TC 3-22.10

Sniper

December 2017

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Sniper

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Preface

TC 3-22.10 outlines the context in which sniper training and operations are executed.

TC 3-22.10 is the authoritative reference to aid in developing doctrine, force structure, institutional and unit training, and standard operating procedures (SOP) for sniper planning and operations. TC 3-22.10 describes the sniper's role, duties, and responsibilities; sniper planning and employment; engagement techniques; equipment; discipline; and safety.

The principal audience for TC 3-22.10 is commanders, staffs, officers, and noncommissioned officers responsible for missions, personnel, organizations, equipment, training, skills, and employment of snipers or sniper teams.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate in accordance with the law of war and the rules of engagement. (See FM 27-10.)

TC 3-22.10 implements STANAG 2020.

The doctrinal principles and techniques used in TC 3-22.10 are a guide. They are not prescriptive.

Uniforms depicted in this manual were drawn without camouflage for clarity of the illustration.

TC 3-22.10 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which TC 3-22.10 is the proponent publication (the authority) are italicized in the text and are marked with an asterisk (*) in the glossary. Terms and definitions for which TC 3-22.10 is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

TC 3-22.10 applies to the active Army, the Army National Guard /Army National Guard of the United States, and the United States Army Reserve.

The proponent of TC 3-22.10 is the Maneuver Center of Excellence (MCoE). Send comments and recommendations on DA Form 2028 (*Recommended Changes to Publications and Blank Forms*) to Commander, Maneuver Center of Excellence, Directorate of Training and Doctrine, Doctrine and Collective Training Division, ATTN: ATZB-TDD (TC 3-22.10), 1 Karker Street, Fort Benning GA 31905-5410; by email to usarmy.benning.mcoe.mbx.doctrine@mail.mil, or submit an electronic DA Form 2028.

Introduction

TC 3-22.10 is organized chronologically to reflect the order in which a sniper team will prepare, execute, and end an operation. To reduce the size of the manual and to comply with regulations, detailed technical processes covered elsewhere have been replaced with references to those resources.

Chapter 1

Overview

Chapter 1 describes the principles of safe weapons handling, the rules of firearm safety, weapon safety, and control status. Chapter 1 is also an overview of the concepts of overmatch as it pertains to a Soldier's individual sniper weapon system.

WEAPONS HANDLING

1-1. Safe weapons handling procedures are consistent, and standard methods used to ensure snipers operate and employ the weapon safely and effectively. Weapons handling is built on three components: the Soldier, the weapon, and the environment. These three components are discussed below.

1-2. The sniper must maintain situational understanding of friendly forces, be aware of the status of the weapon, and have the ability to evaluate the environment to properly handle any weapon. The smart, adaptive, and disciplined sniper is the primary safety mechanism for all weapons under their control.

1-3. The weapon is the sniper's primary tool to defeat threats in combat. The sniper must know the mechanical safeties built into the weapons they employ and how to operate the safeties. They must also know the principles of operation for those weapons.

1-4. The environment is the Soldier's surroundings. The sniper must be aware of muzzle discipline, the nature of the target, and what is behind the target.

1-5. Snipers must know and enforce three distinct weapons handling measures to safely and effectively handle weapons. The weapons handling measures are—

- Rules of firearms safety.
- Weapons safety status.
- Weapons control status.

1-6. The weapons handling measures provide redundant safety measures when handling any weapon or weapon system in training and operational environments. A negligent discharge occurs when a sniper violates two of the rules of firearms safety or violates a weapons safety status

RULES OF FIREARMS SAFETY

1-7. The rules of firearms safety are standardized for any weapon a sniper may employ. Snipers must adhere to these rules during training and combat operations, regardless of the type of ammunition used.

Rule 1: Treat Every Weapon as if it is Loaded

1-8. Any weapon handled by a sniper must be treated as if it is loaded and prepared to fire. Whether or not a weapon is loaded should not affect how a sniper handles the weapon. Snipers must take the appropriate actions to ensure the proper weapon status is applied during operations, whether in combat or training.

Rule 2: Never Point the Weapon at Anything you do not Intend to Shoot

1-9. Snipers must be aware of the orientation of their weapon's muzzle and what is in the path of the projectile if the weapon fires. Snipers must ensure the path between the muzzle and target is clear of friendly forces, noncombatants, or anything the sniper does not want to shoot.

1-10. When the sniper cannot ensure a clear path, they must minimize the amount of time the muzzle is oriented toward people or objects they do not intend to shoot, while simultaneously applying the other three rules of firearms safety.

Rule 3: Keep Finger Straight and off the Trigger Until Ready to Fire

1-11. Snipers must not place their finger on the trigger unless they intend to fire the weapon. The sniper is the most important safety feature on any weapon. Mechanical safety devices are not available on all types of weapons. Even when mechanical safeties are present, snipers must not rely solely on them for safe operation knowing that mechanical measures may fail.

1-12. Whenever possible, snipers should move the weapon to mechanical safe when a target is not present. If the weapon does not have a traditional mechanical safe, the trigger finger acts as the primary safety.

Rule 4: Ensure Positive Identification of the Target and its Surroundings

1-13. The disciplined sniper can positively identify the target and knows what is in front of and what is beyond it. The sniper is responsible for all bullets fired from their weapon, including the projectile's final destination.

1-14. Application of this rule minimizes the possibility of fratricide, collateral damage, or damage to infrastructure or equipment. Applying this rule also prepares the sniper for any follow-on shots that may be required.

WEAPON SAFETY STATUS

1-15. The readiness of a Soldier's weapon is its weapon safety status. Weapon safety status is standard code that uses common colors (green, amber, red, and black) to represent the level of readiness for a given weapon. Each color represents a specific series of actions applied to a weapon. Table 1-1 (page 1-4) shows the weapon safety status for the Army Sniper Weapon System(s).

> ***Note.*** If the component, assembly, or part described is unclear, refer to the respective sniper weapon system technical manual.

GREEN

1-16. The weapon's magazine is out, the chamber is empty, the bolt is locked open or forward, and the safety selector is on SAFE.

> ***Note.*** The command given to direct a GREEN safety status is, CLEAR.

AMBER

1-17. A magazine is locked into the magazine well of the weapon, the bolt is forward on an EMPTY chamber, and the safety selector is on SAFE.

> ***Note.*** The command given to direct an AMBER status is, LOAD MAGAZINE.

RED

1-18. The weapon's magazine is inserted, a round is in the chamber, the bolt is forward and locked, and the safety selector is on SAFE.

> ***Note.*** The command given to direct a RED safety status is, MAKE READY.

BLACK

1-19. The weapon's magazine is inserted, a round is in the chamber, the bolt is forward and locked, and the safety selector is on FIRE. The Soldier's finger is on the trigger. The sniper has a clear path from the muzzle of the weapon to the target.

> ***Note.*** The command given to direct a BLACK safety status is driven by the unit's SOP, rules of engagement (ROE), or the command, FIRE.

Table 1-1. Weapon safety status for the sniper weapon system

STATUS	*GREEN*	*AMBER*	*RED*	*BLACK*
Function	Clear	Prepared	Ready, safe	Ready, fire
Commands	CLEAR	LOAD MAGAZINE	MAKE READY	SOP/ROE/ FIRE
Ammunition	None	Magazine in	Magazine in, round chambered	Magazine in, round chambered
Bolt	Locked open or forward	Forward	Forward	Forward
Chamber	Empty	Empty	Locked	Locked
Safety	Safe	Safe	Safe	Fire
Trigger	Off	Off	Off	On

Legend
SOP standard operating procedure ROE rules of engagement

WEAPON CONTROL STATUS

1-20. When applicable, the leader may impose a weapon control status in addition to the weapon safety status. The weapon control status outlines the conditions, based on target identification criteria, under which friendly elements may engage. The weapons control status is adjustable, as necessary, based on the current rules of engagement established for the area of operations.

1-21. Table 1-2 provides a description of the standard weapon control statuses used in conjunction with the weapon safety status. The weapon control statuses describe when the sniper is authorized to engage a threat target once the threat conditions have been met.

Table 1-2. Example of weapon control status

WEAPON CONTROL STATUS	*DESCRIPTION*
Weapon hold	Engage only if engaged or ordered to engage.
Weapon tight	Engage only if target is positively identified as enemy.
Weapon free	Engage targets not positively identified as friendly.

OVERMATCH

1-22. Overmatch is the sniper applying their learned skills, employing their equipment, leveraging technology, and applying the proper force to create an unfair fight in favor of the sniper. To achieve and maintain overmatch against any threat, this training circular focuses on providing information that develops the sniper's direct fire engagement skills using the following attributes:

- Smart. The ability to routinely generate understanding through changing conditions.

- Fast. The ability to physically and cognitively outmaneuver adversaries.
- Lethal. Deadly in the application of force.
- Precise. Consistently accurate in the application of power to ensure delivery of the right effects in time, space, and purpose.

1-23. Overmatch requires the sniper to understand the key elements that build the unfair advantage and exploit them at every opportunity during tactical operations. The components of overmatch are—

- Target detection, acquisition, and identification. Ability of the sniper to detect and positively identify any suspected target as hostile at greater distances than their adversary. The sniper relies upon their training and their ability to leverage the capabilities of their optics, thermals, and sensors.
- Engagement range. Provide the sniper with weapons, aiming devices, and ammunition that can strike and defeat a threat at a greater range than the adversary can detect or engage the friendly force with effective fires.
- Limited visibility. Provides an advantage for the sniper during operations due to technology and techniques, thus compounding the adversary's disadvantages.
- Precision. Provide a weapon and ammunition package that enhances the sniper's consistent application of shots with a level of precision greater than the adversary's.
- Speed. Employs the sniper with a weapon, aiming devices, and accessories that work seamlessly in unison, are intuitive to use, and leverage natural motion and manipulations to facilitate rapid, initial, and subsequent shots during an engagement at close quarters, midrange, and extended range.
- Terminal performance. Ensures that precise shots delivered at extended ranges provide the highest probability to defeat the threat through exceptional ballistic performance.
- Counter enemy target acquisition. Snipers must be aware of the layered application of the enemy target acquisition cycle and how to exploit the cycle.

1-24. Exceptional training, though not a component of overmatch, is critical to create smart, fast, lethal, and precise snipers. Training builds proficiency in a progressive, logical, and structured manner and provides snipers with the skills necessary to achieve overmatch against any adversary. Thus, the training program must provide snipers with experience in all the components of overmatch to their fullest extent in the shortest amount of time.

TARGET DETECTION, ACQUISITION, AND IDENTIFICATION

1-25. The first component of overmatch at the sniper level is the ability to detect targets as far away as possible during limited and low visibility conditions. This training circular describes the techniques that enhance the sniper's target detection and acquisition skills. The sniper must be able to detect, acquire, and identify targets at ranges beyond the maximum effective range of their weapon and ammunition.

1-26. TC 3-22.10 also provides key recognition information to build the sniper's skills in correctly identifying potential targets as friend, foe, or noncombatant (neutral) once detected.

Engagement Range

1-27. To ensure small unit success, the sniper requires weapon systems that can effectively engage threats at ranges greater than those of their adversaries. This creates a standoff distance advantage that allows friendly forces to destroy the target outside the threat's maximum effective range.

Limited Visibility

1-28. Snipers must be able to detect, acquire, identify, and engage threats in all light conditions, regardless of the tactical situation. To provide that capability, aiming devices are provided that minimize the effects of limited visibility.

1-29. Image intensifiers and thermal optics provide a significant overmatch capability, but they do have limitations and disadvantages. A general discussion of their capabilities, particularly what those systems can view within the spectrum of light is provided. Snipers must understand what can be "seen" or viewed and what cannot be seen when using their assigned equipment. Understanding the advantages and limitations of their equipment has a direct effect on force protection, fratricide and collateral damage prevention, and maintaining overmatch during tactical operations.

Precision

1-30. The Army Sniper Weapon System must be a complete and functional system to have the greatest success on the battlefield. Commanders must ensure that each individual sniper weapon system is outfitted with the required aiming devices and accessories that enable snipers to deliver effective fire to the threshold of the weapon systems capabilities. The sniper must build the skills to use the complete sniper weapon system effectively to deliver precision fires during tactical engagements.

Speed

1-31. The close fight requires rapid manipulations, a balance of speed and accuracy, and very little environmental concerns. Snipers must move quickly and efficiently through their manipulations of the fire control to maintain the maximum amount of muzzle orientation on the threat through the shot process. The sniper's second-nature efficiency of movement comes only from regular practice, drills, and repetition.

1-32. The foundation of speed of action is built through understanding the weapon, ammunition, ballistics, and principles of operation of the associated aiming devices. Speed is reinforced during drills (appendix D) and the training program of the unit.

1-33. The goal of training to overmatch is to increase the speed at which the sniper detects a threat, identifies it as hostile, and executes the shot process with the desired target effect.

TERMINAL BALLISTIC PERFORMANCE

1-34. Terminal ballistic performance is the actions of a projectile from the time it strikes an object downrange until it comes to rest. The ammunition used with the service rifle performs exceptionally well out to its maximum effective range and beyond. This manual provides information on the various munition types available for training and combat, their capabilities and purpose, and the service (combat) round's terminal ballistic performance.

1-35. Snipers must understand the capabilities of their ammunition, whether designed for training or combat use. The snipers' understanding of the capabilities of the ammunition and the appropriate skills necessary to deliver lethal fires creates a respect for the weapon and ammunition and reinforces the precepts of safe weapons handling.

1-36. Snipers who understand the how and why of their weapon system, aiming devices, and ammunition, coupled with a rigorous training program that builds and strengthens their skills, creates more proficient snipers. The proficiencies and skills displayed during training translate into smart, fast, lethal, and precise snipers for the small unit during decisive action combat operations.

COUNTER ENEMY TARGET ACQUISITION

1-37. Near peer enemies have strengthen their approach to modern warfare. The enemy employs numerous sensors, both aerial and ground based, that give the enemy a real time update on the operational environment.

1-38. The enemy target acquisition cycle uses numerous layers of sensors to feed into their target acquisition cycle. The enemy uses multiple unmanned aircraft system (UAS) platforms and snipers to relay target data to artillery systems for devastating action. The enemy employs electronic warfare systems to detect coalition forces and deny and degrade coalition communication systems. The sniper team must have a foolproof P.A.C.E. matrix plan (see Chapter 2, Planning). The P.A.C.E. (primary, alternate, contingency, and emergency situations) plan assists snipers in working through degraded options, including navigation because the enemy can disrupt global positioning system devices. Snipers must also be cautious of their electronic footprint to avoid electronic detection finding. Snipers must plan and prepare accordingly and use the proper field craft and hide site construction to deter these threats.

1-39. Snipers must be prepared to disrupt this target acquisition cycle by hasty reporting of enemy sensors (chapter 6, Observation And Reporting) and immediately going into the direct fire engagement process (chapter 7, Direct Fire Engagement Process) to eliminate the threat.

