Protection across the Domains: Electronic Warfare in the Armored-Cavalry Squadron

by CPT Kevin Zhang and CPT Michael Grdina

Current military conflicts in Iraq, Syria and Ukraine show how civilian drone technologies are cheap, plentiful, sophisticated and effective when employed in a military manner. However, the armored reconnaissance squadron's (ARS) modified table of organization and equipment (MTOE) has no viable response as of 2018. In fact, while assigned electronic-warfare (EW) personnel by MTOE, the ARS does not actually own any EW equipment.

Right now, there is a window of opportunity for the ARS (and the cavalry community as a whole) to step forward as the leader in the brigade's EW fight and to shape how the ARS will integrate itself into the Army's multi-domain battle for years to come.

Protection gap

Two excerpts from the ***Russian New-Generation Warfare Study*** conducted by the Potomac Institute and published on ***ARMY*** magazine's Website in 2016 highlight the current risk to the modern ARS: "Ukrainian units have observed up to eight Russian [unmanned aerial vehicle] overflights per day, and the constant awareness of being observed and targeted is often a traumatic experience that instills fear and inhibits movement, particularly in daylight. The combination of small-size, limited radar cross-section or infrared signature, and lack of acquisition until they are over or past the target, makes engagement with surface-to-air missiles a low-probability and high-cost proposition."

And: "In July 2014, Russia launched fire strikes with long-range artillery and multiple-rocket launchers employing top-attack munitions and thermobaric warheads against two Ukrainian mechanized battalions in the open. This intensely concentrated fire strike lasted only a few minutes, yet inflicted high casualties and destroyed most armored vehicles, rendering both battalions combat-ineffective."

The preceding should not be a surprise. The exact situation described was replicated and documented in our own training centers and relayed to this very publication. In the July-September 2016 issue of ***ARMOR***, CPT Joshua Christian published a piece perfectly outlining the gap in EW protection. Christian describes how a cavalry squadron executed a screening operation and attempted to gain contact with the opposing force (OPFOR) during an exercise at the Joint Multinational Readiness Center. Without warning, the squadron command post (CP) is destroyed when the OPFOR gains a line of bearing to the squadron CP with electromagnetic (EM) detection equipment, cues a reconnaissance asset (a drone in this case), gains an accurate grid and destroys the CP with massed indirect fires.[1]

All this occurred without the squadron or troops identifying any form of contact prior to indirect fire on their positions.

Christian used the preceding scenario to demonstrate in his article the importance of passive protection, but what should be addressed is the role of ***active*** protection in this scenario. Army Technical Publication (ATP) 3-20.98 identifies the purpose of the cavalry squadron in security operations as "provide early warning and reaction time, deny enemy reconnaissance efforts and protect the security area to give the commander freedom of maneuver." Right now the question the cavalry community should be asking itself is: "Does the cavalry squadron have the capability to do this?" The answer unfortunately is no.

The unit tasked with providing security and reconnaissance for the rest of the brigade is at risk of becoming fundamentally obsolete if it cannot protect itself from being observed, disrupted and engaged without providing early warning and maneuver space to the brigade. Passive measures are indeed a part of the solution, but the squadron must leverage active measures to adapt to the rapidly changing technological environment and avoid obsolescence.

Integrating active EW into reconnaissance formations

The squadron is the logical home for a robust and thorough EW capability. A doctrinal screen line consists of multiple observation posts (OPs) operating in depth, within supporting range and distance of each other, and large lines-of-sight overlooking likely avenues of approach and named areas of interest. Consequently, supplementing our OPs with EW equipment would simultaneously enhance the OPs and the equipment's capabilities. Integrating EW into the ARS's MTOE allows the squadron screen or guard to instantly begin operating among multiple domains.

Despite the rumors, unmanned aerial systems (UASs) and intelligence, surveillance and reconnaissance systems are not undetectable, invulnerable, invisible platforms. Indeed, they may be difficult to see, hard to hear and hard to engage, but they emit detectable electromagnetic (EM) signatures all the same. The technology to detect these signatures is real, proven and in use in combat zones around the world. Systems like the Danish Wingman from Mydefense or the Versatile Radio Observation and Direction (VROD) the Army is now taking steps to field provide electronic-frequency-detection capabilities. These devices are manportable sensors that alert the user with an audible or visual cue when a UAS' distinct EM signature is received by the antenna. However, current fielding sees these devices consolidated at the brigade level, along with the rest of the brigade's EW and counter-UAS capability. While these fieldings are a step in the right direction, they do not go far enough and need to be organic to the ARS.

