

COUNTER-UNMANNED AIRCRAFT SYSTEMS

Micro-Assessment



February 2015

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(U) EXECUTIVE SUMMARY

(U//FOUO) Due to the global proliferation of Group 1 UAS¹, the Asymmetric Warfare Group (AWG) set out to understand how a maneuver platoon detects, identifies, and defeats threat UAS using organic equipment. Once understood, AWG seeks to inform the Army on the tactics, techniques, and procedures (TTPs) that can be developed to counter this threat.

(U//FOUO) To assess the response, AWG developed three scenarios within a continuous situational training exercise (STX) lane. The first scenario was a dismounted patrol that provided optimal conditions to observe and hear the UAS. The second scenario was a mounted patrol that limited visual and audio detection. The third scenario was a hasty fixed-site security mission combining overwatch positions with dismounted patrols that provided ideal audio-visual detection opportunities. The opposing force (OPFOR) used a Group 1 Rotary UAS as an ISR platform to command and control their maneuver elements.

(U//FOUO) During the first two scenarios, AWG observed that Soldiers focused on ground-based threats. This was not surprising given the emphasis on detecting and defeating improvised explosive devices (IED) during the last decade of conflict. The UAS went undetected during the first scenario and was only detected in the second scenario due to its aggressive flight pattern. Between the second and third scenarios, AWG informed the platoon of the UAS threat in their area, provided a capabilities brief on common Group 1 UAS, and provided a “C-UAS Tactical Pocket Reference” to aid them in their hasty development of C-UAS TTPs. During the third scenario, the platoon detected the UAS conducting its ISR mission, accurately reported the aircraft to higher, and started generating creative ways to defeat the effect of the UAS.

(U//FOUO) A growing community of interest is making strides in providing materiel solutions that can help detect, identify, and defeat Group 1 UAS. These solutions will take time to develop. To close the immediate gap, leaders must change the mindset of Soldiers to assume that enemy forces cannot threaten them from the air. Doing so does not require an extensive investment of time or resources. Simply integrating a threat UAS into existing training will raise awareness and result in Soldiers creating effective non-materiel solutions to detect, identify, and defeat this emerging asymmetric threat.

(U//FOUO) As UAS become more prevalent worldwide, their presence in the battle space will increase. This threat can be leveraged against dismounted personnel, Forward Operating Bases, or even strategic air defenses. Soldiers must be aware of this threat before it defines the next decade of conflict.

¹ (U//FOUO) Group 1 Unmanned Aircraft Systems are defined in the ARCIC “Counter-Unmanned Aircraft System Concept of Operations” (21 AUG 2014) as “mini (small) UAS and have very small airframes with limited range”.

(U) Recommendations based on Army Warfighting Challenge

8.1:

(U) How does the Army improve and evolve the Integrated Training Environment in order to effectively replicate all conditions of the future operational environment – enabling adaptive realistic training-- while also improving and evolving unit training management and readiness reporting?

1) (U//FOUO) The Combined Arms Center (CAC) develops UAS threat awareness POI for Professional Military Education (PME) courses.

2) (U//FOUO) TCM-Fires, in coordination with other TCMs, writes a requirement for Group 1 C-UAS capabilities.

3) (U//FOUO) Home station training installations, Combat Training Centers, and theatre RSOI sites develop C-UAS training lanes that mirror C-IED training lanes.

(U) BACKGROUND

(U//FOUO) Due to lessening costs of GPS and wireless technology, individuals across the world now have access to a market selling tactical air capabilities for under \$1000. These low-flying, slow-moving, and relatively small drones equipped with cameras are difficult to detect with traditional air defense capabilities and provide an easily-accessible command and control capability.

(U//FOUO) The trend behind this new airpower capability is only increasing. DAISH is using the Phantom DJI Quadcopter to direct battles, adjust indirect fires, and capture images for strategic messaging posts to social media site. How long until DAISH or another non-state actor records the first flying IED detonating over helpless victims and more importantly, how will it shape the strategic decision-making process?

(U//FOUO) The Fires Center of Excellence (FCoE) is the Army's lead for developing Counter Unmanned Aircraft Systems (C-UAS) capability². FCoE, in partnership with Army Aviation Missile Research, Development, and Engineering Center (AMRDEC), has developed electronic capability to defeat the threat and will be assessing it with the Accelerated Capability Division (ACD) at Fort Sill, OK, in July 2015. A range of other detect, identify, and defeat technologies will be present during this exercise as well.