Note. Refer to the Center for Army Lessons Learned Handbook, NO 17-09, Russian New Generation Warfare, for more information on the Russian target acquisition cycle.

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Chapter 2

Planning

Chapter 2 prescribes direction for the commander, staff, sniper employment officer, senior sniper, and several aspects of planning a successful sniper operation. Chapter 2 has four sections—the sniper, planning personnel, mission planning, and command and control of sniper teams.

THE SNIPER

2-1. Snipers are intelligent and mature Soldiers who use the application of field craft and camouflage to move into concealed positions that allow them the highest probability for delivering accurate fire onto a target.

2-2. The snipers' ability to engage point targets with accuracy at long range with minimal risk of collateral damage makes them useful in all levels of conflict. Snipers' observation training, long-range optics, and communication skills make them valuable tools for information collection activities.

CORE COMPETENCIES

2-3. A sniper's core competency enhances a unit's firepower and augments the various means for destruction and harassment of the enemy. Whether snipers are organic or attached, they provide units with supporting fire and the ability to gather information in assigned areas from a ground-level perspective.

CHARACTERISTICS

2-4. By regulation, a sniper is a Soldier in 11-series, 18-series, or 19-series military occupational specialties. The sniper is a graduate from an approved U.S. Army sniper course and is awarded the additional skill identifier B4. A sniper possesses an understanding of—

- Field craft.
- Applied ballistics.
- Optical device adjustments.
- Radio operation and communication procedures.
- Map reading and land navigation.
- Information collection and reporting procedures.
- Observation and adjustment of mortar and artillery indirect fires.

SNIPER DISTRIBUTION IN FORCE

2-5. A modified table of organization and equipment establishes the organization and employment of snipers. Snipers are assigned to Infantry brigade combat teams, armored brigade combat teams, Stryker brigade combat teams, and the 75th Ranger Regiment (table 2-1).

Table 2-1. Sniper distribution in force

Brigade Combat Team	*Snipers*	*Number Assigned to Subordinate Units*	*Subtotal*	*Authorized Positions*
IBCT	10	3 HHC Infantry Battalions	30	37 Snipers
	7	1 Headquarters and Headquarters Troop Cavalry Squadron	7	
ABCT	10	3 HHC Combined Arms Battalions	30	30 Snipers
SBCT	3	9 Infantry Company	27	48 Snipers
	7	3 HHC Infantry	21	
75th Regiment	12	12 per Battalion	36	36 Snipers

Legend

ABCT	Armored brigade combat team	IBCT	Infantry brigade combat team
HHC	headquarters and headquarters company	SBCT	Stryker brigade combat team

2-6. The sniper section consists of a section leader and two or three sniper teams, each with two or three snipers. In organizations that do not have a designated sniper employment officer, generally, the sniper section leader performs that function.

2-7. For some missions, the sniper team is assigned a separate security force. Whether the teams consist of two or three Soldiers, all team members should be highly trained in the use of all team equipment.

DUTIES AND RESPONSIBILITES

2-8. Each member of the sniper section has specific responsibilities. Only through repeated practice can the squad begin to function properly.

SNIPER SQUAD LEADER

2-9. The squad leader is the subject matter expert on all sniper-related issues to include training, equipment, weapons, and employment. The position is a skill-level three position. The sniper squad leader is expected to be a master of both marksmanship and reconnaissance.

SENIOR SNIPER (SPOTTER)

2-10. The senior sniper is the team leader who is responsible for the training, employment, and conduct of the team. The position is a skill-level two. The senior sniper executes the orders of the sniper squad leader and is responsible for team planning and accomplishing the assigned mission. The senior sniper has the following duties:

- Responsibility for all team members and equipment.
- Requests and receives supplies.
- Conducts inspections.
- Plans facility setups.
- Plans for evasion contingencies.
- Time management.
- Supervises and spot-checks.

As a spotter—

- Properly identifies targets.
- Accurately calculates the range of the targets based upon the mil reading that the shooter provides.
- Constantly monitors any environmental or specific changes and provides the shooter with accurate corrections.
- Observes or spots the impact of the round and provides immediate corrections for subsequent engagements.

SHOOTER (SNIPER)

2-11. The shooter is a skill level one position and requires the Soldier to be an expert in long-range marksmanship. The shooter—

- Places precise long-range fire on main targets and selected targets of opportunity.
- Correctly executes all phases of the shot process.
- Provides an accurate mil reading of the target.
- Accurately applies corrections provided by the spotter.
- Assists the section leader and senior sniper as necessary.
- Responsible for the terrain model and objective sketches.

OBSERVER (JUNIOR SNIPER)

2-12. The observer's primary job is to provide security and observation while learning marksmanship and reconnaissance. The observer is a skill-level one position prior to becoming a shooter-sniper. The observer—

- Assists the team leader with planning.
- Maintains the team organic light machine gun (M249) if applicable.

RADIO TELEPHONE OPERATOR (JUNIOR SNIPER)

2-13. The radio telephone operator's primary responsibility is to maintain and monitor communications. The radio telephone operator's additional duties are listed below:

- Responsible for all communications equipment.
- Responsible for section operations security.
- Conducts communications exercise.
- Escorts section leader and records information as necessary

PLANNING PERSONNEL

2-14. The company and battalion level planning personnel that support the sniper team are the—

- Sniper employment officer.
- Intelligence officer.
- Combined arms, Infantry battalion, and Cavalry squadron intelligence cell.
- Company intelligence support team.

SNIPER EMPLOYMENT OFFICER

2-15. The sniper employment officer can be the scout platoon leader, intelligence officer (S-2), operations officer (S-3), or sniper squad leader. Preferably, any officer or noncommissioned officer who is a graduate of an approved sniper course or a graduate of the U.S. Marine Corp Scout Sniper Unit Leaders Course at Quantico, VA, fills this position. The sniper employment officer must possess sufficient knowledge in sniper operations. The sniper employment officer assists the commander with–

- A recommendation on at least two possible courses of actions.
- The number of teams needed or available.
- The capabilities and limitations of the available sniper teams.
- The possible methods of insertion and extraction.
- The logistical considerations for the mission.

2-16. The sniper employment officer also coordinates all aspects of the sniper mission. Coordination is a continual process that begins at the mission-planning phase. Coordination encompasses the following areas of concern:

- Selection of the appropriate sniper team (based on availability, skills required, or other specific considerations).
- Quick reaction force element (who, with what capability, where located, mutual recognition signals to avoid fratricide, and so forth).
- Fire support element.
- Adjacent units in the area of operations, particularly with regard to the sniper element mission and position.
- Insertion and extraction element (including method of insertion).
- Resupply methods.
- Reconnaissance and surveillance considerations.

INTELLIGENCE OFFICER

2-17. The intelligence officer and the sniper employment officer work in conjunction to develop actionable intelligence for a specific target or target area. The sniper employment officer liaises with the intelligence officer to produce intelligence products that enhance the sniper team's mission planning. The intelligence officer provides relevant information regarding the enemy. Information regarding the enemy may include—

- Threat characteristics.
- Potential enemy courses of action.
- Pattern of life development.
- Known significant activity within the area.
- Historical data from intelligence, surveillance, and reconnaissance platforms.
- Specific target information (habits).

2-18. The sniper team can use information to develop a predictive and proactive mindset. When planning, snipers need to focus on pre-event indicators. When snipers focus on pre-event indicators, they can predict various outcomes when deployed. Snipers should concentrate on the following:

- Creating a baseline of the target area.
- Observing suspects to establish their typical tactics and procedures.
- Product requests.
- Collection strategies.

COMBINED ARMS, INFANTRY BATTALION, AND CAVALRY SQUADRON INTELLIGENCE CELL

2-19. Combined arms battalion, Infantry battalion, and Cavalry squadron intelligence cells are responsible for providing timely and accurate intelligence to the commander, staff, and sniper team. The battalion S-3 supervises and coordinates information collection (in conjunction with the battalion S-2) and the production, exploitation, and dissemination of intelligence. The battalion intelligence cell—

- Makes analytical predictions on when and where actions may occur.
- Provides analysis on the effects of the operational environment on friendly and enemy courses of action and capabilities.
- Evaluates the enemy in terms of doctrine, threat characteristics, high-value targets and high-payoff targets, capabilities, and vulnerabilities.
- In conjunction with the battalion S-3, coordinates the entire staff's recommended priority intelligence requirements for inclusion in the commander's critical information requirements.
- Integrates staff input to intelligence preparation of the battlefield products for staff planning, decision-making, targeting, and assessment.
- Coordinates with the S-3 and battalion fire support officer to plan and control intelligence operations.

- Collaborates with the geospatial intelligence (GEOINT) cell to obtain products (such as potential overwatch and firing locations that identify fields of view, and terrain or building masking zones) to assist in planning and executing the missions.

2-20. The combined arms battalion, Infantry battalion, and the Cavalry squadron intelligence cell's primary means of collecting information are subordinate maneuver companies, patrols, scout platoons, UASs (such as the Raven and Puma), snipers, Soldier observations, and field artillery forward observers.

2-21. The combined arms battalion and Infantry battalion intelligence cell supervises the incorporation of information or intelligence received from company intelligence support team elements into battalion intelligence products.

2-22. The sniper employment officer is the liaison for the sniper team and works with the combined arms and Infantry battalion intelligence cell to procure all intelligence products for the planning phase of a sniper operation.

2-23. The S-2 area of responsibility also includes brigade level UAS assets (Shadow), and signals intelligence (SIGINT) (such as Prophet, Low-Level Voice Intercept).

Company Intelligence Support Team

2-24. A company intelligence support team provides an analytical, production, and dissemination capability at the company level. The team provides the commander with options to exploit enemy vulnerabilities. A company intelligence support team analysis focuses on the company area of operations, with the ability to report and populate the battalion and brigade combat team (BCT), intelligence databases, and the common operational picture.

2-25. Company commanders may perform basic intelligence tasks associated with planning, directing, coordinating, and controlling forces and operations to accomplish the company's assigned mission. Company commanders organize small intelligence support teams to assist with these tasks.

2-26. The company intelligence support team is the primary filter and analysis center for raw data at the company level. The team describes the effects of the enemy, terrain and weather, and civil considerations on operations. The team's descriptions assist the commander's decision-making by providing intelligence products to the company and the battalion. The company intelligence support team assists the company commander with—

- Developing and maintaining situational understanding and knowledge of the relevant aspects of the area of operations.
- Facilitating the flow of information to and from company elements and the battalion S-2.

SECTION PLANNING

2-27. The sequence of the steps of the troop leading procedures is not rigid. Leaders modify them as required. Higher headquarters issue frequent warning orders to optimize available time for subordinates to conduct their troop leading procedures.

2-28. Planners should carefully plan, coordinate, and execute sniper operations. Unit standing operating procedures and mission checklists are valuable in helping planners concentrate on the unique aspects of the operation.

2-29. The best planning occurs when the commander, intelligence officer, sniper employment officer, and senior sniper engage in an iterative, collaborative process with input and feedback from all participants. This section begins with the sniper capability brief that the sniper employment officer or senior sniper issues to the commander. This is a vital step in the planning process as it informs and explains to the commander what that sniper team can and cannot do.

2-30. Once the capabilities brief is given, the planners identify several key areas that are specific to sniper planning. The planners use the P.A.C.E. matrix to plan for primary, alternate, contingency, and emergency situations. The last phase of planning is the senior snipers brief back to command and the team rehearsals. Once the team has finished their rehearsals and before departure, the sniper employment officer or company intelligence support team issues a patrol pre-briefing.

Note. Refer to ADP 5-0 and ATP 3-75 for more information on troop leading procedures or operation orders.

CAPABILITIES BRIEF

2-31. The capabilities brief gives the ground commander information about the sniper team's capabilities, restrictions, and limitations. A capabilities brief is used each time a new team arrives in the respected area of operation. The sniper team should request a task and purpose from the ground maneuver commander once arriving into the area prior to briefing.

2-32. A capabilities brief must include—

- Manpower available; task organization options.
- Sniper weapon system maximum range day and night to include threshold of night optics.
- Additional weapons and arms room concept; Class V supplies.
- Communication platforms available, frequency modulation/high frequency/tactical/data (known as FM/HF/tactical satellite/data); annotated level of training, and S-2 requirements.
- Security, survivability, actions on chance contact.
- Sustainability class of supply rundown.
- Uniform configuration options.

- Sections experience and historical roles.
- Additional skills organic to some or all members of the team; pathfinder, joint fire observer.

2-33. Items that are not in the capabilities brief but are considerations specific to or required by snipers are listed below:

- Targeting requirements.
- Engagement criteria.
- Prioritize targets, with situational context.
- Compromises.
- Lost communication plan.
- Quick reaction force emergency exfiltration.
- Adequate time provided for infiltration relating to the main effort force's actions on the objective.
- Possible enemy courses of action upon receiving sniper fire.
- Intelligence reports that directly relate to the task and purpose of the sniper.
- Intelligence reports when considering anti-materiel specific employment.
- Fire support dedicated to snipers during certain phases of insertion and infiltration.
- Fire control measures.
- Mutually supported positions.
- Attachments of enablers.

MISSION PLANNING

2-34. Once the commander has been briefed on the capabilities of their sniper teams, the commander can begin integration of snipers into operations.

INTEGRATE SNIPERS INTO OPERATIONS

2-35. Integration is a six-step process, which is described below:

Step 1. PLAN. BCT and battalion leaders gain and maintain situational understanding using available communications equipment, maps, intelligence summaries, situation reports, and other available information sources. Intelligence sources include human intelligence, SIGINT, and imagery intelligence, to include UASs and unattended ground sensors.

Step 2. The battalion commander and staff receive an order or anticipate a new mission that includes the use of snipers and begin the military decision-making process.

Step 3. The battalion commander, staff, the sniper employment officer, and the sniper squad leader plan the employment of snipers using the mission variables of mission, enemy, terrain, troops available, time and civil considerations (METT-TC) as follows:

a. Conduct a digital or conventional map reconnaissance.

b. Update the intelligence preparation of the battlefield.

c. Develop thorough reconnaissance and surveillance plan.

d. Plan sniper employment during course of action development as follows:
   (1) Include the sniper employment officer in course of action development.
   (2) Develop potential sniper engagement priorities and targets.

e. Assign specific targets or specific types of targets.

f. Ensure the prioritization of targets.

g. Determine the best mix of sniper teams.

h. Ensure proper terrain management with unit sniper assets.

i. Develop criteria that would allow sniper(s) to select key targets.

j. Conduct risk assessment.

