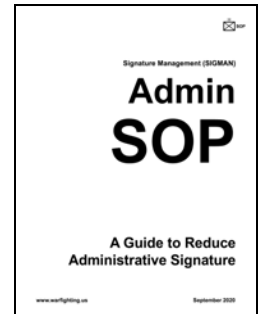
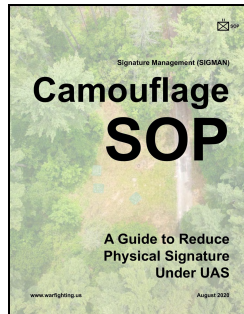
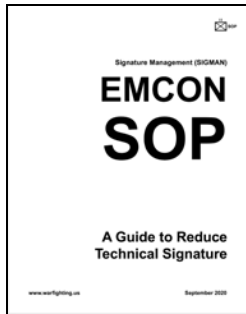




Signature Management (SIGMAN)

Camouflage SOP

**A Guide to Reduce
Physical Signature
Under UAS**



SIGMAN Camouflage SOP: A Guide to Reduce Physical Signature Under UAS

Contributors:

Geoff Ball
Garrett Boyce
Evan Kolodziejczak
Joseph Livi
Walker Mills
Paul Nichols
Zach Schwartz
Chad Skaggs
Matthew Shibata
Eric Todorski
Brian Walsh

Editor: Brendan McBreen

Edition: 1 August 2020

Purpose

Purpose

To REDUCE the physical signature (visual, IR thermal, and radar) of the infantry battalion IOT AVOID being observed and targeted by the adversary.

Process

1. DISPERSE into multiple small **elements**. DISPLACE **often**.
2. FIND a concealed **site**. CONFORM to **terrain**.
3. OPERATE at **night**.
4. CAMOUFLAGE all **people, positions, and equipment**.
5. MINIMIZE **movement**. MINIMIZE **radio**.
6. POST an **air guard**.
7. PLAN to operate under **UAS**.
8. INSPECT your **signature** from the enemy's point of view.

Premise

“To be detected is to be targeted is to be killed.”

- *Marine Corps Operating Concept, 2016*
- *Marine Corps Concept for Signature Management, 2017*

The threat has changed. Our adversaries, large and small, now integrate ISR sensors, especially UAS, with long-range precision fires. For U.S. forces, this is the end of guaranteed air superiority.

Operations have changed. *Littoral Operations in a Contested Environment (LOCE)* and *Expeditionary Advanced Base Operations (EABO)* require Fleet Marine Forces to support Navy sea control missions.

Marines will seize key maritime terrain—Expeditionary Advanced Bases (EABs)—in order to establish fires, ISR, aircraft, logistics, C2, or air and missile defense sites. These distributed EABs, operating under the arc of enemy long-range precision fires, will expand the Fleet’s sea control, challenge the enemy’s ability to target us, and free ships for other missions.

Outside the EABO concept, while conducting traditional amphibious operations or sustained operations ashore—even against unsophisticated adversaries—Marines will still face the threat of advanced sensors and long-range precision fires. UAS are everywhere.

For any mission, any adversary, and any environment, units must ruthlessly reduce their signature. Battle positions and operating bases must be small, dispersed, well-camouflaged, and temporary.

The purpose of this SOP is to reduce the physical signature of the infantry battalion. We can reduce, but never completely mask our signature. We will avoid observation to protect our combat power. The signature of the infantry battalion, with 700 Marines and few vehicles, is less than other units of the GCE, less than the equipment-heavy units of the ACE and LCE, and far less than any partnered Army or Navy units.

Camouflage and concealment DISRUPTS the enemy’s intelligence, surveillance, and reconnaissance efforts. Our units DISPERSE into multiple small elements, DISPLACE often, FIND concealed sites, CONFORM to terrain, OPERATE at night, CAMOUFLAGE all people, positions, and equipment, MINIMIZE movement, MINIMIZE radio, POST an air guard, PLAN to operate under UAS, and INSPECT their signatures from the enemy’s point of view.

Camouflage discipline includes **light** discipline, **heat** discipline, **noise** discipline, **trash** discipline, and **movement** discipline.



Scope of this SOP

The infantry battalion. Overhead UAS and ground-based sensor threats. Precision missile (ballistic missile and LACM), rocket, artillery, and mortar fires threats. Urban, woodland / jungle, and desert environments, but NOT arctic / snow.

The *Marine Corps Concept for Signature Management*, 2017, defines three types of signatures: physical, technical, and administrative. This SOP addresses ONLY the physical signature.

UAS identification is out of scope. Counter-UAS attack is out of scope. EMCON is out of scope. Decoys and tactical deception are out of scope. Redundant positions are out of scope. Field-expedient painting of equipment is out of scope.

Organization of this SOP

Chapter 1 is the actual **SOP**, camouflage procedures and battle drills. Chapter 2 is **How To**, a collection of camouflage instructions. Chapter 3 is **Train**, a guide to training units on the SOP. Chapter 4 is **Understand**, with sources that explain adversary capabilities. Chapter 5 is a **Reference** of additional background materials.

This *Camouflage SOP* is a collective effort. If you can improve this document, send us your ideas or join the online Google Doc.

Brendan McBreen
bbmcbreen@warfighting.us
1 August 2020

“The majority of UAS...are used to detect and identify targets for other weapons... Solutions such as camouflage and smoke can... defeat both attack UAS and fires enabled by UAS.”

- *U.S. Army C-UAS Strategy*, 2016

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Camouflage SOP

Chapter

1

Procedures

In this Chapter

- Camouflage standard operating procedures
- Camouflage battle drills



**SIGMAN Camouflage SOP:
Chapter 1: Procedures**

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SOP

CAMOUFLAGE Standards

Purpose. To REDUCE the physical signature (visual, IR thermal, and radar) of the unit IOT AVOID being observed and targeted by the adversary.



Standards

- 1. ALL Marines:**
CAMOUFLAGE your helmet. See [CAMOUFLAGE a Helmet](#).
CARRY a camouflage ghillie blanket. See [DEPLOY a Camouflage Ghillie Blanket](#).
CAMOUFLAGE your personal equipment and uniform. See [CAMOUFLAGE Equipment](#).
MASK the shine on your optics and equipment.
SILENCE your gear.
- 2. ALL NCOs:**
TRAIN your Marines on this SOP.
TRAIN your Marines on fieldcraft.
TRAIN your Marines on camouflage discipline. Camouflage discipline includes **light** discipline, **heat** discipline, **noise** discipline, **trash** discipline, and **movement** discipline.
- 3. ALL SNCOs:**
TRAIN your Marines on this SOP. INSPECT and CORRECT your Marines on this SOP.
MEMORIZE the *Camouflage Inspection Checklist* standards.
ENFORCE your Marines' camouflage discipline. Camouflage discipline includes **light** discipline, **heat** discipline, **noise** discipline, **trash** discipline, and **movement** discipline.
- 4. ALL drivers:**
CARRY a camouflage net on your vehicle roof. See [CAMOUFLAGE a Vehicle](#).
CAMOUFLAGE your vehicle if you are stopped for more than one hour.
DISPERSE while moving. DISPERSE when stopped. DISPERSE irregularly when parked.
Standard dispersion is three vehicle lengths.
- 5. ALL convoy commanders:**
ORGANIZE serials of no more than twelve vehicles.

PLAN concealed routes in woodlines, wadis, and riverbeds.
 PLAN concealed stops in the shadows of trees or buildings.
 LOWER speed to reduce dust signatures. PUT larger vehicles in front so their dust masks the rest of the convoy.
 BRIEF and REHEARSE the REDEYE UAS Drill. See [REDEYE UAS Drill](#).
 BRIEF and REHEARSE the HAWKEYE Convoy Drill. See [HAWKEYE Camouflage Drill](#).
 ASSIGN an air guard. See [Air Guard SOP](#). ENFORCE movement discipline.

6. **ALL air guards:**
 SCAN and LISTEN for adversary UAS.
 BPT initiate the REDEYE UAS Drill. See [REDEYE UAS Drill](#).
 TRAIN on adversary UAS capabilities.
7. **ALL logistics Marines:**
 ESTABLISH resupply procedures that REDUCE the signature of the unit.
 Air resupply and ground resupply actions are easily seen from the air.
 CAMOUFLAGE RRP, vehicles, and pallets. Pallet shape and shadow are distinctive.
 DISTRIBUTE supplies rapidly to avoid build-up. REMOVE all trash and dunnage.
8. **ALL unit leaders**, squad, section, platoon, and company:
 TRAIN your unit on this SOP. TRAIN attachments on this SOP.
 TRAIN your unit on camouflage discipline. ENFORCE standards.
 PAINT rifles. The battalion commander has authorized painted rifles.
 BRIEF and REHEARSE camouflage SOP drills:

SOP Drill	Purpose	Triggered by	Cancelled by:
REDEYE	“UAS. Freeze!”	Any Marine: “ REDEYE. UAS at one o’clock! ”	Unit leader: “STAND DOWN REDEYE”
HAWKEYE	“Camouflage the unit!”	Unit Leader: “ HAWKEYE 1520! ”	Unit Leader: “STAND DOWN HAWKEYE”
LONGBOW	“Attack the UAS!”	Unit Leader: “ LONGBOW team up! ”	Unit Leader: “STAND DOWN LONGBOW”

Notes

Attached unit leaders are responsible for the training and camouflage discipline of their people.

As a tenant in a base camp, unit leaders discuss SIGMAN issues with the camp commandant.

SOP

CAMOUFLAGE Fundamental Processes

Purpose. To REDUCE the signature (visual, IR thermal, radar) of the unit IOT AVOID being observed and targeted by the adversary.



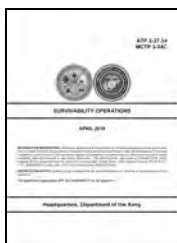
ALL unit **SOPs** and camouflage **TTPs** CONFORM to the following fundamental processes.

1. DISPERSE into multiple small **elements**. This is the most important step. BE **indistinguishable**—unable to be identified as different—IOT avoid being targeted. ASSUME you are being watched. DISPERSE individuals, vehicles, and positions irregularly. DISPLACE **often**.
2. FIND a concealed **site**. CONFORM to terrain. FIND low dead ground and micro-terrain, behind hills, tucked against the shadows of buildings, or under trees. In the city, move *inside* a building.
3. OPERATE at **night**. Camouflage discipline includes light discipline. TRAIN in night operations, with NVGs, lasers, and camouflage ghillie blankets. OPERATE in rain, fog, wind, and dust when UAS cannot fly. OPERATE at dawn or dusk when shadows are long, sun glare is high, and thermal crossover masks your heat signature. KNOW the daily light levels.
4. CAMOUFLAGE all **people, positions, and equipment**. BLEND with your background. Camouflage discipline includes **light** discipline, **heat** discipline, **noise** discipline, **trash** discipline, and **movement** discipline. Minimize lights. Mask engines, heaters, and generators. Silence all equipment. Leave NO trash behind, especially dunnage.
5. MINIMIZE **movement**. Control movement in TAAs and BPs. Control convoys.
6. POST an **air guard**.
7. PLAN to operate under **UAS**. Think overhead. Hills block visual, thermal, and radar observation, but the biggest threat is overhead UAS. PLAN concealed routes and positions. PLAN operations at critical times. MINIMIZE logistics requirements. PLAN resupply events.

8. INSPECT your **signature** from the enemy's point of view. USE binoculars, NVGs, thermal scopes, and UAS.

COUNTER adversary HUMINT, OSINT, and ELINT efforts. This information cues ISR platforms. Reduce the signature of your unit so that the adversary does NOT prioritize his ISR assets against you.

References



ATP 3-37.34 / MCTP 3-34C *Survivability Operations*, 16 Apr 2018. 190 pages.

Contributors. BBM, ZDS, 1 Aug 2020.

SOP

HAWKEYE Camouflage Drill

Purpose. To REDUCE the physical signature (visual, IR thermal, and radar) of the unit IOT avoid being observed and targeted by the adversary.

Conditions. The unit is stationary, operating at a base camp, TAA, or BP. Or the unit is moving, conducting footmobile operations, NOT in contact with the enemy. For convoy operations, see the [HAWKEYE Convoy Drill](#).

Standard. In 20 minutes, the unit's physical signature fades to zero. The unit cannot be seen or heard by a ground or air adversary 1000m away.

Equipment. Each Marine and each vehicle carries the camouflage equipment they need.

Trigger. The unit leader calls the codeword and the time: “**HAWKEYE 1520!**”

Only the **unit leader** can stop the current mission. When he or she makes the deliberate decision to trigger the drill—because of enemy action, an intelligence report, or as a preparation for combat—all movement stops for 40 minutes and HAWKEYE *becomes* the mission.

The mission of the HAWKEYE camouflage drill is to **disrupt** the enemy's intelligence, surveillance, and reconnaissance units. Any scheduled activities by subordinate units are delayed.

Process

1. **STOP** and **DISPERSE**.



All units, all Marines, and all vehicles **CEASE** all activities.

Marines move to their defensive Stand-To positions, or, if moving, find a hasty position.

Slowly. Do NOT run. Do NOT increase the physical signature of the unit.

2. **CAMOUFLAGE** your position for 20 minutes.

Execute camouflage SOPs for individuals, positions, vehicles, TAAs, and CPs.

Camouflage in buddy pairs to maintain security.

3. **STAND-TO** for 20 minutes.

Do NOT move. Do NOT radio. For 20 minutes the unit is dead still, dead quiet.

Only the unit leader can end the HAWKEYE drill: “**STAND DOWN HAWKEYE.**”

Responsibilities

Unit leaders are responsible for their unit's signature. **NCOs** camouflage their units and equipment. **SNCOs** inspect and correct. An **Air Guard** is posted.

Notes

HAWKEYE is NOT a UAS immediate action (IA) drill. [See REDEYE Drill](#).

HAWKEYE is NOT a counter-UAS (C-UAS) attack. [See LONGBOW C-UAS Drill](#).

HAWKEYE can be integrated into a unit's existing Stand-To Drill.

EMCON is a separate drill which may be conducted simultaneously.

In order to meet the 20 minute standard, units must already have good camouflage discipline.

HAWKEYE should be a scheduled event to camouflage the unit when occupying a TAA or BP.

In a TAA, no units depart during the drill. Units arriving stop and camouflage in place.

Camouflage should be a distinct activity, supervised, timed, and inspected to a standard. Camouflage is not an optional action, attempted indifferently, as time permits.

Related Processes

[REDEYE Drill](#) directs the unit to freeze and then operate under UAS observation.

[LONGBOW C-UAS Drill](#) directs the unit to attack a UAS.

[HAWKEYE Convoy Drill](#) directs a convoy to stop and camouflage.

[Stand-To Drill](#) directs the unit to occupy prepared fighting positions.

1 Aug 2020

SOP

HAWKEYE Convoy Drill

Purpose. To REDUCE the signature (visual, IR thermal, radar) of the convoy IOT avoid being observed and targeted by the adversary.

Conditions. The unit is moving by convoy, NOT in contact with the enemy.

Standard. The unit cannot be seen or heard by a ground or air adversary 1000m away.

Equipment. Each Marine and each vehicle has the camouflage equipment they need.

Trigger. The unit leader calls the codeword and the time: **“HAWKEYE the convoy 1520!”**

Only the **unit leader** can stop the convoy. Moving is the best method to avoid being targeted, but stopping is best to avoid detection. When the unit leader makes the deliberate decision to trigger the drill, all movement stops for 40 minutes and HAWKEYE *becomes* the mission.

Process

1. **STOP and DISPERSE.**
All vehicles find a good site and kill their engines.
Slowly. Do NOT increase the physical signature of the unit. Do NOT raise dust.
Disperse at least three vehicle lengths from the next vehicle.
2. **CAMOUFLAGE** your vehicle for 20 minutes.



See [CAMOUFLAGE a Vehicle](#).

3. **STAND-TO** for 20 minutes.
Do NOT move. Do NOT radio. For 20 minutes the unit is dead still, dead quiet.
Only the unit leader can end the HAWKEYE drill: **“STAND DOWN HAWKEYE.”**

Notes

Camouflage is only the last step to reduce the signature of a convoy. DISPERSE into multiple small elements. Serials should be twelve vehicles or less. PLAN concealed routes. Use woodlines, wadis, and riverbeds. OPERATE at night. POST an air guard.

Camouflage discipline includes light discipline, heat discipline, noise discipline, trash discipline, and movement discipline.

1 Aug 2020

SOP

REDEYE UAS Drill

Purpose. To ALERT the unit when an adversary UAS is sighted.

Conditions. The unit is stationary or moving.

Standard. The unit FREEZES. In 5 minutes, the unit leader decides what to do.

Equipment. NONE.

Trigger. An adversary UAS is sighted. Any Marine calls the codeword and the location:

“REDEYE. UAS at one o’clock!” or “REDEYE. UAS to the west, over the river.”

Process

1. **FREEZE:** all units, all Marines, and all vehicles.



GO prone if you are on foot in the open. Minimize your shadow. COVER yourself with a camouflage ghillie blanket, poncho, or tarp.

STAY behind and under the trees if you are in the woods. PUT something between you and the UAS. STAY inside if you are in the city. STAY away from the windows.

AVOID looking up immediately. An obvious feature of aerial photos is upturned faces. Faces shine, eye protection reflects light, and optics reflect light. Cover all optics. Cover the lens of the RCO with a kill-flash (honeycomb).

Do NOT run. Do NOT increase the signature of the unit.

2. **RESPOND** to the unit leader’s orders:

- a. “FREEZE.” Do NOT move. They may not have seen us.

or

- b. **“CONTINUE** the mission.” They have seen us and we will operate under adversary observation. The unit leader refuses to let his unit be suppressed or disrupted by an adversary UAS.

or

- c. **“ATTACK** the UAS. **“LONGBOW team up!”** C-UAS actions are a separate process. See [LONGBOW C-UAS Drill](#).

or

- d. **CAMOUFLAGE** the unit: **“HAWKEYE 1520!”** See [HAWKEYE Camouflage Drill](#). In a bivouac, TAA, or BP, execute the camouflage drill for individuals, positions, vehicles, and CPs.

3. **REPORT** UAS to S-2 and HHQ.

See example UAS Report format in Table 3-1 of ATP 3-01.8 *Techniques for Combined Arms for Air Defense*, 29 July 2016.

Responsibilities

Although an **air guard** is always posted, **any** Marine can call REDEYE. **NCOs** enforce camouflage discipline. **SNCOs** inspect and correct.

The **unit leader** decides on the response to adversary UAS. This decision must be based on an understanding of the adversary: kill chain, habits, capabilities, ROE and TTPs. REDEYE requires a critical combat decision when the unit is operating under the arc of the adversary’s long-range precision fires.

“Does he see me?” is NOT the question. The unit leader needs to assess “What will he do with this information?” Has he been sighted by an enemy squad or an enemy battalion? A fire network? Does the adversary use UAS to recon for a ground attack, call for fire, or solely BDA?

Notes

REDEYE is a UAS immediate action (IA) drill, executed automatically. REDEYE for small UAS is no different than for large UAS. Identification of the specific UAS is not required. Often, an adversary UAS will be heard before it is seen.

REDEYE is executed at night. A UAS operating at night must be assumed to have IR thermal sights.

