



Troopers assigned to 3rd Squadron, 4th Cavalry Regiment, 3rd Brigade Combat Team, 25th Infantry Division, provide security 14 April 2019 during Operation Lightning Strike 2019 at Pōhakuloa Training Area, Island of Hawaii, Hawaii. (Photo by Pvt. Ezra Camarena, U.S. Army)

# Lightning Strike

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**T**he importance of certifying combined-arms formations in mission essential tasks under live-fire conditions is enduring. Virtual and constructive training display shortcomings when replicating terrain, environments, and conditions faced by soldiers. With the advent of multi-domain operations

(MDO), the certification of MDO tenets under live-fire conditions is essential.<sup>1</sup> In the twenty-first century, combined-arms integration is still foundational to the success of Army units. Current and future battlefields will require the employment of effects from multiple domains, layered upon combined-arms integration,

to achieve convergence. Practicing convergence in live conditions augmented with virtual and constructive elements will enable training of large formations and staffs; such practice is required to achieve the highest possible proficiency in warfighting.

In April 2019, the 25th Infantry Division (25th ID) deployed to the Pōhakuloa Training Area on Hawaii's Big Island to do just this. Operation Lightning Strike 2019 was designed to take lessons from the 25th ID's recent Warfighter Exercise (WFX) 19-01 and practice critical events of the WFX under integrated virtual and live-fire conditions within the MDO construct. While the WFX was successful

in meeting training objectives and outcomes while producing a more proficient division staff, all of the training was conducted in the virtual environment with limited constructive portions incorporated

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to augment decision-making processes. The decision to practice the WFX scenario under live-fire conditions was predicated on one simple question: Was the division training in the same way it would fight?

## **Lightning Strike 2019**

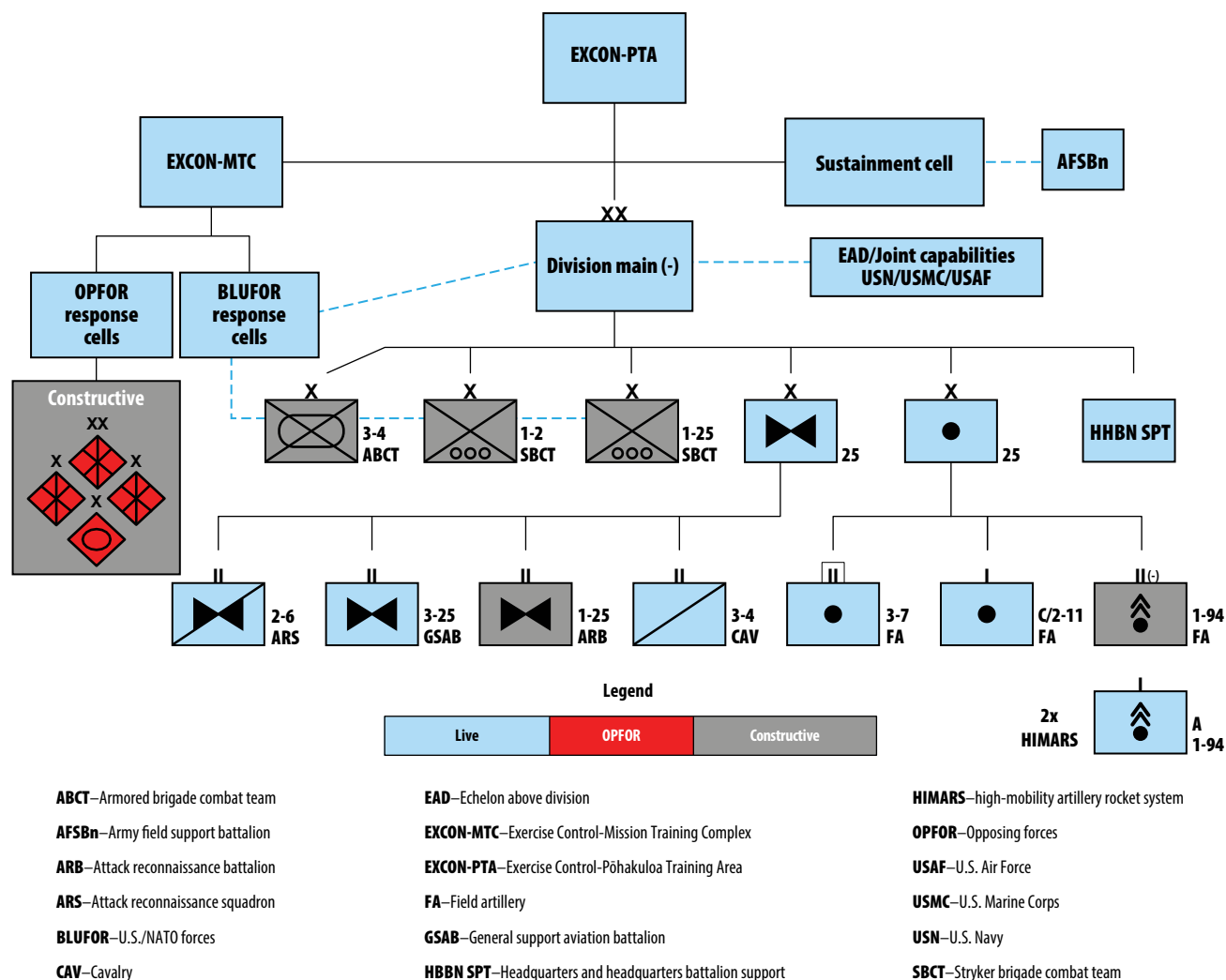
The 25th ID deployed to the Pōhakuloa Training Area in the spring of 2019 to test and validate emerging Army doctrine under live-fire conditions. The division sought to determine whether the way it fought in WFX 19-01 could survive the realities and friction of a live environment. The 25th ID planned, resourced, and executed Operation Lightning Strike using *The U.S. Army in Multi-Domain Operations 2028* concept as the keystone of exercise design. Planning and execution occurred