Step 4. The battalion commander, operations officer (S-3), intelligence officer (S-2), fire support officer, sniper employment officer, or sniper squad leader brief sniper(s) on the current situation and mission as follows:

a. Purpose of each task.

b. Priority of targets.

c. ROE and special instructions.

d. Description of the effects or results the commander expected.

e. The staff section briefs the sniper team leader and provides the following information:
   (1) Identification of the enemy unit(s).
   (2) Weather and light data for the expected duration of the mission.
   (3) Terrain updates (aerial photos, trails, and obstacles not on map).
   (4) Locations, strength, weapons, and possible courses of action of the enemy in the sniper area of operations.
   (5) Recent enemy activity and reaction time of reaction forces.
   (6) Civilian activity in area.
   (7) Priority intelligence and information requirements.
   (8) Challenges and passwords for the expected duration of the mission.
   (9) Changes in the friendly situation.
   (10) Infiltration and exfiltration plan included (as applicable):
      (a) Route.
      (b) Landing zone.
      (c) Pickup zone.
      (d) Linkup procedures.
      (e) Departure and reentry of forward units.

(11) Communications including frequencies, call signs, and communications security requirements.

(12) Special equipment requirements, if required.

(13) Adjacent units operating in the area of operations.

(14) Rehearsal areas.

Step 5. PREPARE. The battalion commander and staff prepare fires to support the sniper team leader and provide the following information:

a. Routes to and from the objective (including alternate routes).

b. Times of departure and expected times of return.

c. Target list (fire plan).

d. Fire support available such as artillery, mortar, naval gunfire, and aerial.

e. Ammunition available (to include different fuses).

f. Priority of fires.

g. Control measures and communications for fire support.

Step 6. EXECUTE. The battalion controls sniper teams.

2-36. The battalion staff, the sniper employment officer, or the sniper squad leader debriefs snipers upon completion of assigned mission.

EMPLOY SNIPERS AT PLATOON AND COMPANY LEVEL

2-37. The below describes how to assign snipers at the platoon or company level.

1. PLAN. Unit leaders gain and maintain situational understanding using available communications equipment, maps, intelligence summaries, situation reports, and other available information sources. Intelligence sources include company intelligence support teams, human intelligence, SIGINT, and imagery intelligence to include UASs and unattended ground sensors.

2. The unit leader receives an operations order or fragmentary order, issues the warning order to the unit, and begins conducting troop leading procedures.

3. The unit leader confirms friendly and enemy situations as follows:

   a. Receives an updated digital report showing the location of forward and adjacent friendly elements, if applicable.

   b. Receives an updated enemy situational template for added fratricide prevention and increased force protection, if applicable.

   c. Clarifies priority intelligence requirements.

   d. Confirms any changes to the higher headquarters and unit task or purpose.

   e. Confirms any changes to the scheme of maneuver.

4. The unit leader plans employment of snipers as follows:

   a. Conducts analysis based on factors of METT-TC.

   b. Considers the enemy's capabilities, likely courses of action, and specific weapons capabilities.

   c. Conducts a digital and conventional map reconnaissance.

   d. Selects and prioritizes targets (unless higher headquarters has assigned targets).

   e. Plans and coordinates sniper supply and resupply.

   f. Organizes sniper team as necessary to accomplish the mission and compensate for combat losses.

   g. Addresses actions on chance contact with the enemy.

   h. Coordinates and synchronizes activities within each warfighting function.

5. The unit leader disseminates digital reports (if applicable), overlays, and other pertinent information to each element to keep them abreast of the situation.

6. PREPARE. The unit conducts rehearsals as necessary.

7. EXECUTE. The unit employs snipers according to the mission as follows:

   a. During offensive operations, the sniper team performs the following tasks:

      (1) Conducts countersniper operations.

      (2) Conducts offensively oriented reconnaissance operations.

      (3) Overwatches movement of friendly forces and suppresses enemy targets that threaten the moving forces.

      (4) Places precision fire on enemy crew-served weapons teams and into exposed apertures of bunkers.

      (5) Places precision fire on enemy leaders, armored-vehicle drivers or commanders, forward observers, and other designated personnel.

      (6) Places precision fire on small, isolated, bypassed forces.

      (7) Places precision fire on targets threatening a counterattack or fleeing.

      (8) Assists with screening a flank using supplemental fires.

   b. During defensive operations, the sniper team performs the following tasks:

      (1) Covers obstacles, minefields, roadblocks, and demolitions.

      (2) Performs counterreconnaissance, that is, identifies or destroys enemy reconnaissance elements.

      (3) Engages enemy observation posts (OPs), armored vehicle commanders exposed in turrets, and antitank guided missile teams.

      (4) Damages enemy vehicles' optics to degrade their movement.

      (5) Suppresses enemy crew-served weapons.

      (6) Disrupts follow-on units with long-range small-arms fire.

   c. During stability operations, the sniper team performs the following tasks:

(1) Engages dissidents involved in activities such as hijacking, kidnapping, and hostage taking according to ROE.

(2) Conducts countersniper missions.

(3) Conducts surveillance, records, and reports all suspicious activity in the area of observation.

(4) Provides fire support and covering fire to supported units.

8. Unit leader determines effectiveness of sniper mission and provides situation reports to higher headquarters.

9. Unit continues operations as directed.

2-38. The commander and planning staff consider the following:

- Rules of engagement (consistent with moral principles of the Army Ethic).
- Planning matrix (P.A.C.E.).
- Target intelligence.
- Sniper and sniper weapon system performance.
- Equipment.
- Team attachments.
- Insertion and infiltration.
- Hide requirements.
- Compromise (hard and soft).
- Exfiltration and extraction.

RULES OF ENGAGEMENT FOR SNIPER OPERATIONS

2-39. *Rules of engagement* are directives issued by competent military authority that delineate the circumstances and limitations under which U.S. forces will initiate and/or continue combat engagement with other forces encountered (JP 1-04).

2-40. The ROE directs how a commander or individual Soldier may use force to achieve military objectives. Normally, combatant commanders issue specifically tailored ROE for each authorized operation and area of responsibility. For each mission or task, a subordinate commander can further restrict the use of lethal force, but cannot override the ROE of the higher command to make them less restrictive. The ROE impose political, practical, and legal limitations upon commanders and snipers.

2-41. Commanders must develop specific ROE for sniper operations. The greatest utility can be gained from snipers if they have distinct and separate ROE that are both sniper and mission specific.

2-42. The ROE should be written as a collaborate effort between the commander, the brigade legal officer, and the sniper employment officer. If a sniper team is sent to observe and engage a person emplacing an improvised explosive device, triggerman, or an enemy mortar team and its equipment at a points of origin site, the sniper team normally is given mission command orders stating the commander’s intent. The mission command orders authorize the sniper team to use their best judgment whether to engage the enemy without resorting to a time-consuming and complex command and control procedure authorizing the use of deadly force. Overly restrictive ROE hinders the combat effectiveness of the sniper team trying to accomplish their mission.

PLANNING MATRIX

2-43. Every aspect of the plan has P.A.C.E. planning (figure 2-1). The P.A.C.E. matrix is a simple-to-use planning tool that designates the order in which the sniper team moves through their plan. As problems arise, the sniper team works through the degraded options, always looking at ways to regain the lost alternatives. The P.A.C.E. matrix also states specific mission criteria and actions on a hard or soft compromise.

	PRIMARY	ALTERNATE	CONTINGENCY	EMERGENCY
	Mission Dependent	Mission Dependent	Based on SOP	Based on SOP
INFIL				
COMM				
CASEVAC				
QRF				
FIRES				
DAY N/F				
NIGHT N/F				
RESUPPLY				
E&E				
EXFIL				

Engagement Criteria	
Extraction Criteria	
Compromise - HARD	
Compromise - SOFT	

Legend

CASEVAC	casualty evacuation	FIRES	fires available
COMM	communications	INFIL	infiltration
E&E	escape and evasion	N/F	near and far
EXFIL	exfiltration	QRF	quick reaction force
		SOP	standard operating procedure

Figure 2-1. P.A.C.E. chart

TARGET INTELLIGENCE

2-44. Commanders must base their decisions to employ a sniper team on solid intelligence of the target area. The commander must consider the current threat and whether suitable targets can be identified within the target area; therefore, leaders must provide the sniper team with the most current target information available. The information must include specifics about enemy locations, equipment, strengths, capabilities, composition, and possible courses of action.

Target Information

2-45. Target information folders have proven to be an efficient and effective way of tracking information related to high-value individuals. Normally, the target information folders include a summary of the key information on the high-value individual. Information included is listed below:

- Map of area.
- Picture of high-value individual.
- Personal history of high-value individual.
- Patterns of life for high-value individual includes the where, when, who, what, and the how.
- Vehicle identification.

Position Packet

2-46. The position packet is important to the sniper team as it gives insight to their occupation position. The packet is built through the course of daily patrols as listed below:

- Close target reconnaissance.
- Cordon and knock.
- Census operations.
- The packet should include—
  - Grid location of position.
  - Household family information.
  - Fields of fire.
  - Infiltration/exfiltration routes.
  - Building floorplan.
  - Compromise plan and alternate positions.
- Photographs.

2-47. In addition to target descriptions, the sniper team must have other information about the area, such as aerial photographs, terrain depictions, and meteorological and environmental conditions of the target area.

2-48. The sniper team uses the employment of intelligence assets to assist them in acquiring the data mentioned above. Intelligence personnel have the primary responsibility of assisting the commander with making informed decisions through intelligence production and analysis, which describe the enemy, terrain, weather, and civil considerations to answer information requirements.

Create a Baseline of the Target Area

2-49. The sniper should have an understanding of patterns of life and daily activities. Life pattern analysis is connecting the relationships between places and people by tracking their patterns of life. While the enemy moves from point to point, reconnaissance or surveillance tracks and notes every location and person visited. Connections between those sites and persons to the target are built, and nodes in the enemy's network emerge. Link analysis and life pattern analysis identify these relationships to complete the targeting folder.

Product Request

2-50. The sniper employment officer needs to have a firm understanding of how to facilitate intelligence assets and employ them correctly. The sniper employment officer should request a capability briefing from organic BCT intelligence assets that can clearly identify what the asset can provide and the limitations the asset faces. The intelligence staff should manage all intelligence requests for information.

Collection Strategies

2-51. The sniper employment officer and intelligence officer can create a table to illustrate which information collection activities can provide support. The list is not all inclusive and is intended to provide examples of information collection capabilities to satisfy information requirements associated with specific problem sets. The sniper employment officer and intelligence officer have production requirements, collection requirements, or both.

Geospatial Intelligence

2-52. Data obtained from sensors (such as UASs or aerial reconnaissance) can be extremely helpful to the sniper team. Snipers can request GEOINT support to task UAS assets to conduct aerial reconnaissance of routes within their objective areas. UASs can focus on entry points to assist snipers in developing the threat situation, such as obstacles, ambush positions on rooftops, or movement of threat personnel as they approach their infiltration point. GEOINT cells are an asset to counter sniper operations (see example).

Finding Snipers

A GEOINT cell received a request from S-3 to conduct analysis of an urban area for potential enemy sniper positions. The GEOINT cell officer in charge tasked geospatial engineers to conduct line-of-sight analysis and identify avenues of approach and mobility corridors. The geospatial engineers generated light detection and ranging products and reverse line-of-sight products to determine most likely locations of past activities as well as potential future sniper positions. GEOINT imagery analysts collected high-resolution electro-optical imagery and exploited ground moving target indicator data to assess activity trends and determine chokepoints along the routes. The GEOINT cell produced three-dimensional models showing potential target areas and the position from which an enemy sniper could strike. This provided the staff, patrol leaders, and convoy commanders with an effective tool to reduce risk on the ground.

2-53. GEOINT can also provide significant details about the operations area including locations of potential hide sites, infiltration and exfiltration routes, imagery for target area, and intelligence, surveillance, and reconnaissance feeds.

2-54. Analysis can involve determining fields of view or lines of sight. With line of sight, an analyst picks two points and asks whether one is visible from the other. The program displays the elevation profile between those two points. A field of view is the area that an observer, such as the sniper, could see around their position.

2-55. The sniper team can use or request specific products to assist them in thorough planning. These products and services can be used before an upcoming deployment (stateside) or while deployed. Some products that the sniper should learn to use are—

- BuckEye.
- Urban tactical planner.
- Light detection and ranging.
- Geospatial information library.
- Manual of environmental effects.
- Military capabilities study.

BuckEye

2-56. The BuckEye mission is to rapidly collect, process and distribute unclassified high resolution and high accuracy color imagery and elevation data. BuckEye collected over 85,000 square kilometers in Iraq, and has collected over 160,000 square kilometers in Afghanistan. BuckEye's requirements and tasking are controlled at the theater command level. A majority of the imagery and light detection and ranging is processed in-theater to provide rapid tactical response.

Urban Tactical Planner

2-57. The urban tactical planner assists the planning and visualization of military operations in the world's urban areas. The urban environment is displayed as an aggregate of features that affect urban area operations, such as building form and function (broken out as polygons of like-building types), building height, vertical obstructions, terrain feature, bridges, lines of communication, key cultural features, landmarks, and so forth. These features are shown as themes or layers that can be displayed, on-or-off, as decided by the user.

Light Detection and Ranging

2-58. Light detection and ranging sensors provide high resolution and high accuracy three-dimensional geospatial data. U.S. forces can use Light detection and ranging for improved situational awareness, battlefield visualization, mission planning, and force protection.

Geospatial Information Library

2-59. The Geospatial Information Library focuses on physical geography, terrain analysis, and military hydrology, and provides support to all authorized Army, Department of Defense, and other government organizations. Access to the Geospatial Information Library is restricted to personnel with a secret (or above) security clearance. Uncleared personnel may submit requests for research and information services and to have access to all unclassified materials.

Manual of Environmental Effects

2-60. The manual provides basic environmental effects and associated climatic and terrain information on military operations for a given country or region. The manual of environmental effects contains vast amounts of information about areas of interest to the Department of Defense.

Military Capabilities Studies

2-61. The strategic-scale study provides information on the physical environment of a country including data on terrain, climate, geology, soils, vegetation, hydrology, conditions effecting cross country movement, and limiting factors of terrain.

Note. The U.S. Army Geospatial Center offers the products and services discussed above. The Army Geospatial Center Combined Arms Center site is a geospatial data repository and information resource for many of the programs and products available at the Army Geospatial Center. The center provides users immediate access to datasets in an easy to navigate structure that is available on their website.

WEATHER

2-62. The U.S. Air Force weather team is the main source of weather support for the BCT. The best weather predictions prove ineffective if more than 48 to 72 hours out. Therefore, the sniper team and sniper employment officer should have a thorough understanding of how weather and changes in weather patterns can affect their respective warfighting function and equipment.

TOPOGRAPHY

2-63. Topography can have an important effect on both the direction and speed of winds. Frictional effects due to rough terrain can slow wind speeds and change their direction. Mountains upstream may delay or block winds or trigger strong downslope winds.

