Eye of the Tiger:
Raven Consolidation at NTC

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The ongoing Russian invasion of Ukraine has both reinforced and redefined the role of unmanned aircraft systems (UAS) in large-scale combat operations (LSCO). With a lower signature and fewer infrastructure requirements than their runway-bound counterparts, small UAS (SUAS) provide tactical echelons with a critical intelligence, surveillance, and reconnaissance (ISR) platform that allows small, dismounted teams to locate targets and observe fires.

The Army SUAS program of record is the RQ-11B Raven, a hand-thrown, Soldier-portable aircraft. Capable of flying missions up to 90 minutes in length within a 10-kilometer range, the Raven has less restrictive ceiling and visibility requirements than the RQ-7B Shadow. It pushes electro-optical/infrared full motion video and accurate targeting data to any One System Remote Video Terminal (OSRVT) within line of sight.

The modified table of organization and equipment (MTOE) and Army doctrine assign Raven operations and maintenance to the company/troop level. As leaders of 2nd Squadron, 2nd Cavalry Regiment observed in a 2018 *Armor* article, this alignment is a vestige of counterinsurgency doctrine unsuited to a LSCO environment.[1] The solution that 2/2 CAV pioneered at the Joint Multinational Readiness Center (JMRC) in Germany is to consolidate and operate Ravens at the squadron level as a dedicated ISR element tasked by the squadron commander as part of the targeting cycle. This article will discuss how 1st Squadron, 3rd Cavalry Regiment (Tiger Squadron) successfully implemented and refined this squadron-level ISR concept during garrison training and National Training Center (NTC) Rotation 22-07.

Raven Section Stand-Up

Tiger Squadron is a Stryker infantry squadron with three line troops, each assigned one Raven system and two operators by MTOE. At the outset of the Fiscal Year (FY) 2022 training cycle, Tiger's Raven readiness was in a poor

Raven Section Task Organization
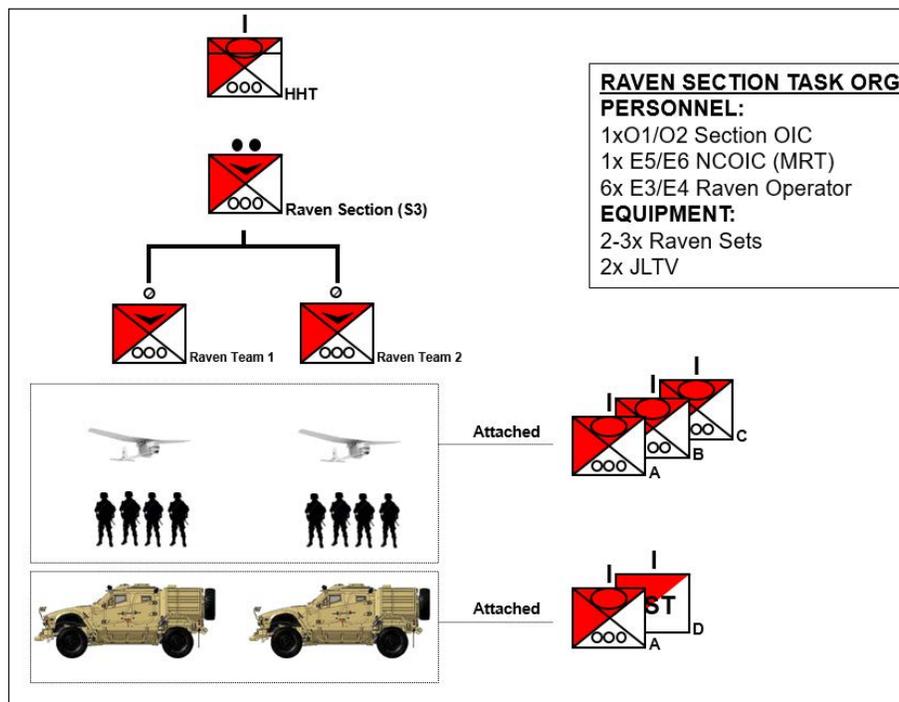
The Tiger Squadron's Raven section conducts training in support of troop external evaluations. (Photos courtesy of 1st Squadron, 3rd Cavalry Regiment)

state. Of the myriad tasks and responsibilities assigned to the line troops, Raven readiness and employment fell to the lowest priority. None of the squadron's three Ravens were fully mission capable; in addition, just one of the squadron's six MTOE-assigned Raven operators was trained and current on flight hours, and the unit lacked a Raven master trainer to generate additional operators.