under the auspices of U.S. Army Pacific and in close coordination with joint, interagency, and multinational partners. Operating as part of a joint force, the 25th ID would (1) validate the division's ability to "*penetrate and disintegrate* enemy antiaccess and area denial systems; (2) *exploit* the resulting freedom of maneuver to defeat enemy systems, formations, and objectives and to achieve our own strategic objectives; and (3) consolidate gains to force a *return to competition* on terms more favorable to the United States, its allies, and partners."<sup>2</sup>

Following the completion of the division's WFX, the 25th ID commander, Maj. Gen. Ron Clark, directed the division and enabled brigade staffs to plan, resource,

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(Figure by Maj. Benjamin Scott and Maj. Matt DeSablo, 25th Infantry Division G35, U.S. Army)

**Figure 1. Exercise Design Task-Organization**

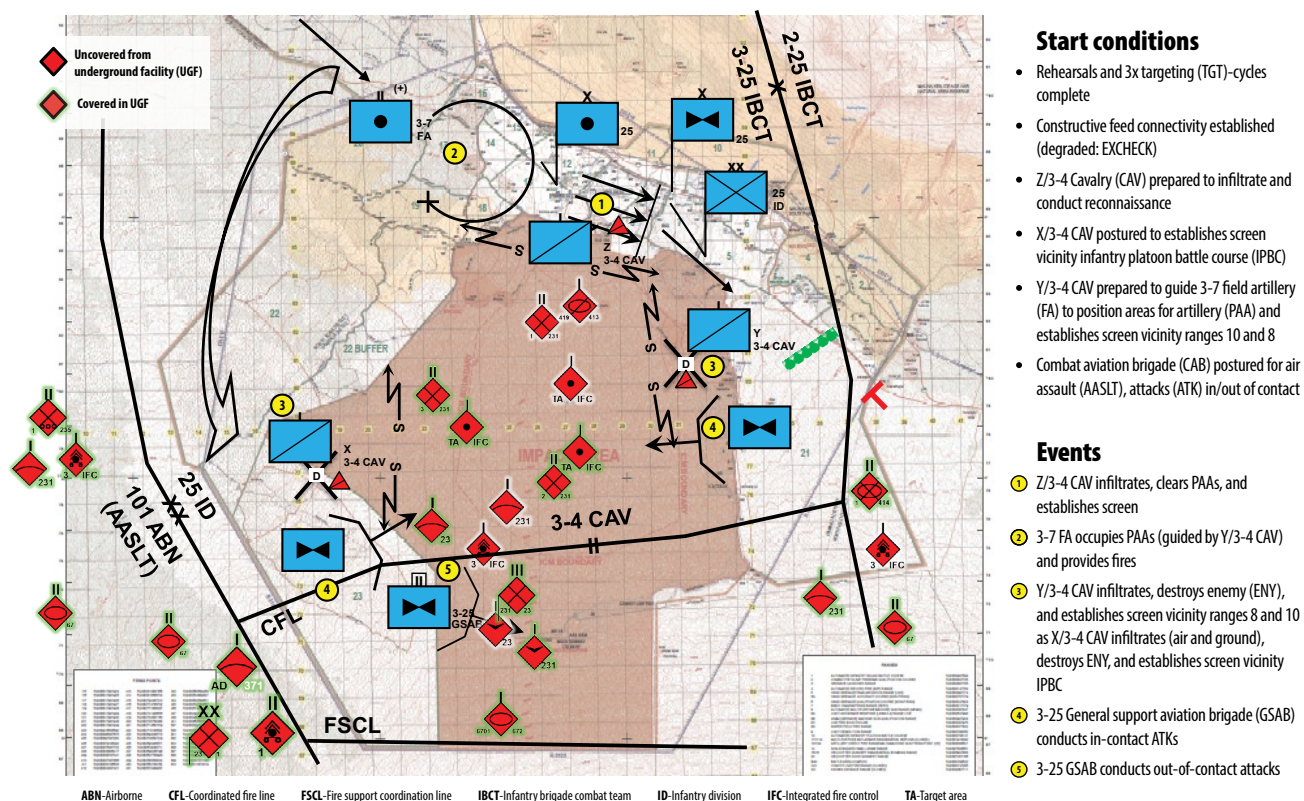
and train concepts, processes, and techniques employed in the WFX under live-fire conditions enabled by a synthetic live, virtual, and constructive training environment. The commander's intent for Lightning Strike was to retrain and maintain the proficiency of the division staff while also validating how the division fought during WFX 19-01. The division adapted its Lightning Strike combined-arms live-fire (CALFEX) at the Pōhakuloa Training Area to incorporate participation of the division main command post, with focus on its Joint Air-Ground Integration Center (JAGIC), employing virtual and constructive systems and formations to drive training. The 25th Division Artillery