REDEYE is NOT the same as AIR ATTACK. Air defense warning conditions (RED, YELLOW, WHITE) and weapons control status (TIGHT, HOLD, FREE) do NOT apply to UAS. The air attack drill—three horns terminated by an “All Clear” signal—assumes that the enemy aircraft will be overhead for only minutes. With multiple, persistent UAS overhead, we cannot make that assumption.

Contributors. **BBM**, ZDS, 1 Aug 2020

SOP

LONGBOW C-UAS Drill

Purpose. To attack an adversary UAS.

Conditions. The unit is stationary or moving.

Standard. In 20 minutes, the UAS is driven off, jammed, disrupted, or destroyed.

Equipment. Weapons. C-UAS weapons.

Trigger. An adversary UAS is sighted. See [REDEYE UAS Drill](#).

Process

1. **ALERT.** “LONGBOW team up!” The unit leader calls the designated C-UAS team. Only the **unit leader** can make the deliberate decision to attack the UAS. Generally, you shoot only if you think you’ve been seen, because engaging a UAS unmasks your position.



2. **ATTACK.** Shoot at the UAS. The LONGBOW C-UAS team attacks the UAS.
3. **REPORT.** The result of the UAS encounter is reported to the S-2 and HHQ.

See example UAS Report format in Table 3-1 of ATP 3-01.8 *Techniques for Combined Arms for Air Defense*, 29 July 2016.

Notes

The LONGBOW counter-UAS (C-UAS) SOP is an active C-UAS measure. It is NOT a UAS immediate action (IA) drill. See [REDEYE UAS Drill](#).

C-UAS weapons are under development. Even when fielded, many units will NOT have C-UAS capability. In 2020, Marine infantry units, with no active C-UAS weapons, must rely on direct-fire weapons and passive responses to adversary UAS.

The LONGBOW C-UAS team is an additional duty assigned to an existing unit. Marines NOT involved in C-UAS actions should maintain camouflage discipline.

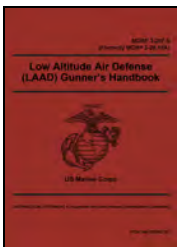
Low, small, and slow UAS are flown by the adversary from nearby clearings and hilltops. Aggressive patrolling of key terrain can push adversary UAS operators away from your unit. The LONGBOW C-UAS team should BPT patrol and pursue nearby UAS operators.

LONGBOW C-UAS procedures and communications need to follow air and missile defense (AMD) anti-air doctrine. AMD terms such as *engage*, *friendly*, and *unknown* have well-defined meanings and must be used precisely. See:



MCRP 3-30B.1 *Brevity: Multi-Service TTPs for Brevity Codes*, 1 May 2020.

Defines standard terms for identification of hostile aircraft: BOGEY, BANDIT.



MCRP 3-20F.9 *LAAD Gunner's Handbook*, 4 Apr 2018. 286 pages.

Defines standard fire control orders: engage, cease engagement, hold fire, resume fire, cease fire, and cover.

See also JP 3-01 *Countering Air and Missile Threats*, 2 May 2018.

See also JP 3-09.3 *Close Air Support*, 25 Nov 2014.

Contributors. BBM, 1 Aug 2020.

SOP

Air Guard SOP

Purpose. To sound the ALERT when the unit is being observed by adversary UAS.

1. Every separate unit POSTS an air guard—at all times, day and night—for all operations. If two or more air guard teams are posted then sectors are assigned.



2. The air guard WATCHES and LISTENS for adversary UAS. The air guard KNOWS the alert process. See [REDEYE UAS Drill](#). The air guard may or may NOT be trained in UAS recognition.



3. The air guard does NOT attack UAS. C-UAS actions are a separate action. See [LONGBOW C-UAS Drill](#).
4. The air guard duty rotates, like any other duty. It is NOT a sleeping post. Air guard may be an additional duty for the existing security watch.

LP/OP should be assigned the air guard mission to listen for UAS.

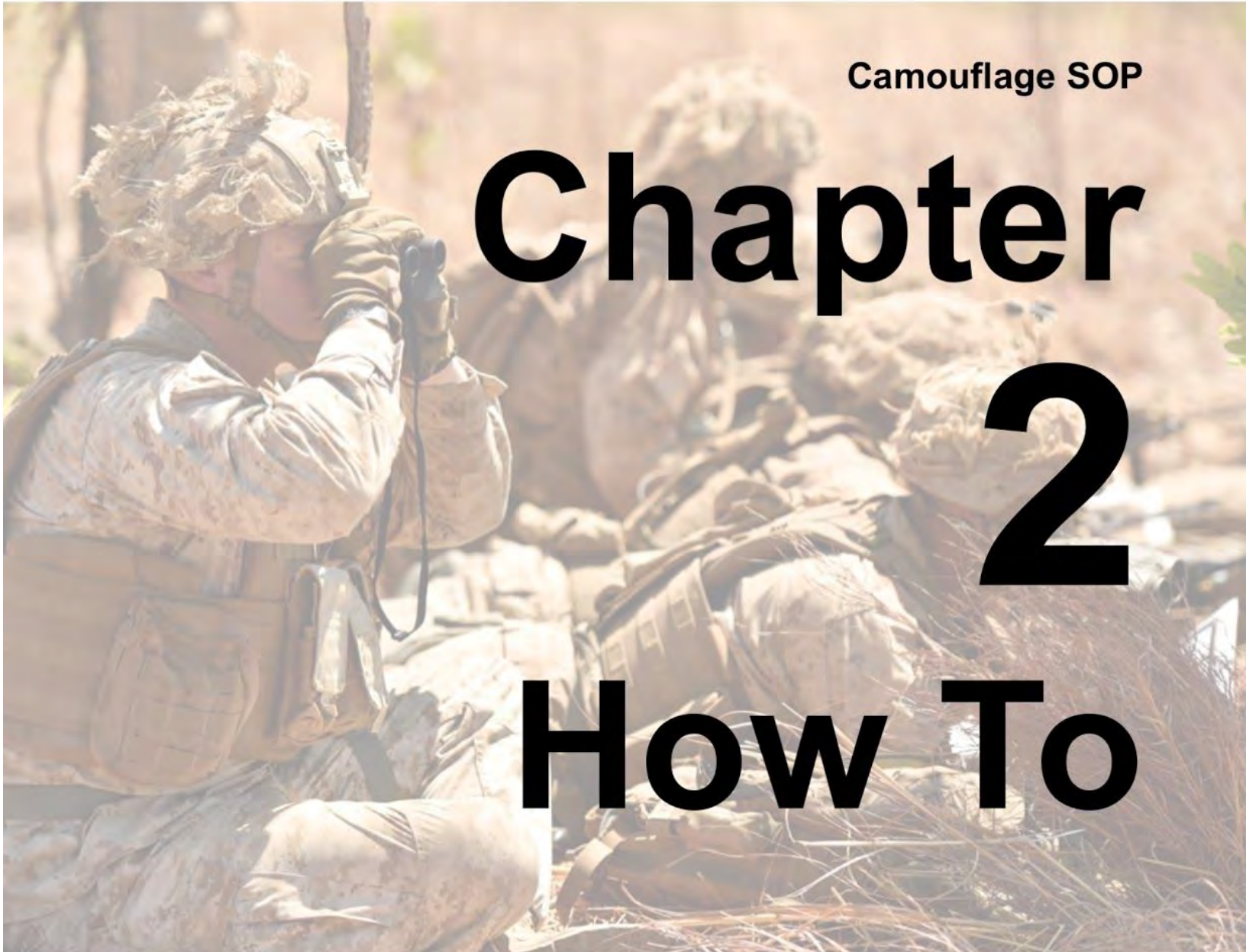
References



ATP 3-01.8 *Techniques for Combined Arms for Air Defense*, 29 July 2016.
68 pages.

Contributors. BBM, ZDS, 1 Aug 2020

Camouflage SOP



Chapter 2 How To

In this Chapter

- How to camouflage equipment
- How to camouflage a vehicle
- How to camouflage positions



**SIGMAN Camouflage SOP:
Chapter 2: How To**

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How To

CAMOUFLAGE a Helmet

Purpose. To REDUCE the physical signature (visual) of the helmet IOT AVOID being observed and targeted by the adversary.



Time

With an already camouflaged helmet, a Marine adds foliage in 10 minutes.

Equipment

Net, helmet band, zip ties, boot bands, and burlap strips. Camouflage net. Foliage.

Process

1. DRAPE a net over the helmet. Secure with a helmet band, zip ties, or boot bands. ADD knotted burlap strips.

Or,



DRAPE a camouflage net over the helmet. SECURE with a helmet band, zip ties, or boot bands.

Or,



PREPARE the helmet with boot bands. ADD foliage in the field.



2. ADD natural camouflage to blend with your environment. Keep vegetation short. Long leaves move too much. Cut vegetation, do NOT rip it up by the roots. See [CUT Vegetation](#).



Notes

The *shape* of the helmet—its most recognizable characteristic—must be changed.

A combination of techniques, camouflage netting plus boot bands, is preferred. The net obscures the shape of the helmet and the boot bands hold vegetation.

Avoid interfering with the function of the NVG mount. The mounting plate should be covered during daytime operations as the shape and shine are easily recognizable at close range.

Add vegetation that matches the primary color and foliage at ground level. The finished helmet should blend with the surrounding foliage.



The kevlar helmet has no radar signature.



The boonie cover is camouflaged in the same way as the helmet. Netting, burlap, and vegetation can be secured to the boonie's MOLLE band.



When the enemy is near, camouflage your face and exposed skin.



Contributors. EAT, ZDS, BBM, 1 Aug 2020

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How To

CAMOUFLAGE a Rifle

Purpose. To REDUCE the physical signature (visual) of the rifle IOT AVOID being observed and targeted by the adversary.



Process

1. PAINT your rifle. This requires command authorization.



[Weapons Painting SOP](#). CamPen, CA: 1st Marines, 1 Feb 2020. 48 pages.

An outstanding reference. Authorization letters, Marine Corps Technical Instructions, and step-by-step painting procedures for all infantry weapons.



Or,

2. WRAP **boot bands** around the stock and the hand guards. WRAP **burlap strips**. ADD **foliage** in the field to BLEND with your surroundings.

The linear *shape* and black *color* of the rifle—its most recognizable characteristics—must be masked.

Avoid interfering with the operation of the rifle—optics, chamber, charging handle, magazine well, ejection port.



Cloth tape can break up the shape of the stock.
The radar signature of the metal rifle cannot be masked.



Notes on Painted Rifles

Painted rifles are well-camouflaged rifles.

The Marine Corps has published a procedure—requiring command authority—and a Technical Instruction, 10 Dec 2015, on how to paint an M4A1.



References



Chad Skaggs. *Camouflage Infantry Rifles (FOUO)*. Camp Pendleton, CA: SOI-W, 17 Aug 2018.

Testing at the School of Infantry determined that painted rifles were much harder for an adversary to detect.

Contributors. CCS, BBM, ZDS, 1 Aug 2020.

How To

CAMOUFLAGE Equipment

Purpose. To REDUCE the physical signature (visual) of the Marine IOT AVOID being observed and targeted by the adversary.

Time

With a prepared assault and/or main pack, a Marine adds foliage in 10 minutes.

With a camouflage ghillie blanket, a Marine covers equipment in 10 minutes.

With prepared platforms, a Marine camouflages flak, boot tops, and sub-belt in 10 minutes.

Equipment

Tactical-colored bungee cords. Boot Bands. Foliage. 550 Cord. Camouflage ghillie blanket.



Process for Main Pack and Assault Pack

1. WRAP a **bungee cord** around the pack.
2. WEAVE a **bungee cord** through the MOLLE webbing on the top of the pack.
3. TIE pieces of “gutless” **550 cord** into other pack webbing you want to camouflage.
4. ADD **foliage** in the field to blend with your environment. Tuck foliage under the bungees and tie it with the 550 cord.

Or,

5. CARRY a **camouflage ghillie blanket**. [SEE DEPLOY a Camouflage Ghillie Blanket](#).
6. TIE **local vegetation** into the camouflage ghillie blanket.
7. COVER your **pack** and equipment.
8. SECURE the **blanket** with 550 cord or bungees.



Notes

550 CORD tie ins should be grouped in twos. One clump of vegetation should be tied into two 550 cord anchors to prevent excessive flapping. Burlap strips can be used instead of natural foliage.

MASK the shine on your equipment. Metal buckles and snaps can reflect light. Clip clips and zip zippers silently.

AVOID staging packs in neat rows on the ground. Patterns are easily seen from the air.

Notes on Camouflage Ghillie Blanket and Using Local Vegetation

A camouflage ghillie blanket is one of the best ways to camouflage a pack, a Marine, or a fighting position. See [CAMOUFLAGE a Fighting Position](#).

Vegetation should be collected from the local environment and periodically updated. See [CUT Vegetation](#).

Process for Flak / Chest Rig, Boot Tops, and Sub-Belt

1. WRAP **shoulder straps** of flak or chest-rig with boot bands or shock cord.
2. DON an extra set of boot bands **outside of trousers**, over the boot top.
3. WEAVE boot bands, bungees, or shock cord **through belt pouches** and **flak pouches**.
4. TUCK bundled **vegetation** into the elastic platforms. [SEE CUT Vegetation](#).

Or,

5. DON a **ghillie blanket** after preparing with cut vegetation. See [DEPLOY a Camouflage Ghillie Blanket](#).



Notes

REPLENISH vegetation that wilts or discolors.

Use the RIGHT SIZE of vegetation for each platform. [SEE CUT Vegetation](#).



A prone Marine with equipment properly camouflaged.

Gutless 550 cord can be used to make vegetation anchors on gear webbing.

Notes on employment

This covers three of the four most distinguishable areas of the human silhouette—shoulders, waist and ankles. For the head, see [CAMOUFLAGE a Helmet](#).

TAILOR the level of vegetation used to the tactical situation. EXAMPLE: a long range foot patrol may not need shin camouflage but a close-in ambush may.

The **camouflage ghillie blanket** provides maximum camouflage, but also maximum encumbrance. It will snag on thick brush and rough terrain. TAILOR it to your mission.

Do NOT camouflage frequently used pouches such as ammunition and batteries.

Contributors: ZDS, BBM, 1 Aug 2020.

How To

CUT Vegetation

Purpose. To REDUCE the physical signature (visual) of Marines and equipment IOT AVOID being observed and targeted by the adversary.

Time. With a field knife, a Marine cuts vegetation in 5 minutes. With a prepared platform, a Marine adds vegetation to the platform in 5 minutes.

Equipment

Field knife. Gloves. Local foliage source. Prepared platform: pack, helmet, boonie cover, flak jacket.



Process

1. DETERMINE the **most common** local vegetation.
2. CUT the **vegetation** with a field knife. Wear gloves.
3. CLUMP the vegetation into **bundles**.
4. ADD the bundles of vegetation to your **prepared platforms**.
See [CAMOUFLAGE a Helmet](#) and [CAMOUFLAGE Equipment](#).

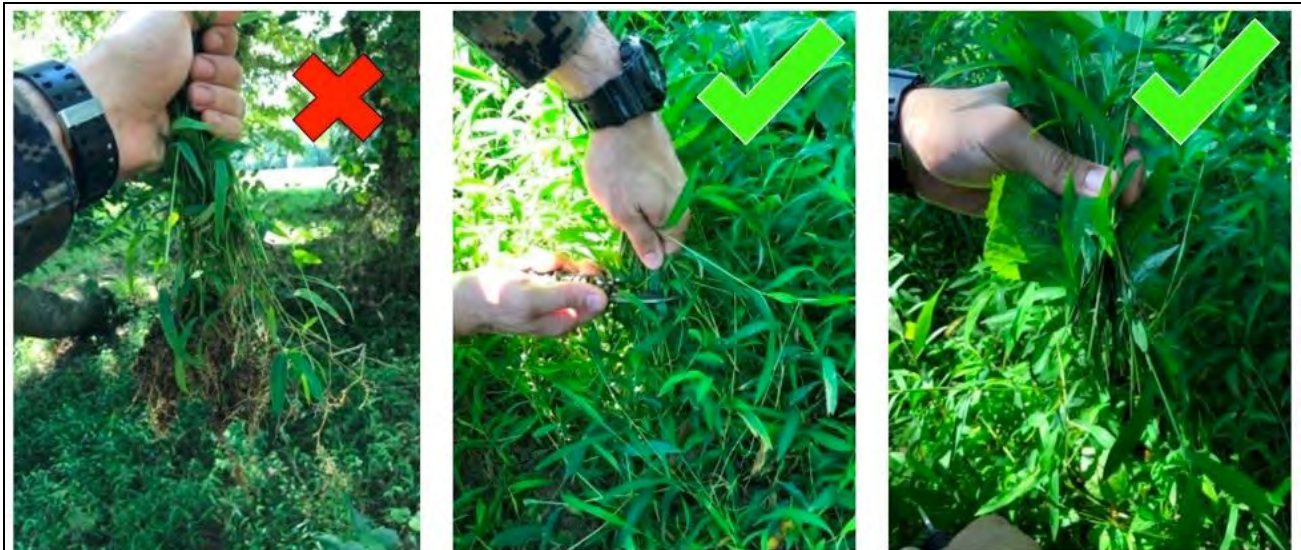
Notes

The most prevalent local foliage may be deadfall.

Always CUT foliage. Do NOT pull it up by the roots. Roots and soil break up the pattern of the vegetation. REPLACE foliage as it wilts and falls out. Camouflage is continuous.

REPLACE foliage if your environment no longer matches the initial foliage.

CUT more than you think you need. This saves having to go back and re-forage for more.



Different platforms require different sizes of foliage bundles to be effective.

Oversized bundles sway too much, giving away your position.



Helmet, boonie cover. USE fist to fist-and-a-half sized bundles.

Pack. USE long clumps of vegetation to cover the pack's larger surface area.

Camouflage ghillie blanket. USE fist-sized clumps around the head and shoulders, longer clumps down the back. Higher back clumps should point down. Lower back clumps should face up.

Plate carrier, chest-rig shoulder straps. USE long blundles to mask the shape of the shoulders and obscure the chest.

Pouches. USE smaller bundles to avoid interference with access and movement.

Contributors. ZDS, 1 Aug 2020.

How To

DEPLOY a Camouflage Ghillie Blanket

Purpose. To REDUCE the physical signature (visual) of Marines and equipment IOT AVOID being observed and targeted by the adversary.

Time

In 5 minutes, a Marine deploys a camouflage ghillie blanket to conceal their silhouette, equipment, or fighting position.

Equipment

Prepared ghillie blanket, bungees, shock cord.



Process to camouflage a Marine

1. PREPARE the **blanket**. It should be rolled up in a position that can be easily accessed and it should have local vegetation already tied in..
2. UNROLL and DRAPE the blanket over the **shoulders** and pack like a cape.
3. SECURE the blanket by tying the **shoulder ties** and **waist ties**.
See [BUILD a Camouflage Ghillie Blanket](#).
4. DON the **hood** if the silhouette of your head is exposed.

Process to camouflage a pack on the deck. See [CAMOUFLAGE Equipment](#).

