

It Ain't Much to Look At -- Reconnaissance and Security Operations in the Future ABCT Cavalry Troop

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Where No Manned-Unmanned Team has Gone Before

This article attempts to enhance discussion about the ways in which Army leaders can think about incorporating advanced technologies on a future battlefield. While not supposing to define the future of maneuver, this story is intended to drive reflection and discussion of priorities and goals. The story was written for an internal, Maneuver Center of Excellence audience and is being shared to widen the discussion. If you were to command the Cavalry Troop of 2030 (or another organization), what would it look like?

CPT O'Brien rubbed his head slowly. He felt certain the plan was solid, but he had been staring stupidly at checkpoint 13 on the digital map for more than thirty seconds. He caught himself and thought, *better have someone double check me on this.*

Three weeks into a war no one had seen coming, he was tired, approaching that silly phase of fatigue where one felt semi-nauseous at all times. Though the deployment to theater and onward movement had gone smoothly for the most part, little screw-ups had cost the unit and its

commander some much needed mental stability. SGT Troy left the A and B cards for his Rover Section locked in the Comms Room in the unit area; uniquely positioned to do no one any good. Everyone else managed to draw the brain cards for their ground vehicles. But SGT Troy...

The Rover series of ground reconnaissance vehicles was quite a departure from the previous Cavalry platforms. Designed to be operated as part of a team, the vehicles could be fully manned, partially manned (Driver/Commander) crew. One hour each day the manned vehicle crew conducted battle simulations. While the simulations certainly improved the capabilities of the crew, the real benefit was training the unmanned vehicle to understand and anticipate the human manned crew of the wingman vehicle.

The 'A' card was the interface for the vehicle that was to be partially manned. Since most of the gunnery functions were automated, the vehicle had to intuitively understand commands from the Commander and Driver. The 'A' card studiously learned every bit of slang, dialect, or mixed language used in the simulations and could interpret through the strained digits of the intercom which target was to be engaged with which munition or if the target was not to be engaged. The 'A' Card was removable, so if Rover 50 was down for maintenance, the crew could jump to another vehicle, insert the card and be at optimal proficiency.

(Photo by Petty Officer 1st Class John Callahan)



The 'B' card also learned during the daily simulations. However, the 'B' card was designed to be inserted in the unmanned wingman Rover. While the manned vehicle merely learned language and crew expectations, the unmanned vehicle had to be able to execute simple tactics autonomously. In fact, the first month of simulation with a new crew had little to do with tactical proficiency and everything to do with teaching the laws of war to a machine that could not understand ethics. Since computers can only operate in a binary world where everything is either yes or no, on or off, applying battlefield ethics training in unmanned vehicles was very difficult. Humans can think in parallel. We can take in thousands of visual, auditory, and olfactory cues while simultaneously applying our moral code to a particular logical or effectual activity. This means that when a child walks forward with a grenade neither readying it for throwing nor overtly showing their intention to turn it in to the authorities, the human being can assess the ambiguity and develop means for resolving the situation. Unmanned autonomous systems react much more poorly. For lethal systems it's either kill or not. Hence the ethical combat training. As the computer completed training scenarios, dynamic algorithms automatically develop that linked ethically correct responses during simulations to actual robot behavior. Because the possibility for battlefield ambiguity can never be totally resolved, humans would always have a place on the battlefield. The idea of a totally autonomous warfare was frightening, but the synergistic effect of manned-unmanned teaming was impressive. 'B' Cards were paired to a specific crew and a crew change required the 'B' card to be reset. Live Fire exercises validated the teams.

A properly trained section, consisting of one partially manned Rover and one unmanned Rover using 'A' and 'B' cards could be devastatingly effective. An unmanned Rover could conduct the crew drill and send a 125 mm, ground skipping round, downrange each 90 seconds at a sustained rate, besting manned tank crews at a rate of better than 2 to 1. The section could annihilate a traditional 4 tank, tank platoon in less than the time for one manned tank to engage. The ground skipping rounds only added to this lethality by seeking to skip up into the soft underbelly of enemy armored vehicles.

But now, SGT Troy's section would be operating in basic mode. Without the cards, one of the section dismounts would have to manually control the unmanned vehicle from the crew compartment of the manned Rover. The intuitive controls would allow the dismount to be effective, but nowhere near as lethal.