Note. Appendix C covers effects of terrain on wind in greater detail.

TRENDS

2-64. If the air mass and pressure systems affecting the area of interest are not expected to change, use persistence for short-term forecasting. This is especially true in tropical locations where conditions remain much the same from day-to-day. In these locations, diurnal variations in winds usually dominate. Trend charts are excellent tools to track and forecast persistent winds.

CLIMATOLOGY

2-65. Climatology is a useful tool for forecasting winds. Climatology provides historic averages of wind speed and direction over a period of years. Consult it first to identify prevailing winds for the location and time of interest. Climatological winds can be retrieved from several sources, including the following:

- Operational climate data summary. This product has climatology for wind directions, wind speed, cloud coverage, precipitation, and temperature for any given month.
- Modeled diurnal curves. This is a tool that uses current conditions and climatology to forecast expected changes in a 24-hour period. Before submitting a request, contact the first Air Force staff weather office within the chain of command.

Note. The tools noted above can be obtained from the Air Force Weather Technical Library, collocated with the Air Force Combat Climatology Center.

SUNRISE AND SUNSET OVERLAY

2-66. A sunrise and sunset overlay is a graphic representation of the angle to the rising and setting sun and the objective. A sunrise and sunset overlay enables a team to plan a line of advance or tentative hide sites to take the best advantage of the light. The sniper team tries to maximize the effects of the sunlight by placing the light in the enemy's eyes, thus preventing detection during movement or while in the hide site.

2-67. If the sniper has access to the Internet, they can use the National Oceanic and Atmospheric Administration solar calculator to find the sunrise, sunset, solar noon, and solar position for any place on earth.

2-68. Another option for the sniper is the table in TC 18-32, para 2-25. The table shows the true azimuth of the rising sun and the relative bearing of the setting sun for all months of the year.

SNIPER AND WEAPON PERFORMANCE

2-69. Leadership tests snipers in crosswind estimation, range to target estimation, and assesses the snipers' rifles precision (grouping ability) and ammunition velocity consistency (by using a chronograph to evaluate a current lot of ammunition). Leadership then assigns snipers to one of three confidence zones seen in table 2-2.

Table 2-2. Confidence zone

Confidence Zones for Sniper
High Confidence
Medium Confidence
Low Confidence

EXAMPLE

Sniper can read wind and range estimate with medium confidence. Sniper can maintain a high confidence for rifle estimation (.5 minute of angle [MOA]) group when zeroing) and by using a chronograph to evaluate their ammunition, they annotate that current lot has a standard deviation in the low zone (20 standard deviation). Sniper would be assigned a **MEDIUM CONFIDENCE LEVEL**.

2-70. A sniper with a high confidence rating can be expected to deliver a more accurate shot than a sniper with a low confidence rating. Commanders must assess their snipers on a routine basis using the integrated weapons training strategy for each sniper weapon system to successfully gauge their effectiveness. Refer to TC 3-20.0 for more information.

2-71. Commanders and sniper employment officers can assess a sniper's probability of successfully hitting the intended target by using the zone confidence table (table 2-3) and the weapon performance tables (table 2-4 and table 2-5, page 2-23) to establish a baseline performance metric.

Table 2-3. Zone confidence table

VARIABLE UNCERTAINTY LEVELS	*CONFIDENCE*		
	High	*Medium*	*Low*
Crosswind estimation	+/- 1 mph	+/- 2.5 mph	+/- 4 mph
Range estimation	+/- 1 m	+/- 10 m	+/- 50 m
Rifle estimation	0.5 MOA	1.0 MOA	1.5 MOA
Velocity consistency	10 fps SD	15 fps SD	20 fps SD

Legend

fps	feet per second	MOA	miunute of angle
m	meter	SD	standard deviation
mph	miles per hour		

2-72. The crosswind confidence level is defined as high, medium, and low. Less than 1 percent of snipers have the ability to routinely estimate the wind speed value to within 1 mile per hour. The average trained sniper should expect to be within 2 miles per hour on most engagements.

2-73. The range estimation confidence level is defined as high (sniper using a laser range finder [LRF]), medium (expert use of ranging reticle), and low (average use of ranging reticle).

2-74. The rifle estimation is represented by the mean group size (5-round shot group) that the sniper is capable of at close range (100 meter zero) expressed in minute of angle.

2-75. Standard deviation characterizes the variation in muzzle velocity of the ammunition. The sniper, using a chronograph for the sniper's respected rifle and ammo, can obtain this metric.

M110 Semiautomatic Sniper System

2-76. Table 2-4 can assist with assessing the performance of the M110 and AA11 ammunition. The modeling for Table 2-4 has the following constants:

- Range uncertainty is modeled at +/- 5 meters and +/- 50 meters to represent instrumented (LRF) and noninstrumented (mil reading) ranging.
- Wind uncertainty is modeled at +/- 1 mile per hour and 5 +/- miles per hour to represent easy and difficult wind conditions.
- E-type body (width of target 19.5 inches by height 29.5 inches [from end of neck line to bottom]) and 10-inch target sizes are modeled to represent hit percentages against full body versus head- and chest-sized vital zones.
- Environment modeled in is wind from 9 o'clock at 5.0/10 miles per hour. Temperature is 59 degrees, pressure at 29.92 inches hectogram, humidity is 50 percent.
- Azimuth is 90 degrees and inclination is 0 degree.

2-77. The parameters for the M110 are—

- The M110 is modeled with the inherent precision of 1 MOA.
- The standard deviation of muzzle velocity is modeled at 15 feet per second to represent the consistency of the loaded ammunition.
- Twist rate is 1:11 right.
- Zero range is 100 meters.
- The ballistic coefficient is .475 G1 scale for drag curve.
- The muzzle velocity is 2570 feet per seconds.

Table 2-4. M110 performance model

M110 with AA11 ammunition 175 grain BTHP at 2570 fps									
Wind est. error	+/-1 mph				+/- 5 mph				
Range est. error	+/- 5 meters		+/- 50 meters		+/- 5 meters		+/- 50 meters		Energy ft-lb
Target	E-type	10 inch	E-type	10 inch	E-type	10 inch	E-type	10 inch	
100 m	100%	100%	100%	98%	100%	100%	100%	98%	2180
200 m	100%	100%	98%	54%	100%	97%	98%	47%	1841
300 m	100%	100%	81%	28%	96%	65%	76%	18%	1545
400 m	100%	94%	60%	15%	74%	37%	43%	7%	1288
500 m	100%	72%	42%	8%	51%	20%	22%	3%	1069
600 m	97%	48%	29%	5%	35%	11%	12%	2%	884
700 m	87%	30%	19%	3%	25%	6%	7%	1%	733
800 m	72%	18%	12%	2%	18%	4%	4%	1%	612
900 m	56%	11%	8%	1%	13%	2%	2%	0%	520
1000 m	41%	7%	6%	1%	9%	1%	1%	0%	454
1100 m	30%	5%	4%	1%	6%	1%	1%	0%	405
1200 m	22%	3%	3%	0%	5%	1%	1%	0%	368
	Best Case						Worst Case		

Legend

BTHP	boat tail hollow point	lb	pound
est	estimation	m	meter
ft	foot	mph	miles per hour
fps	feet per second		

Note. The percentage value is the probability of hitting the type of target listed with the combined estimation errors of wind and range. This does not include errors that could be induced from the sniper such as rifle cant error or poor fundamentals. The chart (table 2-4 above) allows the leadership to establish a baseline of weapon effectiveness based on the parameters of the M110 and the sniper's ability to range a target and make a wind call.

M2010 Enhanced Sniper Rifle

2-78. Table 2-5 can assist with assessing the performance of the M2010 and A191 ammunition. The modeling for the following table has the following constants:

- Range uncertainty is modeled at +/- 5 meters and +/- 50 meters to represent instrumented (LRF) and noninstrumented (mil reading) ranging.
- Wind uncertainty is modeled at +/- 1 miles per hour and 5+/- miles per hour to represent easy and difficult wind conditions.
- E-type body (width of target at 19.5 inches by height of 29.5 inches [from end of neck line to bottom]) and 10 inch target sizes are modeled to represent hit percentages against full body versus head- or chest-sized vital zones.
- Environment modeled in is; Wind from 9 o'clock at 5.0/10 miles per hour. Temperature is 59 degrees, pressure at 29.92 inches hectograms, humidity is 50 percent.
- Azimuth is 90 degrees and inclination is 0 degree.

2-79. The parameters for the M2010 are—

- The M2010 is modeled with the inherent precision of 1 minute of angle.
- The standard deviation of muzzle velocity is modeled at 15 feet per second to represent the consistency of the loaded ammunition.
- Twist rate is 1:10 right.
- Zero range is 100 meters.
- The ballistic coefficient is .523 G1 scale.
- The muzzle velocity is 2985 feet per second.

Table 2-5. M2010 performance model

M2010 with A191 ammunition 190 grain BTHP at 2985 fps									
Wind est. error	+/-1 mph				+/- 5 mph				
Range est. error	+/- 5 meters		+/- 50 meters		+/- 5 meters		+/- 50 meters		Energy ft-lb
Target	E-type	10 inch	E-type	10 inch	E-type	10 inch	E-type	10 inch	
200 m	100%	100%	100%	73%	100%	100%	100%	69%	2833
300 m	100%	100%	94%	43%	99%	80%	93%	31%	2445
400 m	100%	98%	79%	26%	88%	51%	67%	14%	2100
500 m	100%	88%	62%	15%	66%	31%	40%	7%	1794
600 m	99%	69%	47%	9%	48%	19%	23%	3%	1525
700 m	96%	49%	34%	6%	35%	12%	14%	2%	1290
800 m	88%	33%	24%	4%	26%	7%	8%	1%	1087
900 m	77%	22%	16%	2%	20%	5%	5%	1%	915
1000 m	63%	15%	11%	2%	15%	3%	3%	0%	772
1100 m	50%	10%	8%	1%	11%	2%	2%	0%	657
1200 m	38%	6%	6%	1%	8%	1%	1%	0%	567
1300 m	28%	4%	4%	1%	6%	1%	1%	0%	500
1400 m	21%	3%	3%	0%	4%	1%	1%	0%	450
1500 m	16%	2%	2%	0%	3%	0%	0%	0%	411
	Best Case						Worst Case		

Legend

BTHP	boat tail hollow point	lb	pound
est	estimation	m	meter
ft	foot	mph	miles per hour
fps	feet per second		

Note. The chart (table 2-5 above) allows the leadership to establish a baseline of weapon effectiveness based on the parameters of the M2010 and the sniper's ability to range a target and make a wind call. At 100 meters the performance was consistent at 100 percent.

EQUIPMENT

2-80. The sniper team tailors their equipment based on the duration, type, and terrain of the mission. The commander needs to have an understanding of the equipment that the sniper team uses so as not to reject the teams supply request. Instead, the commander considers how the use of these devices (optics, thermal, night vision devices [NVDs], lasers) contribute not only to their precision marksman mission, but also their information collection mission which can contribute greatly to the overall intelligence, surveillance, and reconnaissance mission of the BCT.

2-81. Sniper weapon systems, optics, ancillary equipment, and consumable supplies are all available in the Army logistic system. Spare parts for low-density but essential sniper equipment must be managed to the same degree that commanders manage large mission-essential end items. Commanders at all levels should exert the necessary command emphasis to make the Army supply system work for the sniper as effectively as it works for the aviator, tanker, and engineer.

2-82. From urban climbing ladders, to mountaineer kits, the sniper team must rehearse with terrain specific equipment prior to departure. The team needs to designate specific personnel to carry and use such equipment. The commander needs to send snipers to schools to prepare the team on using the equipment in a safe and efficient manner.

2-83. The sniper team can request the advanced sniper accessory kit to procure items needed to perform their mission. The advanced sniper accessory kit is updated continuously with new products.

TEAM ASSETS

2-84. Team assets are a vital part to enhancing the lethality or observation of the sniper team. Within the BCT, the commander and sniper employment officer can augment the sniper team with specific enablers such as—

- Joint terminal attack controller.
- Tactical air control party.
- Forward observer.
- Joint fire observer.
- SIGINT.
- Gray Eagle.
- Long range multisensory.

JOINT TERMINAL ATTACK CONTROLLER

2-85. A *joint terminal attack controller* is a qualified (certified) service member who, from a forward position, directs the action of combat aircraft engaged in close air support and other offensive air operations. Also called JTAC (JP 3-09.3). A qualified and current joint terminal attack controller is recognized across the Department of Defense as capable and authorized to perform terminal attack control.

TACTICAL AIR CONTROL PARTY

2-86. A *tactical air control party* is a subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft. Also called TACP (JP 3-09.3).

Forward Observer

2-87. A *forward observer* is an observer operating with front line troops and trained to adjust ground or naval gunfire and pass back battlefield information. (Also called FO) (JP 3-09).

Joint Fires Observer

2-88. A *joint fires observer* is a trained Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 close air support terminal attack control, and perform autonomous terminal guidance operations. Also called JFO (JP 3-09.3).

Signals Intelligence

2-89. A tactical SIGINT team with low-level voice intercept capabilities can provide the sniper team and adjacent teams with the information ability within the area.

2-90. Low-level voice intercept can provide real time information and direction findings to the commander. The sniper team can provide line of sight information and in conjunction with the low-level voice intercept, can be used to find, fix, and finish in the find, fix, finish, exploit, analyze, and disseminate process.

2-91. If used properly, the low-level voice intercept can augment the sniper team by—

- Static operations. The low-level voice intercept can monitor and direct enemy communications to the team.
- Overwatching mounted or dismounted patrols. The low-level voice intercept and sniper team can monitor the infiltration and exfiltration routes of the maneuver force and gain insight into suspected insurgent early warning networks.
- Mounted deception operations. Overwatching a smaller element that has detached from the main element to stimulate enemy chatter.

Gray Eagle

2-92. The Gray Eagle's capabilities give the sniper team the advantage to speak directly with the UAS. The Gray Eagle team can tell them what is happening right then and there, and even show them what the Gray Eagle sees with the help of the One System Remote Video Terminal. This system allows an individual, usually a team leader or attached enabler, to view a Gray Eagle's camera feed on a special laptop.

Long Range Multisensory

2-93. The sniper team can augment their effectiveness by attaching to, or working in conjunction with a mounted or dismounted Long Range Scout Surveillance System. The ability to combine a powerful optic with the low collateral damage producing sniper team is an asset in population centric environments.

2-94. The Long Range Scout Surveillance System is a long range multisensory system designed for use by the U.S. Army platforms in surveillance and reconnaissance missions. The Long Range Scout Surveillance System provides in real-time, in day, night, and in adverse weather conditions the capability to detect, recognize, identify, and pinpoint far target locations. The system consists of a second generation forward-looking infrared television camera, global positioning system interferometer, and an eye safe LRF. The Long Range Scout Surveillance System can be mounted either on armored ground vehicles, such as the high-mobility multipurpose wheeled vehicle, M1, M2, and Stryker, or used on a tripod for dismounted missions.