1. DROP your **pack**, ensuring that you have all essential gear on your person.

2. UNROLL and DRAPE the blanket over the **pack**.
3. SECURE the blanket around the pack with a **bungee cord**.
4. HIDE shadows from the blanket by keeping the pack in **defilade** and close to the ground.

Process to camouflage a fighting position. See [CAMOUFLAGE a Fighting Position](#).

1. UNROLL and DRAPE the blanket over the **fighting position**.
The fighting position should already be covered by a flat-top **frame** of deadfall branches lashed to corner tripods.
2. HIDE shadows from the blanket by keeping it **low to the ground**, using local foliage, and staking the blanket to the deck.



Notes

Always use local vegetation with the camouflage ghillie blanket. The blanket is a baseline but “veg is the edge.” See [CUT Vegetation](#).

You are NOT invisible while wearing a camouflage ghillie blanket. The blanket is most effective when you are **prone, still, and silent**.

When moving, the camouflage ghillie blanket must be **secured tightly** to the Marine to prevent tell-tale movement and catching on terrain.

Contributors. ZDS, 1 Aug 2020.

How To

BUILD a Camouflage Ghillie Blanket

Equipment

Tactical-colored netting, black marker, tactical colored 550 cord (with the guts pulled out), burlap, multi-tool / knife. Optional: fabric paints, fabric dyes, sliding toggle from main-pack repair kit.



Process

1. SIZE the **netting**. It should cover your head like a hood while falling just above the waist.
2. MARK the **hood**. Wearing the netting, have another Marine trace the outline of your head and shoulders with a black marker.
3. TIE **shoulder ties**. TIE one 18-inch piece of gutless 550 cord to each shoulder of the hood. These ties will hold the blanket to your shoulders.
4. TIE **waist ties**. TIE one 18-inch piece of gutless 550 cord to each of the lower corners of the blanket. These ties will hold the blanket to your waist.
5. TIE **foliage anchors**. TIE a pair of 12-inch pieces of gutless 550 cord to the blanket, four inches apart. Repeat this with a dozen or more pairs of 550 cord until the back of the blanket has enough anchor points to hold a suitable amount of foliage. Prioritize anchors on the hood and the top third of the blanket. The middle third and bottom third need less.
6. TIE **burlap strips** to the back of the blanket. Avoid patterns but prioritize the hood and the top third of the blanket. The middle third and bottom third need less burlap.



On left, burlap and tie density are greatest on hood and top third of blanket, with less burlap on the middle and bottom third. Close-up on right shows the shoulder ties with toggle.

Notes on enhancing the Camouflage Ghillie Blanket

Fabric paint and **dyes** can be used to add camouflage patterns to the blanket.

A **sliding toggle** can be used to connect the shoulder ties.

WASH and DRY the blanket. Getting the blanket wet helps weather it. A quick cycle in the dryer will help gnarl and weather the burlap.

A **concealment hood** (NSN 8415-01-544-6870) can be ordered through the supply system.



Contributors. ZDS, 1 Aug 2020.

How To

CAMOUFLAGE a Bivouac

Purpose. To REDUCE the physical signature (visual, IR thermal, and radar) of the bivouac IOT AVOID being acquired and targeted by the adversary.

Scope. Bivouac sleeping area only. See other sections for vehicles, TAAs, fighting positions, and OP/LPs. For patrol base operations, see [CAMOUFLAGE a Patrol Base](#).

Process

1. DISPERSE into multiple small **elements**. This is the most important step. BE **indistinguishable**—unable to be identified as different—IOT avoid being targeted. Multiple small bivouacs are better than one large one. DISPLACE often.

DISPERSE positions irregularly, NOT covered and aligned. AVOID rows of tents, packs, pallets, or equipment. Patterns are easily seen from the air:



2. FIND a concealed **site**, off the main roads and away from junctions. CONFORM to terrain. FIND low dead ground and micro-terrain, under trees, behind hills, tucked into the shadows of buildings. In the city, bivouac *inside* a building.
3. OCCUPY at **night**. Camouflage discipline includes light discipline.
4. CAMOUFLAGE. Every position and all equipment needs overhead concealment. BLEND with your surroundings.

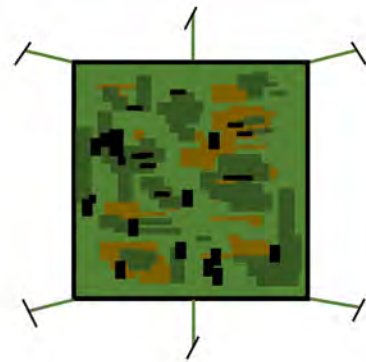
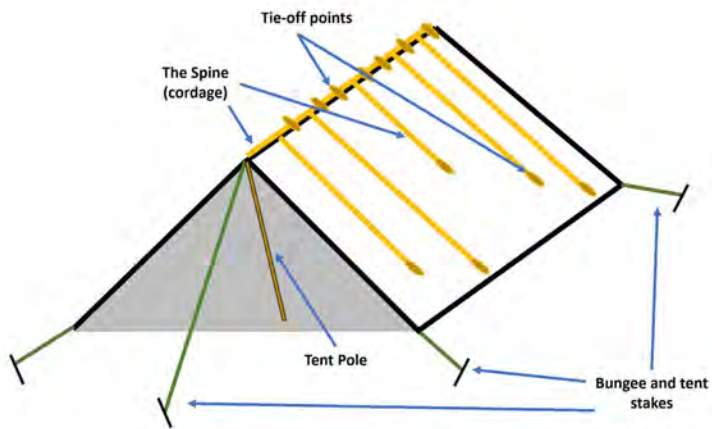
STAGE packs under trees and in the shadows, NOT covered and aligned. COVER with camouflage ghillie blankets. See [CAMOUFLAGE Equipment](#).

COVER crew-served weapons, ammunition, and equipment with tarpaulins. COVER supplies with tarpaulins. CAMOUFLAGE antennas and comm equipment.

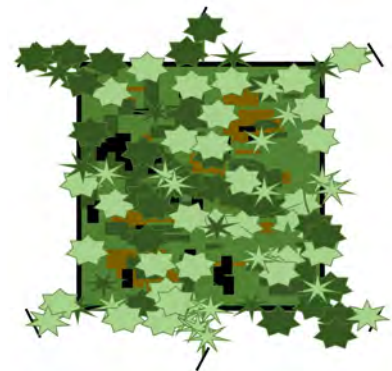
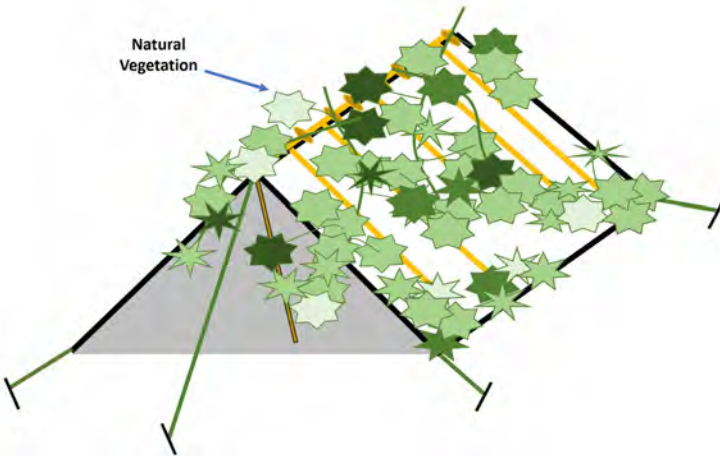
CAMOUFLAGE sleeping positions. USE the tarpaulin even during daylight.

TIE a length of 550 cord along the spine of the A-frame: clove hitch at one end, trucker's hitch at the other. ATTACH irregular lengths of 550 cord to the spine with square knots.

TIE natural vegetation at the tie-off points to cover the tarpaulin.



TIE a length of 550 cord along the **Spine** of the A-frame. ATTACH irregular lengths of 550 cord to the Spine.



TIE natural vegetation at the tie-off points to cover the tarpaulin.



5. MINIMIZE movement.
6. POST an air guard.

7. PLAN to operate under **UAS**. Think overhead. Hills block ground visual, IR thermal, and radar observation, but the biggest threat is overhead UAS. PLAN resupply events.
8. INSPECT your signature from the enemy's point of view. USE binoculars, NVGs, thermal scopes, and UAS during **clearance patrols**.

Notes

A bivouac near vehicles needs to cordon and mark the bivouac area. USE IR chemlites to maintain light discipline and preserve night vision.

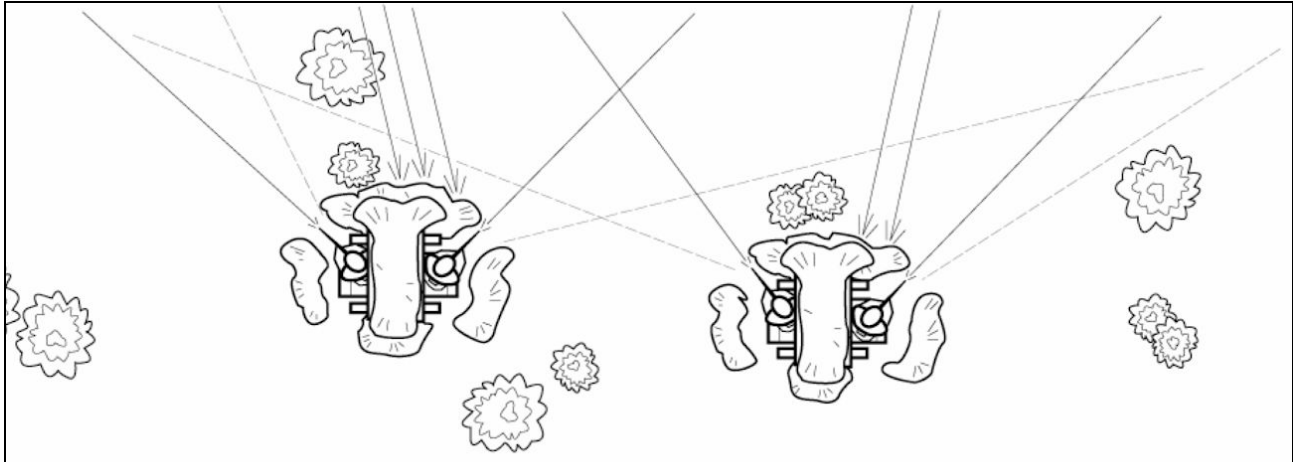
Contributors. MIS, BBM, ZDS, 1 Aug 2020.

www.warfighting.us

How To

CAMOUFLAGE a Fighting Position

Purpose. To REDUCE the physical signature (visual, IR thermal) of the fighting position IOT AVOID being observed and targeted by the adversary.



Time. Two Marines should camouflage an already-constructed fighting position in 60 minutes.

Process

1. DISPERSE into multiple small **elements**. This is the most important step. BE **indistinguishable** IOT avoid being targeted. ASSUME you are being watched. ESTABLISH irregularly-spaced positions, NOT linear positions.
2. FIND a concealed **site**. The mission—the sector of fire—dictates the position. CONFORM to terrain. AVOID silhouettes. Positions in open desert terrain have few options.
3. OCCUPY at **night**. Camouflage discipline includes light discipline.
4. CAMOUFLAGE your **position**. BLEND with your surroundings. Every position needs overhead concealment. COVER your position with a camouflage ghillie blanket, camouflage net, woven mat, or a MARPAT tarp. ADD foliage to blend with your environment.



1: Ghillie Blanket



2: Camouflage Net



3: Woven Mat



4: MARPAT Tarp

All of these coverings are best when laid on top of a flat-top **frame** of deadfall branches lashed to corner tripods.

Experiments at SOI-W concluded that the camouflage ghillie blanket is the most effective camouflage against UAS. A camouflage net is second, followed by a locally-constructed woven mat. The MARPAT tarp is the least effective covering due to its square and shiny appearance, distinctive sag, and difficulty in adding foliage. A thermal blanket below the concealment layer disrupts the IR thermal signature.

PICK a position with natural frontal cover to AVOID building a parapet of newly-dug earth.

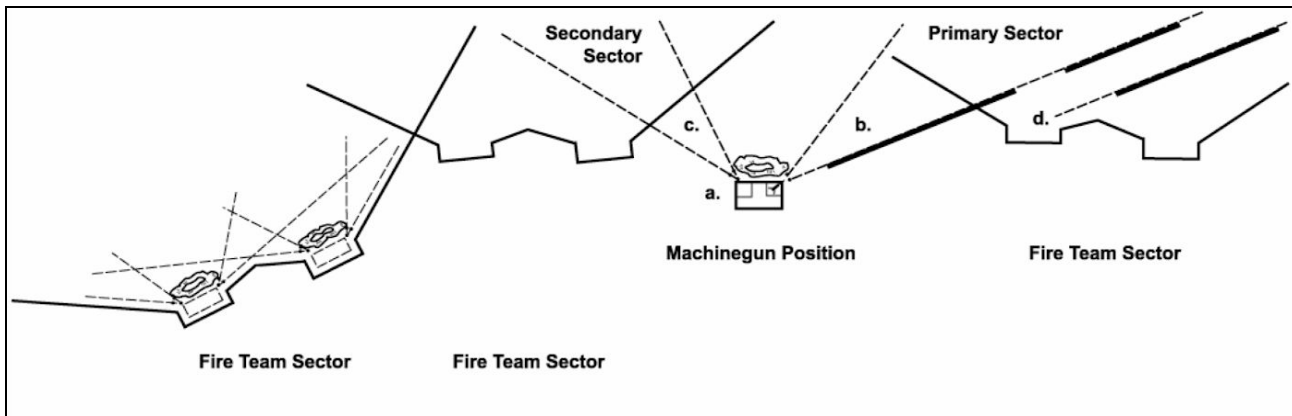
5. MINIMIZE **movement**.
6. POST an **air guard**. LP/OPs should be assigned the air guard mission to listen for UAS.

Crew-served weapons positions

Critical machinegun (MG) and anti-armor (AA) fighting positions must be well-camouflaged.

In the illustration, the MG position (a) is protected by a squad. The MG primary sector (b) is defined by an FPL across the company front. A secondary MG sector (c) protects the left flank. A squad automatic rifle FPL (d) is laid to parallel the MG.

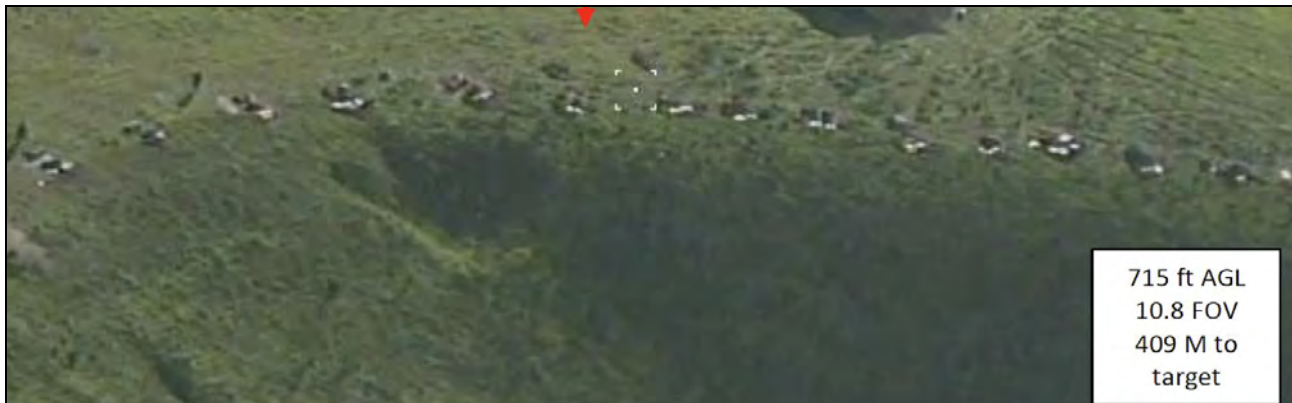
The vital MG position and its protective squad is a single high-priority position and must be well-camouflaged from enemy observation and protected from enemy fires.



All **positions** need overhead concealment: a flat-top **frame** of deadfall branches lashed to corner tripods. Beneath the poncho and leaves, a thermal blanket disrupts IR thermal signature.



Notes on Sandbags. Synthetic sandbags “shine like light bulbs” and are easily seen from the air. SOI-W recommends smearing sandbags with mud.



Sandbags shining in the sun. Source: SOI-W camouflage experiments, 2017.

Platoon, Company, and Battalion Battle Positions

Battle position preparations are difficult to mask. Uncontrolled noise, people, activities, equipment, materials, vehicles, and possible engineer support can create an overwhelming signature.

Unit leaders *must* discipline the process to avoid being targeted. OCCUPY at night. STAGGER activities to reduce noise and congestion. CAMOUFLAGE preparations, positions, and supplies.

AVOID excessive clearing. AVOID creating a visible trail to your position. CAMOUFLAGE the CP. CONCEAL spoil. REMOVE trash and dunnage. CONTROL vehicle movement. CONTROL fires and stoves. Cook in dead ground or under trees, and only during daylight.

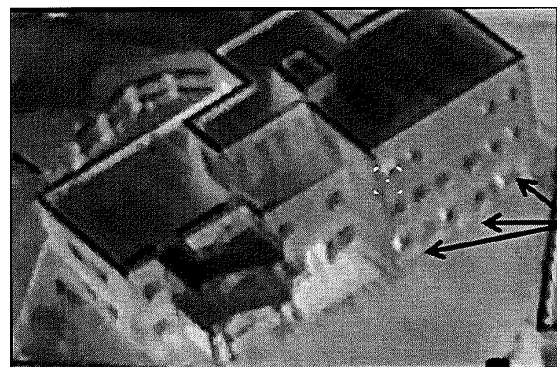
CAMOUFLAGE RES positions. SELECT a concealed CATK position and CATK route.

Battle Positions in MOUT

Existing buildings, indistinguishable from the air, provide both cover and concealment for fighting positions.

Establish firing positions back from the windows, deep in the shadows. Mask dust signature from firing weapons.

AVOID creating obvious IR thermal signatures near windows.



Notes

PLAN to operate under **UAS**. Think overhead. Hills block visual, thermal, and radar observation, but the biggest threat is overhead UAS. PLAN operations at critical times. MINIMIZE logistics

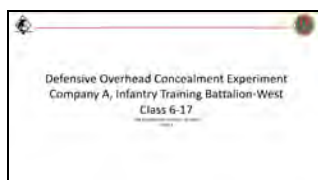
requirements. PLAN resupply events.

INSPECT your signature from the enemy's point of view. USE binoculars, NVGs, thermal scopes, and UAS.

Hasty positions, skirmishers trenches, need overhead concealment early in the process. Units need TTPs to CAMOUFLAGE a bunker, CAMOUFLAGE a tower, CAMOUFLAGE a building, and CAMOUFLAGE a mortar position.

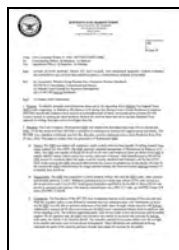
Low, small, and slow UAS are flown by the adversary from nearby clearings and hilltops. Aggressive patrolling of key terrain can push adversary UAS operators away from your unit.

References



Chadd Skaggs. [Defensive Overhead Concealment Experiment](#). CamPen, CA: SOI-W, 11 Apr 2017.

