



The Mitchell Forum

Drip Feeding Improvements in EMSO Will Not Work

by Maj Gen Ken Israel, USAF (Ret.)

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Introduction

While the United States is taking an incremental approach to improving electromagnetic spectrum operations (EMSO) capabilities, Russia and China have fully committed to improving their spectrum superiority capabilities. There is certainly a growing realization that spectrum superiority is a leading indicator of intentions. As Winston Churchill once said, "At the summit, true strategy and politics are one." The current, dangerous test of wills in Ukraine has underscored the role and importance of achieving spectrum superiority. On January 16, 2022, Kyiv reported that Russian security services targeted over 70 government websites. If left unchecked, this malware attack could render the Ukrainian digital infrastructure inoperable. There is every reason to believe the Russians would expand their cyber-attacks, if necessary, to counter NATO and U.S. operations regardless of geopolitical boundaries.

At the same time that the United States is in the bureaucratic process of taking action on its FY 2021 EMSO Superiority Strategy Implementation Plan (see table), the Russians are rapidly deploying highly mobile, proven electronic warfare (EW) sets of capabilities that more than offset our EMSO initiatives. In addition, the United States abandoned its primary source of diplomatic leverage at the outset of this conflict in Ukraine by making statements precluding that under some circumstances it would intervene with military power. Make no mistake: spectrum dominance is the modern age, de facto precursor to military operations. If the United States does not have an interest in sustaining the independence of the states of the former Soviet Union (FSU), Putin has a clear way forward to create a 21st Century Russian Empire out of the FSU ashes. So, the Russian exploitation of the spectrum should give us notice.

Goal 1: Develop superior EMS capabilities	<ul style="list-style-type: none"> • Improve technologies to enable systems to sense, assess, share, maneuver, and survive in complex EMOEs • Use a comprehensive approach to acquire EMS capabilities suitable for great power competition • Leverage and adopt commercial technologies • Develop robust electromagnetic battle management capabilities • Field disruptive EMS capabilities
Goal 2: Evolve to an agile, fully integrated EMS infrastructure	<ul style="list-style-type: none"> • Accelerate EMS information integration into operations and planning • Establish dedicated intelligence for EMS superiority • Establish and manage architectures and standards that enable interoperability, efficiency, and information sharing. • Modernize EMS live, virtual, constructive infrastructure for testing, training, and analysis
Goal 3: Pursue total force EMS readiness	<ul style="list-style-type: none"> • Train and sustain EMS expertise • Incorporate EMS concepts and doctrine into formal education • Evaluate and track EMS readiness
Goal 4: Secure enduring partnerships for EMS advantage	<ul style="list-style-type: none"> • Increase leadership in international force • Enhance access, interoperability and capacity with allies and partners • Increase leadership in domestic processes
Goal 5: Establish effective EMS governance	<ul style="list-style-type: none"> • Unify department-wide EMS enterprise activities • Develop a continuous process improvement culture • Promote policies that support DoD EMS capabilities

Table: EMSO Superiority Strategy Goals and Objectives

Source: DOD

Russian information warfare actions coupled with military maneuvers have become the first and most critical flashpoint for determining the appropriate, proportional response which should be undertaken by the Western Alliance. You cannot measurably enhance our national spectrum capabilities on the cheap or by bluffing. You either have the capability or you don't. Numerous studies have indicated that EMSO, cyber, and ISR programs need significant additional resources, and they need these resources fast. Funding a year-long continuing resolution will put our nation's EMSO capability at a huge disadvantage.

The DOD Chief Information Officer (CIO) has recently been given the primary responsibility (Primary Staff Agency) of overseeing the recovery of our national, overarching spectrum superiority capabilities.

There is but one spectrum, and all the functions that exploit, manipulate, store, distribute, and process data and information parameters related to EMSO, cyber, and ISR need to be coordinated, converged, and reconciled to produce aligned architectures, strategies, policies, and regulatory actions. The Air Force was prescient in standing up the 16th Air Force, Information Warfare Command. Its future is bright and extremely important for undertaking the goal of spectrum superiority. Unfortunately, we do not have a current National Security Strategy that addresses information warfare priorities. We do not need an aspirational document, but an actionable document that lays out what we need to do and by when to achieve spectrum superiority. We also need the funds to implement an updated National Defense Strategy.