(25th DIVARTY); 25th Combat Aviation Brigade (25th CAB); 3rd Squadron, 4th Cavalry Regiment (3-4 CAV); and Battery A (minus), 1st Battalion, 94th Field Artillery Regiment participated as live-fire units.

The 25th ID conducted WFX 19-01 in October 2018. During this exercise, the division fought purely in the simulated environment while applying concepts, processes, and techniques intended to best meet mission requirements. Significant among these were (see figure 1)

- the division's execution of deliberate and dynamic targeting across all domains;
- shaping in the division's deep-fight using all available resources;

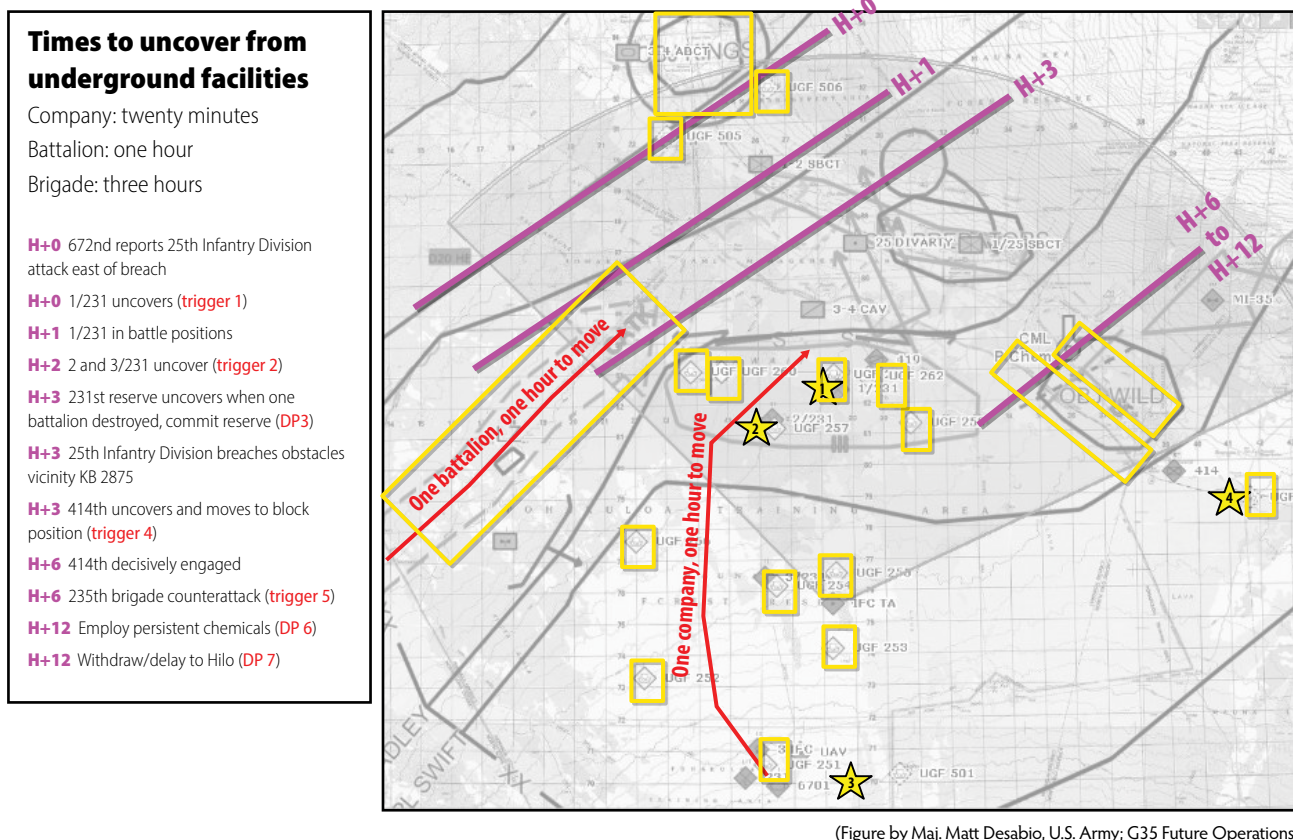




## Figure 2. Lightning Strike 2019 Combined-Arms Live-Fire Concept

## Exercise Design

options feasible at the Pōhakuloa Training Area. With formations and terrain available, the CALFEX consisted of the following (see figure 2):