Testing at the School of Infantry evaluated multiple overhead cover options for fighting positions, both in daylight and at night.



Walker Mills. *AAR from 1st Battalion, 4th Marines MCCRE Regarding Small Unmanned Aerial Systems*. CamPen, CA: 2nd Battalion, 1st Marines, 30 Jun 2018.

"An entrenched defense is no longer tenable... against an enemy... with UAS and long-range fires. A defense... needs to prioritize concealment... Digging a... defense is a sure way to get...targeted. The (adversary) was able to identify all the elements... more accurately when they were in the defense than at any other time."



NAVMC 3500.44D *Infantry T&R Manual*, 7 May 2020.

- Task 0300-DEF-1001 Construct a Fighting Position
- Task 0311-MOUT-2201 Prepare a Fighting Position within a Building
- Task INF-ANTI-3002 Construct an Anti-Armor Fighting Position
- Task INF-MGUN-3003 Construct a Machinegun Fighting Position



MCIP 3-10A.4i *Marine Rifle Squad*, 10 Jun 2019.

The SAFESOC priority of work, Figure 4-2 on page 81, puts camouflage last. This is based on an outdated assumption that firepower negates the risk of discovery by the enemy. This is no longer true and therefore the priority of work must be changed: camouflage is second priority after security.

Contributors: BBM, ZDS, JLL, 1 Aug 2020.

How To

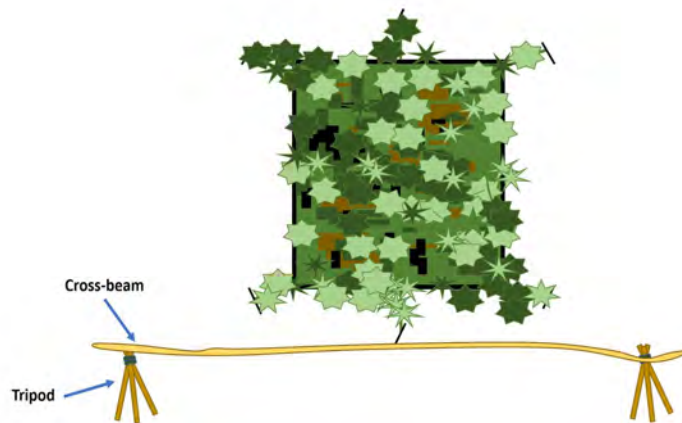
CAMOUFLAGE an OP/LP

Purpose. To REDUCE the physical signature (visual, IR thermal) of the OP/LP IOT AVOID being observed and targeted by the adversary.

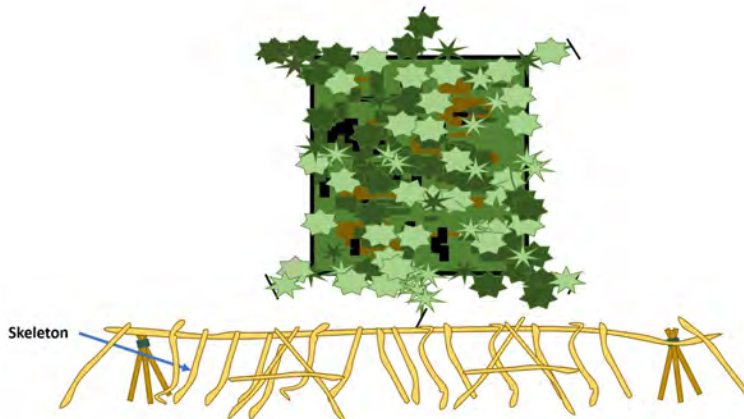
Process

1. BUILD a flat-top **frame** to avoid overhead observation of the OP. All **positions** need overhead concealment: a flat-top **frame** of deadfall branches lashed to corner tripods. Beneath the poncho and leaves, a thermal blanket disrupts IR thermal signature.
2. BUILD a **linear barrier** in front of the OP to avoid ground observation.

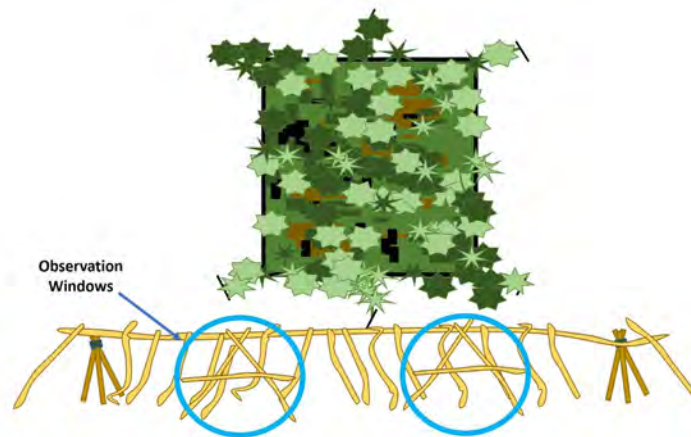
LASH a **cross-beam** between two **tripods** of lashed deadfall branches.
 LEAN sticks against the cross-beam to form a **skeleton**.
 LEAVE gaps for two **observation windows**.
 COVER the skeleton with **ground covering**.



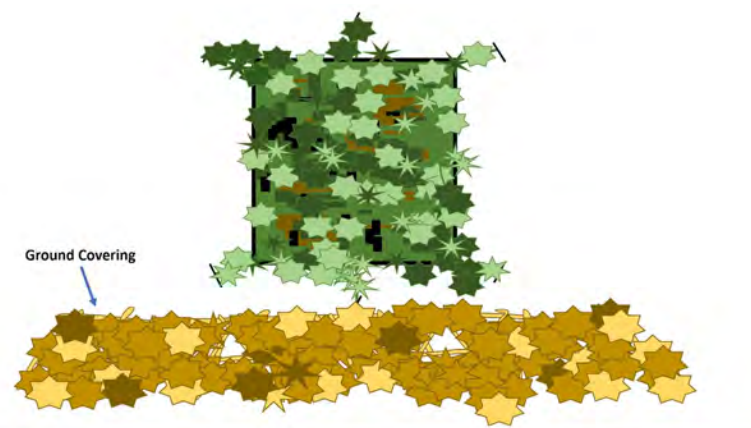
LASH a **cross-beam** between two **tripods** of lashed deadfall branches.



LEAN sticks against the cross-beam to form a **skeleton**.



LEAVE gaps for two **observation windows**.



COVER the skeleton with **ground covering**.

3. POSITION plexi-glass behind the observation windows to mask thermal signature. Camouflage ghillie blankets can be draped over the observation windows to prevent glare from plexi-glass and optics.



OP view from left observation window.



OP view from right observation window.



View from behind the linear barrier. Detail of tripod.



View from behind the linear barrier.



View of OP from enemy point of view. Linear barrier masks OP.



PAS-28 thermal view of OP at 15m. A head is visible.



Plexi-glass masks thermal signature of head.

4. BUILD a v-shaped barrier for flank positions. USE three or four tripods.



V-shaped barrier.



View from behind v-shaped barrier.



View of v-shaped barrier from enemy point of view.



OP detail views of overhead concealment: flat-top frame of deadfall branches lashed to corner tripods.

Contributors. MIS, BBM, 1 Aug 2020.

How To

CAMOUFLAGE a Vehicle

Purpose. To REDUCE the physical signature (visual, IR thermal, and radar) of the vehicle IOT AVOID being observed and targeted by the adversary.



Time. After picking a position, two Marines should camouflage a vehicle in 15 minutes.

Equipment. LCSS or ULCANS camouflage netting system with tent pins. Styrofoam dunnage.

Process

1. DISPERSE into multiple small **elements**. This is the most important step. BE **indistinguishable**—unable to be identified as different—IOT avoid being targeted. ASSUME you are being watched. DISPERSE vehicles irregularly. DISPLACE **often**.
2. FIND a concealed **site**.

CONFORM to terrain.
FIND low dead ground and micro-terrain, behind hills, tucked against the shadows of buildings, or under trees. In the city, park *inside* a building.



3. UNROLL the **camouflage net**.

Stretch out the corners and drape the vehicle.

The best practice is to carry the rolled net on the roof.



POSITION the net diagonally, offset from the long axis of the vehicle, with more material on the shady side of the vehicle. BLEND with your environment. Vehicles in open desert terrain often have few options.



4. LIFT the net with **support poles** to create an irregular shape. The *shape* of the vehicle—its most recognizable characteristic—must be changed.

Get two feet of clearance off the hot engine block. Otherwise, the heat will show through the netting to thermal sensors.



If thermals sensors are a threat, get two feet of clearance off of all metal surfaces. Use styrofoam dunnage to prop the netting off the surface of the vehicle. Styrofoam dunnage can be glued/taped down to the surface of the vehicle, in order to speed up camouflage efforts and keep netting off of hot areas.

5. PIN the net down with **tent pins**, flush and tight to the ground.

Maximize the slope.
Avoid vertical sides.

The vehicle shape—its most recognizable characteristic—must be changed.

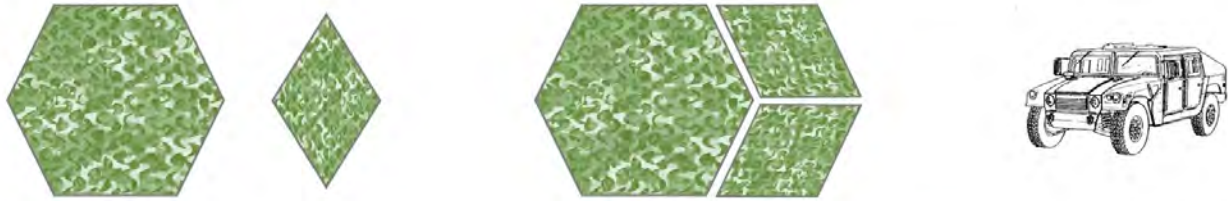


BLEND with your surroundings. ADD foliage. COVER all glass reflections.

Notes on Camouflage Nets

Camouflage netting provides concealment where none is available. It is portable, quick to set up, and *multispectral* - masking vehicles from visual, IR thermal, and radar sensors.

The older Lightweight Camouflage Screen Systems (LCSS), has been replaced by the newer Ultra Lightweight Camouflage Net Systems (ULCANS). There are three colors. **Class 1** is Woodland, **Class 2** is Desert, and **Class 3** is Snow. Each is reversible, with a different shade on each side. Additionally, nets are typed as either radar scattering or radar transparent (for use with radar vehicles), but the differences are invisible. Each net is labelled with Class and Type.



Camouflage netting comes in two shapes: Hexagon and diamond.
Join one hex and two diamonds (48 x 28 feet) to cover a tactical vehicle.

Notes

PLAN to operate under **UAS**. Think overhead. Hills block visual, thermal, and radar observation, but the biggest threat is overhead UAS. Use a thermal blanket to disrupt your heat signature against enemy thermal sights. Use the right color camouflage netting to blend with your environment.

INSPECT your signature from the enemy's point of view: binoculars, NVGs, thermal scopes, UAS.

The *contained shadow* is the biggest error made with camouflage netting. Avoid creating a dark triangular gap that can easily be seen from the air.

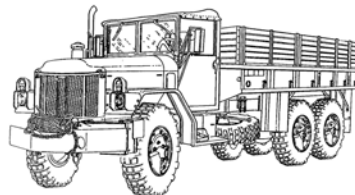


Finally, do not neglect camouflage discipline with the vehicle's crew. Limit the movement of the vehicle's crewmembers outside the netting once netting is set up.

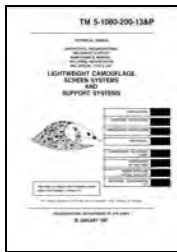
Camouflage Other Vehicles

One hex (28 x 32 feet) covers a generator or a GP Small Tent. Two hex and two diamonds (56 by 48 feet) covers a truck. Three hex and three diamonds (56 x 64 feet) covers larger vehicles or a GP Medium tent. See TM 5-1080-250-12&P, pp 1-5.

The net on larger vehicles need to be propped up to avoid easily-identified silhouettes.



References



TM 5-1080-200-13&P *Lightweight Camouflage Screen Systems (LCSS)*, Change 10 is 1 Sep 2002. 138 pages.

Chapter 2 is nine pages of operating instructions. The remainder of the manual is maintenance, NSNs, and re-ordering information.



TM 5-1080-250-12&P *Ultralightweight Camouflage Net Systems (ULCANS)*, change 1 is 1 Aug 2008. 99 pages.

Chapter 1 describes ULCANS and diagrams recommended configurations for vehicles and tents. Chapter 2 is nineteen pages of operating instructions.



TM 10-180-256-10 *Ultra Lightweight Camouflage Net Systems (ULCANS) Increment I*, 10 Mar 2020. 188 pages.

Describes the newest ULCANS Increment I.



NAVMC 3500.44D *Infantry T&R Manual*, 7 May 2020.

Task 0300-TVEH-2002, "Camouflage a Tactical Vehicle," is useless.



Chad Skaggs. *Vehicle Camouflage Techniques* (FOUO). CamPen, CA: SOI-W, 9 June 2018.

Contributors. GEB, BBM, ZDS, 1 Aug 2020.

How To

CAMOUFLAGE a Convoy

Purpose. To REDUCE the physical signature (visual, IR thermal, and radar) of the convoy IOT AVOID being observed and targeted by the adversary.

Process to DRIVE

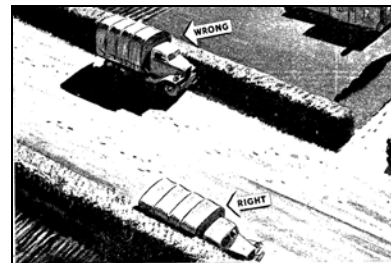
1. DISPERSE vehicles irregularly along the route. This is the most important step. DRIVE in small serials of twelve or less vehicles. BE **indistinguishable**—unable to be identified as different—IOT avoid being targeted. ASSUME you are being watched.
2. DRIVE on concealed routes. CONFORM to terrain. When driving cross-country, parallel fence lines, fields, and natural features. Do NOT cut diagonally across open terrain.
3. DRIVE at night. DRIVE with blackout lights and NVGs. KNOW the hours of *moonrise (MR)* and *moonset (MS)*, and the percent of *lunar illumination*.
4. POST an air guard.

Process to STOP

1. DISPERSE vehicles irregularly.
2. FIND a concealed site to stop. CONFORM to terrain.

Morning and afternoon shadows are long and protective. MOVE when the shadow moves.

On a road, stop so that your dark shadow is NOT showing on the road.



3. CAMOUFLAGE vehicles if stopped for more than one hour.
4. MINIMIZE **movement** of people around vehicles. MINIMIZE **radio**.
5. POST an **air guard**.

Process to PLAN

1. PLAN DISPERSED operations. PLAN multiple small serials travelling separately.
2. PLAN concealed routes. PLAN concealed stops, concealed re-fueling, and concealed TAAs.

3. PLAN to OPERATE at night.
4. PLAN to MINIMIZE radio.
5. PLAN an **air guard** for each serial.
6. PLAN to operate under **UAS**.
7. PLAN rally points for separated vehicle/serials. Rally points should be areas where multiple vehicles can be easily camouflaged (i.e., wood lots, towns, hilly areas, etc.)

Notes

Do NOT leave a broken-down vehicle in an open field.
Do NOT leave easily-seen tracks in open fields.
Do NOT cut corners across intersections, leaving tracks.

Contributors: BBM, 1 Aug 2020.

How To

CAMOUFLAGE a CP

Purpose. To REDUCE the physical signature (visual, IR thermal, and radar) of the CP IOT AVOID being observed and targeted by the adversary.

Equipment. LCSS or ULCANS camouflage netting.

Process

1. DISPERSE into multiple small **elements**. This is the most important step. BE **indistinguishable**—unable to be identified as different—IOT avoid being targeted. ASSUME you are being watched. DISPLACE **often**.

AVOID rows of vehicles, packs, pallets, or equipment. Patterns are easily seen from the air.

DISPERSE antenna farms. Disperse logistics pallets. Disperse generators. Mask noise with a dirt berm or put the generator indoors in the basement. Hide security positions, especially barbed wire.

DISPERSE vehicles with three vehicle lengths between each vehicle.



2. FIND a concealed **site**. Select a site unimportant to the adversary, off the main roads. AVOID road junctions.

CONFORM to **terrain**. FIND low dead ground and micro-terrain, behind hills, tucked against the shadows of buildings, or under trees. In the city, move *inside a building*.

Dirt blocks visual, light, thermal, EM, and radar sensors. Woods and towns are good. Dense urban clutter masks EM signals. CPs in open desert terrain have few options.



3. OCCUPY at **night**. Camouflage discipline includes light discipline.
4. CAMOUFLAGE all **tents**, vehicles, logistics pallets, and bivouac areas. Camouflage netting disrupts **visual** sensors, **radar** sensors, and **IR thermal** sensors. Cordon and mark bivouac areas.
5. MINIMIZE **movement**. MINIMIZE radio for EMCON. ESTABLISH routes in and out to reduce track signature. CONTROL traffic.

6. POST an **air guard**.
7. PLAN to operate under **UAS**. Think overhead. Hills block visual, thermal, and radar observation, but the biggest threat is overhead UAS. PLAN concealed routes and positions. PLAN resupply events.
8. INSPECT your **signature** from the enemy's point of view. USE binoculars, NVGs, thermal scopes, and UAS.

COUNTER adversary HUMINT, OSINT, and ELINT efforts. This information cues ISR platforms. Reduce the signature of your CP so that the adversary does NOT prioritize his ISR assets against you.



Notes on Camouflage Nets

See [CAMOUFLAGE a Vehicle](#). One hex (28 x 32 feet) covers a generator or a GP small tent. Three hex and three diamonds (56 x 64 feet) cover a GP Medium tent. See TM 5-1080-250-12&P, pp 1-5.

The *contained shadow* is the biggest error made with camouflage netting. Pin the net flush and tight to the ground. Avoid creating a dark triangular gap that can easily be seen from the air.

Notes

Use the right color camouflage netting to blend with your environment.

A CP is a critical asset that the adversary will target.

See [Command Post SOP](#). The main CP is four vehicles. The log train and BAS are separate serials. No serials exceed twelve vehicles.

Notes on Base Camps

Base camps, ports, warehouses, and airfields are easily visible from the air. Infantry units are usually tenant organizations. The camp commandant is responsible for base camp SIGMAN and camouflage discipline.



“CPs require excellent camouflage and concealment to survive on the battlefield.”

- ATP 3-37.34 *Survivability Operations*, 16 April 2018

Contributors. BBM, ZDS, ELK, 1 Aug 2020

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How To

CAMOUFLAGE a TAA

Purpose. To REDUCE the physical signature (visual, IR thermal, and radar) of the TAA IOT AVOID being observed and targeted by the adversary.

Equipment. Each Marine and each vehicle has the camouflage equipment they need.

Process

1. DISPERSE into multiple small **elements**. This is the most important step.
BE **indistinguishable**—unable to be identified as different—IOT avoid being targeted.
ASSUME you are being watched.
DISPERSE vehicles irregularly within the site.

AVOID rows of vehicles, packs, pallets, or equipment.
AVOID well-defined square perimeters.
AVOID clusters of Marines.
Patterns are easily seen from the air.