The other foul up that had landed CPT O'Brien in hot water was regarding the tactical electronic exploitation teams. He had two, one in each platoon, but both teams were out of tolerance in their annual certifications. It was controversial placing teams of soldiers, trained in some of the most secret electronic warfare techniques in the Scout Platoons, uncomfortably close to the enemy. But it made less sense to capture a signal with a scout, play a telephone game relaying it two, three, or four echelons back, just to have the guy have to come forward anyway if the commander wanted anything done. While snooping on enemy communications networks was an understood requirement for the teams, implanting false messages or attacking network nodes could be detected more easily and required a leader to decide how the situation should be developed. If the platoon was remaining stealthy in a particular phase, it would not do to announce one's presence with an aggressive network attack. It took some time to recruit and train these skilled individuals. Initially looked down upon by the line scouts, the exploit guys earned kudos through their incessant practical joking. Tactical exploit teams had, in successive weeks, programmed the Squadron Commander's Phone to ring at seven minute intervals between 4 and 6 am every day for two weeks, slowly caused the Troop Commander's smart watch to lose track of time on runs until the Troop was sprinting or walking at an '8 Minute pace,' and hacked the Brigade Command and Staff slides to start playing Lionel Riche songs each time MEDPROS was discussed. Needless to say, the exploit teams fit right in the culture of the Cavalry.

Consisting of a Staff Sergeant Squad Leader, a signal intelligence analyst, an electronic warfare technician, and a cyber-exploiter, the team was a one stop shop for dealing with the electromagnetic spectrum. When properly trained, an enemy signal could be triangulated to find the location of the sender and analyzed for content and type. From there the cyber exploiter could crack the encryption, recon the wireless network on which the signal was transmitted, pull unprotected data, and input false signals into the network. In training, expert exploiters had been able to use enemy networks to transmit legitimate message to friendly platforms using the interconnected

nature of the internet, though this would prove difficult with an enemy in a life and death struggle. The exploit team allowed the platoon to explore enemy command and communication nodes without a scout ever seeing an enemy Soldier. The EW trained tech could react much quicker when the enemy employed jamming or other EW techniques, ensuring friendly networks remained active.

The teams had to be trained and certified annually by the NSA. If not, it was probable a Platoon exploit team would try to do something sneaky on the battlefield in Belarus or Vietnam, and later that day, a bank teller in Ohio would notice her machine was acting funny because the worm had self-replicated across the world in 12 hours. CPT O'Brien had tried juggling the seemingly endless 350-1 training glass balls, and the annual certification had been pushed too far to the right. Now he had a trained, but uncertified, exploit team and he prepared for the imminent mission with a clear sense of the enormity of his mistake.

Still, these were ankle biters, and the real problems lay ahead. Through three weeks of zone reconnaissance, screens, and the odd Reconnaissance in Force operation that placed them in their current location, the fighting remained at a low pitch. The enemy had used some nifty tricks to impress upon all the coalition members their earnest intention to retain what they swiftly and illegally seized in a surprise attack 45 days ago.

Initially, the enemy had tried to force the coalition to fight 'dumb,' massing electronic jamming and spoofing satellites to prevent remote control of UAS and digital access to front line units across so that coalition elements would not be able to communicate. This slowed things down and gave the air forces a devil of a time, but the Brigades used ground form integrated relay system (GFIRS) which were largely immune to the jamming effort. Combining the FM radio concept with the functionality of an integrated digital network, the GFIRS minimized electronic signatures, ensured data integrity, and made establishment and organization of data networks easy. Each vehicle in the BDE acted as a hub for several devices, be they radios, planning tools, or forward entry devices. These hubs used directional antennas to shoot digital communications across a frequency hopping net to 'slinky' retrans antennas. By not using omni-directional antennas, manned positions and C2 nodes would be difficult or impossible to locate except by unlucky enemy observation. The 'Slinky' antennas got their name from their ability to always be sitting upright, even on rough terrain, just as a slinky continues to flip-flop until it has found solid ground. The antennas were basically small network nodes, like routers in the shape of a six foot antenna with the computing power of a smartphone. The antennas pull data from across the EM spectrum and sort it by encryption. Enemy signals could be captured and routed rearward for analysis, but mainly, the antennas allow friendly communications to be reliable. Incorporating checksums in the signal metadata, no transmission would pass a node without being complete. If a signal was garbled, the nearest router would send a 'send again' message with just the missing data blocks needed.