(U//FOUO) The Asymmetric Warfare Group is also assessing what non-materiel solutions can be used to defeat adversarial use of UAS. Understanding that threat actors are after a specific effect when they employ UAS, defeating the effect is the critical task to defeating the use of the drone.

² ARCIC C-UAS CONOP

(U) EVENT EXECUTION

(U) Mission:

(U//FOUO) AWG conducted an experiment to demonstrate the threat a Group 1 UAS poses to a maneuver platoon during dismounted, mounted, and fixed-site security missions. The experiment occurred at the Home Station Training Lane 2 (HSTL 2), Fort A.P. Hill, VA, on 26-29 JAN 15. AWG Operational Advisors (OAs) embedded with the platoon during the experiment to observe Soldier reactions from pre-mission planning through mission completion.

(U) Objectives:

(U//FOUO) The objectives of this experiment were:

- (U//FOUO) Visually depict (video) the threat of adversary Group 1 UAS during specific missions.
- (U//FOUO) Observe TTPs that provide the ability to detect, identify and defeat threat Group 1 UAS.
- (U//FOUO) Observe TTPs of a maneuver elements reaction to the identification of a threat platform.
- (U//FOUO) Brainstorm materiel solutions that would enhance an element's ability to defeat or negate an adversary Group 1 UAS.

(U) Methodology:

(U) The team used a systematic approach to this experiment to maximize the understanding and awareness during a short period of time. The approach allowed for a “build-up” of complexity between the three different scenarios conducted. The team was able to re-organize between scenarios in order to determine what needed to be assessed during the follow-on mission.

(U//FOUO) Scenario 1: PLT conducts dismounted maneuver down tree-lined route with no knowledge of threat Group 1 UAS in the area of responsibility (AOR).

(U//FOUO) Phase 2: PLT conducts mounted maneuver down tree-lined route with limited intelligence reporting of threat Group 1 UAS in the AOR.

(U//FOUO) Phase 3: PLT conducts fixed site security for a period of time around a walled-in compound with full knowledge of threat Group 1 UAS in the AOR.

(U) ASSESSMENT

(U) Scope and Limitations:

(U) The scope of this experiment was to observe a maneuver platoon's ability to detect, identify, and defeat a threat Group 1 UAS.

- (U) This assessment was an initial effort to understand the C-UAS capability of a maneuver elements.
- (U) Data was collected by members of the AWG team (first hand observation) moving with the platoon.

(U) Analysis Approach:

(U) Metrics were allocated under the broader elements of detect, identify and defeat in order to integrate easily with the Army's CONOP.

- (U) Do friendly forces have the capability to **detect** enemy tactical micro-UAS (Group 1) at the tactical maneuver element level?
- (U) Do friendly forces have the capability to **identify** enemy tactical micro-UAS (Group 1) at the tactical maneuver element level?
- (U) Do friend forces currently have the capability to **defeat** enemy tactical micro-UAS (Group 1) at the tactical maneuver element level with issued equipment?

(U) Each operational issue coincided with Essential Elements of Analysis (EEA) and measures which made up the data matrix. The full data matrix can be seen in the appendix to this report and are summarized in the results section.


(U) RESULTS

(U) Summary:

(U//FOUO) The platoon conducted two missions, one dismounted and one mounted, without knowledge of the threat Group 1 UAS in their immediate AOR. The platoon was focused on ground-based threats and did not visually or audibly detect threat Group 1 UAS operating 150 to 300 feet above ground level (AGL). Following the initial detection and identification, there was a major lag in reporting the sighting to higher. After providing the platoon with a C-UAS tactical pocket reference (TPR) prior to the execution of the third mission, leaders made several changes to their roles and responsibilities and Soldiers were more apt to detect the threat Group 1 UAS in their AOR.