**Figure 3. Enemy Courses of Action for the Combined-Arms Live-Fire Depicted on an Event Template**

- Exercise control–Pōhakuloa Training Area conducted range support and safety operations and served as the single point of contact with range control.
- Five iterations of CALFEX were executed with three occurring during daylight and two at night. Each iteration occurred for approximately four and a half hours over three days. Iterations were independent, and the scenario was reset after each iteration.

The division would assault southeast from along the main avenue of approach against an enemy brigade consisting of mechanized, light, and motorized forces defended in the enemy's battle zone for the live-fire and simulated exercises. These enemy forces represented a near-peer threat and possessed substantial air-defense and long-range artillery while making maximum use of terrain. The enemy also employed underground facilities to prevent effective targeting

and shaping by U.S. forces. The challenge would be to induce the enemy to uncover these facilities with both sensors and delivery assets prepared to detect and destroy enemy forces in compressed time and space.

After completing the CALFEX maneuver scheme, the focus shifted to creating the simulated environment necessary to stimulate CALFEX, JAGIC, and command posts. Within the simulation, planners developed an enemy scheme of maneuver that overlaid locations of physical targets on the ranges and in the impact area at Pōhakuloa Training Area. The simulated enemy provided the stimuli necessary to drive dynamic targeting and CALFEX when paired with simulated fires assets; maneuver forces; intelligence, surveillance, reconnaissance platforms; and underground facilities. The simulation, tied to targets on the ground, provided enemy stimuli for collection that drove joint fires, maneuver, and decision-making (see

Time	ATO	ROLL 0001Z	1400	JB	1400	JC	1400	JD	1400	JE	1400	JF	1400	JG
	D-DAY	HST (W)	10	11 APR	12 APR	13 APR	14 APR	15 APR	16 APR					
	SET		SET 2		SET 3		SET 4					SET 5		
ILLUM.														
WEATHER														
ENEMY														
Higher	I CORPS	PHASE III												
Adjacent	 													
Division														
Subordinate BDEs														
		PP: SPT 3-4 LOC: CP11												
		OOCA EA4 (SE KINGS), SPT BREACH												
		1-94 FA: TAA PRIDE 3-7 FA: PL MURRAY Q-53: PL MURRAY												
		1-94 FA: PL COLLINS 7 FA: Move IVO OBJ PREDATORS 53: PL COLLINS												
Collection	DETECT	Focus	672nd CATK		672d AR BDE, ENY obstacle belt 235th CATK, Threats to 3-4 AASLT		23rd Div CATK (235th or 414th), MPAA IFC, 231st MECH BDE		23ID Reserve Commitment		414th retrograde 23rd DAG remnants		ENY Dispo IVO HURRICANES	
		Support	JSTARS, NTM		JSTARS, Rivet Joint, NTM		JSTARS, Rivet Joint, NTM		JSTARS (GMTI)		GMTI, NTM		NTM, GEOINT	
		Organic	Puma-GE/Shadow		Puma-GE/Shadow		Puma-GE/Shadow		GE		GE		GE	
	ASSESS	Support	Rivet Joint, NTM		GMTI, Rivet Joint, NTM		Rivet Joint, NTM		Rivet Joint, NTM		Rivet Joint, NTM		Rivet Joint, NTM	
		Organic	GE, DIV CAV		Shadow & GE, TF RAIDER		Shadow & GE, TF RAIDER		DIV CAV		GE		GE	
Shaping	I CORPS	Fires			PAHALA						HURRICANES			
		16 CAB									OOCA HURRICANES			
		Focus	WILD		AXIS SMASH - CAPITALS				SABRES-HURRICANES					
	DIVISION	Focus	PREDATORS		PREDATORS SOUTH - WILD		AXIS SMASH, CAPITALS-PANTHERS		CONSOLIDATE GAINS		SABRES-HURRICANES			
		Fixed Wing	SCAR 672ND, 231ST		SCAR 672ND. IFC, 231ST		SCAR - IFC, 231ST, 414TH		SCAR - 233RD, 231ST, 414TH		SCAR - 233RD, 231ST, 414TH			
		25 CAB	OOCA EA4 (SE KINGS), SPT BREACH		OOCA PREDs, WILD		AASLT C/3-4, A/3-4 - OOCA EAS, ICA EA6							
		Fires	672ND, 231ST BAG/DAG		231ST BAG/DAG		IFC, 231ST, 414TH FS/ADA SYSTEMS		233RD, 231ST, 414TH FS/ADA SYSTEMS		233RD, 231ST, 414TH FS/ADA SYSTEMS			
BRIGADES	Projected OBJ Ratio	FPOL - 76.2:1		BREACH & KINGS - 2.5:1		PREDS - 3.0:1		WILD - 2.5:1						
CFL / FSCL		CFL: MULLINS, FSCL: KEAN		CFL: KEAN, FSCL: SWIFT		CFL: BRADLEY o/o SWIFT, FSCL: WILLIAMS o/o MADDOX		CFL: WILLIAMS roll to CARTER, FSCL: MADDOX o/o POWELL		CFL: CARTER roll to WEYAND FSCL: POWELL o/o FULLER		CFL: WEYAND, FSCL: FULLER		
Decisions/ Triggers		T1 - FPOL 3-4 CAV into AO LIGHTNING												
		T2 - FPOL 3-4 ID into AO LIGHTNING												
		T3 - BREACH at OBJ KINGS												
		D4 - Continue 3-4 ID ATK along AXIS SMASH or FPOL 1/25 ID												
		D5 - Transition assault from 1/25 ID to 1-2 ID												
		D6 - Transition to defense												
		T7 - FPOL 1 RoM DIV												