2-95. The Long Range Scout Surveillance System can establish target location coordinates up to 10 kilometers. The laser rangefinder is capable of range measurements to within 5 meters of accuracy.

Urban Terrain, Iraq, November 2004

Task Force 2-2 Infantry, 3rd Brigade, 1st Infantry Division participated in the battle of Fallujah in November 2004. The reconnaissance troop of this brigade combined the seeing power of the long-range scout surveillance system with the shooting power of the M107 .50 caliber rifle to engage insurgents in rooftop positions at ranges of up to 1200 meters. The Soldier behind the long range scout surveillance system spotted for and adjusted the fire of the sniper.

INSERTION

2-96. Insertion and infiltration are not the same. Insertion is the route the insert platform (vehicle, helicopter, ship) takes to the insert point, such as a series of waypoints along a flight plan. Insertion is an extremely dangerous phase of the sniper operation. The risk of enemy contact on the insertion platform is high when operating in a hostile area.

2-97. The sniper team prepares an insertion plan before departure. The method of insertion selected depends on METT-TC. The team considers terrain, enemy detection methods, and the route with the least chance of detection. Once they finalize the insertion plan, the sniper team develops a detailed assembly plan based on the insertion method and the terrain at the insertion site. Upon reaching the insertion site, the sniper team performs the following actions.

2-98. The sniper team selects an assembly area they can identify at night and is near the insertion site. They use this assembly area if team members get separated during the insertion.

2-99. The sniper team designates an initial rally point they can identify at night. Normally, the rally point is at least several hundred meters or yards from the insertion site. If attacked on insertion, or shortly after departing the insertion site, the team assembles in the initial rally point.

2-100. When the insertion is complete, the sniper team accounts for equipment and supplies and treats any injuries. The sniper assesses mission capability at that time.

2-101. The sniper team's most critical task is to verify their location. The sniper either does this at the insertion site or after moving away from the site.

> ***Note***. The sniper team sterilizes the site and caches or discards nonessential equipment. The preferred method is to bury discards away from the insertion site. The sniper team must camouflage the cache site.

2-102. The three types of insertions that the sniper team can use to successfully insert themselves into the area of operation are—

- Air insertions.
- Water insertions.
- Land insertions.

AIR INSERTIONS

2-103. The fastest way to insert is by air. Sniper teams and equipment can insert by parachute using the static line or freefall technique, by fixed wing (air landing) or by helicopter (air landing, rappelling, or parachuting).

Air Movement Plan

2-104. The selection of pickup zones or landing zones requires adequate planning and coordination for effective use of air assets. The sniper team and command must establish an air movement plan.

2-105. An air movement plan coordinates the movement of the team into the zone of action in a sequence supporting the landing plan. Key considerations are flight routes, air movement tables, flight formation, in-flight abort plan, altitude, and airspeed.

Drop Plan

2-106. The landing plan introduces the team into the target area at the proper time and place. The team rehearses all contingencies before the mission. The team rapidly assembles, reorganizes, and leaves the insertion site. Deception or pattern of life techniques, such as utilizing regularly occurring supply runs, may also be used to disguise air drops.

Assembly Area

2-107. The sniper team must be able to assemble and reorganize quickly and precisely because the assembly area is vulnerable to detection. The sniper team develops assembly plans after carefully considering METT-TC, especially the location of the enemy, visibility, terrain, drop zone information, dispersion pattern, and cross-loading. The team can use terrain association as an alternate method for designating assembly areas.

WATER INSERTIONS

2-108. Water insertion includes swimming, small boats or other surface craft, helocasting, or a combination thereof. The sniper team needs detailed information to plan and execute a small boat landing, which is the most difficult phase of a waterborne insertion. Close coordination is required with naval support units.

Water Movement Plan

2-109. While on the transporting craft, the team plans for all possible enemy actions and weather. The accurate timing of each event is critical to the success of the operation.

2-110. Helicopters launched from a ship may extend the range of sniper teams. They may be vectored from ships to a predetermined landing zone. Once in the air, landing and assembling are the same as for air movement operations.

2-111. Helocasting combines a helicopter and small boat in the same operation. It is planned and conducted much the same as air movement operations, except the landing zone is in the water. While a helicopter moves at low levels (unit SOP and safety guidelines) and low speeds (unit SOP and safety guidelines), the sniper team launches a small boat and enters the water. Members then assemble, climb into the boat, and continue the mission.

2-112. Initial planning includes the following:

- Schedule, a list of all events is used as a planning guide.
- Embarkation points, where the team enters the transporting craft.
- Drop site, the site where the team leaves the primary craft and loads into a smaller boat.
- Landing site, where the team beaches the boat or lands directly from the amphibious craft.
- Loading, loads and lashings according to unit SOPs, emphasis is on waterproofing. Supervisors must perform inspections.

Drop Plan

2-113. Primary and alternate drop sites must be agreed upon. The drop site should be far enough away from the objective area to prevent compromise from noise during the drop. However, some operations may permit landing directly from the transporting craft onto the shore.

2-114. The beach landing site must allow for undetected approach, insertion, and exit. When possible, the team avoids landing sites that cannot be approached from several different directions. If sand beaches are used, tracks and other signs that may compromise the mission must be erased. Rural, isolated areas are preferred. Other factors considered in each selection include—

- Enemy dispositions.
- Distance to the target area.
- Characteristics of landing and exit sites.
- Availability of cover and concealment.

Assembly Area

2-115. The team must consider the following when planning the assembly area at the landing site:

- Actions during movement to the beach.
- Noise and light discipline.
- Navigational techniques and responsibilities.
- Actions on the beach.
- Plan for unloading gear off the boats and personnel debarkation from the boat.
- Plan for disposal or camouflage of boats.

LAND INSERTIONS

2-116. Land insertion is the most common method of sniper insertion. The sniper team can be inserted by the following methods—

- Mechanized.
- Foot mobile.
- Leave behind.

Mechanized

2-117. Mechanized insertion method is the departure of friendly lines in a military vehicle and being inserted inside or in the vicinity of the target area.

Foot Mobile

2-118. Another common method of land based insertion for the sniper team is the simple departure of friendly lines and foot patrol to the tentative hide site position. Inserting by foot is the simplest method of insert and generally requires little to no outside assistance from other units. Assuming the patrol is conducted at night, it is also the stealthiest method. However, the sniper team is limited in firepower and vulnerable while in route to the hide.

Leave Behind

2-119. The sniper team can also employ a deceptive tactic to be inserted into a target area. This method has the sniper team accompany a maneuver element, which conducts a cordon and search of the area, a regular patrol, and a supply run. During this time the sniper team blends in with the patrol and enters a building or an area of cover and concealment and remains behind once the maneuver element departs. This method does have drawbacks, as the large presence of force could keep the area on high alert and under enemy observation.

INFILTRATION

2-120. Infiltration is a high-risk patrol movement, requiring low-light, low-signature mobility through various terrain and at times in close proximity to civilians and combatants. Team SOP refinement, team rehearsals conducted day and night with kit and communication (with P.A.C.E. planning), and solid patrol discipline by all team members ensures successful infiltration without detection.

2-121. Planners must conduct a detailed, in-depth route analysis with as many information assets as possible. The sniper team must study civil and military maps; imagery; intelligence, surveillance, and reconnaissance feeds; gridded reference graphics; and any other intelligence information on their route.

2-122. The sniper team makes primary and alternate insert points with their own corresponding primary and alternate infiltration routes and rally points. The team ensures there are both pre- and post-objective rally points assigned on easily identifiable locations. All team members must know SOPs, ROEs, routes, rendezvous, and missing or lost sniper plans.

2-123. The sniper team and sniper employment officer requests fixed wing or UAS intelligence, surveillance, and reconnaissance coverage during insert and infiltration, observing the route ahead. If attached, a joint terminal attack controller or tactical air control party can speak and coordinate with them as the team moves. If possible, the sniper team uses these assets during the entire infiltration route. The team takes advantage of longer loiter times with UAS platforms. With intelligence, surveillance, and reconnaissance assets, the team may be able to determine the possibility of sentries or enemy patrols. The sniper team submits requests for information and builds knowledge about the enemy situation in the city and objective area.

HIDE REQUIREMENTS

2-124. The definition of reconnaissance and surveillance, defined below, must be considered to understand the purpose of a hide.

RECONNAISSANCE

2-125. *Reconnaissance* is a mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or adversary, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area (JP 2-0).

SURVEILLANCE

2-126. *Surveillance* is the systematic observation of aerospace, cyberspace, surface, or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means (JP 3-0).

2-127. The hide site is a position that is carefully selected, constructed, and concealed, to accomplish these tasks in a stealthily manner. Every hide must facilitate the following elements—

- Positive communication.
- Concealment.
- Observation and fields of fire.

- Escape routes.
- Hide security.

2-128. The sniper team must use all available intelligence products to facilitate the selection of a tentative hide position.

COMPROMISE (HARD AND SOFT)

2-129. The sniper team develops compromise planning in conjunction with the P.A.C.E. planning matrix. The team plans for the two types of compromises below:

- Hard compromise (enemy engaged).
- Soft compromise (wildlife disturbance).

2-130. The sniper team must also plan for actions on compromise. The sniper team needs to have a plan for immediate action on the hide site, and a hide defense plan. The sniper team **MUST** rehearse these drills before mission departure.

EXFILTRATION AND EXTRACTION

2-131. Exfiltration planning covers the sniper teams' exit from their hide site to extraction point. The P.A.C.E. planning matrix lists the primary, alternate, contingency, and emergency exfiltration methods.

2-132. Extraction planning covers the extraction methods that are available to the sniper team.

Note. Chapter 8, of this publication, discusses the exfiltration and extraction procedures in detail.

PRECOMBAT CHECKS AND REHEARSALS

2-133. Precombat checks and precombat inspections are critical to the success of sniper missions. These checks and inspections are leader tasks and cannot be delegated below the team leader level. They ensure snipers are prepared to execute the required individual and collective tasks supporting the mission. Checks and inspections are part of the troop leading procedure protecting against shortfalls endangering snipers' lives and jeopardizing the execution of a mission.

2-134. Precombat checks and precombat inspections must be tailored to the specific unit and mission requirements. Each mission and each patrol may require a separate set of checklists. Each element has its own established set of precombat checks and precombat inspections. This phase encompasses inventorying equipment and replacing or substituting anything having been damaged, such as cracked scopes, or assuring ammunition explosives levels are appropriate and of the correct type for mission success.

2-135. Snipers check each other to ensure they have all mission essential and related equipment and that their equipment is worn to unit SOPs before loading vehicles and departing on the mission. Communications checks are imperative and must be accomplished before departure.

2-136. Full dress rehearsals are conducted if time permits. These rehearsals run at combat speed with communication and full battle equipment. The rehearsals allow the leader to envision last minute details as they occur in the area of operation, to include operations conducted during limited visibility.

2-137. Precombat checks and precombat inspections must include back briefs on the mission, the task and purpose of the mission, and how the Soldiers' role fits into the scheme of maneuver. The sniper must know the latest intelligence updates, ROE, be tactically and technically proficient in medical evacuation, call for indirect fire, close combat attack, and close air support procedures and sustainment requirements.

INFILTRATION COMBAT CHECKS

2-138. The second phase is where snipers conduct last minute checks and prepare necessary equipment for insertion. This can include turning electronic aiming devices on and assuring special equipment is prepared if needed. Leaders can reiterate critical mission tasks or schemes of maneuvers, while Soldiers visualize and rehearse in their heads. This keeps snipers focused on their tasks. Snipers can adjust according to last minute updates such as activity on target or a change in the route plan.

ON TARGET COMBAT CHECKS

2-139. The third phase encompasses checks taking place upon the hide site or position occupation. These checks are used to assess the position security level, the positions ability to be modified for appropriate team security, or whether the team needs to relocate for a more secure position. This phase also includes checks just before the shot such as target confirmation, range confirmation, adjustments to wind conditions, adjustments for angle fire, or confirming friendly locations.

EXFILTRATION COMBAT CHECKS

2-140. The fourth phase consists of checks sniper leaders conduct before leaving the area of operation and leaving the battlefield. Assuring all sensitive items have been accounted for and signs of the team's occupation have been reduced to its lowest signature possible or nonexistent.

ARMS AND AMMUNITION

2-141. METT-TC, and unit SOP's determine the arms and ammunition sniper teams carry. When the team cannot find items they need, they substitute or do without.

REHEARSALS

2-142. During rehearsals, the team leader rechecks and refines their plans. A good way to rehearse is to talk the team through each phase, describing the actions of each team member, and then perform the actions as a dry run. When the team understands all of its actions, they go through all the phases, using the signals and commands to be used during the mission.

2-143. If the team has no time for rehearsals, they brief the plan back or talk through it together. This supplements rehearsals or replaces them when security or time constraints prohibit their conduct. The team leader talks the sniper through their actions, and then has the sniper restate them.

SNIPER TEAM BRIEF BACK

2-144. The sniper team rehearses the brief back before presenting it to the S-3, sniper squad leader, or commander. A good brief back indicates the team's readiness for the mission.

Brief to C-Co 1-29 IN: Viper 6 with Team 2, Team 3

I have 2 sniper teams w/ security equipped with 1x M2010, 2x M110, 2x M4A1, and 1x M249, capable of providing the following:

° 2 OPs with final firing positions able to interdict up to PL Red.

° Site 1 (TM2: M110, M249, M4A1) Site 2 (TM3: M2010, M110, M4A1) Viper 6 locates with TM3.

° Dismounted infil from CP 31, 6 hours of movement time, able to sustain in place for 36 hours before resupply is required.

° Scout platoon as designated internal support.

° Task is to overwatch OBJ Cancun and provide the commander with real time intelligence and situational reports leading up to the raid. During the raid, sniper teams conduct observation to prevent enemy counterattack from the West flank until follow-on forces can secure the area.

° Teams are not in place longer than 3 days. Scout platoon is designated QRF and Recon 1 is designated resupply. No fires are available.

° Purpose (restate purpose of mission).

° Commanders intent (restate commander’s intent).

° Duration (state timeline for infil, on sight and exfil).

° Assets available to support sniper and scout operations (in line with the Bn commander’s guidance for minimum force requirements, resupply, and fires.)

