



Ukraine: Lessons for Leaders

What should Marines learn from this modern war?

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Russia invaded Ukraine in February 2022. But the two sides have been fighting since 2014. The ground war in Ukraine is unlike the Marine Corps' experience in Iraq and Afghanistan, and significantly different from our future, forecasted role in the Pacific. Ukrainian forces, fighting for their country's survival, have been innovative and flexible, fielding new technology, destroying Russian tanks, discarding doctrine when required, fighting well with donated equipment and citizen soldiers, and keeping their enemies off-balance.

Is the war in Ukraine relevant to the Marine Corps? If so, what can we learn? If we had to fight a similar conflict, what would we need? The following insights on modern, conventional ground combat are taken from thirty recent reports and analyses.

1. **The battlefield is totally transparent. UAS are everywhere, all the time. We need to disperse, camouflage, and move to survive.**

Reports: During the battle of Bakhmut, in August 2022, there were 50 UAS in the sky at all times.¹ In addition to continuous ISR, armed UAS killed tanks, artillery, and aircraft.² Under this threat, UKR units have learned to disperse HQ, C2, ammunition, logistics, and aircraft. Dispersing is difficult, but more effective than concealment.³ "There is no sanctuary" says U.S. Army General J. Rainey.¹

We need counter-UAS EW jammers to defend ourselves.

Reports: Every UKR tank needs its own anti-drone system.⁴ RUS frontline EW, with one major system every 10 km, is primarily focused on disabling UKR UAS.⁵ Half of UKR UAS losses are now due to EW jamming of GPS signals.⁶

We need organic UAS. Every unit. Every echelon.

Reports: 90% of UKR drones are disposable—lost after an average of six flights. UKR may be losing 10,000 drones per month.^{5,16} All types of units on both sides are using expendable drones, loitering munitions, and counter-UAS capabilities.³ When RUS formations cannot hide and cannot mass, they cannot achieve surprise, and are therefore denied an important tactical advantage.^{8,9}

2. **Every signal is a target. The AO is electromagnetically transparent. We need to reduce emissions and mask our signals.**

Reports: UKR units now view *all* emissions as targetable.¹⁰ UKR soldiers avoid cell phones.¹¹ When UKR units stop cell phones and start paper-based comms, RUS sensors lose their ability to track UKR emissions.¹² RUS brigade HQ pull back from the front line and seek protection underground in reinforced structures.⁵ Units need the capability to measure their own signals.¹⁰

3. The modern all-source, real-time surveillance network is not ours. We need to use commercial sources of information.

Reports: In February 2023, a UKR citizen uploaded a geo-located video of RUS invaders arriving at Bakhmut.¹⁶ Everyone is now a collector. Precise RUS locations are reported by civilian smartphone photos, social media, amateur drone videos, and commercial satellite imagery. Anyone with a laptop can access a real-time operational picture.^{13,14,15} Crowd-sourced security cameras and mobile phones feed a real-time sensor network far more responsive than any centralized, legacy military system.^{17,18}

4. Artillery kills everybody. Rockets kill. Missiles kill less often. We need artillery. We need artillery rounds.

Reports: The RUS critical capability is fires.⁵ Dumb artillery rounds are still the greatest killer on the battlefield.¹⁵ Over 80% of current UKR casualties are caused by artillery,¹⁰ over 90% during the previous eight years, 2014–2022.³ Although precision weapons reduce logistics requirements,³ they cannot replace the large volume of dumb munitions needed.⁷

Russia fired 200,000 shells per day in the summer of 2022.¹ Barrels melted. During the battle of Bakhmut, RUS guns were reduced from firing 60,000 shells to 10,000 shells per day.¹⁹ To meet high artillery consumption rates, RUS transported 700,000 *tons* of shells in the first five months of war.^{3,20}

RUS uses massive salvos of artillery and MLRS to suppress UKR positions and support tactical advances.²¹ Plentiful RUS artillery often makes up for poorly trained infantry assault elements.^{5,18}

To mass artillery effectively, RUS has formed artillery brigades.⁵ Most of the 110 to 136 RUS mechanized battalion tactical groups (BTG) that had invaded UKR were dissolved, and their small detachments of artillery, tanks, engineers, and air defense were reformed into full-strength units.^{3,18} RUS leaders recognized that ad hoc and non-cohesive BTG, with too few infantry, poor infantry-armor cooperation, and ineffective small attachments, were unsuited for the Ukraine war.^{3,10}

5. Modern fires networks can see, strike, and destroy in 60 seconds. We need counter-UAS jammers to attack the kill chain.