(Figure by Maj. Benjamin Scott, U.S. Army; G35 Future Operations. This product is based on a model taught by Dr. Bruce Stanley in the Advanced Military Studies Program at the School of Advanced Military Science)

**Figure 4. Planning Covered a Seven-day Operation to Facilitate Deliberate Targeting**



figure 3, page 23). This forced units to fight the enemy as he or she appeared, rather than fighting a script. Simulated enemy units and systems were essential to provide target identification and to replicate effects achieved against the constructive enemy formations. The simulation also provided constructive subordinate maneuver and fires brigades to trigger enemy actions and to provide training for the division's current operations staff. Absent a suitable virtual and constructive environment, CALFEX would not properly stimulate division and enabling brigade staff processes and would limit or degrade training opportunities. The Exercise Control–Mission Training Center, led by a planner and the division simulations officer and staffed with troops trained in the lead-up to execution, conducted these simulations operations.

Once planners created the simulated environment that would drive realism for CALFEX, the division expanded the scope of the exercise to support execution of a targeting process. As in WFX 19-01, the division used a ninety-six-hour targeting horizon to nest collection, maneuver, and fires within the air tasking order cycle.

Planners developed a corps-level operation to provide the contextual framework of a joint task force operation that extended for seven days (see figure 4, page 24). CALFEX resided within the fourth day of the plan that provided three days before and after to ensure the scenario supported the targeting horizon throughout the exercise. Division planners produced a division operations order that included graphics, a synchronization matrix, a visualization matrix, an execution checklist, and a decision support template and matrices.

## Convergence at the Division Echelon

*The U.S. Army in Multi-Domain Operations 2028* asserts that current convergence is insufficient to meet challenges of future operations against near-peer threats under current conditions.<sup>3</sup> “The Joint Force currently converges capabilities through episodic synchronization of domain-federated solutions”; the next sentence in the pamphlet documents gaps in the form of requirements for continuous and rapid integration of multi-domain capabilities to achieve overmatch.<sup>4</sup> To this end, the joint force must become sensor-shooter interoperable across all platforms and must develop a common operating picture. To present

the enemy with multiple dilemmas, the joint force must converge and integrate solutions and approaches before the battle starts.

Operating as part of the joint force, the 25th ID contacted a series of partners across the U.S. Indo-Pacific Command area of responsibility to seek its participation in Operation Lightning Strike to test and validate cross-domain aspects of the exercise. To achieve the training objective of layering joint-effects across multiple domains, the 25th ID received outstanding participation from Marine Corps Forces Pacific, who provided joint tactical air controllers and air naval gunfire liaison officers (LNOs). The U.S. Navy and Pacific Fleet provided the USS *Wayne E. Meyer*, an Aegis-equipped Arleigh Burke-class destroyer, and a naval gunfire LNO team that provided real-time execution of cross-domain (sea-to-land and land-to-sea) fires. Pacific Air Force Command from Indo-Pacific Command supported with its traditional complement of 25th Air Support Squadron personnel. The 25th Air Support Squadron personnel filled positions in the division JAGIC and provided the airspace management and air-ground integration of supporting aircraft out of Joint Base Pearl Harbor-Hickam in close coordination with the Marine Corps Joint Terminal Attack Controller teams embedded with the division reconnaissance squadron.

With its joint force partners, the 25th ID sought to integrate its mission command systems across upper tactical-infrastructure network to communicate directly between the division JAGIC and the Navy Fire Control Room aboard the *Wayne E. Meyer*. The division established a communication architecture that supported the direct connection between JADOCS and AFATDS from the 25th ID JAGIC directly to the *Wayne E. Meyer*'s gun fire control system and naval gun fire system.