Legend

Bn	battalion	OBJ	objective
Co	company	PL	phase line
CP	checkpoint	QRF	quick reaction force
exfil	exfiltration	Recon	reconnaissance
IN	Infantry	TM	team
infil	infiltration		

COMMAND AND CONTROL

2-145. Patrol pre-briefing (ATP 2-19.4) is used to better focus information collection by snipers conducting an operation. The patrol pre-briefing is not to be confused with the patrol order given by the sniper employment officer or commander. The pre-briefing is generally given by a company intelligence support team Member to the senior sniper before departing for mission. The pre-briefing is perhaps the most important function of the company intelligence support team. During the briefing, the team shares the following:

- Events that occurred in the area of operations over the past 12 to 24 hours.
- Route status.
- Information collection assets in use throughout the battalion's area of operation.
- Specific information requirements tasked to answer.
- Other units operating within the area.
- Be-on-the-lookout lists.
- Applicable target packets.
- Predictive analysis based on analysis during the targeting phase.

2-146. Mission command of snipers is accomplished using indirect and direct control procedures. The sniper team often operates in situations where direct control is not possible. Therefore, the sniper must execute their mission (within the parameters of the commander's intent) on personal initiative and determination.

INDIRECT CONTROL

2-147. Commanders can accomplish indirect control of snipers through a variety of methods, the simplest being ROE and fire control measures.

RULES OF ENGAGEMENT

2-148. The ROE normally designates combatant forces and situations which would allow snipers to engage the enemy. One significant challenge associated with a ROE is the restrictive measures used in peacetime operations. Often, such ROE specify enemy personnel as only those presenting a direct threat to friendly forces or those requiring a verbal warning before engagement.

FIRE CONTROL MEASURES

2-149. Fire control measures are just as important for the sniper as they are for indirect-fire weapons and aircraft. Positive target identification is difficult at extended ranges, even when using advanced optics. Establishment of no-fire zones or times, fire coordination lines, and free-fire zones or times help establish guidelines for when and where the sniper can fire.

DIRECT CONTROL

2-150. Commanders can maintain direct control of snipers using technical and nontechnical systems. The mission and the operational environment determine the methods of control.

TECHNICAL SYSTEMS

2-151. Snipers can use many forms of technical communication, to include radio and wire. Both radio and wire offer near-instant message traffic and two-way communications. Certain environments may allow for more flexible communication techniques, such as commercial telephones or other nontraditional tactical forms of communication.

NONTECHNICAL SYSTEMS

2-152. Nontechnical control of snipers involves using prearranged methods, to include rendezvous, message pickups and drops, and other clandestine methods of secure communication. In denied areas or those with electronic interception capabilities, these methods may be the only secure techniques for communicating with the sniper team. Although quite secure, these systems are slow and tend to be complex.

TACTICAL OPERATIONS CENTER TRACKER

2-153. The tactical operations center (TOC) tracker worksheet is used to assist in tracking mission progress. It also includes a P.A.C.E. planning matrix that is provided by the sniper team once planning is finalized (figure 2-2).

TOC TRACKER SHEET

TIME	ACTION/RADIO LOG

TIME	ACTION/RADIO LOG

	P.I.R. TRACKER	
	DESIGNATED QRF	

TIME	ACTION/RADIO LOG

TIME	ACTION/RADIO LOG

	PRIMARY	ALTERNATE	CONTINGENCY	EMERGENCY
	Mission Dependent	Mission Dependent	Based on SOP	Based on SOP
INFIL				
COMM				
CASEVAC				
QRF				
FIRES				
DAY N/F				
NIGHT N/F				
RESUPPLY				
E&E				
EXFIL				

Engagement Criteria	
Extraction Criteria	
Compromise-HARD	
Compromise-SOFT	

SAMPLE

Legend

COMM	communications
CASEVAC	casualty evacuation
E&E	escape and evasion
Exfil	exfiltration
FIRES	fires available
Infil	infiltration
N/F	near and far
PIR	priority intelligence requirement
SOP	standard operating procedure
TOC	tactical operations center
QRF	quick reaction force

Figure 2-2. TOC tracker worksheet

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Chapter 3

Field Craft

Field craft is the tactical skill to operate stealthily and the methods used to do so, which can differ during day or night and due to weather or terrain. These skills include camouflage, individual movement, understanding the difference between concealment from view and cover from small arms fire, and using the terrain and its features to mask ground movement. Efficient infiltration is only possible by spending time, effort, and attention to the following sections covered in this chapter—movement preparation, stalking, individual movement, camouflage, and concealment.

MOVEMENT PREPARATION

3-1. Snipers seldom have an opportunity to view the ground prior to the mission. Snipers rely on maps and aerial photographs for their information. The sniper should address the following before movement:

- Location, position, or target to be stalked.
- Cover and concealment.
- Best possible firing position to engage targets.
- Best line of advance to stalk.
- Obstacles, whether natural or artificial.
- OPs along the route.
- Known or suspected enemy locations.
- Method of movement throughout the mission.
- Withdrawal route (to include method of movement).

ROUTE SELECTION

3-2. Route selection is a critical component of the sniper mission. The sniper team should use a route that gives the team the advantage to dominate key terrain. Sniper teams should select routes that make maximum use of cover and concealment and should avoid natural lines of drift.

MOVEMENT

3-3. The sniper team cannot afford to be seen at any time by anyone. Therefore, the team's movement must be slow and deliberate. The movement over any given distance is considerably slower than Infantry units. Stealth is a sniper's security.

3-4. When moving, the sniper team should always remember the following rules:

- Always assume that the area is under enemy observation.
- Move slowly; progress by feet and inches.
- Do not cause the overhead movement of trees, bushes, or tall grasses by rubbing against them.
- Plan every movement and traverse the route in segments.
- Conduct stop, look, listen, and smell, as needed.
- Move during disturbances, such as gunfire, explosions, aircraft noise, wind, or anything that distracts the enemy's attention or conceals the team's movement.

ORIENTATION

3-5. The success of the sniper team's mission depends upon the team being able to close the range to their target, engage or observe the target, and withdraw without being detected. To succeed, the team must move silently through different types of terrain while staying oriented to their intended target.

GHILLIE SUIT

3-6. The ghillie suit is a camouflage uniform covered with irregular patterns of jute and garnish attached by netting (figure 3-1). Although a ghillie suit does not make the sniper invisible to enemy observation, it serves as a base in the total camouflage process.

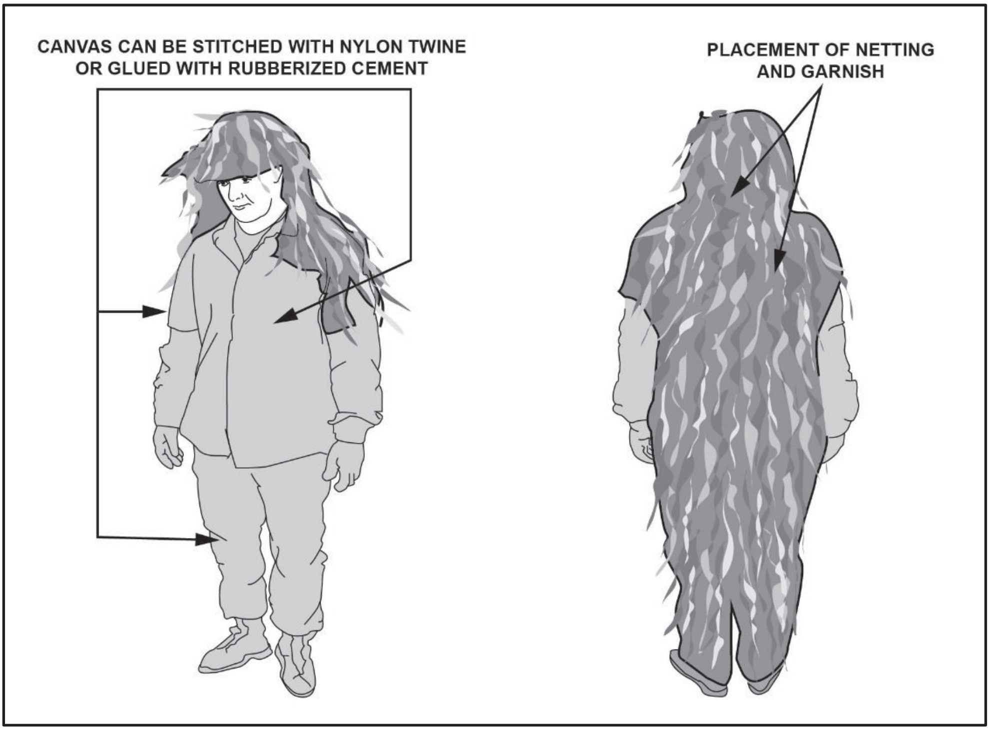


Figure 3-1. Ghillie suit

CONSTRUCTION

3-7. To construct a ghillie suit—

- Begin with a battle dress uniform, desert combat uniform, or a multicam uniform.
- Remove the pockets, and place them on the sleeves, shoulders, or sides of the shirt.
- Cover the front with canvas or some type of heavy, reinforced cloth.
- Cover heavy-wear areas, such as knees and elbows, with two layers of canvas.
- Stitch the canvas with nylon twine or glue with rubberized cement.
- Reinforce the seam of the crotch with heavy nylon thread.
- Place the jute or garnish so it covers the sniper's shoulders and reaches down just above their elbows (on the sleeves).
- Apply the jute or garnish to the back of the suit so it covers the sniper's sides when in the prone position.
- Cover a bush hat with garnish so it breaks up the outline of the sniper's neck, but allows the sniper to see and move.

- Make a veil from a net or piece of cloth covered with garnish or netting so it covers the weapon and sniper's head when in a firing position. The veil can be sewn into the ghillie suit or carried separately.
- Add natural vegetation to help the sniper blend with their surroundings.

EQUIPMENT

3-8. The sniper team camouflages their equipment, ensuring the camouflage allows for unhindered operation.

Rifles

3-9. All sniper weapons must be camouflaged to break up their outlines. The M110 Semiautomatic Sniper System or the M2010 Enhanced Sniper Rifle can be carried in a drag bag (figure 3-2), which is a rifle case made of canvas. Like the ghillie suit, this bag can be covered with jute, which provides a base to apply natural vegetation.

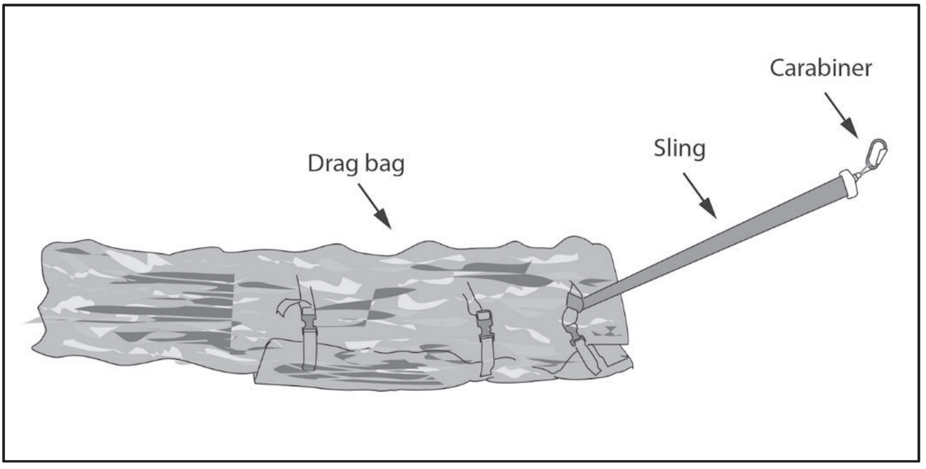


Figure 3-2. Drag bag

Optics

3-10. The team must camouflage their optics to avoid silhouetting them and to prevent light from reflecting off the lenses. They can cover lenses with field expedient methods (such as mesh type webbing or a "bird’s nest" [rolled up grass placed into the lens]) or commercial products.

Pack

3-11. The team must also camouflage their pack. Whether they are traveling with a lightweight day pack, or an extended mission pack, it must be covered similarly to a drag bag to avoid detection. Netting and jute can be applied directly to the pack.

Concealment Hood

3-12. A concealment hood (National Stock Number [NSN] 8415-01-544-6870) is designed to be worn in unison with a combat loadout, to include the improved outer tactical vest, assault packs, rucksacks, and chest rigs (figure 3-3). The hood allows the sniper to achieve camouflage and concealment effectiveness, but in a scaled down package when compared to the heavy and burdensome ghillie suit. The hood is a great tool when infiltrating into and exfiltrating out of an objective. The sniper can add jute, tie downs, and apply natural vegetation to the hood once they are on the ground.

Figure 3-3. Sniper concealment hood

STALKING

3-13. Stalking is the sniper's ability to move unseen into a firing position within a range that ensures a high hit percentage onto a target and then withdraw undetected. Stalking incorporates all aspects of field craft and can be learned by repeated practice over various types of ground.

CONDUCT OF THE STALK

3-14. A sniper may lose their sense of direction while stalking, particularly if they have to crawl a great distance. Losing direction can be reduced if the sniper—

- Uses a compass, map, and aerial photograph, and thoroughly and accurately plans the route, direction, and distance to various checkpoints.
- Memorizes a distinct landmark or two.
- Has the ability to use terrain association.

3-15. The sniper must be alert at all times. Any relaxation on a stalk can lead to carelessness, resulting in an unsuccessful mission and even death. The sniper should also conduct an observation at periodic intervals. If the sniper is surprised or exposed during the stalk, immediate reaction is necessary. The sniper must decide whether to freeze or move quickly to the nearest cover and hide.

3-16. Disturbed animals or birds can draw attention to the area of approach. If animals are alarmed, the sniper should stop, wait, and listen. Their flight may indicate someone's approach or call attention to their position. However, snipers should take advantage of any local disturbances or distractions that could enable them to move more quickly than would otherwise be possible. It should be emphasized that such movement includes a degree of risk, and when the enemy is close, risks should be avoided.

3-17. While halted, the sniper identifies their next position and the position after that position. If they are moving through tall grass, they should occasionally make a slight change of direction to keep the grass from waving in an unnatural motion. If crossing roads or trails, they should look for a low spot or cross on the leading edge of a curve and always avoid cleared areas, steep slopes, and loose rocks. The sniper should never skyline themselves. They should also be aware of any changes in local cover, since such changes usually require an alteration to their personal camouflage.

3-18. During route selection, the sniper must always plan one or two points ahead of their next point. Doing so prevents the sniper from crawling into a dead-end position.

3-19. The use of a periscope (NSN 1240-01-571-5004) can aid the sniper in observation while maintaining a low visibility signature. Snipers must take precautions and camouflage the periscope to deter detection.

NIGHT STALKING

3-20. A sniper is less adapted to stalking at night than during the day. They must use slower, more deliberate movements to occupy an observation post or a firing position. The principal differences between day and night stalking are that at night—

- There is a degree of protection offered by the darkness against aimed enemy fire. However, a false sense of security may compromise the sniper.
- The sniper should use NVDs to aid in movement.
- Hearing is more important in the dark, although observation is still important. Silence is vital.
- Cover is less important than background. The sniper should avoid crests and skylines against which they may be silhouetted. The sniper should hide in lunar shadows to help defeat NVDs.
- Thorough reconnaissance is very important, because maintaining direction is much more difficult to achieve. A compass or knowledge of the stars may help.