When the enemy put their big jam plan into action, it slowed things down, but the Brigade kept on communicating. Frustrated, the enemy started lobbing rockets at these antennas as they were the only battlefield nodes able to be identified through SIGINT. Though more than one mangled antenna was pulled from a smoking crater, the hundreds of other nodes picked up the slack.

Unable to use the electronic spectrum to target friendly units or jam communications, enemy units started infiltrating rearward of the front line to angle their detection equipment back toward the front. They had some unfortunate successes using this technique, but the teams could not operate freely and were mainly used for identifying Brigade command nodes which earned them significant and immediate attention from the combined exploit/MP teams securing the rear areas.

Another trick the enemy used was thermally shielded robots that lay dormant until triggered by an unmanned ground sensor. Upon triggering, the robots kamikaze attacked while simultaneously marking the location for attached enemy artillery or aviation units to join the fight. Well camouflaged and programmed to accept no electronic signals after emplacement, the robots were effectively smart mines that could swarm a target, seeking armor vulnerabilities, burrowing into the ground to attack from beneath or springing up and hitting a vehicle from above. Alternatively, they could spring up and detonate like a 'bouncing betty' grenade to attack dismounted troops. B Troop struggled with these ambushes. If the area was open, CPT O'Brien would order the swarm squad

to fly its spoofers in, giving off the signature of a helicopter landing. This would trigger the robot ambush with only the loss of a spoofer UAS or two. Alternatively, the Troop would operate on a very narrow front and then approach robot ambushes from the rear, the ambushes having to be directional in order to allow the enemy to adjust. Overcoming the ambush and capturing three enemy militiamen for questioning. It had been a close call and CPT O'Brien promised himself that he would never again operate without his UAS swarms in position if the weather was in any way permissive.

But how would they fight now? Up to this point, the wooded countryside and small towns had been familiar problems to the Troop Commander who had trained his Troop on the rolling hills of Fort Hood, TX. But now the enemy had fallen back upon a large city. The Brigade was to isolate and seize the city, a daunting task and one in which combat power necessitated precise targeting. That was his job. Answer the Brigade Commander's questions so he could place his combined arms battalions at just the right place and time to be decisive.

"XO, check me out on this plan. This one's gonna be tough." O'Brien said.

"Roger 6," 1LT Rogers switched his pad into planning mode. GFIRS shared everything in real time, so CPT O'Brien's enemy SITEMP overlay popped up. Rogers studied the image, changing the map functions and altering perspective.

Fighting in a 3D urban environment posed a logistical nightmare for attacking armies striving to target the enemy without eviscerating the city itself, but it helped to be able to look at the problem from the perspective of the scout on the ground. The images had been updated from mapping bots that had recently flown over. Rubble piles were accurate to within the last 8 hours. O'Brien anticipated a mixed threat consisting of irregular militia, a few conventional infantry squads, and an excessive amount of ambush bots. If the fight went like CPT O'Brien thought it would, this was more of a massive EOD clearance drill than a maneuver battle. Still B Troop only had to focus on finding the enemy forces so someone else could destroy them. The militia squad that would be attacking from beneath the streets was particularly troubling to the young XO.

"Alright," O'Brien cut in over the intercom. They were separated by eight km and hadn't been face to face in five days. Whoever thought the Cavalry Troop was going to be able to all gather around the sand table of old was lying to themselves. Even if you could pull leaders back, they would have to cover a long distance, increasing risk of drawing attention to their locations. The distributed Ops process and TLPs were the default. Thank heaven all the home station training had incorporated it. The Squadron was always operating with ambiguous instructions during exercises to replicate the fact they would be out front of the Brigade before a full plan could be made. And they did their training at night. It was paying off now.

"The enemy is in about Battalion strength across the city. They won't operate that way of course, but that's about their size. Their purpose is to draw the Brigade in to the city, negating our maneuver and firepower advantage. Then attacking into planned engagement areas here, and here. Once they have bloodied us and forced us to cede the initiative, the enemy main body will attack south of the city to cut us off. Our part is this area between RTE GREEN and RTE BLUE. The enemy here will utilize hit and run ambushes along this subway line, attacking from below then utilizing the tunnels to exfil. Once the enemy has attrited us to Checkpoint 18, they will move into defensive positions overwatching EA1 and EA2. They are to hold for nine hours, until the 200th Brigade can counterattack. What do you think?"