Establishment of these mission command network architectures required deliberate planning that began three months prior to execution. With no existing relationship between the 25th ID and the U.S. Pacific Fleet staffs, the division executed a series of deliberate mission command thread tests. These thread tests worked through closed enclaves that initially precluded the 25th ID from establishing a sustained digital connection with the *Wayne E. Meyer*. While many existing firewalls between the

Air Force and the Army are familiar, this series of barriers was unknown for the division and required a redesign of the division JAGIC's mission command network-architecture to support.

Having established formidable mission command architecture between the 25th ID and the Navy, the 25th ID JAGIC and *Wayne E. Meyer* sought to rehearse a series of deliberate cross-domain missions to validate the team's ability to *penetrate and disintegrate* enemy antiaccess/area denial systems and then *exploit* the resulting windows of opportunity that provide freedom of maneuver to the joint force. The first set of targets permitted the 25th ID to synchronize deliberate Tomahawk land-attack missile strikes and joint electronic attack with surface fires from the 25th DIVARTY against known enemy air defense targets to enable the division CAB's out-of-contact attacks in the division deep area. The 25th ID JAGIC planned, coordinated, and synchronized these strikes with naval gunfire LNOs and Air Force personnel in the JAGIC utilizing JADOCs and Naval Mako chat client. The Mako chat client is a naval messaging service that leverages the internet relay chat (IRC) and XMPP protocol. This service allows Mako Chat to operate in a low-bandwidth, high-latency environment with frequently interrupted satellite connectivity. With the 25th JAGIC tied directly into the MAKO chat client, it afforded the opportunity to leverage real-time chat communication between multiple users regardless of their geographic location. In this case, the locations included Schofield Barracks Mission Training Complex, Joint Base Pearl Harbor-Hickam, Pōhakuloa Training Area, and the *Wayne E. Meyer*. Although on the surface, Mako is similar to historical chat clients that Army users are familiar with, such as Transverse, Mako chat's unique capability accounts for low-bandwidth environments, and it allows the 25th ID to leverage a joint solution in complex communication environments. The target set was sent directly from aboard the *Wayne E. Meyer* to the 25th ID JAGIC against a sea-vessel threat that allowed effective target-execution using a high-mobility artillery rocket system from the 17th Field Artillery Brigade. The 25th DIVARTY prosecuted using available long-range attack munitions to enable freedom of navigation for the U.S. Navy. Though planners developed and rehearsed execution of these

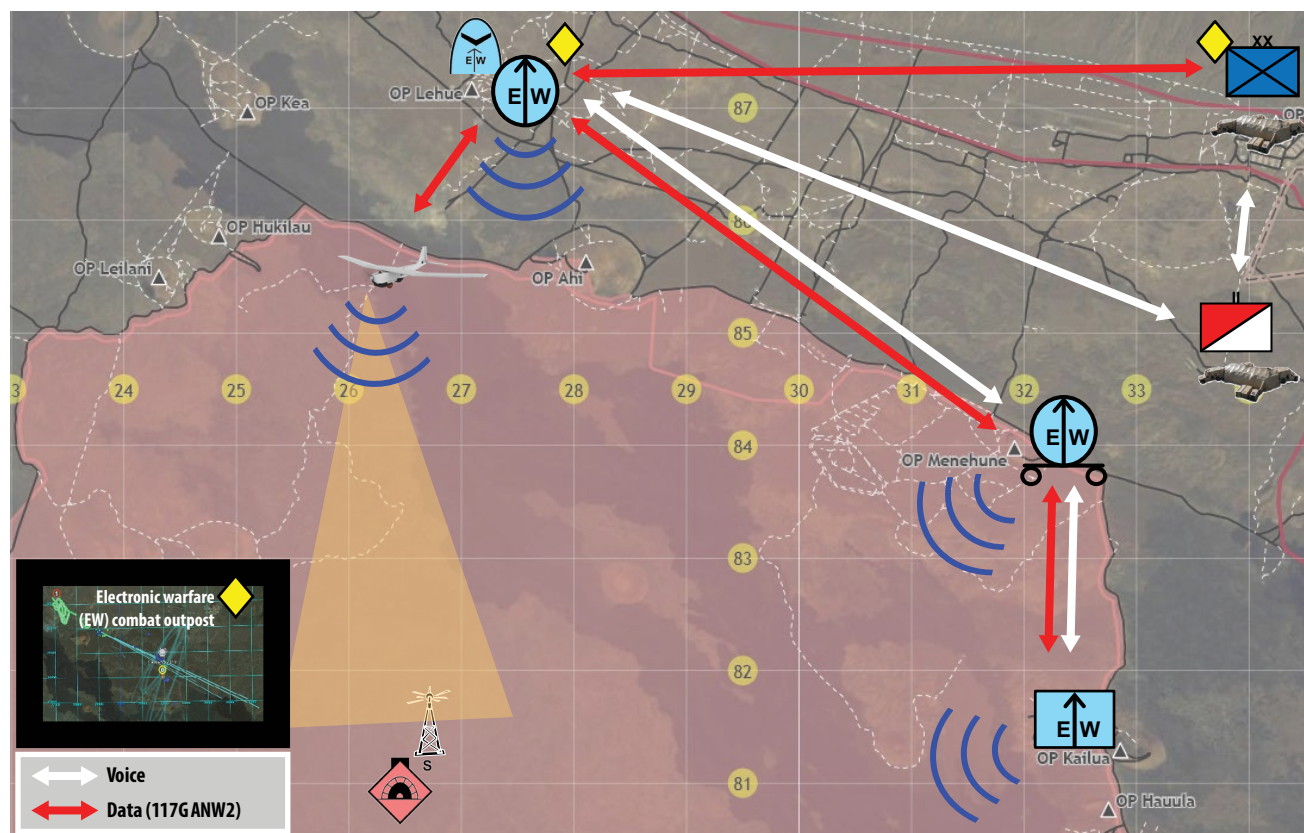
fires as deliberate targets, in both cases, the timing and synchronization was conducted in a dynamic manner because neither the team from the 25th ID JAGIC nor the team aboard the *Wayne E. Meyer* were aware of the target location or sequence of events until queued by the exercise control team.