The new EC-37B Compass Call electronic warfare aircraft with an EC-130 in the background

Source: BAE Graphic

Fortunately, USSTRATCOM has taken on the operational challenge of revitalizing our EW/EMSO national capabilities with gusto. The command is standing up a Joint Electromagnetic Spectrum Operations Center (JEC) and has appointed a two-star general to lead this transformation who will report directly to the USSTRATCOM Commander. General John Hyten, recently retired vice chairman of the Joint Chiefs of Staff, did a remarkable job in setting up a talent-rich Electromagnetic Spectrum Operations Cross Functional Team (EMSO CFT) to publish a new EMSO strategy and companion implementation plan. This effort has galvanized the larger EW communities to work together and develop a joint, integrated approach to counter the current gaps in our EMSO capabilities. Russia is seeking to impose their version of a Monroe Doctrine, covering both the independent states of the FSU as well as the eastern European states of the Warsaw Pact. We do not have the luxury of time or promised future resources to fix our EW/EMSO gaps. The following are some of my personal recommendations, a product of past experiences as a former operational Electronic Warfare Officer (EWO), thoughts from close colleagues, and my lifelong interest in advancing spectrum superiority.

First: Cadre Focus

We must rebuild and expand our core EMSO expertise fast. For a confluence of reasons, we thinned out our EW expertise at the worst possible time. The digital revolution was no surprise, and if we analyzed the need for Cyber Command and Space Command, then we should have appreciated the need for quickly revolutionizing the highly technical and specialized areas of electronic warfare or electromagnetic capability as well. The spectrum superiority thought leaders go all the way back to the early 1990s and include Admiral Cebrowski, Admiral Owens, Admiral Tuttle, and their collective focus on network centric warfare and transformational warfare. We keep relearning old lessons because we keep changing out our key technical and experienced EW leaders at unprecedented speed. There is a saying that if you want a new idea, read an old book, and vice versa. We are living this adage. We are in a tail chase to catch up. We must have constancy, less turbulence, resources, and a changed culture.

There are two ways you become proficient in electronic warfare or electromagnetic operations: have a hard science degree with a focused interest or have years of hands-on operational experience and a strong desire to

master this particular complex and changing career field. For example, the Air Force only graduates about 80 electronic warfare officers a year from the Pensacola school for Combat Systems Officers (CSO). The services apparently do not have the inclination to channel technically credentialed individuals with high potential into 10- or 15-year cross-domain spectrum sensitive positions. The assignment process that drives mastering modern, complex threat signals and appreciating the various modes of operation in highly contested EMSO environments must be reformed. If the Air Force can divert pilots into remotely piloted aircraft career fields when we had a shortage of expertise, a similar, tailored approach should be undertaken for technically competent EMSO professionals.

The electronic warfare career field is going to become even more technically stressing—not less—and that implies that operational electronic spectrum awareness, using ever-increasing automated tools, will continue to be a serious technically complex challenge. Strong EW or EMSO operators of the future will need to understand the fundamental physics of a broad array of inter-related spectrum-dominated technologies to include artificial intelligence, networks, 5G, complex waveforms, interferometry, antenna designs, microelectronics, phase reversing phenomena, digital processing, cloud topologies, metadata analytics, encryption, directed energy, and other forms and modes of electronic warfare. Ask the revealing question: how many current EWOs or CSOs have written a single line of code or can comprehend the details of specific metadata analytics? It is hard to imagine a social studies or music major will understand and transition easily into mastering the essentials of cognitive and complex signals, bi-static and passive threat emitters, artificial intelligence, robotics, digital processing, and other highly technical knowledge. Career EWOs or EMSO

operators will require refresh and continuation technical training at shorter cycles than are now available. Our adversaries are increasing their technical expertise and our need is to stay abreast of this technically demanding and complex career field. Our prime adversaries are testing and improving their EW concepts and capabilities in conflicts around the world, to include Syria, Taiwan, Yemen, Iran, North Korea, and most recently Ukraine.