Recognizing that a critical capability had atrophied, the squadron commander authorized the formation of a Raven section as an attachment to the squadron S3 section. Composed of an Infantry lieutenant section leader, an Infantry staff sergeant NCOIC and Raven master trainer, and two teams with three operators each, the section would be fully expeditionary, with two of its own vehicles and all sustainment functions fulfilled through the S3.

Before standing up and manning this element, the squadron needed to restore the readiness of its Raven program. Having consolidated the squadron's systems, the section leader worked with Program Manager-UAS at Redstone Arsenal, AL, and the regimental aviation officer (RAO) to fill all Raven equipment shortages and restore the squadron's SUAS capability. Raven section leadership also planned and executed an operator qualification module and subsequent training events in coordination with the RAO to maintain operator proficiency and flight hours.

By late January 2022, the Tiger Raven section was fully mission capable and integrated with squadron operations and intelligence processes during troop external evaluations (EXEVALs), which served as the regimental certification event prior to NTC. For the EXEVALs' culminating attack, troops were given priority for Raven support. The Raven section operated from the squadron tactical operations center (TOC), where the squadron assistant S2 (AS2), acting as collection manager, issued an information collection matrix to the Raven section leader. The Raven section then traveled as an attachment within the security perimeter of the executing troop and reported observations of enemy activity over Joint Battle Communications Platform (JBC-P) and FM radio via the squadron fires net. The OSRVT allowed the S2 to pull full-motion video feed at the TOC, validating multiple tiers of communication. At the end of the EXEVALs, Tiger Squadron had standardized procedures for Raven section planning, employment, reporting, collection management, and restricted operations zone (ROZ) coordination with the RAO.

Tiger Ravens at NTC

During NTC Rotation 22-07, the Raven section operated according to the model established at the EXEVALs. The section primarily moved with the TOC as an S3 element, but it was capable of being detached with other troops or employed independently. For each phase of operations, the AS2 worked with Raven leadership and the operations officer during mission planning to determine the named areas of interest and essential elements of information best suited for the Raven's airframe and sensor capabilities. The AS2, in her capacity as the squadron collection

manager, briefed the plan at the squadron operation order, allowing the Raven section to begin its own mission planning and the often arduous ROZ request process. Then, the Raven section leader synchronized his portion of the information collection plan with the squadron and troop fire support officers (FSOs) at the squadron information collection and fires rehearsal.

NTC also necessitated changes to the Raven communications plan. Because the squadron commander often commanded and controlled combat operations from a mobile tactical command post (TAC) closer to the forward line of troops, the Raven section utilized voice reporting over the squadron command net (FM radio), ensuring maximum dissemination of real-time reporting between disparate command and control nodes. Although OSRVTs at the TOC and mounted to a TAC Stryker were fully operational, line-of-sight challenges presented by NTC's plentiful mountains made FM and JBC-P communications the most reliable reporting mechanisms.

To illustrate how Tiger Squadron tactically employed the Raven section, the Ravens were attached to a troop at the outset of the first battle period (BP) and flew zone reconnaissance in support of that element's screen mission along key enemy avenues of approach through the Central Corridor. During this mission, the Raven section successfully identified two enemy scout vehicles and observed squadron mortar fires on target. During a subsequent BP, the Raven section detected multiple enemy dismounted observation posts along the Northern Wall before successfully identifying an enemy armored formation counterattacking the squadron's area defense at the mouth of Alpha and Bravo Passes. In a separate BP, when the regiment pivoted south to seize Razish, the Ravens traveled behind a troop and searched for irregular threat targets in support of Tiger Squadron's breach and subsequent clearance operations.