Reports: In May 2022, a RUS unit crossing the Sverskyi Donets river was detected by UKR UAS. Artillery destroyed over 70 vehicles and killed 485 soldiers.⁹ In 2014, two battalions of UKR vehicles (and hundreds of casualties) were destroyed by a RUS UAS-to-MLRS fires network at Zelenopillya.²¹

Multiple RUS UAS forward observers supported a single attack over the village of Artemivske in 2022. One UAS targeted UKR artillery outside the city, one targeted UKR reserve routes, one scouted ahead to target enemy ambushes, and a fourth flew overwatch above the assault element.⁵

Doctrinally, a RUS ‘reconnaissance fire complex’ uses long-range artillery and precision weapons to destroy targets identified by distant UAS.^{10,28,31} Vehicles are attacked with guided missiles, but unit positions, HQ, and logistics are struck with high-explosive artillery, which cannot be jammed.³¹ RUS UAS now send grids directly to fires commanders.⁵ This kill chain can take less than a minute. The goal is ten seconds.³¹ Instead of ground reconnaissance units, most RUS observers are now UAS.⁵

Multiple RUS generals (many on cell phones) have been killed by UKR fires networks.³¹ 86% of UKR targets are derived from UAS.¹ RUS artillery no longer digs in, since it must move quickly after firing.⁵

6. **A single tank is the most lethal weapon on any battlefield.**

We need tanks—for infantry support in close terrain.

Reports: UKR has killed 1,000 RUS tanks, but who killed them—ATGM, UAS, UKR tanks, or indirect fires—and in what percentages is not known.^{18,4} Infantry ATGM success is exaggerated. UKR has received 150 Javelins, 1200 missiles, and 2000 British next-generation light anti-armor weapons (NLAW),³ but how many ATGM gunners survived their encounters? In the early days of the war, RUS tanks were exposed, not protected by combined arms suppression or infantry escorts.^{2,4}

The tank is not dead, as many have predicted.^{2,28} UKR, whose units must withdraw when faced with even one RUS tank, wants more tanks. Between 2014 to 2018, UKR received 500 new tanks and built a force of 30 tank battalions. By the time of the invasion, February 2022, UKR fielded 900 tanks.³

RUS tanks are generally employed three ways. First, as indirect fire platforms. Second, to raid—attack by fire and then withdraw. And third, most importantly, to support infantry assaults. In this support by fire role, the tank is better than an infantry fighting vehicle—in firepower, protection, optics, and standoff range against ATGM.⁵ The tank is still essential in urban warfare.⁴ *“Tanks are like dinner jackets. You don’t need them very often, but when you do, nothing else will do.”* – Australian General K. Toohey²

7. **Helicopters are vulnerable to MANPADS.**

We cannot assume RW CASEVAC. We cannot assume RW anything.

Reports: On D+4, outside Kyiv, RUS attack helicopters suffered heavy attrition due to MANPADS.³ In the air assault against Hostomel airport, two RUS helicopters were shot down by MANPADS.³ RUS lost 170 helicopters in the twelve months through June 2022.¹³ Everyone has MANPADS and RUS air defense forces have regularly shot at their own aircraft.³ Because of losses, UKR helicopters no longer fly within 30 km of the front lines.¹⁰ Neither side has air superiority, much less supremacy, so both can lose large numbers of aircraft.¹⁵

All units need air defense, even if they do not have access to the common air picture.^{3,10} If helicopters cannot survive, then assault support, RW CAS, resupply, and CASEVAC have to be done by ground.¹⁰

8. **Ground combat is high-intensity, large-scale, long-term, and deadly.**

We need casualty replacements to sustain our ground combat units.