Note. The sniper periscope has a PVS-14 adapter.

DETECTION DEVICES

3-21. The sniper must be constantly vigilant in their movements and actions to defeat enemy detection.

Passive and Active Light Intensification Devices

3-22. Snipers must be aware of enemy detection devices and remember that they could unknowingly be under observation. Where there is the possibility that NVDs are being used, snipers can combat them by moving very slowly and staying very low to the ground. This way, vegetation breaks the snipers' dark silhouette. Preferably, snipers move in dark shadows or tree lines that obscure the enemy's vision. In addition, moving in defilade through ground haze, fog, or rain greatly benefits snipers by helping them remain undetected. Using the infrared reflecting material (used in equipment netting) as a base for the ghillie suit limits the enemy's infrared viewing capabilities. This practice should be used with caution, and the sniper must experiment with the correct balance.

Sensors

3-23. Sensors are remote monitoring devices with seismic sensors, magnetic sensors, motion sensors, infrared sensors, or thermal sensors planted in the ground along likely avenues of advance or perimeters. These devices vary in sensitivity. They are triggered by vibration of the ground, metal, movement, breaking a beam of light, or heat within their area of influence. The sniper can move past these devices undetected only by using the slowest, most careful, and errorless movement. The sniper can help combat the effects of seismic devices by moving when other actions that activate the devices, such as artillery fire, low-flying aircraft, rain, snow, or even a heavy wind, are in progress or, in some instances, moving without rhythm. The sniper can defeat most other sensors if they know their limitations and capabilities.

Ground Surveillance Radars

3-24. Ground surveillance radars can detect troop or vehicle movement at an extended range, but only along its line of sight and only if the object is moving at a given speed or faster. A sniper can combat the use of ground surveillance radars by moving in defilade, out of the direct line of sight of the equipment, or slower than the radar can detect. The sniper should move extremely slowly and low to the ground, using natural objects and vegetation to mask the movement. The more laterally to the radar the sniper moves, the easier it is for the radar to detect the sniper's movement.

Thermal Imagers

3-25. Thermal imagers are infrared heat detectors that locate body heat. The difference between heat sources is what is registered. These devices could locate even a motionless and camouflaged sniper. One way to confuse such a detector would be to attach a space blanket (Mylar) to the inside of the camouflage suit. The blanket would reflect the body heat inward and could keep the sniper from being distinguished from the heat pattern of the surrounding terrain. This method works best when the temperature is warm and the greatest amount of radiant heat is rising from the ground. Active infrared spotlights and metascopes may be used against the sniper. The sniper must always avoid the infrared light or they will be detected.

Selecting Lines of Advance

3-26. Part of the sniper's mission is to analyze the terrain, select a good route to the target, use obstacles (man-made and natural) and terrain to their best advantage, and determine the best method of movement to arrive at their target. Once at the target site, the sniper must select firing positions and plan a stalk.

3-27. On the ground, the sniper looks for a route that provides the best cover and concealment. They should use low ground, dead space, and shadows to their advantage and avoid open areas. The sniper looks for a route that provides easy movement, yet allows quiet movement at night. The sniper selects the route, and then chooses the movement techniques that allow undetected movement over that specific terrain.

Note. Snipers should move at a 90-degree angle to the target when possible. This prevents the sniper from travelling parallel to a target, which should never occur.

3-28. Position selection is critical to mission success. The sniper should select a position away from prominent terrain features of contrasting background. When possible, they select an area that has an obstacle (natural or man-made) between them and the target. Selecting a position that is obvious and ideal is more than likely where the enemy is also looking and best avoided.

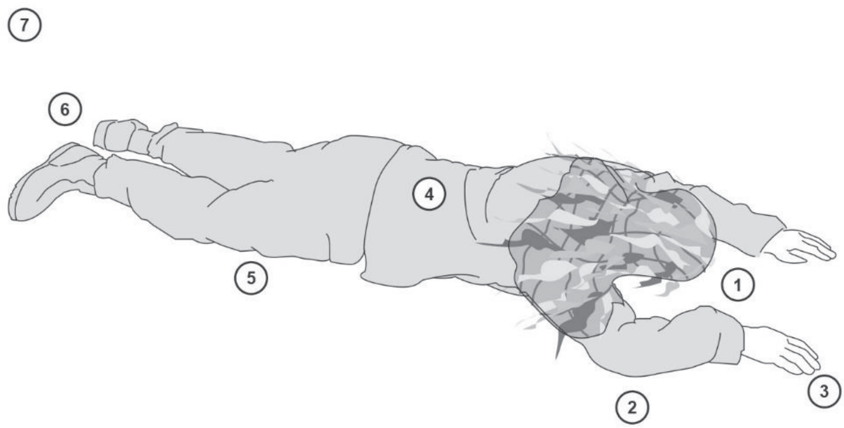
3-29. Stalk planning involves map and ground reconnaissance, selection of a route to the objective, selection of the type of movement, notation of known or suspected enemy locations, and selection of a route of withdrawal. Sniper teams should avoid being detected or even suspected by the enemy. To maintain efficiency, each sniper must master individual movement techniques and ensure team effort is kept at the highest possible level.

INDIVIDUAL MOVEMENT TECHNIQUES

3-30. The individual movement techniques used by the sniper team are designed to allow undetected movement. These techniques include the following:

LOW CRAWL

3-31. Snipers use the low crawl when vegetation is extremely limited, when close to the enemy, or when occupying a firing position (figure 3-4).

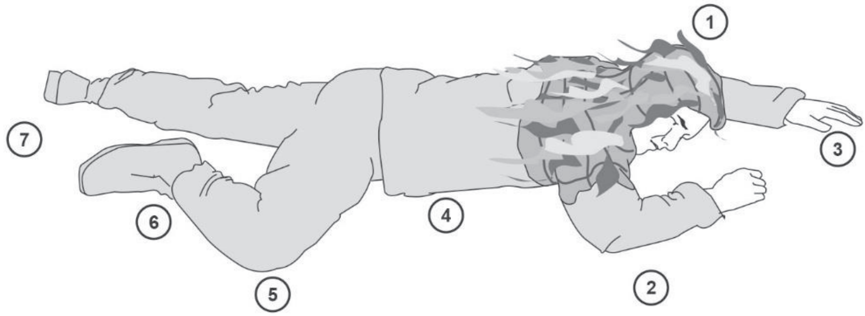


1	HEAD:	HEAD IS DOWN, ROUGHLY 1 TO 2 INCHES FROM GROUND.
2	ARMS:	ARMS ARE EXTENDED OUT, IN THE DIRECTION OF TRAVEL.
3	HANDS:	HANDS ARE FLAT ON THE GROUND. THE FINGERS ARE USED TO PULL THE BODY IN THE DIRECTION OF TRAVEL.
4	TORSO:	TORSO IS FLAT ON THE GROUND.
5	LEGS:	LEGS ARE TOGETHER AND EXTENDED OUT, IN LINE WITH THE TORSO.
6	FEET:	HEELS ARE FLAT ON THE GROUND. THE TOES ARE USED TO PUSH THE BODY IN DIRECTION OF TRAVEL.
7	WEAPON/ EQUIPMENT:	HOLD THE WEAPON BY SLING, OR TOW DRAG BAG WITH A CARABINER ATTACHED TO THE BELT, WITH CONNECTING STRAP BETWEEN LEGS.

Figure 3-4. Low crawl

Medium Crawl

3-32. The medium crawl is used when vegetation is limited, and the sniper needs to move faster than the sniper low crawl allows. The medium crawl is similar to the Infantrymen's low crawl (figure 3-5).

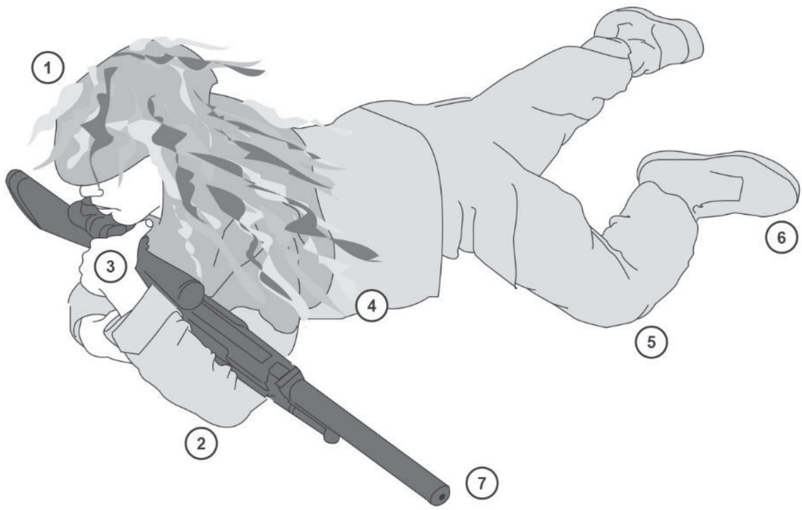


1	HEAD:	HEAD IS KEPT DOWN AND TILTED TO THE SIDE.
2	ARMS:	ARMS ARE EXTENDED OUT. THE ARMS WILL PULL THE BODY IN THE DIRECTION OF TRAVEL.
3	HANDS:	HANDS ARE FLAT ON THE GROUND. THE HANDS AND FINGERS WILL ASSIST THE ARMS IN PULLING THE BODY FORWARD.
4	TORSO:	TORSO IS FLAT ON THE GROUND.
5	LEGS:	LEGS ARE SPREAD OUT. THE LEGS WILL PUSH THE BODY IN THE DIRECTION OF TRAVEL.
6	FEET:	HEELS ARE FLAT ON THE GROUND. THE TOES WILL ASSIST THE LEGS IN PUSHING THE BODY FORWARD.
7	WEAPON/ EQUIPMENT:	HOLD WEAPON BY SLING, OR TOW DRAG BAG WITH A CARABINER ATTACHED TO THE BELT, CONNECTING STRAP BETWEEN THE LEGS.

Figure 3-5. Medium crawl

HIGH CRAWL

3-33. The high crawl resembles the Infantry high crawl (figure 3-6). The team uses this movement technique when vegetation is high enough to allow the sniper to move undetected.

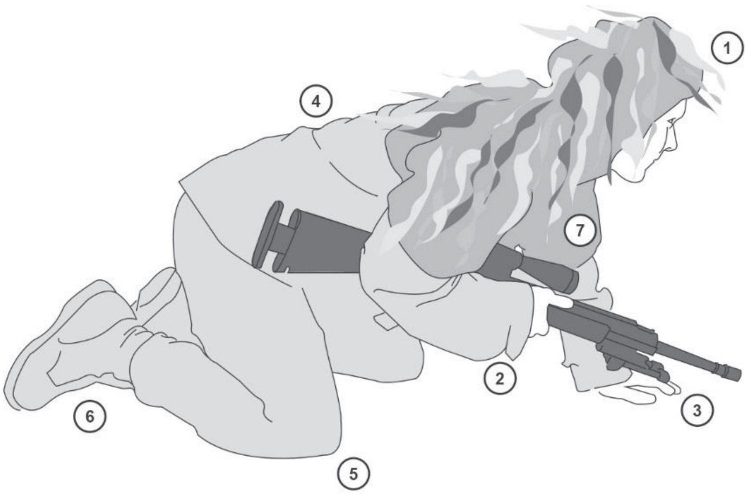


1	HEAD:	HEAD IS UPRIGHT WITH CHIN SLIGHTLY TUCKED.
2	ARMS:	THE ARMS ARE USED TO CRADLE THE WEAPONS. THE ELBOWS ACT AS SUPPORT, AND ARE USED TO MOVE THE BODY IN THE DIRECTION OF TRAVEL.
3	HANDS:	THE HANDS AND FINGERS ARE USED TO SECURE THE WEAPON.
4	TORSO:	THE TORSO IS RAISED OFF THE GROUND.
5	LEGS:	LEGS ARE SPREAD OUT. THE KNEES WILL PUSH THE BODY IN THE DIRECTION OF TRAVEL.
6	FEET:	HEELS ARE FLAT ON THE GROUND. THE TOES WILL ASSIST THE LEGS IN PUSHING THE BODY FORWARD.
7	WEAPON/ EQUIPMENT:	THE WEAPON IS CRADLED IN THE ARMS, IF NOT USING A DRAG BAG. IF USING A DRAG BAG, TOW THE DRAG BAG WITH A CARABINER ATTACHED TO THE BELT, WITH THE CONNECTING STRAP BETWEEN THE LEGS.

Figure 3-6. High crawl

Hand and Knees Crawl

3-34. The team uses the hand and knees crawl when terrain and thick vegetation is available and they need to move faster than the sniper medium crawl allows (figure 3-7).

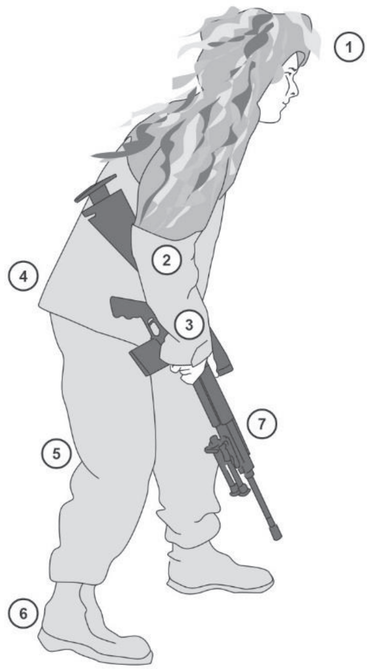


1	HEAD:	HEAD IS UPRIGHT.
2	ARMS:	THE NONFIRING ARM WILL CRADLE THE WEAPON WITH SCOPE TUCKED INTO ARMPIT. THE FIRING ARM WILL SUPPORT THE BODY, AND WILL BE USED TO MOVE THE BODY IN THE DIRECTION OF TRAVEL.
3	HANDS:	THE NONFIRING HAND WILL SUPPORT THE RIFLE. THE FIRING HAND WILL AID IN SUPPORT AND MOVEMENT.
4	TORSO:	THE TORSO IS OFF THE GROUND AND THE CORE IS TIGHT TO AID IN STEADY MOVEMENT.
5	LEGS:	LEGS ARE BENT WITH KNEES ON THE GROUND. THE KNEES SUPPORT THE BODY AND WILL BE USED TO MOVE THE BODY IN THE DIRECTION OF TRAVEL.
6	FEET:	THE FEET AND TOES AID IN THE SUPPORT AND MOVEMENT OF THE BODY.
7	WEAPON/ EQUIPMENT:	THE WEAPON IS CRADLED IN THE ARMS, IF NOT USING A DRAG BAG. IF USING A DRAG BAG, TOW THE DRAG BAG WITH A CARABINER ATTACHED TO THE BELT, WITH THE CONNECTING STRAP BETWEEN THE LEGS.