(U) Scenario 1:

(U) The following was the OPORD given to the PLT leadership:

MISSION OPORD	
<p>Mission: 1/A conducts movement to Chikaca (Vic TH 9306 2877) NLT 080027JAN15 IOT conduct KLE and village assessment.</p> <p>Execution Concept of the Operation: 1/A conducts mounted movement along previously cleared route to VDO Alpha. PLT conducts LU and KLE vic. PLT is prepared to conduct village assessment with Mr. Jonathon Ogandi and log his requests. Complete assessment and move back to VDO to conduct mounted movement back to FOB AWTC.</p> <p>Key Tasks :</p> <ul style="list-style-type: none"> - Conduct mounted movement to VDO vic TH 9364 2850 - Conduct LU w/ Mr. Ogandi vic TH 9306 2877 NLT 093027JAN15 - Conduct dismounted movement from VDO to Chikaca - Conduct KLE w/ Mr. Jonathon Ogandi - O/D conduct village assessment of Chikaca - Coordinate for vehicle extraction upon mission completion. <p>Fires:</p> <ul style="list-style-type: none"> - There are no fire support capabilities available. <p>Air Support:</p> <ul style="list-style-type: none"> - There are no friendly air assets in the area. <p>CDIR:</p> <ul style="list-style-type: none"> - Contact with hostile forces - Injury to friendly forces or local nationals <p>Coordinating Instructions:</p> <ul style="list-style-type: none"> - 2/A will provide VDO security (notional). - Provide PLT Internal Graphics to CO CDR NLT 070027JAN15. 	 <p>Timeline:</p> <ul style="list-style-type: none"> 0800 SP FOB AWTC NLT 0930 LU with Mr. Ogandi NLT 1130 RTB <p>Service Support:</p> <p>CASEVAC/MEDEVAC (notional):</p> <ul style="list-style-type: none"> - Level 1: Ground CASEVAC to FOB AWTC - Level 2: Establish hasty HLZ and request 9-line MEDEVAC <p>Command and Signal:</p> <ul style="list-style-type: none"> - Command Net: (MOTOROLA or SCPT) - Provide SITREPs to CO CDR every 20 minutes or upon critical mission information

(U//FOUO) During the dismounted mission, the Soldiers did not detect the threat Group 1 UAS even though they should have been able to do so. Multiple AWG observers detected the threat Group 1 UAS by sight and sound on the initial approach to the village. The maneuver from the first village to the second provided another opportunity; however, only AWG observers had positive detections and identification. Throughout the engagement between the platoon element and OPFOR, the Group 1 UAS hovered in direct sight of the element.

	Platoon Element	AWG Observers	UAS Details
Initial Approach	N/A	Detection & Identification	300 feet AGL
Between Villages	N/A	Detection & Identification	300 feet AGL
During Engagement	N/A	Detection & Identification	200 feet AGL

(U) Scenario 2:

(U) The following FRAGO was given to the PLT leadership:

(U) Situation: Mr. Ogandi and the Police Chief are extremely upset about the firefight that occurred in the village. A couple of days after the incident, the local police chief received a tip from a village member and the two individuals were arrested. Mr. Ogandi is interested in setting up training to modernize his police force.

(U) Mission: Conduct mounted movement to the village mosque in order to conduct KLE with Mr. Ogandi to discuss police training initiatives.

(U) Key Tasks:

- *(U) Conduct mounted movement to mosque.*
- *(U) Determine what material assets Mr. Ogandi will request for his police force.*
- *(U) Maintain speed limit of 25 mph in order to minimize risk of incidents with LNs on the road.*

(U//FOUO) During the mounted mission, the Soldiers did not detect the threat Group 1 UAS while the convoy was in motion. While the platoon leadership was conducting a key leader engagement (KLE) with locals, Soldiers provided perimeter security. During the brief KLE, Soldiers detected and identified the threat UAS.

(U//FOUO) Note: the below results happened while the Soldiers were dismounted and providing perimeter security, not while in the convoy. To observe the platoon's reaction, the experiment team instructed the Group 1 UAS operator to bring the UAS closer to view and lower to the ground incrementally. At the time of detection, the Group 1 UAS was operating approximately 250 meters from the Soldiers and 50 feet AGL.

(U) Do friendly forces have the capability to detect enemy tactical micro-UAS (Group 1) at the tactical maneuver element level?

(U//FOUO) Visual detection occurred on the Northwest corner of the mosque by a perimeter guard. Initial characterization included pointing and talking with guard on opposite corner of mosque. A report was sent to platoon leadership five (5) minutes after detection and platoon leadership reported it higher (company) five (5) minutes after that. While visual detection occurred, audible detection did not, possibly due to the trucks still running.

(U) Do friendly forces have the capability to identify enemy tactical micro-UAS (Group 1) at the tactical maneuver element level?