Disperse vehicles with at least three vehicle lengths between each vehicle.

DISPLACE **often**.



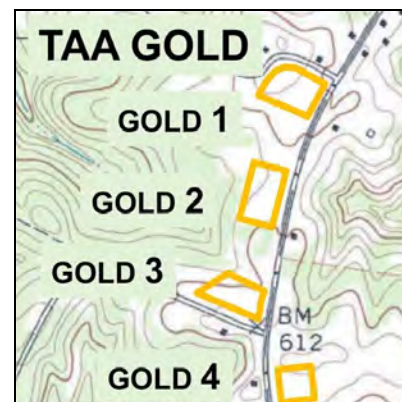
2. FIND a concealed **site**. Woods are best.

CONFORM to terrain. FIND low dead ground and micro-terrain, behind hills or under trees. Dirt blocks visual, light, thermal, EM, and radar sensors.

Woods and towns are good. Dense urban clutter masks EM signals. TAAs in open desert terrain have few options.

For multiple sites, assign separate areas for units, logistics functions, and the CP.

MAKE a site plan showing parking, unloading, and refueling areas, as well as a one-way traffic pattern. USE existing roads. POST traffic guides.



3. OCCUPY at **night**. Camouflage discipline includes light discipline.
4. CAMOUFLAGE all **vehicles**, logistics pallets, CPs, and bivouac areas.
Camouflage netting defeats **visual** sensors, **radar** sensors, and **IR thermal** sensors.
See [CAMOUFLAGE a Vehicle](#). Cordon and mark bivouac areas. See [CAMOUFLAGE a Bivouac](#).

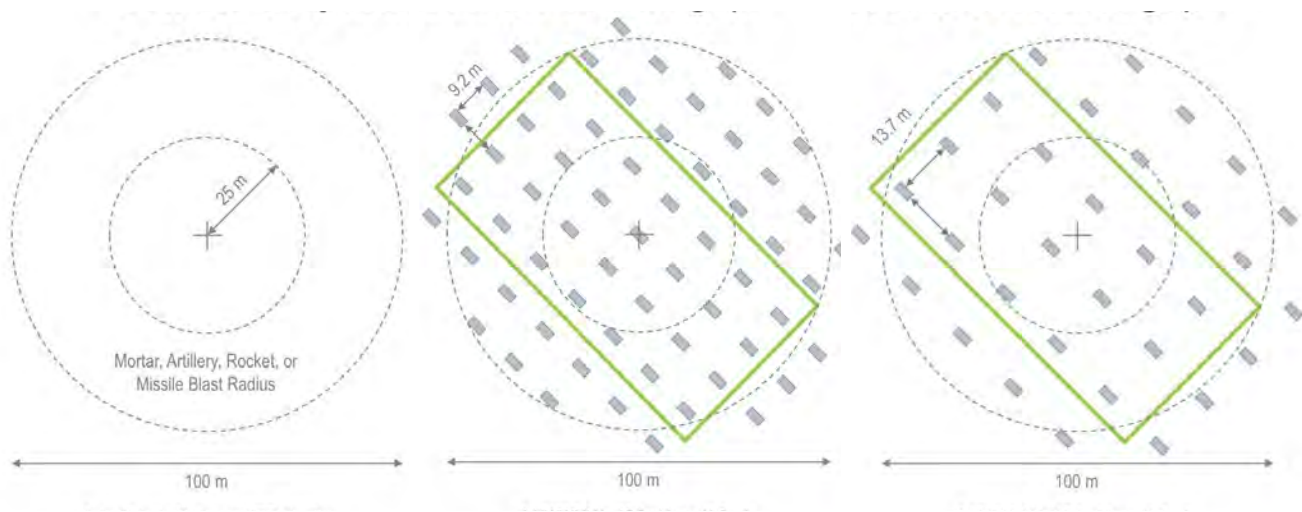
5. MINIMIZE **movement**. MINIMIZE radio for EMCON. ESTABLISH routes in and out to reduce track signatures. CONTROL traffic.
6. POST an **air guard**.
7. PLAN to operate under **UAS**. Think overhead. Hills block visual, thermal, and radar observation, but the biggest threat is overhead UAS. PLAN concealed routes and positions. PLAN operations at critical times. MINIMIZE logistics requirements. PLAN resupply events.
8. INSPECT your **signature** from the enemy's point of view. USE binoculars, NVGs, thermal scopes, and UAS.

COUNTER adversary HUMINT, OSINT, and ELINT efforts. This information cues ISR platforms. Reduce the signature of your unit so that the adversary does NOT prioritize his ISR assets against you.



Notes on Vehicle Dispersion

Missile, rocket, artillery, and mortar blast effects differ by weapon, size, and munition. HE, DPICM, and fuel-air explosive blasts are different. Generally, however, increasing vehicle dispersion from two to three vehicle lengths, **reduces** the number of vehicles in the kill zone by almost **half**.

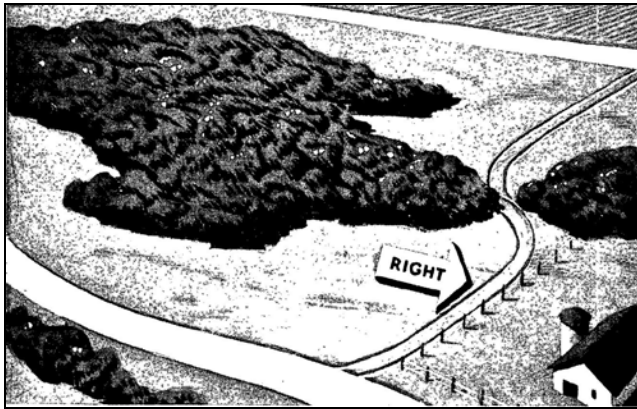


Vehicle dispersion. With 30 foot dispersion, 28 HMMWVs fit on a football field. With 45 foot dispersion, 15 HMMWVs fit. **Notes:** Blast effects are not circular. HMMWV is 15 feet long (4.6 m).

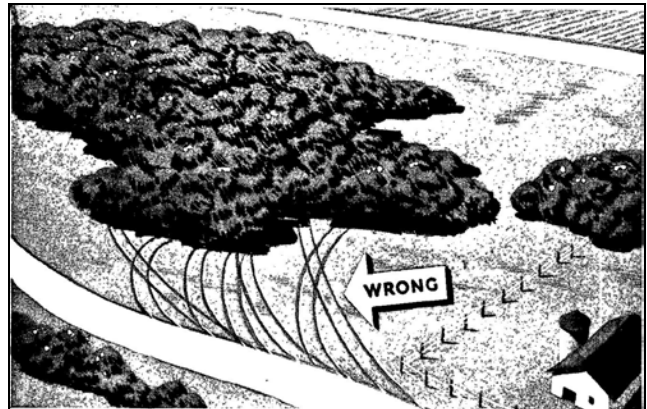
Notes on Vehicle Tracks

Vehicle tracks, easily seen from the air, are a dead giveaway for a TAA. Any diagonal tracks, across a field or cutting through an intersection, are especially noticeable. Looping tracks, at a turnaround point or refueling area, are especially noticeable.

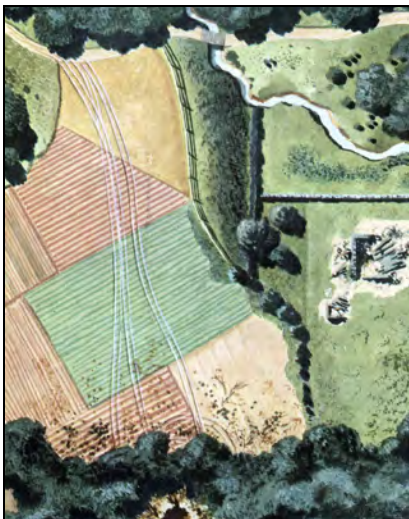
The TAA site plan should establish a new track along a linear feature with a marked turnoff point.



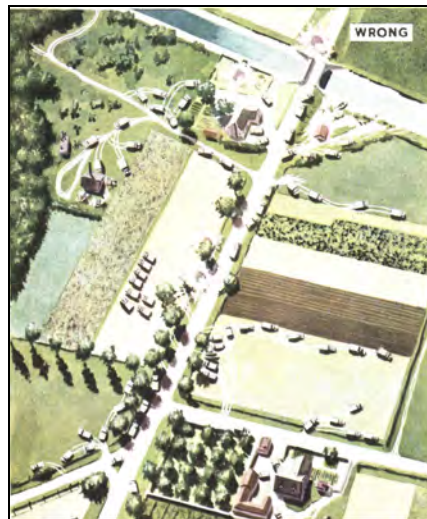
RIGHT: Single track with inconspicuous turnoff into TAA.



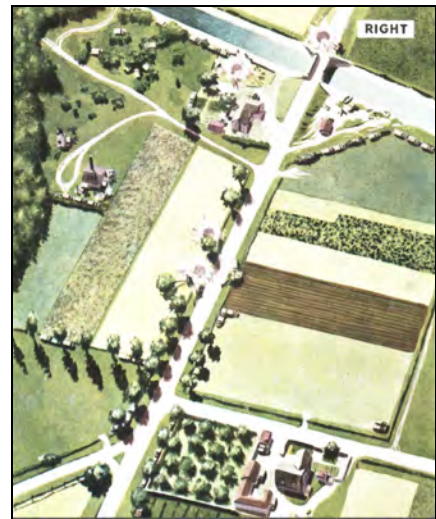
WRONG: Tracks clearly point to a concealed TAA.



Vehicle tracks, easily seen from the air.



TAA: NO site plan, NO traffic control.

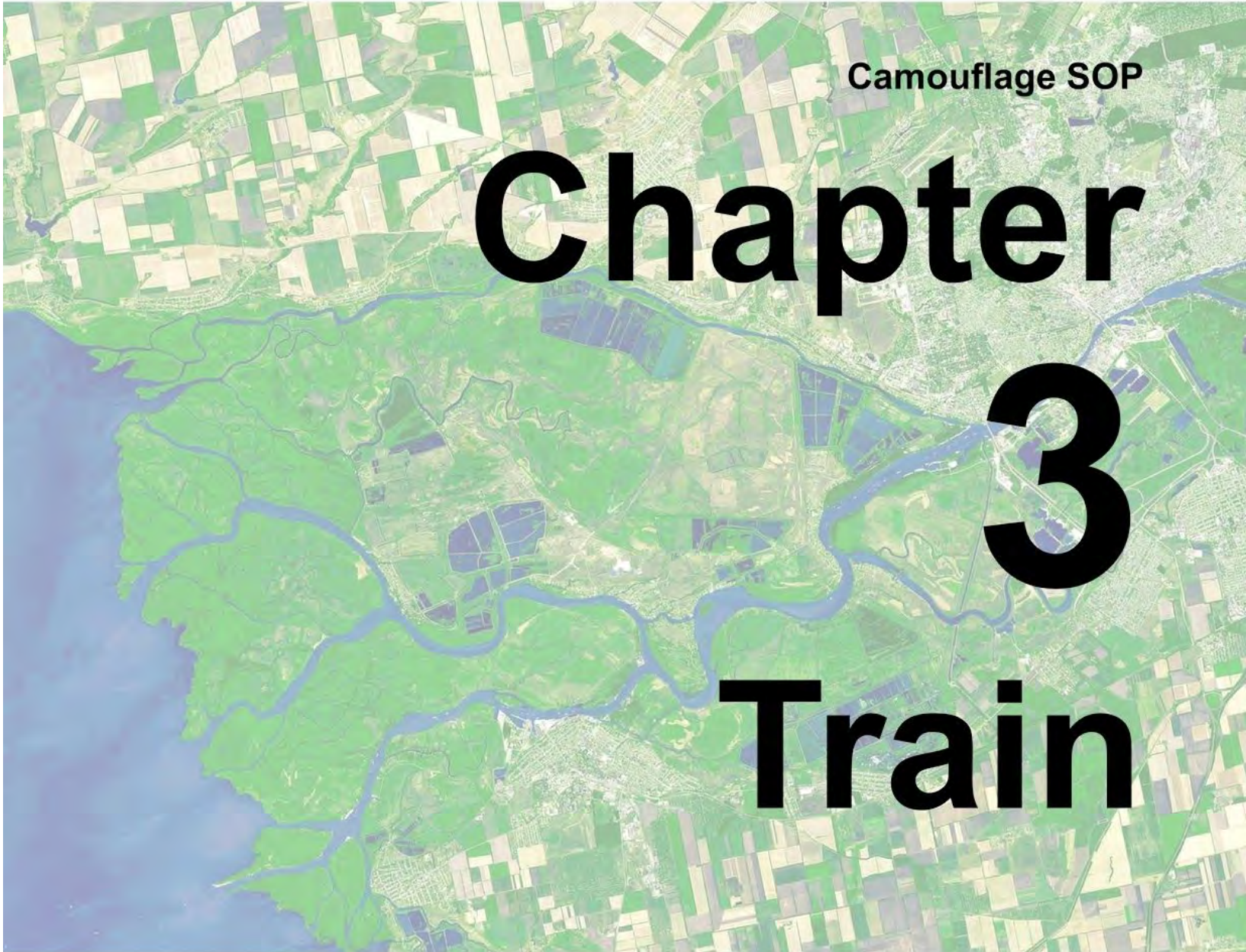


Same vehicles, parked well, less tracks.

Contributors. BBM, ZDS, BMW, 1 Aug 2020.

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Camouflage SOP



Chapter 3 Train

In this Chapter

- Training your unit
- Camouflage training standards
- *A Camouflage Inspection Checklist*



**SIGMAN Camouflage SOP:
Chapter 3: Train**

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Train

CONDUCT a Field Exercise

Purpose. To share best practices on SIGMAN camouflage training.

Training

1. Camouflage standards should be practiced during *all* training and *all* exercises, in *all* environments, regardless of the primary purpose of the training.

Unit leaders can use time during larger exercises to practice drills and evaluate their own unit's camouflage efforts.

NCOs train Marines on camouflage discipline. **Camouflage discipline** includes **light** discipline, **heat** discipline, **noise** discipline, **trash** discipline, and **movement** discipline.

Scout Snipers can train Marines on individual camouflage techniques.

2. Company training should include:

HAWKEYE Camouflage Drill
REDEYE UAS Drill
LONGBOW C-UAS Drill
Air Guard Training
USMC UAS capabilities
Adversary UAS capabilities
Adversary air, missile, rocket, artillery, and mortar threats

Training on most company operations should be augmented with camouflage requirements:

Convoy Operations + Camouflage
Fighting Positions + Camouflage
Movement to Contact + Camouflage
MOUT + Camouflage
Night Operations + Camouflage
Patrolling + Camouflage

3. Example training plans are included below.

UNITED STATES MARINE CORPS

2nd Battalion, 5th Marines

Camp Pendleton, CA 92055

28 Aug 2020

From: Commanding Officer

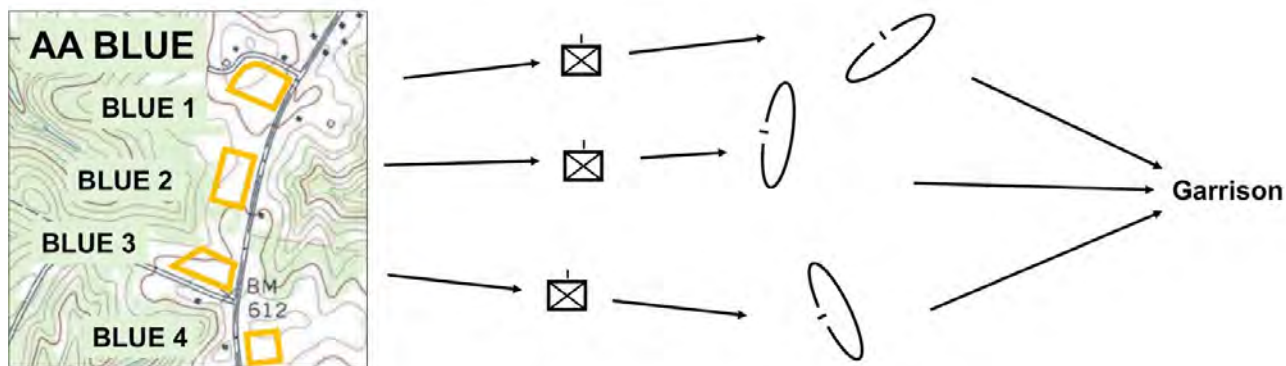
To: Distribution A

Subj: FIELD TRAINING PLAN, 8-10 SEP 2020

Ref: *Battalion SOP*, 30 June 2020

Encl: (1) DODIC List
(2) Exercise FRAGOs

1. Situation. The Bn SOP has been updated with multiple SIGMAN camouflage drills and standards. All Marines and units need to be trained to the established standards.
2. Mission. On 08-10 Sep, 2/5 conducts operations and applies SOP standards IOT evaluate unit camouflage skills.
3. Execution
 - a. CONOPS. Over three days, each unit executes multiple FRAGOs, all while under adversary ground and air (UAS) observation and probing attacks. From TAA BLUE, units move during the day and night, occupy a BP, conduct security patrols, resupply, and then retrograde.



b. Tasks

- (1) Units. OCCUPY TAA BLUE NLT 1000 TUE 8 SEP 2020. EXECUTE operations IAW FRAGOs. TRAIN on SIGMAN Camouflage SOP skills.
- (2) OPFOR. COLLECT on Bn units using both ground and air (UAS) assets. Call for fire. CONDUCT probing attacks. PHOTOGRAPH and report on unit sizes and locations. ASSESS unit training levels. BRIEF results at AAR.
- (3) EXCON. CONTROL the exercise. ASSESS casualties. CONDUCT AAR in order to improve Bn SIGMAN Camouflage SOP and procedures.

c. Coordinating Instructions

- (1) Task Organization
 Units (8): E, F, G, 81, HMG, COC, BAS, Log Train.
 OPFOR: XO, S-2, SSP, AA Platoon, UAS, and four company 1stSgt.
 EXCON is OpsO and a det from the AA Platoon.

- (2) Schedule:

Time	Units	OPFOR	EXCON
Tue 1000	OCCUPY TAA BLUE	TAA RED	TAA RED
Tue 1100	FRAGO 01: Movement to Contact	Collect	
Tue 1900	FRAGO 02: Night Infiltration Operation	Collect	
Wed 0800	FRAGO 03: ESTABLISH BP	Collect / Probe	
Wed 1900	FRAGO 04: Night Security Operation	Collect / Probe	
Thu 0800	FRAGO 05: Movement to Garrison	Prepare AAR	Prepare AAR
Thu 1300	Classroom: AAR for all Battalion Leaders	AAR	Run AAR

- (3) All FRAGOs will be issued in the field. The OPFOR will NOT see the FRAGOs.
- (4) Range control coordination, airspace coordination, and safety vehicle requirements will be executed by EXCON.
- (5) NO external support units—transportation or air assault—is planned.
- (6) EW and EMCON procedures will NOT be evaluated. OPFOR will NOT collect on technical (EMCON) signatures.

4. Admin and Logistics

- a. Encl (1) lists pyrotechnics and blank ammunition requirements. S-4 will issue ammunition in TAA BLUE NLT 1100 Tue 8 Sep 20.
- b. S-1 will process daily PERSTATREPs and other required reporting IAW SOP.
- c. S-4 Log Train will resupply units each day as a tactical evolution IAW RRP SOP. No hot chow.