Rogers studied the work. The CO had done a good job understanding the 3D science. Weapons ranges, survivability positions, mutually supporting arcs of fire were all properly positioned and recorded. *It was just too... well, like how we would fight. The enemy had a worldview 68 degrees from the way we looked at the world. He valued mass while we valued precision. He thought life held relative value while we believed in its immutable value. He considered this land sacred while we were primarily just annoyed by its dense population and poor sanitation.* The XO felt that if anything, the enemy would not fight how we wanted him to.

Still the CO had been on point up til now. During their initial zone reconnaissance in support of the Brigade movement to contact, the Troop had defeated a well camouflaged position using the quadcopter laser spoof-

ers en masse. The CO had templated an enemy ambush position, but underestimated how hard the enemy would fight up front. Threat attack helicopters and tankbots were positioned in a rear slope defense, well sighted and radio silent. The CO had done masterful IPB. Instead of 1st Platoon cresting the hill into a hail of deadly AT and ATGM fire, a swarm of laser armed quadcopters floated over the IV line. The quadcopters flew around firing lasers at the enemy ground and air vehicles. The automatic warning devices of the enemy went crazy, slewing to defeat enemy vehicles that turned out to be \$20 quadcopters.

In moments, the enemy had revealed his positions, allowing for the FIST to reach back for the right tool in the Brigade box. In this case, a barrage of smart rockets launched from the Brigade's strike Battery rained down. Good planning had ensured the strike battery was in position and that the target was one the BDE commander wanted destroyed by the Strike battery. GFIRS had enabled the FIST to reach directly to the strike battery FDC with two clicks of drop down menus. As the last of the rocket shrapnel came to a rest on the ground, 1st Platoon polished off the remainder, capturing three enemy soldiers.

This was going to be different. The city offered a dozen positions. And even if you correctly guessed the building, which floor? *I guess that's why we're still in the reconnaissance business.* Someone will have to go find out. "That's how I would fight," Rogers said.

"OK. Let's get everyone on the net." O'Brien responded.

O'Brien spent some time describing the particulars of terrain and civilian population before describing how the enemy would fight. It was hard to know exactly how the population would react with such ethnic, religious, and linguistic diversity in the city. While an enemy firing at you was relatively easy to ID, the ones that hid among the population were much harder to find. Nothing to be done, but wade in and talk to people. Equally as important were the people not talking to them. O'Brien was counting on them talking on their phones, emails, texts, and messaging services. ID of enemy outposts would be essential.

OK. Here's how I see the fight going. This will be a Forceful and Deliberate Reconnaissance. Once in Phase Two, we will be observed by enemy and civilian alike. Not going to BS you and say we'll be stealthy. But I do need detailed information about our zone. Engage enemy team size elements. Our HPTs are the enemy anti-tank bots. Once identified, Swarm squad will provide a lethal UAS to destroy the target. Displace once we have confirmed the presence of enemy in greater than 30 soldiers strength and pass to the 3rd Battalion to destroy.

"1st Platoon will infiltrate to PL BRAVO and establish observation of NAI 1 and 2. Ensure your exploit team is oriented on this building with excellent lines of sight to the west. Once 1st Platoon is at PL BRAVO, Swarm Squad Faith will launch all spoofers into ROZ YANKEE, oriented on NAI 1 & 2. Mortars will fire a Coordinated Surveillance on AB 0210."

"Excuse me Sir," LT Walters, 1st Platoon Leader, said, "are we permitted to fire mortars in the city?"

"That's why they're firing the coordinated surveillance mission, Walters. One cannon fires an aerial antenna which deploys and slowly floats down like an illum round, all the time relaying data back to us. The other cannon fires a canister round full of sensors that fall to the ground, bounce around, or otherwise disperse. You've seen the movie *Twister*, right? It's kinda like the little balls they keep trying to launch into tornados. As they fall, they are reporting back what signals they pick up, what weapon signatures they see, and what activity is going on. After they fall they become unmanned ground sensors. Maybe we'll get lucky and one will be taken back to the enemy command post. The coordinated surveillance mission is going to allow us to see and hear on the back side of this row of buildings."