(U//FOUO) Initial thoughts by the Soldier who detected the Group 1 UAS was that it was part of the event (i.e., the UAS was being used for data collection purposes). The Group 1 UAS was never identified as friend or enemy and Soldiers were indifferent to its presence; however, the tone of the conversation during reporting clearly indicated that it was an enemy asset. The Soldiers identified the UAS as hovering over the mosque when, in fact, the UAS was approximately 250 meters away, signifying the difficulty of accurately reporting the location of a small aircraft.

(U//FOUO) Basic details were not passed during the beginning of the reporting process. Details such as friend or enemy, moving or hovering, location, direction of movement, distance, altitude, size, speed, intention, and type of platform were only achieved after prompting from the Company Commander.

(U//FOUO) During the identification phase, focus was on the Group 1 UAS and attention to sectors and ground threats were greatly reduced.

(U) Do friendly forces have the capability to defeat enemy tactical micro-UAS (Group 1) at the tactical maneuver element level with issued equipment, currently?

(U//FOUO) The UAS was clearly identified and reported as hovering and no movement. Soldiers hinted that the Group 1 UAS was collecting information on them and it posed no immediate threat. Soldiers did not make an attempt to destroy, defeat, or avoid the capabilities of the UAS.

	Detection	Identification	Defeat	UAS Details
Convoy	N/A	N/A	N/A	Operated at 300 feet while following the convoy from the start location to the fixed site
Perimeter Security	Occurred at ~250 meters and 50 feet AGL	Chaotic reporting details	No TTPs were used to defeat; however, the UAS was identified as an ISR asset	No detection while UAS operated in the tree line. Detection occurred as the UAS came closer and lower

(U) Scenario 3:

(U) The following was the FRAGO given to the PLT leadership:

(U) Situation: Its two weeks after the IED attack that struck your convoy. The situation in the village has somewhat deteriorated as reports of insurgents from the town of Maiduguri (vic 18S TH 923 263) keep instigating violence against the residents of Chikaca. Mr Ogandi has asked for a PLT of U.S. Soldiers to occupy the town's police station IOT provide order to the town.

(U) Intelligence reports that a 2-3 man team from the town of Maidugiri occasionally infiltrates the village and intimidates supporters of Mr. Ogandi and the elected government of the Western African Republic. Two other units have reported seeing some type of UAS in the district since your unit was attacked by an IED, so analysts indicate there is likely a two-man team flying an aircraft in conjunction with insurgent activity.

(U) Mission: Occupy Chikaca police station (Vic TH 9247 28487) NLT 28JAN090015 IOT provide security for the village.

(U) Key Tasks:

- *(U) Conduct mounted movement to Police Station at 280800JAN15 IOT allow for U.S. route clearance package to clear RTE Powers.*
- *(U) Occupy Police Station NLT 0900.*
- *(U) Establish defensive position for 24-hours.*
- *(U) BPT conduct dismounted patrols in support of local police chief.*
- *(U) Conduct Relief in Place at police station with 3/A at 290900JAN15.*

(U) Coordinating Instructions:

(U) PIR:

- (U) Report as much information pertaining to UAS aircraft to higher HQ.

(U//FOUO) The platoon was fully aware of what the experiment team was trying to observe by this point. The assessment team instructed the UAS operator to make three separate patterns at different speeds, heights, and distances. Overall, the platoon was much more alert to the presence of a threat Group 1 UAS.

Tactical Pocket Reference
A Guide for U.S. Forces
November 2014

**Unmanned Aerial System
(UAS) Threat Awareness**

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Bottom Line

- The enemy's use of UAS means you have an air threat. Operate that way.
- The "Poor Man's" Air Force: UAS are cheaper to use than manned aircraft and can perform many of the same missions.
- Low, Slow, Small: These three attributes of UAS make them tough to detect on radar or even visually. Thus, UAS present a challenge for modern air defense artillery.

Enemy UAS Mission

- UAS can be used to conduct Direct Attacks, Indirect Attacks, ISR, Cyber Warfare, to elicit reactions or any other combination limited only by creativity.
- Once spotted, UAS are vulnerable. Direct fire engagement is one option (be aware of collateral damage beyond the target).
- An option to consider is to use terrain analysis and the flight path of the UAS to determine the launch point and neutralize the controller.

Find Enemy UAS

- Use Air Guards. Designate a person to observe above the horizon.
- Pay close attention at key times: Immediately after IDF attacks, during/after Key Leader Engagements, during/after raids.
- ColIST/S2 should determine if enemy UAS are establishing a pattern.
- All C2 elements should know who to call to determine if airspace is clear of friendly air.