## The Division's Cyberspace Electromagnetic Activities

Cyberspace electromagnetic activities (CEMA) were also integrated into the CALFEX.<sup>5</sup> The primary CEMA objectives were to integrate tactical electronic-warfare support (ES) and to exercise units' abilities to operate in a denied, degraded, and disrupted space operational environment (D3SOE) (see figure 5, page 27).<sup>6</sup> Key tasks in the integration of ES included providing electromagnetic spectrum situational awareness, establishing an electronic warfare common operating picture, and enabling targeting through the provision of timely, actionable information. To provide ES, the 25th ID G39 and the 3rd Infantry Brigade combat team personnel created an ad-hoc platoon to replicate the electronic warfare platoon force design update.<sup>7</sup> This team employed the RQ-20A PUMA small unmanned aircraft system that was equipped with a spectral sieve, an ES payload, as well as ground systems such as the Resolve 3 in both mounted and dismounted configurations. These electronic warfare systems together integrated in a RaptorX framework using the CEMA advanced planning, execution, and review plug-in. Using these systems, the platoon successfully identified radio frequency emissions originating from emitters placed in the impact area and tied to simulated enemy and live-fire targets. Upon detection of the target emissions, the JAGIC and current-operations staff cued additional virtual and live intelligence, surveillance, and reconnaissance platforms before employing lethal fires to destroy enemy formations.

To prepare for operations in D3SOE, the 25th ID employed the D3SOE training support package outside of live-fire periods. Elements of the 25th DIVARTY, 25th CAB, and individual aircraft were instructed on D3SOE and included specifics of organic space-enabled equipment. These units were then exposed to iterations of deliberately planned and executed GPS jamming by dismounted and





(Figure by Chief Warrant Officer 3 Zach Cervantes, U.S. Army; 25th Infantry Division G39)

**Figure 5. Concept of Electronic Warfare Support during Lightning Strike**

mounted systems. Jamming activities, conducted in the “crawl” and “walk” phases, thus set conditions for “run”-level training in future situational training and live-fire training events. This training provided firing batteries and aircraft the opportunities to operate in a degraded environment and to develop initial techniques and procedures to sustain the “kill chain,” survive, and fight with a more resilient command, control, and communications plan.

## Outcomes

Lightning Strike 2019 exercised the 25th ID’s ability to incorporate tactics and capabilities from WFX 19-01 and validate division multi-domain deep operations and joint cross-domain fires in a live, virtual, and constructive exercise at the Pōhakuloa Training Area. The division employed the DIVARTY and CAB with a ground cavalry squadron to synchronize deep fires and maneuver in the counterreconnaissance and

counterfire fights. The division maneuvered rapidly to emplace firing units to extend the operational range of rockets while simultaneously employing weapons-locating radars to enable pattern analysis and proactive attacks against enemy long-range fires and air defense systems. The division then applied tempo and cross-domain maneuver in the form of air assaults, raids, and out-of-contact attacks to present multiple dilemmas to the enemy.

Ultimately, the balance of live and constructive environments forced the division and enabled brigade staffs to evaluate the best methods to synchronize fires and maneuver in the division deep area, manage transitions to the division close area, and enable constructive maneuver brigades to close with the enemy, seize terrain, and force enemy decisions favorable to friendly forces.