5. Communication and Signals. S-6 will establish an EXCON and an OPFOR net. All Battalion units will operate on standard nets IAW Bn SOP.

P.A. BEEKMAN
 By dir

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Train

ESTABLISH Training Standards

Purpose. To ESTABLISH training standards for camouflage.

This section recommends camouflage training standards. To be effective, standards must be rigorously enforced. A unit is only as camouflaged as its least camouflaged Marine. A single poorly camouflaged Marine, vehicle, or position can give away the entire unit.

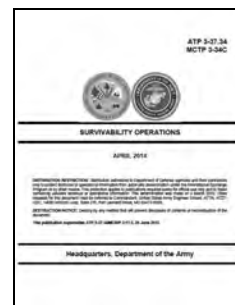
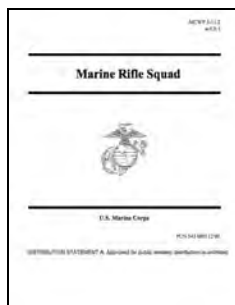
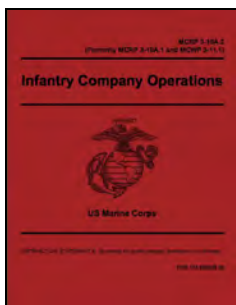
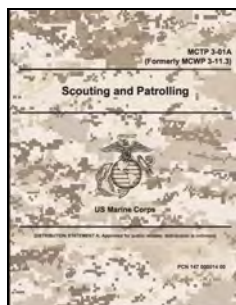
Marine Corps Infantry Camouflage Standards. NAVMC 3500.44D *Infantry Training and Readiness Manual*, 7 May 2020, contains only two camouflage tasks:

- 0300-TVEH-2002 Camouflage a Tactical Vehicle
- 0317-PAT-2002 Camouflage Sniper Equipment

Fourteen other tasks mention camouflage as a minor performance step:

- INF-FP-5001 Employ Platoon Force Protection Measures
- INF-FP-4001 Employ Squad Force Protection Measures
- INF-0317-3002 Conduct Scout Sniper Team Operations
- INF-ANTI-3002 Construct an Anti-Armor Fighting Position
- INF-MGUN-3003 Construct a Machinegun Fighting Position
- 0300-DEF-1001 Construct a Fighting Position
- 0300-DEF-1002 Construct a Skirmisher Trench
- 0300-DEMO-2003 Employ a M18A1 Anti-personnel Mine (Claymore)
- 0311-MOUT-2201 Prepare a Fighting Position within a Building
- 0317-PAT-2005 Operate from a Hide
- 0317-PAT-2006 Conduct Individual Actions in an Observation Post (OP)
- 0317-PAT-2007 Conduct Individual Actions During Infiltration
- 0317-OPS-2501 Lead Sniper Operations from a Hide
- 0317-OPS-2507 Conduct Counter-sniper Operations

Marine Corps Doctrine. The following manuals emphasise the importance of camouflage and provide camouflage instructions: MCTP 3-01A *Scouting and Patrolling*, MCRP 3-10A.2 *Infantry Company Operations*, MCIP 3-10A.4i *Marine Rifle Squad*, MCTP 3-01E *Sniping*, and MCTP 3-34C *Survivability Operations*.



Recommended Camouflage Individual Training Standards

1. Task: **Camouflage a Marine.**
Conditions: In the field.
Standard: Helmet is camouflaged. Rifle is camouflaged. Skin is camouflaged. Marine is equipped with a camouflage ghillie blanket. All camouflage matches surrounding terrain.
2. Task: **Camouflage a Vehicle.**
Conditions: Vehicle is stopped for 60 minutes or more.
Standard: Vehicle is parked in available shadows near buildings or under trees. Vehicle is covered in camouflage netting, raised irregularly off the vehicle outline, and pinned flush to the ground. All camouflage matches surrounding terrain.
3. Task: **Camouflage a Fighting Position**
Conditions: In an existing fighting position.
Standard: Marine cannot be seen from 25m away. Marine cannot be seen from above. All camouflage matches surrounding terrain.

Recommended Camouflage Unit Training Standards

1. Task: **Camouflage a Unit Position.**
Conditions: In a stationary position—a TAA, patrol base, EAB, BP, or bivouac.
Standard: The unit cannot be seen from 1000m in open terrain, or 100m in close terrain. Units are dispersed. CP is camouflaged. RRP is camouflaged. All Marines are camouflaged. All positions are camouflaged. OPs are camouflaged. Vehicles are camouflaged. Movement is minimized. Lights are not visible. Trash is not visible. After the unit leaves the position there is little to no evidence the unit was there. Efforts are made to disguise the true size and type of the unit that had occupied the position.
2. Task: **Camouflage a Convoy.**
Conditions: A moving convoy is directed by the unit leader to stop and camouflage.
Standard: Vehicles are dispersed, operating in serials of twelve vehicles or less. Drivers maintain three vehicle lengths between vehicles. Route was selected based on available concealment. Every vehicle carries camouflage netting. Every vehicle selects a good site to stop. Every vehicle is covered with camouflage netting, pinned flush to the ground. When occupying a position for more than 60 minutes vehicles employ camouflage netting and are arranged irregularly. If possible the convoy is scheduled to take advantage of inclement weather and satellite observation windows.
3. Task: **Respond to Adversary UAS.**
Conditions: An adversary UAS is overhead.
Standard: Unit identifies enemy or unknown UAS visually or by sound. Unit executes a C-UAS drill directed by the unit leader. A UAS warning is passed through the unit and a UAS report is passed to higher. An Air Guard is assigned. A C-UAS element is assigned. The C-UAS element attacks the UAS if directed.

Responsibilities. During each phase of an amphibious operation or a raid the responsibility for both the adversary threat and signature management is assigned to a specific unit or command. It is important for signature management responsibility to be centralized because a large unit or task force's signature management is only as good as its weakest link. Military deception needs to be

integrated with signature management. Commands can delegate signature management responsibility or assign specific individuals to oversee signature management. This does not absolve individuals and smaller units of the responsibility to reduce their signature.

The responsibility for both the adversary threat and signature management shifts during an operation and the specific camouflage and signature management actions Marines will need to take will vary depending on the environment: urban, jungle, wooded, or desert.

Action	Adversary Threat	SIGMAN Responsibility
MOVE by ship toward the coast <i>undetected</i>	Satellites, radars, ASCM Ships, submarines, aircraft Mines, patrol craft	CATF
INSERT by surface craft <i>undetected</i>	UAS , Aircraft Mines, patrol craft Adversary units	CATF
INSERT by helicopter <i>undetected</i>	IADS (Radar, SAM) Reconnaissance, MANPADS Adversary units	ACE
MOVE on foot toward the objective <i>undetected</i>	UAS , aircraft Reconnaissance, IDF Adversary units	Unit of Action
CONVOY by vehicle toward objective <i>undetected</i>	UAS , aircraft Reconnaissance, IDF Adversary units	Unit of Action
Actions on the objective	UAS , aircraft Reconnaissance, IDF Adversary units	Unit of Action
MOVE on foot toward the LZ <i>undetected</i>	UAS , aircraft Reconnaissance, IDF Adversary units	Unit of Action
INFILTRATE helicopters to LZ <i>undetected</i>	IADS (Radar, SAM) Observation, MANPADS Adversary units	ACE
EXTRACT unit by helicopter <i>undetected</i>	IADS (Radar, SAM) Observation, MANPADS Adversary units	ACE
EXTRACT by surface craft <i>undetected</i>	UAS , Aircraft Mines, patrol craft Adversary units	CATF

Tasks. During combat operations ashore, the responsibility for signature management is generally with the unit of action. However, expeditionary bases with multiple units are a signature management challenge. Camouflage actions differ in each environment: urban, jungle, wooded, or desert.

Action	Adversary Threat	SIGMAN Responsibility
MOVE by helicopter within the AO <i>undetected</i>	IADS (Radar, SAM) Observation, MANPADS Adversary units	ACE
CONVOY by vehicle within the AO <i>undetected</i>	UAS , aircraft Reconnaissance, IDF Adversary units	Unit of Action
OCCUPY an AA <i>undetected</i>	UAS , aircraft Reconnaissance, IDF Adversary units	Unit of Action
OPERATE from an established base camp	UAS , aircraft Reconnaissance, IDF Adversary units	Camp CO
MOVE on foot within the AO	UAS , aircraft Reconnaissance, IDF Adversary units	Unit of Action
OPERATE from a patrol base <i>undetected</i>	UAS , aircraft Reconnaissance, IDF Adversary units	Unit of Action

Contributors. WDM, BBM, 1 Aug 2020

Train

COLLECT Own-Force Signature

Purpose. To COLLECT the physical signature of your own unit and see what the adversary sees IOT improve camouflage effectiveness.

Condition. The unit has been stationary for at least two hours. The unit is camouflaged.

Standard. The unit cannot be seen or heard by a ground or air adversary 1000m away.

Equipment. “Camouflage Inspection Checklist,” binoculars, NVGs, PAS-28 thermal scope, or UAS.

Scope. Physical signature is collected by adversary geospatial-intelligence assets (space, aerial, ground, or human) or through direct observation. Technical signature—collected by adversary SIGINT assets and countered by EMCON procedures—is out of scope. Administrative signature (online records) is out of scope.

Process

1. EXAMINE the unit from the adversary’s point of view.
USE binoculars, NVGs, thermal scopes, and UAS to spot-check your signature.
2. PHOTOGRAPH the unit.
RECORD discrepancies.
3. REPORT to the unit commander.

Notes

Unit leaders should appoint a SNCO to collect own-force signature. Fieldcraft is SNCO expertise. The observer should understand adversary ISR capabilities—satellites, aviation, UAS, and ground sensors.

The observer should envision the unit signature from the air: lines, lights, vehicles, tracks, fighting positions, spoil, debris, pallets, and supplies.

References



Marine Corps Concept for Signature Management, 24 Oct 2017.

“To be detected is to be targeted is to be killed.”

Defines physical, technical, and administrative signatures. Relates signature management (SIGMAN) to CI, OPSEC, MILDEC, fires, and intelligence. Defines the SIGMAN capabilities that the Marine Corps needs.

Camouflage Inspection Checklist		Date:		
Purpose. To inspect a <i>stationary</i> unit that has been in an TAA or BP for more than two hours.		Unit:		
Scope. NOT a base camp. NOT a movement. NOT a convoy. Marks. All "YES" is best.		Initials:		
1.	Leadership. Do unit leaders inspect camouflage every day IAW SOP?	Y	N	TBD
	Is an air guard, who knows the warning procedure, on watch for aircraft and UAS?			
2.	Marines. Is every Marine's helmet camouflaged? Rifles? Attachments too?			
	Is every Marine's bivouac or fighting position camouflaged? Are packs camouflaged?			
3.	Vehicles. Is every vehicle off, covered with a camouflage net, flush to the ground?			
	Is every vehicle dispersed, irregularly, at least three vehicle lengths from the next?			
4.	Is the Command Post camouflaged so it will NOT be targeted?			
	Are the elements (and antennas) of the CP dispersed?			
	Tents. Is every CP tent covered with a camouflage net, flush to the ground?			
	Or buildings. Do CP buildings look ordinary so they will NOT be targeted?			
5.	Are the Supply Points camouflaged so they will NOT be targeted?			
	Are the separate supply points dispersed?			
	Tents. Are all supplies or pallets covered with a camouflage net, flush to the ground?			
	Or buildings. Do supply buildings look ordinary so they will NOT be targeted?			
6.	Unit. Is the unit's overall position camouflaged well enough NOT to be targeted?			
	Have piles of earth (spoil) been masked so that they are NOT visible from the air?			
	Have vehicle tracks been masked so they are NOT visible from the air?			
	Was light discipline good last night? Were lights from vehicles and the CP masked?			
	Is trash discipline good? Have trash bags, dunnage, and debris been hidden?			
	Summary:			

Camouflage SOP

Chapter 4

Understand

In this Chapter

- Understanding adversary sensors
- Understanding adversary indirect fire weapons



**SIGMAN Camouflage SOP:
Chapter 4: Understand**

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Understand

Adversary UAS

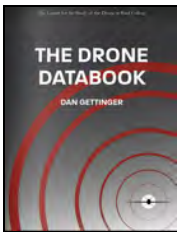
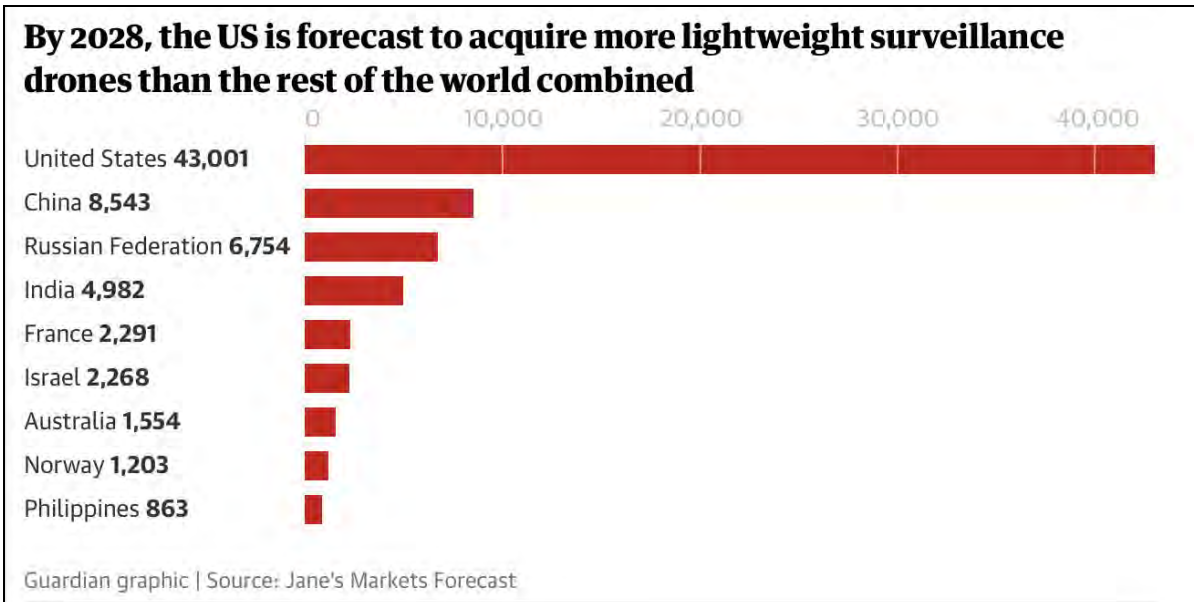
Purpose. To find information on adversary UAS.

Process

1. ASK the S-2 for adversary UAS intelligence in your AO.
2. SEARCH the classified U.S. intelligence sites on SIPR:
 - NGIC** (U.S. Army) provides intelligence on foreign ground forces.
 - NASIC** (U.S. Air Force) provides intelligence on foreign air and space forces.
 - ONI** (U.S. Navy) provides intelligence on foreign naval forces.
3. SEARCH the web for evolving UAS capabilities and UAS imagery.
See the **TRADOC** [ODIN Worldwide Equipment Guide](#).
4. UNDERSTAND UAS **terms**. UAS groups 1 through 5 are defined by the Joint UAS COE CONOPS V1.5, 2008. Low, slow, and small (LSS) UAS, which include micro- and mini-UAS are defined by ATP 3-01.81 *C-UAS Techniques*, 13 Apr 2017.

UAS Groups	Maximum Weight (lbs) (MGTOW)	Normal Operating Altitude (ft)	Speed (kts)	Representative UAS	
Group 1	0 – 20	<1200 AGL	100	Raven (RQ-11), WASP	
Group 2	21 – 55	<3500 AGL	< 250	ScanEagle	
Group 3	< 1320	< FL 180		Shadow (RQ-7B), Tier II / STUAS	
Group 4	>1320		> FL 180	Any Airspeed	Fire Scout (MQ-8B, RQ-8B), Predator (MQ-1A/B), Sky Warrior ERMP (MQ-1C)
Group 5		Reaper (MQ-9A), Global Hawk (RQ-4), BAMS (RQ-4N)			

5. UNDERSTAND UAS **proliferation**.



[The Drone Databook](#). By Dan Gettinger. Annandale-on-Hudson, NY: Bard College, 2019. dronecenter.bard.edu

Use of UAS by the world's militaries has doubled since 2010. Gettinger lists over 100 separate systems used by over 100 countries.



[The Islamic State and Drones: Supply, Scale, and Future Threats](#). By Don Rassler. West Point, NY: U.S. Military Academy, 2018. www.ctc.usmc.edu

Many insurgent groups may replicate what ISIS did to acquire, arm, and employ commercial UAS.

6. UNDERSTAND adversary UAS **TTPs**. Because offset position reporting is difficult for small UAS, Russian practice is to fly directly over the target to acquire an accurate target position.
7. UNDERSTAND U.S. **signatures** that are vulnerable to adversary UAS.

1 Aug 2020

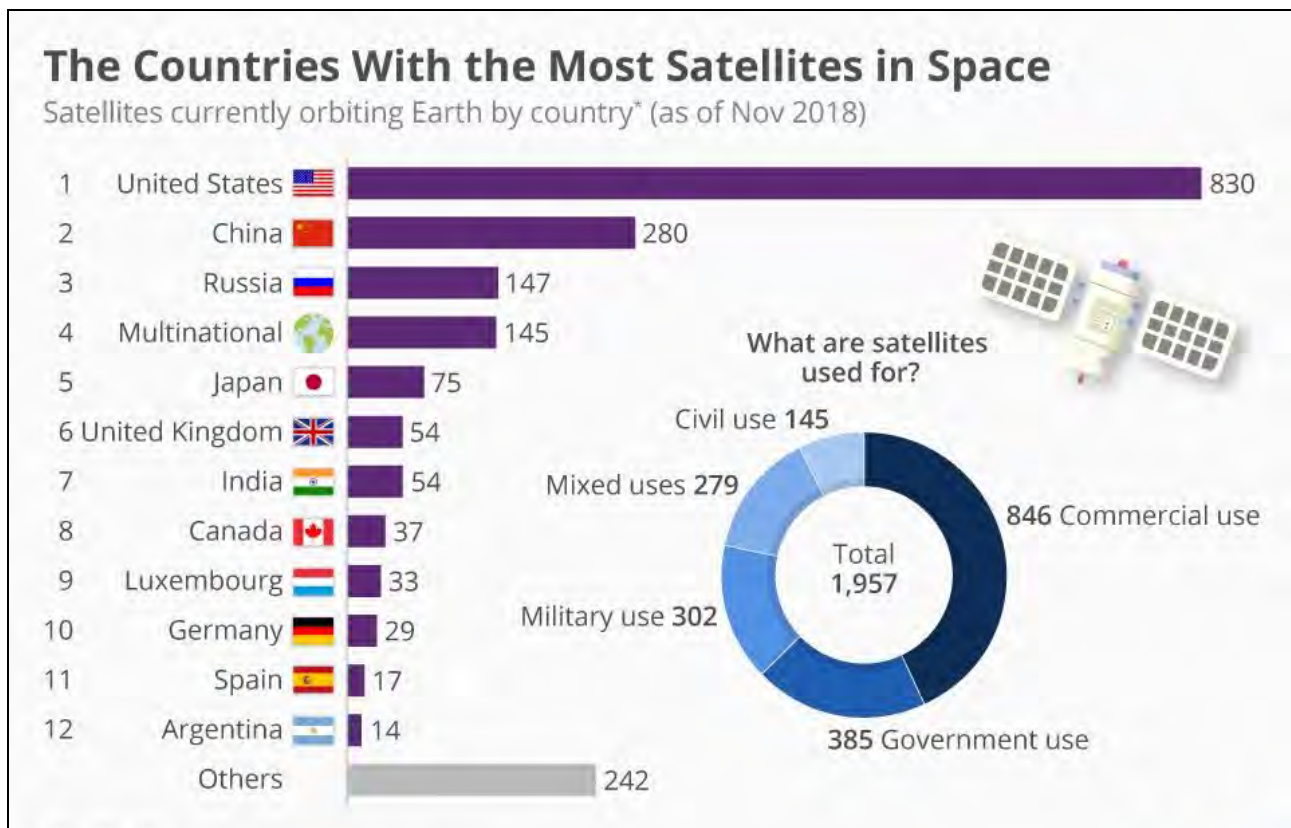
Understand

Adversary Satellites

Purpose. To find information on adversary satellites.