What Do I Do?

- Proper planning by leaders will ensure that units employ adequate force protection measures to counter the UAS threat. Units must develop TTPs to counter this threat in their respective areas of operation.
- Observe the threat (gather intel) or engage?
- Notify higher and adjacent units (Clear airspace and pass early warning).
- Move to overhead cover.
- Get distance and bearing to the threat.
- Take pictures. Use optics or handheld cameras.

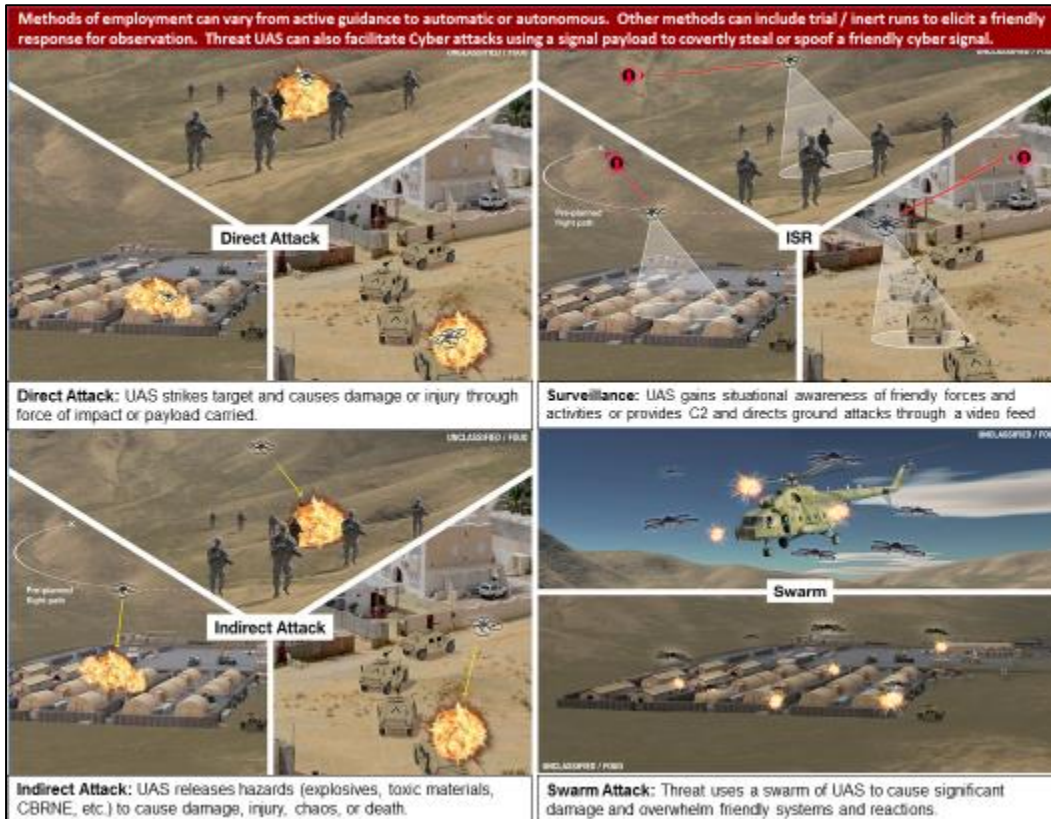
Recommended Format for Reporting Enemy UAS

LINE	INFORMATION EXAMPLE	Example
1	Unit call sign and frequency	Red 1, FHXXX
2	Unit location	6- or 8-digit grid
3	Location of threat UAS asset	Grid or distance and direction from reporting unit location
4	Time threat UAS asset spotted/detected	DTG
5	Estimated time on site	Was threat UAS asset approach observed or was it spotted overhead? How long might it have been there?
6	Flight characteristics	Is threat UAS loitering in one spot (possibly already spotted/reporting unit), is it flying straight (en route to loitering location), what is direction of flight, or is it flying randomly (searching)?
7	Estimated size, elevation, and physical description	Wingspan, height, color, tail configuration,

Reference: Infantry Magazine, May-June 2013

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(U) Do friendly forces have the capability to detect enemy tactical micro-UAS (Group 1) at the tactical maneuver element level?