LT Walters acknowledged as CPT O'Brien continued, "The spoofer fly by and the coordinated surveillance fire mission should cause the enemy to start talking. 1st Platoon Exploit Squad, you develop the situation from there. I want confusion to reign. Map their network, then go direct with Swarm Squad Hope. Hope, have ten hunter-killer UAS teams in ROZ ZULU. Once 1st Exploit has identified an enemy node, they'll notify you directly. Gain observation contact and then use the lethal UAS to destroy each team. While this is happening, 2nd Platoon infiltrates and occupies this open area near these buildings on the outskirts of town. Your job is to

identify and mark these three subway entrances. You will then go direct with the Brigade strike battery. You got me? LOI 5 straight to the guns. You will observe targets AB 0215, AB 0220, & AB 0225. Each target is two rounds HE followed by six of CS gas tumbling 155 rounds. If your TLE is on, CS gas will fill the subway tubes for the first 800 meters on the west side of town. The enemy platoon operating subterranean will be busy donning masks as we make our initial bound into town. I don't really have an answer for them, but I want them uncomfortable and off balance. If they pop out through the entrances, call repeat on the targets and ruin their day. Oh yeah, Carver c/ UAS section, I want you oriented on the tops of these buildings. I think they will try to sail down lethal UAS on us from there. I don't expect anything but broken parts to hit the top of my vehicle."

The UAS Squads were terribly useful. Each squad consisted of 40 drones auto-launched from the back of a cargo truck style vehicle. The first up was always the control UAS. The control bot passed signals from the ground control station to the swarm allowing for much greater line of sight linkage. As many as four control bots could be up, extending the swarm range. The Commander could task organize his swarms with a mix of electronic spoofing bots, traditional observation bots, and armor penetrating lethal bots. If necessary, the UAS pilots could hand off bots to scouts on the ground though this was the less preferred method as it forced the scout on the ground to take his attention from the area in front of him. The observation bots could be slaved to ground units, assisting in situational awareness and alerting them to danger. Spoofer bots picked up signals needed by the platoon exploit teams and relayed instructions back. They also could replicate radar signatures of different helicopters or planes, causing ADA to reveal themselves on the battlefield. Lethal bots swooped in attacking the soft armor of vehicle tops.

CPT O'Brien paused as though he had forgotten something, "Pay attention to this no fire area here. That's a Jordanian Special Forces Team that has been in the city for a week now. They've been keeping us up to date via the hypersonic relay system. Walters, you need to do a face to face link up. Remember the GFIRS language protocol should let you communicate with them. Though they've done a good job reporting, I want to know what they've been seeing up to that second."

The hypersonic relay system used sound transmitted at wavelengths that could not be picked up by the human ear but which machines, and dogs, poor dogs, could decipher. When transmitting, the team leader simply aimed the dish toward friendly lines and plugged in. A three second hypersonic burst could pass gigabytes of information that a computer could then turn into useful information.

"If we have not made contact with enemy in greater than platoon size strength by PL BRAVO we know the enemy is running a variation on COA 2 and this answers PIR 1. If that happens we bound forward repeating the steps we just conducted to PL CHARLIE. I want to replay the same game plan to keep things simple. XO will man link up point 1 and is prepared to pass 3rd Battalion to destroy the enemy. Remember, dismounts are on foot for the entire operation. Our best chance for good information is what we can get talking to people. I'd wager the indicator we're looking for will come from talking to some folks in one of these houses."

Following 1SG Soileau's thorough briefing on the MEDEVAC and logistics plan, the platoon Leaders asked questions to ensure they understood what was required. CPT O'Brien looked at his watch, "OK. The time is 1135. Digital Rehearsal is 1400. Out."

Acronyms

3D – Three Dimensional
ABCT – Armored Brigade Combat Team
AT – Antitank
ATGM – Antitank Guided Missile
CPT - Captain
BDE – Brigade
EA – Engagement Area
EOD – Explosive Ordnance Disposal
EW – Electronic Warfare
FIST – Fire Support Team
HPT – High Payoff Target
LOI – Level of Interoperability
MEDEVAC – Medical Evacuation
MP – Military Police
MTOE – Modified Table of Organization and Equipment
NAI – Named Area of Interest
NSA – National Security Administration
PL – Phase Line or Platoon Leader
RTE – Route
ROZ – Restricted Operating Zone
SGT – Sergeant
SIGINT – Signal Intelligence
TLP – Troop Leading Procedure
UAS - Unmanned Air System
XO – Executive Officer