Process

1. ASK the S-2 for adversary satellite intelligence in your AO.
2. SEARCH the classified U.S. intelligence sites on SIPR:
 - NASIC** (U.S. Air Force) provides intelligence on foreign air and space forces.
3. SEARCH the web for evolving satellite **capabilities**.
4. UNDERSTAND satellite **terms**. What is geosynchronous orbit?
5. UNDERSTAND satellite **proliferation**.



Source: Union of Concerned Scientists Satellite Database.

6. UNDERSTAND satellite **TTPs**. When are adversary satellites collecting on *your* unit in *your* AO? When is your window of vulnerability? What types of units, ships, facilities, and equipment are most vulnerable to satellite collection? What sensors are being used? How can those sensors be mitigated?

7. UNDERSTAND U.S. **signatures** that are vulnerable to adversary satellites.



Satellite image of Camp Leatherneck, Helmand Province, Afghanistan.

1 Aug 2020

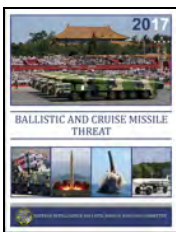
Understand

Adversary Missiles

Purpose. To find information on adversary missiles.

Process

1. ASK the S-2 for adversary missile intelligence in your AO.
2. SEARCH the classified U.S. intelligence sites on SIPR:
 - NGIC** (U.S. Army) provides intelligence on foreign ground forces.
 - NASIC** (U.S. Air Force) provides intelligence on foreign air and space forces.
 - ONI** (U.S. Navy) provides intelligence on foreign naval forces.
3. SEARCH the web for evolving missile **capabilities**.
See the **TRADOC** [ODIN Worldwide Equipment Guide](#).
4. UNDERSTAND missile **terms**. What is the difference between ballistic missiles and cruise missiles? Why are ballistic missiles classified by range, but cruise missiles classified by type of target?



[2017 Ballistic and Cruise Missile Threat](#). Wright-Patterson AFB, OH: NASIC / DIMBAC, 2017. 40 pages. nasic.af.mil

Explains ballistic missiles (CRBM, SRBM, MRBM, IRBM, ICBM), submarine and ship-launched ballistic missiles (SLBM, ShLBM), land attack cruise missiles (LACM), and anti-ship cruise missiles (ASCM).

5. UNDERSTAND missile **proliferation**.



[Missile Defense Project](#), Washington, DC: Center for Strategic and International Studies (CSIS). csis.org

A library of missile references, analyses, budgets, studies, and adversary inventories: [Missiles of Russia](#), [Missiles of China](#), [Missiles of North Korea](#), [Missiles of Iran](#).



[A Low-Visibility Force Multiplier: Assessing China's Cruise Missile Ambitions](#). By Gormley, Erickson, and Yuan. Washington, DC: NDU Press, 2014. 196 pages. ndupress.ndu.edu

A detailed study of Chinese ASCM, LACM, and missile doctrine.

6. UNDERSTAND adversary missile **TTPs**.

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Understand

Adversary Rockets, Artillery, and Mortars

Purpose. To find information on adversary rockets, artillery, and mortars.

Process

1. ASK the S-2 for adversary rocket, artillery, and mortar intelligence in your AO.
2. SEARCH the classified U.S. intelligence sites on SIPR:

NGIC (U.S. Army) provides intelligence on foreign ground forces.

NASIC (U.S. Air Force) provides intelligence on foreign air and space forces.

ONI (U.S. Navy) provides intelligence on foreign naval forces.

3. SEARCH the web for evolving weapons capabilities.
See the **TRADOC** [ODIN Worldwide Equipment Guide](#).

UNDERSTAND the significance of the **Zelenopillya Rocket Attack**.



On 14 July 2014, two mechanized battalions of the Ukrainian Army, in an assembly area near Zelenopillya, Ukraine, were almost completely destroyed by a Russian rocket barrage.



The attack was conducted by **UAS**. The Russian rocket launchers, firing from inside Russian territory, were **Tornado-G** 122mm MLRS, an upgrade to the BM-21. The barrage included top-down anti-tank DPICM and thermobaric fuel-air explosives.

Over 100 other Russian rocket and artillery attacks followed during [July and August 2014](#).


4. UNDERSTAND rocket, artillery, and mortar **terms**.

System	Caliber	Range	
Common Russian Multiple Launch Rocket Systems (MLRS) Nomenclature			
BM-21	122mm	20 km	
BM-27	220mm	35 km	
BM-30	300mm	90 km	

9A52 Tornado is a new MLRS. It is separate from the **Tornado** upgrades to the BM-21, BM-27, and BM-30. The **Tornado 9A53-G** is the upgrade to the **BM-21**. Range is 40 km.

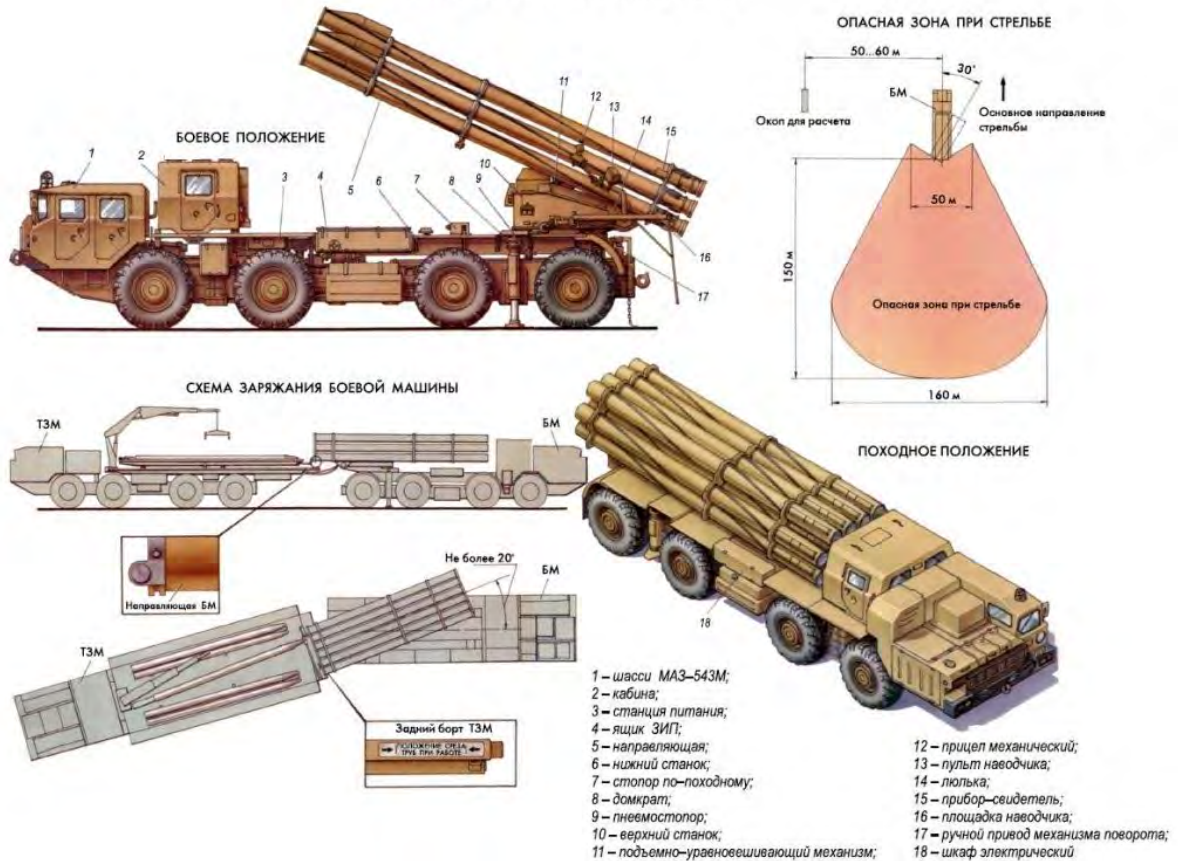
Common Russian Self-Propelled (SP) Artillery Nomenclature			
2S1	122mm	15 km	
2S3	152mm	18 km	

Common Russian Towed Artillery Nomenclature			
D-30	122mm	15 km	

Common Russian Mortar Nomenclature			
2B11	82mm	7 km	

5. UNDERSTAND rocket, artillery, and mortar **proliferation**. What adversaries have acquired what weapons from what countries?

СХЕМА БОЕВОЙ МАШИНЫ 9А52-2



Russian BM-30 Smerch (9A52-2)

6. UNDERSTAND rocket, artillery, and mortar **TTPs**. Russia is fielding one UAS company to each brigade to support multiple artillery battalions.



“Integration of Unmanned Aerial Systems within Russian Artillery,” by Lester Grau and Chuck Bartles, **Fires**, May-June 2016, pp 31-38.

Direct overhead flight is the primary means of calling for fire with UAS at night: “Since terrain association with a thermal imager would be difficult... and the risk of the UAS being shot down at night is... reduced, it is likely the UAS operator uses the ‘fly-over-the-target’ method to fix the target.”

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Understand

Adversary Naval Threats

Purpose. To find information on adversary naval capabilities.

Process

1. ASK the S-2 for adversary naval intelligence in your AO.
2. SEARCH the classified U.S. intelligence sites on SIPR:

NASIC (U.S. Air Force) provides intelligence on foreign air and space forces.

ONI (U.S. Navy) provides intelligence on foreign naval forces.

3. SEARCH the web for evolving naval **capabilities**.
See the **TRADOC** [ODIN Worldwide Equipment Guide](#).
4. UNDERSTAND naval **terms**.



5. UNDERSTAND naval **proliferation**.



[China Naval Modernization: Implications for U.S. Navy Capabilities—
Background and Issues for Congress](#). By Ronald O'Rourke. Washington, DC: Congressional Research Service (CRS) RL 33153, 21 May 2020.



[Russia's Black Sea Fleet: Toward a Multiregional Force](#). By Igor Delanoë. Arlington, VA: CNA, 5 Jun 2019. 36 pages.

6. UNDERSTAND naval **TTPs**.

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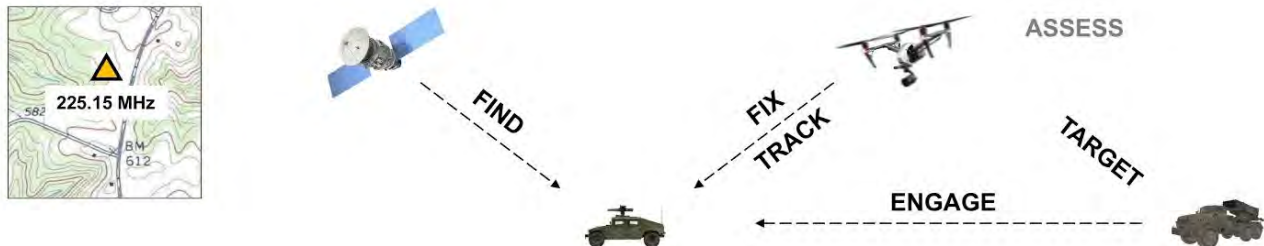
Understand

Adversary Fire Networks

Purpose. To find information on adversary reconnaissance and fire networks.

Process

1. UNDERSTAND the F2T2EA **kill chain** model.



FIND — An EM signal is detected and cues UAS. The FIND step can be done by any ISR: ground reconnaissance, SIGINT, HUMINT, ELINT, or MASINT.

FIX — The UAS plots the exact target location.

TRACK — The UAS tracks the target location if the target is moving.

TARGET — The adversary Tornado-G battery calculates range and targeting data.

ENGAGE — The adversary Tornado-G battery fires rocket barrages to destroy the target.

ASSESS — The UAS, or other ISR asset, assesses BDA.

There are many combinations of equipment and units that can execute a kill chain.

2. UNDERSTAND Russian **reconnaissance fire networks**.



[The Russian Reconnaissance Fire Complex Comes of Age](#). By Lester W. Grau and Charles K. Bartles. Oxford, England: University of Oxford, 30 May 2018.

The Russian Reconnaissance Strike Complex (RYK) links long-range weapons to intelligence and targeting for surface-to-surface missiles and aircraft-delivered “smart” munitions. The Reconnaissance Fire Complex (ROK) is the tactical equivalent for field artillery.

3. UNDERSTAND how to disrupt adversary **ISR** efforts.

Table. Disruption: ISR platforms vs. types of targets.

	Eyes Day: Binoculars, Optics	Eyes Night: NVGs	Eyes Night: Thermal Scopes	Ears Day and Night	UAS Day: Visual Imagery	UAS Night: IR Thermal Imagery	Aircraft Day: Visual Imagery	Aircraft Night: FLIR Thermal Imagery	Ground Radar Day and Night: MTI	SIGINT Day and Night: DF	Satellite Day and Night: Imagery
Marines	Movement	Lights	Body Heat	Tools Voices	Movement	Body Heat	Movement	Body Heat			
Positions	Movement, Spoil	Lights, Fires	Fires, Stoves	Tools Voices	Movement, Spoil	Fires, Stoves	Movement, Spoil	Fires, Stoves	Metal Weapons	Radios	Contrast
Vehicles	Vehicles, Tracks	Lights	Engines	Engines	Vehicles, Tracks	Engines	Vehicles, Tracks	Engines	Metal Vehicles	Radios	Vehicle Patterns
CPs	Tents, Facilities	Lights	Equipment, Generators	Engines, Generators	Tents, Facilities	Equipment, Generators	Tents, Facilities	Equipment, Generators	Metal Vehicles	Radios, Generators	Vehicle Patterns
AAs	Vehicles, Tracks	Lights	Engines, Generators	Engines, Generators	Vehicles, Tracks	Engines, Generators	Vehicles, Tracks	Engines, Generators	Metal Vehicles	Radios	Vehicle Patterns
Buildings	Movement, Traffic	Lights			Movement, Traffic		Movement, Traffic			Radios	Vehicle Patterns

Camouflage Discipline:	LIGHT Discipline	HEAT Discipline	NOISE Discipline	EMCON	METAL
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Light discipline disrupts visual ISR. The human eye can see a campfire at 8 km, and vehicle lights at 20 km.

Heat discipline disrupts IR thermal ISR.

Noise discipline disrupts direct observation (listening) by ground reconnaissance units.

EMCON disrupts adversary SIGINT collection efforts.

4. UNDERSTAND how to disrupt adversary **NVGs**.

NVGs are image intensifiers. They take existing light—from the stars, the moon, and from manmade illumination—and magnify it.

To disrupt adversary NVGs, PLAN operations at critical times. KNOW the hours of *moonrise (MR)* and *moonset (MS)*, and the percent of *lunar illumination*.

This information is available worldwide at: https://weather.af.mil/AFW_WBS/ (NIPR/CAC) and https://weather.af.smil.mil/AFW_WEBS/ (SIPR).

A 20% moon, positioned at 30 degrees above the horizon provides 0.022 lux. Less than this amount of light is called *low light*. A full moon is ten times brighter than a new moon.

5. UNDERSTAND how to disrupt adversary **IR thermal** sensors.

To disrupt adversary IR thermal sensors, PLAN operations at critical times. KNOW the hours of *BMNT*, *sunrise (SR)*, *EENT* and *sunset (SS)*.

This information is available worldwide at: https://weather.af.mil/AFW_WBS/ (NIPR/CAC) and https://weather.af.smil.mil/AFW_WEBS/ (SIPR).

Thermal crossover times differ—because each piece of equipment heats and cools at different rates—but they generally occur near sunrise and sunset.

6. UNDERSTAND how to disrupt adversary **radar**.

A moving target indicator (MTI) picks up metal. Vehicles in the open can be detected by air or ground MTI at 20 kilometers. Convoys moving on covered routes can disrupt their metal signature. Camouflage netting, when kept two feet off the metal surface, can disrupt the radar signatures of vehicles. Conex boxes, infantry weapons, and metal ammunition cans can be vulnerable to air and ground radars.

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Understand

U.S. Air and Missile Defense (AMD)

Purpose. To find information on AMD. All leaders should have a basic understanding of U.S. Air and Missile Defense (AMD) terms, weapons, and capabilities.

Process

1. UNDERSTAND **Joint** AMD terms.

The Joint Force Commander (JFC) is responsible for AMD. The JFC appoints an Area Air Defense Commander (AADC), who establishes an integrated air defense system (IADS) and writes the Area Air Defense Plan (AADP). The Joint Force Air Component Commander (JFACC) executes the AADP. Only the AADC can delegate engagement authority to tactical units to shoot at adversary aircraft and missiles.

Air and Missile Defense (AMD) consists of **Air Defense (AD)** - against aircraft, UAS, and cruise missiles - and **Ballistic Missile Defense (BMD)**.



[2019 Missile Defense Review](#). Washington, DC: Secretary of Defense, 2019. 108 pages.

Summarizes evolving missile threats and describes U.S. missile defense capabilities, including GMD, THAAD, Aegis, and Patriot PAC-3.



[JP 3-01 Countering Air and Missile Threats](#), 2 May 2018. 169 pages.

Defines joint terms for AMD. Describes key roles in the AMD command and control structure. Discusses offensive and defensive AMD planning, homeland security, and global missile defense.



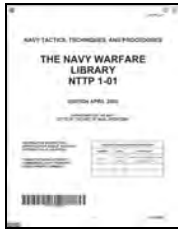
ATP 3-01.15 / MCTP 10-10B **AMD: Multi-Service TTPs for Air and Missile Defense**, 14 Mar 2019. 188 pages.

A comprehensive source for Joint and service AMD equipment, C2, and doctrine, with a separate chapter for each service. JIPOE for AMD, UAS challenges, planning checklists, and an AADP template.

2. UNDERSTAND **Navy** AMD terms.

In the Navy's Composite Warfare Commander (CWC) construct, the Air Missile Defense Commander (AMDC) defends the force against airborne weapons launched from aircraft,

ships, submarines, and land-based sites. The Ballistic Missile Defense Commander (BMDC) defends the force from ballistic missiles.