For joint interoperability and mission command, the exercise permitted the division to develop



procedures to better leverage joint enablers using current mission command systems to integrate cross-domain fires and effects from the Air Force and Navy. The division tested digital and voice communications to synchronize dynamic targets delivered from fixed-wing close air support, naval surface fires from the *Wayne E. Meyer*, and the integration of simulated electronic attack and nonlethal fires. These opportunities forced the division to build and manage airspace control measures that enabled permissive fires and did not force a trade-off between the delivery of multi-domain surface and air-to-surface fires. Procedures developed utilized existing mission command systems including AFATDS, JADOCs, Tactical Airspace Integration System, Theater Battle Management Core System, and Air and Missile Defense Workstation to permit a rapid synchronization of airspace and delivery of compounding effects against enemy high payoff targets in the division deep area. Finally, as the exercise provided an opportunity to identify procedures that increase joint interoperability, it also exposed the potential to expand future Lightning Strike training events as a multinational

Soldiers assigned to 3rd Battalion, 7th Field Artillery, 25th Infantry Division, prepare to fire a 155 mm artillery round from an M777 howitzer 13 April 2019 during Operation Lightning Strike 2019 at Pōhaku-loa Training Area, Island of Hawaii, Hawaii. (Photo by Pvt. Lawrence Broadnax, U.S. Army)

exercise with partners and allies in the U.S. Indo-Pacific Command area of responsibility.

Lightning Strike 2019 permitted the division to expand some of the MDO lessons from previous multi-domain exercises like Rim of the Pacific Exercise 18 and WFX 19-01. The exercise gave the division JAGIC an opportunity to synchronize cross-domain fires with the best sensor and the best shooter to enable cross-domain maneuvers. By augmenting the existing JAGIC with a naval gun LNO and marine fire control team, the division acquired the resident experts to dynamically retask joint detection and delivery assets to find, destroy, assess, and reattack division targets from the high payoff target list to achieve the best effects. By leveraging the joint targeting process, the JAGIC achieved lethal effects



in the live environment and layered nonlethal effects in the constructive environment to create windows of opportunity described in MDO doctrine. These opportunities contributed to increased readiness for the 25th ID to complete its mission by fighting with fires in a multi-domain environment and helped identify specific authorities and mission command processes required to establish the timing, tempo, and synchronization to achieve effects.

The ability for the division to replicate a D3SOE at a home station through a live, virtual, and constructive integrated training exercise presented the opportunity to fight in a degraded environment and identify methods to sustain the effectiveness of the division fires enterprise. The employment of jammers that disrupted or denied critical position, navigation, and timing and communications forced the division to train and identify additional capabilities required to increase the resiliency of sensor to shooter linkages. The training also forced command posts at echelon to focus on the deception, decoys, and efforts to reduce electromagnetic spectrum emissions to increase survivability.

The exercise exposed shortcomings in live execution that were not identified during WFX 19-01. First, CABs do not possess the capacity to serve as the division reconnaissance task force with current modified tables of organization and equipment. Fires planning and execution, intelligence, and maneuver planning are significant shortfalls for this role; for success, the combat aviation brigade would require significant augmentation. Second, units have become overly reliant on the upper tactical internet for command

and control of division operations as a result of the WFX and other simulations exercises. This exercise demonstrated the necessity for command posts to refine primary, alternate, contingency, and emergency communications and to develop procedures to increase the resiliency of these plans.

Units must focus training to operate on both primary and alternate communications plans simultaneously to sustain sensor to shooter kill chains. Training on the contingency communications plan requires additional focus so that when primary and alternate communications plans fail, units do not lose the ability to fight. Third, the 25th ID's training to-date has not adequately incorporated the U.S. Navy and Marine Corps to the extent required to achieve seamless integration.

## Way Forward

The 25th ID will build on successes and lessons from Lightning Strike 2019 by integrating proven practices and improving upon systems and techniques found unusable when executed live. Over the upcoming months, the division will incorporate and further develop the validated tactics, techniques, and procedures required to fully achieve readiness to fight and win in a multi-domain environment during large-scale ground combat operations. The division will practice in command post exercises what it developed in Lightning Strike 2019 and will then test refined practices in Lightning Strike 2020. From the division-level, successful adherence to all three tenets requires seamless synchronization with and leveraging of national-level and joint assets beyond experience of previous training and exercises. ■

## Notes

1. U.S. Army Training and Doctrine Command (TRADOC) Pamphlet 525-3-1, *The U.S. Army in Multi-Domain Operations* (Fort Eustis, VA: TRADOC, 6 December 2018), 2–6.

2. *Ibid.*, iii, 15–17.

3. *Ibid.*, 20.

4. *Ibid.*

5. *Ibid.*, 19–20.

6. U.S. Army Forces Command (FORSCOM), "FORSCOM Command Training Guidance – Fiscal Year 2019" (Fort Bragg, NC: FORSCOM, 7 August 2018), 13–14.

7. Office of the Army Deputy Chief of Staff, G-3/5/7, "HQDA Form 5 – Electronic Warfare Platoon Force Design Update" (Washington, DC: Headquarters, Department of the Army, 21 February 2019), Tab A.