into the sky. Instilling the crew mentality to the employment and recovery of UAS assisted in the speed, safety, and the preservation of our systems. We learned this lesson the hard way after numerous failures or too slow launches, and worse, breaking hard-to-replace antennas as a flustered operator yanked a \$12,000 drone out of his assault pack. Integrating the platoon's RTO, FO, and medic into the UAS "crew" helped decrease launch and recovery time and led to more effective tactical transport of the systems. There were also hard-to-quantify advantages to getting more Soldiers involved in drone employment that led to smoother integration.

### Building UAS Enabling Systems

Systematizing an activity helps to weight the effort appropriately. We found adding drone employment to our battalion training resource meeting made an outsized impact. When our drones were just another system sitting in a tough box dependent on the individualized efforts of the high-speed operator or innovative leader, we had sporadic successful employment. Once we added the issuing of UAS and requesting of a ROZ as critical items for each training event — the same as ammunition and land — we were able to increase training opportunities. Events that were not



**COTS drones, although easier to use than the Raven or Puma, require expert operators to rapidly employ in tactical situations.**

normally viewed as times to integrate UAS, such as crew qualification and land navigation, became occasions for operator repetitions and TTP development. Adding our drone status to our maintenance meeting was also key to forcing us to work through how to repair or coordinate replacement of non-standard equipment. Deliberate recovery operations with company drone status reporting allowed us to better see ourselves and get broken systems fixed. What we track and report on is how we prioritize efforts, and we were unable to weight this effort effectively until we integrated UAS into the battalion's core systems.

**Recommendations**

- Battalion leader development programs account for training platoon-level leaders on how to employ sUAS, similar to how we train our leaders to integrate fires.
- Battalion training resource systems establish ROZs at every training event, pool the sUAS in the unit, and ensure their maintenance status and allocation to every unit's training.
- Leaders, all of them, fly drones, not because they have to become experts, but understanding the basic employment allows more effective integration, similar to how every fighting leader can employ all the weapons assigned to his or her unit.
- Companies build a bench of trained UAS operators (we have a minimum of eight per company). This allows continuity, spreads the knowledge of employment throughout the ranks, and drives innovation as the incredible creativity of our Soldiers is identified and unleashed.
- Every unit trains with sUAS — we do not recommend consolidating the systems with the scout platoon as that risks their integration into every aspect of a unit.
- sUAS is fought as a crew (not necessarily Soldiers'

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primary or only duty); we have an assigned primary duty UAS operator supported by the RTO, FO, and/or medic at our company and platoon headquarters.

Drones are not just the future of warfare; they are the present. Unlike the Ukrainians, we do not have the stimulus that drives battlefield innovation from the level of violence and desperation existing in war. We cannot afford to wait until that happens to develop the training and employment techniques with this vital new asset. Our Army will not use drones exactly the way others are employing them. Many units employing UAS in many ways will create an environment where the most practical and effective uses flourish. There are more obstacles to employing UAS; however, training leaders to understand how and when to employ them, building expertise with operators, and adjusting existing systems to maintain and resource our UAS efficiently are ways to integrate this critical asset into a unit. I am certain there are more and look forward to learning better ways to do so!

**Notes**

<sup>1</sup> Eado Hecht, "Drones in the Nagorno-Karabakh War: Analyzing the Data," *Military Strategy Magazine* 7/4 (Winter 2022), <https://www.militarystrategymagazine.com/article/drones-in-the-nagorno-karabakh-war-analyzing-the-data/>.

<sup>2</sup> Mia Jankowicz, "How Hamas Likely Used Rudimentary Drones to 'Blind and Deafen' Israel's Border and Pave the Way for its Onslaught," *Business Insider*, 10 October 2023, <https://www.businessinsider.com/hamas-drones-take-out-comms-towers-ambush-israel-2023-10>.

<sup>3</sup> Rodney Barton, "The Use of Drones in the Nagorno-Karabakh Conflict," *Australian Defence Business Review*, 24 May 2021, <https://defense.info/air-power-dynamics/2021/06/the-use-of-drones-in-the-nagorno-karabakh-conflict/>.

<sup>4</sup> GEN James Rainey and LTG Laura Potter, "Delivering the Army of 2030," *War on the Rocks*, 6 August 2023, <https://warontherocks.com/2023/08/delivering-the-army-of-2030/>.

<sup>5</sup> Army Techniques Publication 3-01.81, *Counter-Unmanned Aircraft System (C-UAS)*, August 2023, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN38994-ATP\\_3-01.81-000-WEB-1.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN38994-ATP_3-01.81-000-WEB-1.pdf).

<sup>6</sup> Training Circular 3-04.62, *Small Unmanned Aircraft System Aircrew Training Program*, August 2013, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/tc3\\_04x62.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/tc3_04x62.pdf).

<sup>7</sup> U.D. Defense, SUASMAN, retrieved from Small Unmanned Aircraft Systems Manager, <https://suasman.sofapps.net/Site/Home>.

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**1LT Jonathan Dow** is the 2-506 IN battalion editor and greatly contributed to this article.



*Soldiers in 2-506 IN employ a drone in a crew manner at night.*