NTTP 3-01.11 **Maritime Air and Missile Defense Planning**, 1 Apr 2015.

The Navy's Aegis weapons system tracks and engages incoming missiles. Aegis integrates air and missile defense weapons, as well as ASW torpedoes and Tomahawk LACM.

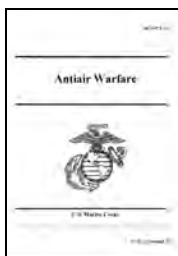
3. UNDERSTAND **Marine Corps** antiair warfare terms.

The ACE protects the MAGTF. The ACE is not expected to contribute to the Joint AADP. Antiair warfare, primarily conducted by aircraft, is one of the six functions of Marine aviation. Marine LAAD units, with AD weapons but no radar, provide local air defense.



Marine Aviation Weapons and Tactics Squadron One (MAWTS-1), Yuma, AZ.

The MAWTS-1 website, and the antiair curriculum, is FOUO on SIPR.



[MCTP 3-20C Antiair Warfare](#), 4 Apr 2018. 92 pages.

Describes Marine antiair units and procedures.

Out-of-date. Written in 1999, with no discussion of adversary UAS.

4. UNDERSTAND passive air defense TTPs for ground units.



ATP 3-01.8 **Techniques for Combined Arms for Air Defense**, 29 Jul 2016. 68 pages.

Ground combat units conduct passive air defense: dispersion, camouflage, and concealment. Are air defense warnings (ADW red, ADW yellow, ADW white) still relevant under adversary UAS observation?

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Camouflage SOP

Chapter

5

Reference

In this Chapter

- Glossary
- Bibliography
- UAS Imagery



**SIGMAN Camouflage SOP:
Chapter 5: Reference**

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Reference

Glossary

Purpose. To collect standard definitions of SIGMAN and camouflage terms.

A2/AD — Anti-access and area denial. *An imprecise term banned by the CNO in 2016.*

A2 (antiaccess) — Action, activity, or capability, usually long-range, designed to prevent an advancing enemy force from entering an operational area (*DOD Dictionary*, 1 Jan 2020).

AD (air defense) — Defensive measures designed to destroy attacking enemy aircraft or aerodynamic missiles, or to nullify or reduce the effectiveness of such attack (*DOD Dictionary*, 1 Jan 2020).

active air defense. REMOVED from JP 3-01 *Countering Air and Missile Threats* and *DOD Dictionary*.

passive air defense. REMOVED from JP 3-01 *Countering Air and Missile Threats* and *DOD Dictionary*.

ADWC (air defense warning condition) — An air defense warning given in the form of a color code corresponding to the degree of air raid probability with yellow standing for when an attack by hostile aircraft or missiles is probable; red for when an attack by hostile aircraft or missiles is imminent or is in progress; and white for when an attack by hostile aircraft or missiles is improbable (*DOD Dictionary*, 1 Jan 2020).

AMD (air and missile defense) — Direct [active and passive] defensive actions taken to destroy, nullify, or reduce the effectiveness of hostile air and ballistic missile threats against friendly forces and assets (*DOD Dictionary*, 1 Jan 2020).

ASCM — Anti-ship cruise missile (NO DOD or USMC definition).

ascent phase — That portion of the flight of a ballistic missile or space vehicle that begins after powered flight and ends just prior to apogee (*DOD Dictionary*, 1 Jan 2020).

BM (ballistic missile) — Any missile that does not rely upon aerodynamic surfaces to produce lift and consequently follows a ballistic trajectory when thrust is terminated (*DOD Dictionary*, 1 Jan 2020). See:

CRBM — close-range ballistic missile — Less than 300 NM.

SRBM — short-range ballistic missile — 300 to 600 NM.

MRBM — medium-range ballistic missile — 600 to 1,500 NM.

IRBM — intermediate-range ballistic missile — 1,500 to 3,000 NM.

ICBM — intercontinental ballistic missile — Greater than 3,000 NM.

SLBM — submarine-launched ballistic missile.

SuLBM — surface-launched ballistic missile.

BMD — ballistic missile defense (*DOD Dictionary*, 1 Jan 2020).

TBMD — theater ballistic missile defense (*DOD Dictionary*, 1 Jan 2020).

BMNT (begin morning nautical twilight) — The start of the period where, in good conditions and in the absence of other illumination, the sun is 12 degrees below the eastern horizon and enough light is available to identify the general outlines of ground objects and conduct limited military operations (*DOD Dictionary*, 1 Jan 2020) (This definition should specify the “center of the sun.” The term “first light” is NOT used and has been dropped from the *DOD Dictionary*).

BP (battle position) — 1. In ground operations, a defensive location oriented on an enemy avenue of approach from which a unit may defend. 2. In air operations, an airspace coordination area containing firing points for attack helicopters (MCRP 1-10.2 *Marine Corps Supplement*, 31 May 2018).

battle drill — A critical collective action or task performed by a platoon or smaller element without the application of a deliberate decision-making process, initiated on cue, accomplished with minimal leader orders, and performed to standard throughout like units (MCRP 1-10.2 *Marine Corps Supplement*, 31 May 2018).

CCD — camouflage, concealment, and deception (*DOD Dictionary*, 1 Jan 2020).

CDCM — Coastal defense cruise missile (NO DOD or USMC definition).

CM (cruise missile) — A guided and powered missile that flies at constant speed for the majority of its route and relies upon aerodynamic forces for lift (*DOD Dictionary*, 1 Jan 2020). See:

LACM — Land-attack cruise missile (NO DOD or USMC definition).

ASCM — Anti-ship cruise missile (NO DOD or USMC definition).

CDCM — Coastal defense cruise missile (NO DOD or USMC definition).

CMD — Cruise missile defense (*DOD Dictionary*, 1 Jan 2020).

C-RAM — Counter-rocket, artillery, mortar (*DOD Dictionary*, 1 Jan 2020).

C-UAS — Counter-unmanned aircraft system (*DOD Dictionary*, 1 Jan 2020).

CRBM (close-range ballistic missile) — A land-based ballistic missile with a range capability up to 300 nautical miles (*DOD Dictionary*, 1 Jan 2020).

camouflage — (NO DOD or USMC definition).

camouflage discipline

light discipline — (NO DOD or USMC definition).

heat discipline — (NO DOD or USMC definition).

noise discipline — (NO DOD or USMC definition).

trash discipline — (NO DOD or USMC definition).

movement discipline — (NO DOD or USMC definition).

concealment — The protection from observation or surveillance (MCRP 1-10.2 *Marine Corps Supplement*, 31 May 2018) (NO DOD definition).

cover — 4. Protection from the effects of direct and indirect fire. It can be provided by ditches, caves, river banks, folds in the ground, shell craters, buildings, walls, and embankments (MCRP 1-10.2 *Marine Corps Supplement*, 31 May 2018) (NO DOD definition).

dead ground — Terrain not visible to the enemy and protected from enemy direct fires.

defilade — 1. Protection from hostile observation and fire provided by an obstacle such as a hill, ridge, or bank. 2. A vertical distance by which a position is concealed from enemy observation. 3. To shield from enemy fire or observation by using natural or artificial obstacles (*DOD Dictionary*, 1 Jan 2020).

dispersal — Relocation of forces for the purpose of increasing survivability (*DOD Dictionary*, 1 Jan 2020).

dispersion — 1. The spreading or separating of troops, material, establishments, or activities, which are usually concentrated in limited areas to reduce vulnerability (*DOD Dictionary*, 1 Jan 2020).

disrupt — 1. To integrate fires and obstacles to break apart an enemy's formation and tempo, interrupt the enemy's timetable, or cause premature commitment or the piecemealing of enemy forces. 2. To preclude the efficient interaction of enemy combat or combat support systems (MCRP 1-10.2 *Marine Corps Supplement*, 31 May 2018) (NO DOD definition).

EENT (end evening nautical twilight) — The point in time when the sun has dropped 12 degrees below the western horizon, and is the instant of last available daylight for the visual control of limited military operations. (*DOD Dictionary*, 1 Jan 2020) (This definition should specify the "center of the sun").

engage — 1. In air and missile defense, a fire control order used to direct or authorize units and/or weapon systems to attack a designated target. 2. To bring the enemy under fire (*DOD Dictionary*, 1 Jan 2020).

F2T2EA — find, fix, track, target, engage, and assess (*DOD Dictionary*, 1 Jan 2020).

FLIR (forward-looking infrared) — An airborne, electro-optical, thermal imaging device that detects far-infrared energy, converts the energy into an electronic signal, and provides a visible image for day or night viewing (*DOD Dictionary*, 1 Jan 2020).

friendly — A contact positively identified as a friend using identification, friend or foe and other techniques (*DOD Dictionary*, 1 Jan 2020).

guided missile — An unmanned vehicle moving above the surface of the Earth whose trajectory or flight path is capable of being altered by an external or internal mechanism (*DOD Dictionary*, 1 Jan 2020).

ICBM (intercontinental ballistic missile) — A long-range ballistic missile with a range capability greater than 3,000 nautical miles (*DOD Dictionary*, 1 Jan 2020).

IFPC (indirect fire protection capability) — IFPC Increment 2-Intercept (IFPC Inc 2-I) is a mobile, ground-based weapon system designed to acquire, track, engage and defeat Unmanned Aircraft Systems (UAS), Cruise Missiles (CM) and Rockets, Artillery and Mortars (RAM).

IRBM (intermediate-range ballistic missile) — A ballistic missile with a range capability from 1,500 to 3,000 nautical miles (*DOD Dictionary*, 1 Jan 2020).

ISR — intelligence, surveillance, and reconnaissance — 1. An integrated operations and intelligence activity that synchronizes and integrates the planning and operation of sensors, assets, and processing, exploitation, and dissemination systems in direct support of current and future operations. 2. The organizations or assets conducting such activities (*DOD Dictionary*, 1 Jan 2020).

kill chain — In dynamic targeting, the steps and procedures involved to find, fix, track, target, engage, and assess (F2T2EA) a target (JP 3-09 *Joint Fire Support*, 10 Apr 2019)(NO DOD or USMC definition).

LACM — Land-attack cruise missile (NO DOD or USMC definition).

LCSS — lightweight camouflage screen system (MCRP 1-10.2 *Marine Corps Supplement*, 31 May 2018).

low light — Light level less than 0.0022 lux. Other than low light is light level greater than or equal to 0.0022 lux (CNAF M-3710.7 *NATOPS*, 5 May 2016).

LLL (low light level) — < 0.0022 lux (NO DOD or USMC definition).

HLL (high light level) — > 0.0022 lux (NO DOD or USMC definition).

LSS — low, slow, small UAS (ATP 3-01.81 *C-UAS Techniques*, 13 Apr 2017).

lunar illumination — Given in percentage of the actual lunar disk visible at midnight of each given day (MCRP 2-10.6 *MAGTF Meteorological and Oceanographic Support*, 4 Apr 2018) (Lunar illumination is reduced by cloud cover and weather. Lunar illumination is NOT the percentage of illuminated hours of a given night. A full moon below the horizon provides zero illumination).

lux — Luminous flux per unit area, measured as one lumen per square meter (SI). Sunrise is approximately 400 lux (U.S. Naval Observatory: <https://aa.usno.navy.mil>).

MD (missile defense) — Defensive measures designed to destroy attacking enemy missiles, or to nullify or reduce the effectiveness of such attack (*DOD Dictionary*, 1 Jan 2020).

micro-terrain — Small folds in the ground that provide protection from observation and enemy fire (NO DOD or USMC definition).

MRBM (medium-range ballistic missile) — A ballistic missile with a range capability from about 600 to 1,500 nautical miles (*DOD Dictionary*, 1 Jan 2020).

MR (moonrise) — The instant when the upper edge of the moon appears on the sea-level horizon (MCRP 2-10.6 *MAGTF Meteorological and Oceanographic Support*, 4 Apr 2018).

MS (moonset) — The instant when the upper edge of the moon disappears below the sea-level horizon (MCRP 2-10.6 *MAGTF Meteorological and Oceanographic Support*, 4 Apr 2018).

multispectral — Of or relating to two or more ranges of frequencies or wavelengths in the electromagnetic spectrum (*Merriam-Webster*, 2020).

RAM — Rockets, artillery, and mortars.

RRP (repair and replenishment point) — A combat service support installation, normally in forward areas near the supported unit, established to support a mechanized or other rapidly moving force. It may be either a prearranged point or a hastily selected point to rearm, refuel, or provide repair services to the supported force (MCRP 1-10.2 *Marine Corps Supplement*, 31 May 2018).

RSTA — Reconnaissance, surveillance, and target acquisition (*DOD Dictionary*, 1 Jan 2020).

sensor — 1. A device that responds to a physical stimulus (such as heat, light, sound, pressure, magnetism, or a particular motion) and transmits a resulting impulse (as for measurement or operating a control) (*Merriam-Webster*, 2020).

shadow

cast shadow — A cast shadow is a silhouette of an object projected against its background. It is the more familiar type of shadow and can be highly conspicuous. In desert environments, a shadow cast by a target can be more conspicuous than the target itself (ATP 3-37.34 / MCTP 3-34C *Survivability Operations*, 16 Apr 2018) (NO DOD definition).

contained shadow — a contained shadow is the dark pool that forms in a permanently shaded area. Examples are the shadows under the track guards of an armored fighting vehicle, inside a slit trench, inside an open cupola, or under a vehicle. Contained shadows show up much darker than their surroundings and are easily detected by an enemy (ATP 3-37.34 / MCTP 3-34C *Survivability Operations*, 16 Apr 2018) (NO DOD definition).

signature — A characteristic of an indicator that makes it identifiable (*Marine Corps Concept of Signature Management*, 24 Oct 2017) (NO DOD or USMC definition).

physical signature — Physical signatures are those that can be collected by adversary geospatial-intelligence assets or through direct observation (*Marine Corps Concept of Signature Management*, 24 Oct 2017) (NO DOD or USMC definition).

administrative signature — Administrative signatures are those that an individual or unit creates when conducting planning, movement, contracting, or other administrative actions and that can be collected on by adversary Open Source Intelligence (OSINT), Signals Intelligence (SIGINT), or human source intelligence (HUMINT) (*Marine Corps Concept of Signature Management*, 24 Oct 2017) (NO DOD or USMC definition).

technical signature — Technical signatures are those that can be collected by adversary signal intelligence (SIGINT) assets (*Marine Corps Concept of Signature Management*, 24 Oct 2017) (NO DOD or USMC definition).

SIGMAN (signature management) — The process by which we understand own-force signatures and indicators, identify methods and capabilities to collect and analyze those signatures, develop and implement countermeasures to mask those signatures; and when necessary develop and implement methods to project false signatures which protect friendly forces from adversary exploitation; or to draw the adversary toward a specific course of action or position of disadvantage (*Marine Corps Concept of Signature Management*, 24 Oct 2017) (NO DOD or USMC definition).

SLBM — submarine-launched ballistic missile (*DOD Dictionary*, 1 Jan 2020).

SRBM (short-range ballistic missile) — A ballistic missile with a range capability between 300-600 nautical miles (*DOD Dictionary*, 1 Jan 2020).

SR (sunrise) — The instant when the upper edge of the sun appears on the sea-level horizon (MCRP 2-10.6 *MAGTF Meteorological and Oceanographic Support*, 4 Apr 2018).

SS (sunset) — The instant when the upper edge of the sun disappears below the sea-level horizon (MCRP 2-10.6 *MAGTF Meteorological and Oceanographic Support*, 4 Apr 2018).

SUAS — Small UAS.

SuLBM — surface-launched ballistic missile.

TAA (tactical assembly area) — An area that is generally out of the reach of light artillery and the location where units make final preparations (pre-combat checks and inspections) and rest, prior to moving to the line of departure (*DOD Dictionary*, 1 Jan 2020).

TAC-D (tactical deception) — Deception executed by tactical commanders not necessarily linked to a higher MILDEC plan (NO DOD or USMC definition).

thermal crossover — The natural phenomenon that normally occurs twice daily when temperature conditions are such that there is a loss of contrast between two adjacent objects on infrared imagery (*DOD Dictionary*, 1 Jan 2020).

terminal phase — That portion of the flight of a ballistic missile that begins when the warhead or payload reenters the atmosphere and ends when the warhead or payload detonates, releases its submunitions, or impacts (*DOD Dictionary*, 1 Jan 2020).

UAS — Unmanned aircraft system (*DOD Dictionary*, 1 Jan 2020).

ULCANS — Ultra-lightweight camouflage net system.

unknown — 1. A code meaning “information not available.” 2. An unidentified target. An aircraft or ship that has not been determined to be hostile, friendly, or neutral using identification friend or foe and other techniques, but that must be tracked by air defense or naval engagement systems. 3. An identity applied to an evaluated track that has not been identified (*DOD Dictionary*, 1 Jan 2020).

WEZ (weapon engagement zone) — In air and missile defense, airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with a particular weapon system (*DOD Dictionary*, 1 Jan 2020).

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Purpose. To understand what UAS can see.

Observers for the Organization for Security and Co-operation in Europe (OSCE) use UAS to observe Russian Army units inside Ukraine.





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Reference

UAS Imagery of Marine Units

Purpose. To understand what UAS can see.



Infantry battalion **TAA** from 2014 ft MSL.



Infantry Company **CP** from 1519 ft MSL.



Infantry, on road in daylight, from 1483 ft MSL.



Infantry, on road at night, from 1404 ft MSL.



Vehicles dispersed, from 1499 ft MSL.



Vehicles raising dust, from 817 ft MSL.



Good effort at concealment in the treeline, but netting does NOT match background. From 1178 ft MSL.



Good effort at concealment, but square, shiny tarps do NOT match background. From 1453 ft MSL.



Good effort. Tan uniforms blend with background. From 935 ft MSL.



Good effort. Mortar section is undetectable. From 1548 ft MSL.



Synthetic sandbags shine "like light bulbs." From 100 ft AGL.



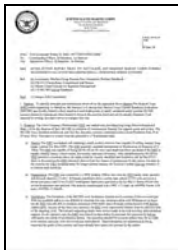
Contained shadows make fighting positions visible. From 500 ft AGL.

Notes

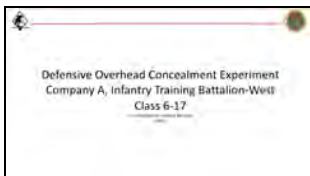
1. **Patterns**—rows of vehicles, tents, packs, pallets, or tarps—are easily seen from the air.

2. **Roads** are easily viewed from the air. Shadows and dark uniforms contrast with light-colored roads. After dusk, roads retain heat.
3. **Vehicles** are easily seen from the air. Even when dispersed in foliage, vehicles still need camouflage netting. Vehicles on dirt roads raise dust clouds.
4. Vehicle **tracks**—in grass, dirt, or sand—are easily seen from the air. Tracks are difficult to avoid or erase.
5. Square, shiny **tarps** are easily seen from the air. Tarps often do NOT blend with the background.
6. Synthetic **sandbags**—reflecting white sunlight—are easily seen from the air.
7. Contained **shadows**—in fighting positions and vehicle netting—are easily seen from the air.
8. Marines in building **windows** are easily seen from the air with IR thermal sights.

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www.warfighting.us



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