In sum, the Tiger Raven section flew 13 flight missions over the eight-day training period, totaling 17 flight hours — 15 hours more than any other squadron in the regiment. Tiger Ravens identified and observed fires that destroyed an enemy reconnaissance section, a tank platoon, and two separate dismounted observation posts. As a consolidated unit reporting directly to the squadron commander and TOC, the Raven section provided a dynamic, responsive ISR option that successfully answered priority intelligence requirements (PIRs) and greatly increased lethality.

Lessons Learned and Recommendations

NTC Rotation 22-07 also uncovered friction points and opportunities for improved Raven employment, including the ROZ process and Raven system limitations.

The ROZ request process presented a persistent impediment to Raven operations. Of the many ROZ requests that the Raven section leadership submitted, only 20 percent received approval. Some of these denials were substantive; for example, other higher-priority aviation assets were in the area, or the ROZ overlapped with an existing air corridor. Other denials were more procedural or administrative, stemming from inconsistent guidance from higher echelons or discrepancies between data submitted on the request versus that called up from the launch and recovery location. One advantage of Raven consolidation, vice operation at the troop level, is that the section leader and NCOIC were able to engage with the RAO directly. This alleviated administrative friction and optimized the request process to ensure ROZ approval. In the future, Tiger Ravens will maintain a close dialogue with the RAO during garrison training to streamline the ROZ process.

The other major friction point was the Raven system itself. Launched like a paper airplane and recovered by crash landing, the RQ-11B platform is a fragile airframe flown with outmoded ground control station software. As a rear-propelled aircraft, it is unduly vulnerable to weather and prone to unexpected crashes; because it must continuously fly forward at low altitude, it can be difficult for even the most adept operators to retain a sensor fix on stationary targets. These issues meant that the Raven section spent an excessive amount of time troubleshooting software issues and recovering aircraft. The Raven's range and loiter limitations also prevented the section from maximizing collection before having to recover and relaunch.

An NTC-specific solution is for units to draw the RQ-20 Puma upon arrival at Fort Irwin, CA. A larger and more stable airframe, the Puma offers a 20-kilometer range and five-hour loiter time — two and three times that of the Raven, respectively. Longer term, the Army should expedite and prioritize SUAS modernization. The Raven replacement for the troop/squadron level should be a quadcopter-style, vertical take-off/landing SUAS platform that offers a similar range and loiter time to the Puma with greater stability, portability, and hover features that

A Soldier in the Tiger Squadron launches a Raven during training in support of troop external evaluations.

maximize the tactical echelons' ability to find and destroy the enemy.

Operating Ravens as a squadron ISR asset was extremely successful for Tiger Squadron during NTC 22-07 and further validated the advantages of Raven consolidation at the squadron level. By concentrating its Raven assets, the unit generates a battalion-level ISR capability using existing MTOE equipment, filling a previous gap between the brigade Shadow and the unit of action. Troops simply lack the bandwidth to train, certify, and utilize the Raven platform successfully during large-scale combat operations. While there are certainly circumstances where troop-level SUAS are beneficial, so long as that SUAS is the Raven, squadrons and battalions will greatly benefit from consolidation to increase lethality in the targeting cycle.

Notes

[1] CPT Peter Kerkhof and LTC Steven Gventer, "Lessons in Small Unmanned Aerial Systems Employment for High-Intensity Conflict at Squadron Level," *Armor* (Summer 2018), accessed from https://www.benning.army.mil/armor/eARMOR/content/issues/2018/Summer/3Kerkhof-Gventer18.pdf.

Other Resources

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"Puma LE," AeroVironment, https://www.avinc.com/uas/puma-le

"Raven B," AeroVironment, https://www.avinc.com/uas/raven

PEO Aviation, "Soldier Unmanned Aircraft System (SUAS)," Army News Service, 24 September 2020, accessed from https://www.army.mil/article/239374/soldier_unmanned_aircraft_system_suas.

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Squadron during NTC Rotation 22-07. 1LT Murray is a 2020 graduate of the Redbird ROTC Battalion at Illinois State University.