Another method of reinforcing the ARS' EW capabilities is to provide it more active EW jamming capabilities. Using currently fielded kinetic air-defense assets to engage UAS assets is an unrealistic proposition for multiple reasons. It remains an economically poor trade-off to kinetically engage cheap drones with sophisticated guided missiles. Also, detecting the physical signature of small UASs is a daunting prospect under field conditions.

A promising option for the cavalry community is therefore active EM jamming. Active jamming can occur at echelon from the OP and upward. Systems such as VROD Modular Adaptive Transmit (VMAX) currently in use or the Northrup Grumman's Drake system are manportable EM jammers that can deny UAS command and control and Global Positioning System signals in a large area. Active jamming can be used in the same manner as an "area effect" weapons system. Area jamming is preferable to more traditional point weapons systems, as it allows the individual Soldier to cover a greater area, something critical for any force establishing a screen line.

There is a trade-off in weight, power and EM signature requirements, but there is an overall net increase in protection for the squadron and the brigade. Multiple OPs linked with common active EW equipment in a screen or guard could be quite effective in disrupting or denying enemy UAS reconnaissance efforts.

Some may argue that the brigade-level EW team could simply be tactically controlled by the ARS, but devices such as the VROD and VMAX could more easily be carried forward by a 19D onto an OP and operated passively for hours, only raising an alarm when there is a UAS within line-of-sight of the system. The ARS screen would now have the ability to gain EM contact with the UAS and can report its presence, even if it could not be physically seen. This vital reporting could facilitate more active or passive measures in alignment with the commander's reconnaissance and security guidance, cue additional reconnaissance or air-defense assets at echelon or even facilitate informing decisions linked to the commander's critical-intelligence requirements.

Larger and more powerful systems such as the Army's vehicle-mounted Sable Fury jamming and signal-detection system could (and should) be echeloned at critical nodes such as the troop CP, squadron CP and various squadron-trains locations. These sites have inherently larger physical signatures, lack immediate mobility, have lower protection and have higher payoff value for the enemy. The squadron's command and sustainment nodes are likely the closest to the enemy and are in most danger of detection as it coordinates the ARS across the entire brigade's frontage. Vehicle-mounted passive sensors and active jammers would add to the security and capability of these critical nodes with low or no impact to the staff and logistical personnel using them. Setting chemical sensors out with the establishment of a CP or tactical-assembly area for protection is normal, and so now too should be the establishment of EM sensors.

By integrating EW ability into the ARS, the possibility of EW fratricide ncreases measurably. The use of EW systems will unavoidably degrade an ARS' own ability to communicate with friendly forces no matter how well positioned or aimed those systems are, and if not planned or coordinated, may prevent an armored brigade combat team (ABCT) from being able to use its own mission-command systems to maximum effect. This degradation can be

heavily (if not entirely) mitigated by adding (and using) EW personnel at the squadron level who can collaborate efforts horizontally and vertically to minimize EW fratricide. ATP 3-20.96 identifies that an ARS staff should plan to operate beyond traditional frequency-modulation communications, using alternate communications methods and retransmission stations as necessary.[2] The ARS should be, by doctrine, the unit most familiar operating in a constrained communications environment, and an EW-saturated area is just one example of that possible constraint.

Current EW assets potentially available to U.S. and allied forces are controlled at brigade and echelons above brigade and are not organic to Army maneuver forces – and certainly not the squadron. EW will play its most decisive role in the opening salvos of any conflict, long before any theater- or division-level assets can be expected to action in support. The primary EW gap in today's fight is persistent EW capability available to the line units required to screen and advance against potential adversaries. Current platforms are often mounted on vulnerable and highly visible aerial platforms that, by their nature, will not be responsive to the requirements of forces potentially in contact.