Reports: Conventional land combat dominates the war in Ukraine.²¹ The conflict is a long, grinding war of attrition,^{8,14} where both armies have suffered crippling losses of vehicles, units, aircraft, and people.^{13,29} Over 47,000 RUS may have died in the first year of the war.²⁵ *“We (the U.S. military) have chronic inexperience in offensive combat against a competent adversary.”* – U.S. Army Colonel D.E. Johnson.⁹

With both pre-war armies gone, the new armies are a mix of conscripts and volunteers.¹ Many RUS conscripts are disposable, making well-trained soldiers even more valuable.²⁶ Armies need access to large reserves of well-trained infantry.³⁰ Because western militaries suffer casualty phobia, and prioritize force protection over mission,⁹ casualty replacement and unit reconstitution is not planned.

On the modern dispersed battlefield, new soldiers with only individual or technical training do not have the initiative, knowledge, or skills required.¹¹ Competent infantry unit leaders in particular are critical to coordinate combined-arms attacks, the key skill of successful armies.⁵

9. Defense is now the stronger form of war.

We need to be able to defend cities from mechanized attacks.

Reports: Technology now makes the defense stronger than the offense.^{7,8} Defenders in prepared positions now have enormous advantages, combining firepower with unmanned intelligence collection,⁸ especially in cities.²⁷ UAS, vulnerable to EW and AD, do not provide the same advantages to attackers.¹² Offensive forces cannot hide their unit concentrations or avenues of approach.^{8,9}

UKR forces have increased their reliance on prepared defenses.¹⁰ RUS engineers and contractors have built complex obstacles—trenches, earth berms, razor wire entanglements, minefields, and dragon’s teeth anti-tank obstacles—and 1400 entrenched positions in Zaporizhzhia, and 600 each in Kherson, Donetsk, and Luhansk.^{5,22,23,24} Some defenses in depth are 5 km, each belt separated by a kilometer.⁵



Ukrainian defensive entrenchments, 2023.

10. Jamming GPS is more effective than jamming radios.

We need backup methods for navigation and targeting.

Reports: RUS jams GPS to interdict UKR UAS. Between 2018 and 2020, RUS EW disabled at least 150 UAS. In 2019, RUS neutralized 60 drone-and-missile attacks against a single air base.¹²

RUS jams GPS to counter precision weapons. During one UKR attack, 4 of 9 JDAM missiles missed their targets due to RUS jamming.⁶ RUS jams GPS to disrupt UKR ground units, who then revert to paper maps for planning, navigation and calls for fire.¹⁰

RUS jams tactical radios—forcing UKR soldiers to use wire and written messages—but has difficulty jamming Starlink internet satellites and SINCGARS radios.⁶ RUS cyber attacks have not significantly affected the conflict.^{15,18} “You can’t cyber your way across a river.” – British General Sir P. Sanders.¹

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Glossary:

DOD Dictionary, Apr 2023: AD—air defense. AO—area of operations. C2—command and control. CASEVAC—casualty evacuation. EW—electromagnetic warfare. GPS—Global Positioning System. HQ—headquarters. ISR—intelligence, surveillance, and reconnaissance. km—kilometer. MANPADS—man-portable air defense system. MLRS—multiple launch rocket system. RW—rotary-wing. UAS—unmanned aircraft system. FM 1-02.1 **Operational Terms**, 9 May 2021: ATGM—antitank guided missile. RUS—Russian Federation. UKR—Ukraine.

Scope:

Ukraine: Lessons for Leaders addresses only ground combat in Ukraine, not air or naval combat. No missiles, air defense or BDA. No intel, planning, comms, logistics, information, or cyber. No training, manning, force structure, force generation, or doctrine. No procurement.

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2. **Every signal is a target.** The AO is electromagnetically transparent.
3. **The modern, all-source, real-time surveillance network** is not ours.
4. **Artillery kills everybody.** Rockets kill. Missiles kill less.
5. **Modern fires networks** can see, strike, and destroy in 60 seconds.
6. **A single tank** is the most lethal weapon on any battlefield.
7. **Helicopters are vulnerable** to MANPADS.
8. **Ground combat** is high-intensity, large-scale, long-term, and deadly.
9. **Defense is now the stronger form of war.**
10. **Jamming GPS** is more effective than jamming radios.