Second: Build a Professional EWO Base

Not all our Air Force EW Expertise resides in the EC-130H Compass Call and/or RC-135V/W Rivet Joint EW aircraft communities. There is a huge cadre of EWOs and spectrum specialists in bomber squadrons, special ops units, government laboratories and agencies, professional military education (PME) academia, and even the Space Force. What is lacking is career incentives to support them and develop their technical expertise. The Air Force actively supported the Society of Experimental Test Pilots (SETPs), Daedalian Clubs, and other like-minded aviation associations. There is absolutely no EWO or EMSO equivalent forum that permits like-minded professional experts to get together and share operational design, tactics, threat, and real-world experiences. The EW/EMSO talent culture needs a face lift and top-down support.

Third: Skills Matching

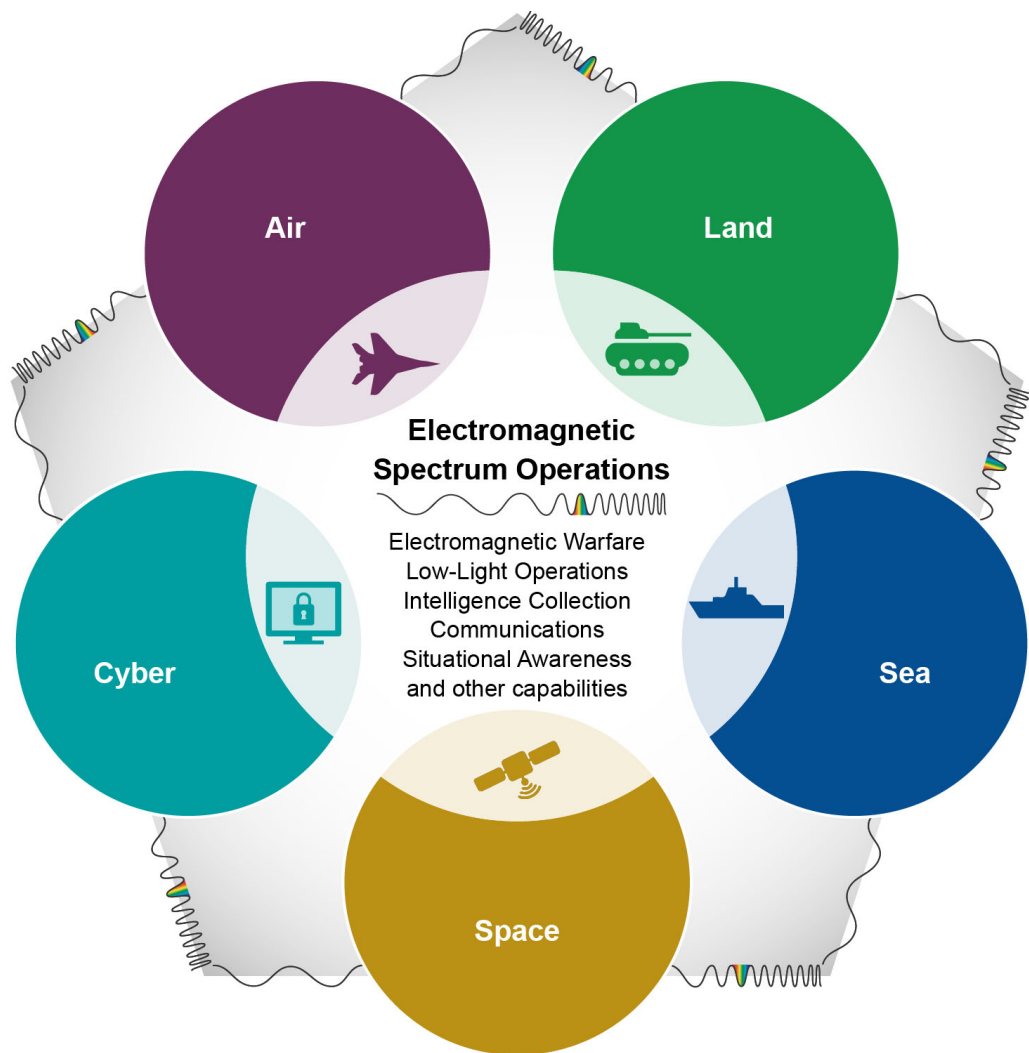
I have maintained that cyber, EW, and ISR have more in common than differences. Aligning the A-2/6 is a common organizational construct for the Air Force and Navy—that is, those services establish a single deputy chief of staff for intelligence, surveillance, and reconnaissance operations and cyber effects operations. The Army has a G-3/5/7 DAMO-SO structure to consolidate its electromagnetic spectrum operations.