(U//FOUO) The Soldiers had full knowledge of the threat Group 1 UAS in their AOR; however, initially this highlighted the possibility of a Soldier reporting a false detection. In the first 30 minutes of the fixed site mission, when no UAS was flying, multiple false reports were sent to the platoon leadership. Once perimeter security was set, the UAS operator launched and flew the first pattern around the site at 350 feet.

(U//FOUO) Eleven minutes after launch, a Soldier detected the high pitch sound the UAS made when hovering. No visual recognition was gained for several minutes; however, this was mostly due to the height at which it was operating. When the Group 1 UAS moved to the opposite side of the site, visual detection was gained and Soldiers began to report the detection. This all occurred within two minutes. Soldiers took the initiative to try and get a picture of the UAS by using their personal cell phones.

(U//FOUO) During the second and third flight patterns, audible sound was again the first detection. Once Soldiers knew what sound to listen for they were able to locate visually where the Group 1 UAS was. Reporting the detection of the UAS became easier and more routine.

(U//FOUO) In the final approach, the UAS was flown directly over the site (20 feet AGL). At this time, Soldiers were engaged in a simulated gunfight with OPFOR. The UAS was flown overhead three times without any detection from the Soldiers, mostly due to their attention to the OPFOR battle.

(U) Do friendly forces have the capability to identify enemy tactical micro-UAS (Group 1) at the tactical maneuver element level?

(U//FOUO) The “identify portion” of the event was considerably better. Soldiers were aware and prepared for where threats were in their AOR. Reports of the Group 1 UAS were drastically faster and more accurate. Location, size and altitude were all added to the initial reports. Due to repeating the flight patterns, the team was able to recognize the attention Soldiers were giving to the air dimension.

(U) Do friendly forces have the capability to defeat enemy tactical micro-UAS (Group 1) at the tactical maneuver element level with issued equipment, currently?

(U//FOUO) During the first three flight patterns, the Group 1 UAS was used as an ISR asset. The Soldiers did not try to take cover or avoid the UAS; however, as a way to attack the network, leaders began to organize a patrol to find the operator of the UAS. During the fourth direct flyover of the sight, Soldiers began to fire at the platform.

	Detection	Identification	Defeat	UAS Details
Pattern 1	Audible and then visual	Positive reporting	N/A	Flight pattern at 350 feet
Pattern 2	Audible and then visual	Positive reporting	Soldiers began to track where the UAS was coming from and going to	Flight pattern at 250 feet
Pattern 3	Audible and then visual	Positive reporting	Leaders arranged patrol to find the operator	Flight pattern at 200 feet and follow patrol
Flyover 1	N/A	N/A	N/A	NE to NW, 20 ft AGL
Flyover 2	N/A	N/A	N/A	NW to SE, 20 ft AGL
Flyover 3	N/A	N/A	N/A	SE to NE, 20 ft AGL
Flyover 4	Visual	Positive	Soldiers fired weapons at UAS	SE to SW, 20 ft AGL

(U) Summary of Results:

(U) Do friendly forces have the capability to detect enemy tactical micro-UAS (Group 1) at the tactical maneuver element level?

- (U//FOUO) Awareness of threat Group 1 UAS and their capabilities can increase a unit’s ability to detect.

- (U//FOUO) Understanding the environment and noticing what sounds or sights are different can help hasten detection. The noise the Group 1 UAS made was the greatest contributor to detection.
- (U//FOUO) Visually detecting the Group 1 UAS was incredibly hard when at an altitude about 150 feet AGL without any other indicators.
- (U//FOUO) Weather, AOR, and sky color can all impact the ability to detect the Group 1 UAS, both visually and audibly.

(U) Do friendly forces have the capability to identify enemy tactical micro-UAS (Group 1) at the tactical maneuver element level?

- (U//FOUO) Awareness of the threat can lead to proper reporting of the identified threat.
- (U//FOUO) Knowledge of the capabilities and limitations can lead to more concise reporting of size, altitude, location, etc.

(U) Do friendly forces have the capability to defeat enemy tactical micro-UAS (Group 1) at the tactical maneuver element level with issued equipment, currently?

- (U//FOUO) Knowledge of the capabilities and limitations led to Soldiers engaging leaders and detailing the paths the Group 1 UAS took from certain locations. This information led to leaders arranging a patrol to find the operator.
- (U//FOUO) The only kinetic action taken was to fire weapons at the Group 1 UAS.