What is needed are assets and tactics at the troop and squadron level that can mitigate the negative impacts of such emergent technologies on U.S. operations while simultaneously leveraging them to enable the U.S. warfighter to perform his or her job in a changing environment.

Integrating active EW into indirect fires

The solution to the current capability gap in electronic warfare is threefold: 1) integrate counter-UAS technology in the short to medium term; 2) continue to develop active anti-UAS technology in the long term; and 3) integrate counter-UAS EW capability into the maneuver and fires warfighting functions (WfF).

Counter-UAS technology often consists of radio jammers that deny the ability to control and communicate with any UAS assets. Such equipment could be used simultaneously to prevent unwanted communications while also denying enemy UAS freedom of maneuver. There are multiple systems on the market as well as being fielded now that will provide mounted and dismounted forces the ability to detect and deny enemy UAS effective operation.

Active EW capabilities, although most complementary to the missions of cavalry squadrons, would be of distinct use to the fires and protection WfFs. For example: first deployed in the mid-80s, the Bulgarian R-045 Sharshel is an electronic area-denial weapon deployable by 122mm and 152mm artillery.[3] A battery fire mission provides the capability of jamming communications in nearly an entire grid square for up to an hour. The same technology can be integrated into our own indirect fires and operate in a similar fashion as the family of scatterable mines. In today's complex and nebulous conflicts where multiple state and non-state actors of varying alignments and allegiances operate in close quarters, the ability to employ non-lethal but selective counter-capability weapon systems should not be overlooked.

An ABCT's ARS is the logical home for counter-UAS capability. A doctrinal screen line consists of multiple OPs, operating in depth and within supporting range and distance of one another. By integrating counter-UAS systems into an ARS's MTOE, an ABCT's screen becomes capable of denying enemy forces the ability to easily achieve their own reconnaissance or security objectives.

Neither does integrating counter-UAS and EW assets into the ARS preclude retaining the same complementary capabilities at brigade level. Reconnaissance formations must always orient on force, facility or area to be protected, thereby placing them in the ideal location to employ and position EW assets.

The ability to deny any potential enemy the ability to freely use drone and radio communications within an area is absolutely critical. With the current ongoing developments in drone technology, such capabilities should be considered and controlled at the same level that obscuration indirect fires are. While pushing down such capabilities will needlessly complicate communications in any attempts to use rotary and fixed-wing assets, the requisite additional planning time required will be more than offset in the ability to protect friendly forces from easy detection and destruction.

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Notes

[1] CPT Joshua T. Christian, "Mastery of the Fundamentals of Passive Counter-reconnaissance to Survive against a Hybrid Threat," ***ARMOR***, July-September 2016.

[2] ATP 3-20.96, ***Cavalry Squadron*****,** Washington, DC: Government Printing Office, May 2016.

[3] "Wingman 101: Wearable Drone Detector," MyDefense; accessed May 4, 2018, http://mydefence.dk/military-customers/wingman101/.

[4] "Company's mobile acoustic sensing and electronic attack innovations detect and defeat emerging threats in complex scenarios," Northrup Grumman; accessed May 10, 2018, https://news.northropgrumman.com/news/releases/northrop-grumman-demonstrates-counter-uas-technologies-at-black-dart-exercise.

[5] "Electronic Warfare Equipment," Defense Industry Group PLC Bulgaria; accessed June 10, 2018, http://www.digplc.com/communicationselectronics5.html.

[6] "2CR trains on Enhanced Electronic Warfare Systems," U.S. Army; accessed Nov. 14, 2018, https://www.army.mil/article/184853/2cr_trains_on_enhanced_electronic_warfare_systems.

Acronym Quick-Scan

ABCT – armored brigade combat team
ABOLC – Armor Basic Officer Leader's Course
ARC – Army Reconnaissance Course
ARS – armored reconnaissance squadron
ATP – Army technical publication
CP – command post
EM -- electromagnetic
EW – electronic warfare
MCCC – Maneuver Captain's Career Course
MTOE – modified table of organization and equipment
OP – observation post
OPFOR – opposing force
UAS – unmanned aerial system
USMA – U.S. Military Academy
VMAX – VROD Modular Adaptive Transmit
VROD – Versatile Radio Observation and Direction
WfF – warfighting function