Eventually the technology and quick-reaction-driven mission area of electromagnetic spectrum operations must converge joint cyber, EW, and ISR into a joint information warfare mindset and proficient discipline. We should routinely assign EWOs to cyber and ISR key positions. This skill-based cross-fertilization initiative will enhance everyone's appreciation of all aspects of spectrum superiority challenges and opportunities.

Fourth: Tactics Orientation

There must be recurring, highly classified lessons learned forums for all key EMSO positions relating to feedback

from ongoing conflicts that involve Russia, China, and their proxies. The improvements in the threat electronic order of battle (EOB) and reprogramming updates require us to share adversary tactics, techniques, and procedures (TTP) with our EMSO leaders (both U.S. and international partners) on a timely and consistent basis. Both the Russian and Chinese EOBs are sophisticated, strategic, mobile, rapidly adaptable, and employ various platforms and tactics. Our U.S. and allied mission partner EW tactics will continue to evolve as technology and concepts of operation mature to support specific operations.



The joint force depends on the electromagnetic spectrum for operations in all domains.

This diagram from a 2020 GAO report to Congress details DOD's use of the electromagnetic spectrum across warfighting domains

Source: GAO

Fifth: IPA Surge

Flood this professional career field with both military and commercially trained EMSO operators using the Intergovernmental Personnel Act (IPA). If we can bring on doctors with special skills into the DOD workforce, we should be able to bring on highly qualified commercially trained EMSO experts and give them an equivalent IPA rating commensurate with their expertise and training. We don't have time to grow the diversified spectrum expertise required to stay abreast of already fielded Russian and Chinese informationized warfare capabilities. Our adversaries are growing, training, and utilizing their future cadre of EMSO operators faster than we are. We learned this lesson from the improvised explosive device (IED) era and simply put it behind us. Technology does you no good if you don't understand how to use it or integrate it.

Sixth: EW/EMSO Training

EMSO modeling and simulation are crucial to advanced EW/EMSO training. This includes commitment to fund live, virtual, and constructive training for all frontline EMSO operators. Likewise, more focus on electromagnetic battle management (EMBM) and electronic warfare planning and management tools (EWPMT) to better allow commanders to understand their ability to maneuver in the electromagnetic spectrum must be undertaken immediately. This area has been underfunded and underappreciated. Likewise, I am not sure that the training of 80 Air Force Combat Systems Officers a year with specialized EW/EMSO talents is sufficient to fill the growing needs of expanding EW/EMSO personnel requirements. We also need to significantly enhance the EW/EMSO pipeline of future EMSO operators who have diverse and competitive science, technology, engineering, and mathematics (STEM) talents.

Summary

Our current thinking about EMSO must not replicate the trench warfare mentality of past conflicts. Slugging it out electronically with our adversaries obviates all the advantages of such innovative operational concepts such as mosaic warfare; decision advantage via the electromagnetic version of the observe, orient, decide, act (OODA loop); extreme maneuver capabilities; and the open systems of systems architecture approach. Retired General Hyten's heroic efforts in developing a new Joint Warfare Concept (JWC) and Joint All Domain C2 (JADC2) capability should help guide us to an improved understanding of the benefits of spectrum superiority.

Spectrum superiority is critical to multi-domain and multi-functional capabilities and operations. From gray zone conflicts to nuclear conflagration, the ability to control and dominate the spectrum will likely determine the outcome of future conflicts. Our EMSO policy ultimately rests on the twin foundations of purpose: a skilled EMSO trained force and superior, fielded technological capabilities infused with adequate resourcing. If you want to achieve spectrum superiority, the speed of information must exceed the speed of engagement. What we desperately need now in regard to Ukraine is better, near-real-time, theater-wide spectrum superiority awareness and resolve. Today Russia has the upper hand in its deployed EMSO capabilities on the Ukraine border. The Heritage Foundation's 2022 Index of U.S. Military Strength rated the Air Force and Space Force as "weak." A key part of this weakness is the lack of commitment to a robust EMSO integrated infrastructure. We can and must do better. 🌟

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