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APPENDICES

Terms of Reference:

AGL – Above Ground Level

ASP – Ammunition Supply Point

AOR – Area of Responsibility

AWG – Asymmetric Warfare Group

AWTC – Asymmetric Warfare Training Center

CERDEC – Communications-Electronics Research, Development and Engineering Command

CONOP – Concept of Operations

C-UAS – Counter Unmanned Aircraft System

EEA – Essential Elements of Analysis

FCoE – Fires Center of Excellence

HSTL 2 – Home Station Training Lane 2

IED – Improvised Explosive Device

ISR – Intelligence, Surveillance and Reconnaissance

ICD – Initial Capabilities Document

KLE – Key Leader Engagement

OPORD – Operations Order

PLT - Platoon

TTP – Tactics, Techniques and Procedures

TPR – Tactical Pocket Reference

UAS – Unmanned Aircraft System

US – United States

Data Matrix:

Operational Issues	Essential Element of the Analysis	Measure	Data Element	
Issue 1: Do friendly forces have the capability to detect enemy tactical micro-/nano- Unmanned Aircraft Systems (category 1 UAS) at the tactical maneuver element level?	Characterize the unit's ability to report the detection of an UAS in their AOR to higher.			
	Characterize the units ability to visually detect the presence of an UAS in the AOR.	distance from units position	Unit grid location (8 digit or better); CUAS grid location (8 digit or better) or direction and distance to CUAS	
		time in air since launch	time of flight (minutes since launch to detection)	
		Unaided sight (naked eye) or aided (scope, binoculars, etc.)	Means of detection	
	Characterize the unit's ability to detect the presence of an UAS in their AOR by hearing .	distance from unit position	Unit grid location (8 digit or better); CUAS grid location (8 digit or better) or direction and distance to CUAS	
		time in air since launch	time of flight (minutes since launch to detection)	
		with or without ear protection	Means of detection	
	Issue 2: Do friendly forces have the capability to identify and track enemy tactical micro-/nano- Unmanned Aircraft Systems (category 1 UAS) at the tactical maneuver element level?	Characterize the unit's ability to report the detection of an UAS in their AOR to higher.		
		Describe the unit's capability to identify the UAS as friend or foe .	positive identification	identification friendly or foe
		Describe the unit's ability to determine whether the UAS platform is moving or hovering .	positive identification	identification moving (direction) or stationary
Describe the unit's ability to determine a location of the UAS if hovering.		grid position	Unit grid location (8 digit or better); CUAS grid location (8 digit or better) or direction and	

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			distance to CUAS from reference point
	Characterize the unit's ability to identify the direction of movement if the UAS is moving.	level of accuracy	direction of movement of CUAS from reference point
	Characterize the units' ability to identify the distance from their location the UAS is operating.	level of accuracy	
	Characterize the unit's ability to identify the altitude at which the UAS is operating.	level of accuracy	Altitude reported to higher by unit (salute report)
	Characterize the units ability to determine the size of the UAS operating in their AOR.	level of accuracy	size reported to higher by unit (salute report)
	Describe the unit's ability to identify the speed at which the UAS is traveling or operating.	level of accuracy	speed reported to higher by unit (salute report)
	Characterize the units ability to identify the intention of the UAS operating in the AOR.	ISR	as reported to higher by unit (salute report)
		attack	as reported to higher by unit (salute report)
	Characterize the unit's capability to identify the equipment/platform of the UAS.	type	as reported to higher by unit (salute report)
		payload	as reported to higher by unit (salute report)
Issue 3: Do friendly forces have the capability to defeat to enemy tactical micro-/nano-Unmanned Aircraft Systems (category 1 UAS) at the tactical maneuver element level?	Characterize the unit's ability to report the detection of an UAS in their AOR to higher.		
	Identify the units ability to destroy a threat UAS in their AOR.	kinetic	Direct observation by Data Collector
	Identify the units ability to destroy a threat UAS in their AOR.	non-kinetic	Direct observation by Data Collector

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	Identify the units ability to degrade the capabilities of a threat UAS in their AOR.	unit employs obscurants	Direct observation by Data Collector
	Identify the units ability to degrade the capabilities of a threat UAS in their AOR. Characterize the units ability to safely evade a threat UAS operating in their AOR.	electronic warfare	Direct observation by Data Collector
		unit avoids UAS	Direct observation by Data Collector
	Characterize the units ability to safely evade a threat UAS operating in their AOR.	cover	Direct observation by Data Collector
		concealment	Direct observation by Data Collector