Figure 3-7. Hand and knee crawl

WALK

3-35. The team walks when terrain, weather, and darkness allows. Snipers use walk when the team needs to move quickly and contact is not likely (figure 3-8).



1	HEAD:	HEAD IS UP, WITH EYES FORWARD, AND CHIN SLIGHTLY TUCKED.
2	ARMS:	ARMS ARE TO THE BODY'S SIDE. THE NONFIRING ARM IS PINNING THE RIFLE TO THE BODY.
3	HANDS:	THE NONFIRING HAND AND FINGERS ARE SECURING THE RIFLE.
4	TORSO:	THE TORSO IS BENT SLIGHTLY FORWARD AT THE HIP. CORE IS TIGHT TO AID IN STEADY, CONTROLLED MOVEMENT.
5	LEGS:	LEGS ARE BENT SLIGHTLY AT THE KNEES.
6	FEET:	THE FEET WILL SLOWLY MOVE THE BODY FORWARD, CAUTIOUSLY WALKING TO AVOID EXCESSIVE NOISE AND DISTURBANCE TO THE AREA.
7	WEAPON/ EQUIPMENT:	THE WEAPON IS ALIGNED WITH THE BODY, WITH MUZZLE POINTED DOWN.

Figure 3-8. Walk

CAMOUFLAGE, CONCEALMENT, AND COVER

3-36. Camouflage and concealment is the sniper's primary defense when conducting any form of sniper operation. This section covers the rural means of camouflage and concealment. Refer to the appendixes for specific details on camouflaging in urban, mountain, desert, and jungle terrains. Teams can request camouflage accessories at the unit supply level.

TARGET INDICATORS

3-37. Target indicators are anything that a sniper does or fails to do that could result in being detected. A sniper must know and understand target indicators to not only move undetected, but also to detect enemy movement. The sniper trains to seek and engage targets, knowledge of camouflage and target indicators helps the sniper avoid becoming a target.

3-38. Target indicators are grouped into the four categories listed below:

- Olfactory. What the sniper does that allows the enemy to smell their presence.
- Tactile. What the sniper does or creates that allows the enemy to touch an object that gives away their presence.
- Auditory. What the sniper does that allows the enemy to hear their presence.
- Visual. What the sniper does or fails to do that allows the enemy to see them or indications that they're present.

CAMOUFLAGE

3-39. Camouflage is one of the basic weapons of war. Camouflage can be the difference between a successful or unsuccessful mission. To the sniper, camouflage can be the difference between life and death. Camouflage plays a fundamental role for the sniper, because the sniper cannot afford to be detected at any time while moving alone, as part of another element, or while operating from a firing position. Marksmanship training teaches a sniper how to hit their target, field craft keeps them from becoming a target. Paying attention to camouflage and terrain is the mark of a well-trained sniper.

Natural

3-40. Snipers add local vegetation and other materials to their ghillie to alter their outline and appearance and to add texture (figure 3-9). The rule of thumb is to apply 70 percent of natural vegetation and 30 percent of artificial material. The sniper must be aware that vegetation often changes as they move towards their objective. The sniper may need to halt and change their vegetation to match their surroundings.

3-41. The sniper team must be aware that as soon as they cut the natural vegetation, it begins to die. The hotter the environment, the faster the vegetation wilts. Snipers must refresh their vegetation regularly.

Figure 3-9. Natural types of camouflage

Artificial

3-42. Snipers use artificial camouflage, such as jute, to break up the human shape, and add texture and color to the ghillie base (figure 3-10). Team members cover all exposed skin using color and coverage materials and substances made for concealing. These materials can be camouflage sticks, face paints, nets, or veils to cover all exposed skin.

3-43. The team must also prepare their equipment (tripods, drag bags, rucksacks) and weapons. The team can use camouflage tape, colored electrical tape, spray paint, and other means to properly camouflage their equipment and weapons.

Figure 3-10. Artificial types of camouflage

Face Paint

3-44. Face paint and camouflage sticks are used to cover all exposed areas of skin such as the snipers face, ears, hands, and the back of the neck. The low parts of the face that cause shadow should be lightened. The high parts of the face that cause shine should be darkened.

Note. Add dark color to high points on the face and light colors to the low points. Attempt to mimic the vegetation the sniper is operating in.

CONCEALMENT

3-45. The sniper team uses concealment to maneuver undetected to and from the target area. Sniper teams need to consider the following:

- Sound—
  - Most noticeable during hours of darkness.
  - Small noises may be dismissed as natural, but talking will not.
- Movement—
  - Most noticeable during daylight hours.
  - The human eye is attracted to movement. Quick or jerky movements can be detected far before any slow and deliberate movements.
- Improper camouflage—
  - Shine.
  - Outline.
  - Contrast to background and foreground.
- Disturbance of wildlife—
  - Birds suddenly flying away.
  - Sudden stop of animal noises.
- Odors—
  - Smoking.
  - Soap.
  - Insect repellent.

Shine

3-46. Shine is one of the main reasons for compromise in the rural environment. The enemy can spot the smallest reflection from great distances. The natural coloring of the skin stands out in the rural environment.

3-47. Reflections off shiny surfaces instantly attract attention and are visible from great distances. Snipers must use optics carefully in bright sunshine and must always be aware that reflections can give the sniper away.

3-48. The snipers optic can expose the sniper team, if not properly concealed. The inside of the scope objective lens cap must be dulled with nonreflective tape or paint. The team can use nonreflective tape to cover the objective lens cap and cut slots into it (cat eyes); or the sniper can use the bird nesting technique or netting.

> ***Note.*** The M-series binoculars have an anti-laser coating on the objective lens and are notorious for reflection. The team must use antireflection devices or other means to conceal them.

3-49. The sniper team must always be mindful of light direction with their position, such as direction of sunrise and sunset. Sun light behind the team in the morning can reduce the enemy's ability to spot the sniper team. However, the direction of light during sunset can reduce the team's ability to observe and engage targets. Light can also create reflections off the team's equipment, and increase the chances of detection.

> ***Note.*** If possible, cover or dull watch faces, compasses, identification tags, and belt buckles.

Shape

3-50. A human shape is very noticeable and distinct, even at long ranges. Depending on the range, the body can be identified, especially the head and shoulder area. To combat this, the sniper team must break up their body outline, starting with the head and shoulders and then the equipment they are carrying.

Silhouette

3-51. The clear silhouette of a figure on the skyline is a good target. It is visible from great distances, even at night, because a dark outline stands out against the lighter night sky. This is most dangerous at night where there is clear sky and a full moon. Similar to silhouetting, sky lining occurs when a sniper or sniper team moves over the top of a high feature.

Shadow

3-52. The sniper team can use shadow to their advantage by moving within it. If the sniper team can get from point to point by moving in a shaded area, then they should seek that route.

Smell

3-53. Smell can compromise the team, which mandates that the team take proper precautions. The team should never wash their ghillie, and the team must not use scented soaps, detergents, or deodorants before and during a mission.

Light

3-54. Before departure, the team needs to conduct proper precombat inspections on all equipment that could discharge any light, both visible and infrared. The team must conduct this check in the dark and with the use of NVDs, because NVDs can compromise a team's location if discipline is not adhered.

Noise

3-55. The sniper team needs to conduct a noise check prior to departure. The best way to conduct this check is to have the sniper don all equipment and jump up and down as the senior sniper listens for any loose equipment. Make sure all equipment is tapped, tied, or strapped down to prevent unnecessary movement.

DEFEAT TARGET INDICATORS

3-56. Snipers may defeat target indicators through the common senses listed below:

- Olfactory through elimination of cause.
- Tactile through proper construction of sniper hide.
- Auditory through noise discipline and equipment preparation.
- Visual through proper knowledge of fundamentals of concealment and camouflage.

3-57. Camouflage construction is the use of one of the three fundamentals of concealment, which are hiding, blending, and deceiving.

Hiding

3-58. Hiding means completely concealing the body from observation by lying behind or in an object or thick vegetation.

Blending

3-59. Blending is skillfully matching personal camouflage with the surrounding area, or backdrop, to a point where the sniper is indiscernible. Blending may be called "protective coloration," and is best achieved with bland colors and not dramatic patterns. Ghillie suits help snipers blend in with the terrain and does not hide them or make them appear to be trees or bushes.

Deceiving

3-60. Deceiving is a technique used to trick the enemy into false conclusions about location or identity of the sniper, so that the enemy doubts the shooter's presence or misinterprets the sniper's true location after the shot.

COVER

3-61. Cover can be either natural or artificial protection from enemy fire. Natural cover (creek beds, trees, fallen logs, reverse slopes) and artificial cover (sand bags, walls, vehicles) protects the sniper from enemy direct fire weapon systems, although they do not provide the sniper cover from indirect weapon systems. Micro terrain and large vegetation, like trees, should be used in the sniper's route selection if the sniper feels contact is eminent.

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Chapter 4

Infiltration

Infiltration is a high risk patrol movement, requiring low signature mobility through various terrain. Patrol skills are required for the sniper team. Methods of moving covertly over open ground in the daytime or at night, crossing obstacles, and ground considerations are all factors that the sniper team must consider.

SECURE AND PINPOINT

4-1. Once the sniper team has successfully inserted into the area of operation, the sniper team conducts a series of tasks that they must execute before they depart from their assembly area en route to their observation point.

4-2. The first task is to conduct stop, look, listen, and smell (defined below) once all team members are in the assembly area:

- STOP. Stops all movement.
- LOOK. Looks for signs of the enemy, things like trash, old fighting positions, or the enemy themselves.
- LISTEN. Listens for signs of the enemy, things like engines running, the enemy talking, or the enemy moving.
- SMELL. Smells for signs of the enemy, things like food, smoke from fires, or petroleum, oils, and lubricant products (fuels).

4-3. The sniper team conducts stop, look, listen, and smell for 3 to 5 minutes or for as long as the senior sniper deems necessary.

4-4. The next task is for the senior sniper to pinpoint their location on the map so they can relay to the sniper TOC that the team has inserted safely, provide the TOC with a six digit grid, and begin their movement to the target area.

COMMUNICATION

4-5. Once the sniper team has established their location and conducted stop, look, listen, and smell, the sniper team initiates a radio check with the TOC. Depending on the mission and the mission duration, the sniper team could establish communication windows. Communication windows allows the sniper team to conserve battery power and, when working within a larger operation, communication windows can prevent multiple teams from interfering with each other when trying to send up information to the TOC.

MOVEMENT FORMATION

4-6. The tactical situation dictates the type of movement formation that the sniper team uses when moving to the target area. The sniper team uses ATP 3-21.8, chapter 2, section III, and combat formations. They should modify as needed based on the team size, composition, and security attachments.

MOVEMENT TECHNIQUES

4-7. Movement techniques are methods a unit uses to traverse terrain. The three basic movement techniques are traveling, traveling overwatch, and bounding overwatch. Selection is based on the likelihood of enemy contact and need for speed. Factors to consider for each technique are control, dispersion, speed, and security. Movement techniques are not fixed formations. They refer to the distance between snipers, teams, and squads, based on METT-TC.

Note. See ATP 3-21.8, chapter 2, section IV.

DANGER AREAS

4-8. A danger area is any place along a unit's route where the leader determines their unit may be exposed to enemy observation or fire. If a sniper team must cross a danger area, it must do so as carefully as possible. Due to their autonomy and lack of personnel and firepower, the sniper team must avoid detection by the enemy. The team should consider use of ghillie suits or hours of limited visibility.

4-9. Sniper leaders decide how the unit crosses based on the time they have, the size of the element, the size of the danger area, fields of fire into the area, and the amount of security being posted.

4-10. A sniper element can cross all at once, in buddy teams, or one sniper at a time. However, snipers need to maintain heightened security at all times. Teams must stop, look, listen, and smell for enemy in the area before committing to crossing danger areas, and must employ counter-tracking methods when applicable.

4-11. Cross roads or trails at or near a bend, a narrow spot, or on low ground. Avoid crossing on azimuth or at intersections.

4-12. Select a narrow spot in the stream offering concealment on both banks and observe the far side carefully. If possible, emplace near and far side security for early warning and clear the far side. Avoid crossing on azimuth or at intersections and assure the team crosses quietly.

4-13. Pass villages on the downwind side and well away from them. Avoid animals, especially dogs, which might reveal the presence of the team.

4-14. Pass known or likely enemy positions on the downwind side. Be alert for trip wires, pressure plates, and early warning systems. If it cannot be confirmed, assume the enemy has a dog team available.

CONTACT DRILLS

4-15. A sniper team must never become decisively engaged with the enemy. They must rehearse immediate action drills until they react automatically and immediately to unexpected contact. SOPs must be established and rehearsed so the team can react to different situations.

> ***Note***. See ATP 3-21.8, chapter 2, section V.

MAN DOWN DRILLS

4-16. If the sniper team takes a casualty, and contact is still present, the team must establish a base of fire and secure the wounded. The team needs to initiate a break contact drill and extract the wounded. It is vital that the team has established and rehearsed a man down drill both in contact and noncontact scenarios.

> ***Note.*** It is important to have at least two members of the team emergency medical technician (basic level) certified.

EXTRACTING THE WOUNDED

4-17. There are a number of ways that wounded, nonwalking team members can be extracted off the ground. (Refer to ATP 4-25.13 for additional information and resources.)

EXTRACTION SITE

4-18. As soon as the sniper team is out of the contact area and has reached a rally point or a layup point, the team can coordinate medical evacuation of the Soldier. Army aeromedical evacuation is the preferred evacuation method based on the trained medical personnel and medical equipment on the aircraft. Casualty evacuation is the alternate method of evacuation and may not have the capabilities of an aeromedical evacuation asset. Either can be used to evacuate Soldiers, but all effort should be made to use an Army aeromedical evacuation resource first. (Refer to ATP 4-25.13 and ATP 4-02.2 for more information.)

4-19. Snipers use set dimensions when creating a helicopter landing zone. Each aircraft requires a specific sized area that must be cleared before it is safe to land.

> ***Note.*** It is important to have at least one member of the team who is pathfinder qualified.

Chapter 5

Rural Hides

A hide is a carefully constructed position that affords excellent radio communications, concealment, observation, and clear line of sights for the sniper to engage from. This chapter has four sections—locating a hide position, hide construction, occupation, and extractions.

LOCATING A HIDE POSITION

5-1. During the mission planning phase, the sniper selects an objective rally point. They use topographic maps, aerial photographs, permission visual reconnaissance, and information from units in the area. From the objective rally point, the sniper team reconnoiters the tentative position to determine the exact location of its final position. The objective rally point must provide cover and concealment from enemy fire and observation and offer good routes to and from the selected area. From the objective rally point, the team moves forward to view the tentative position area (figure 5-1).

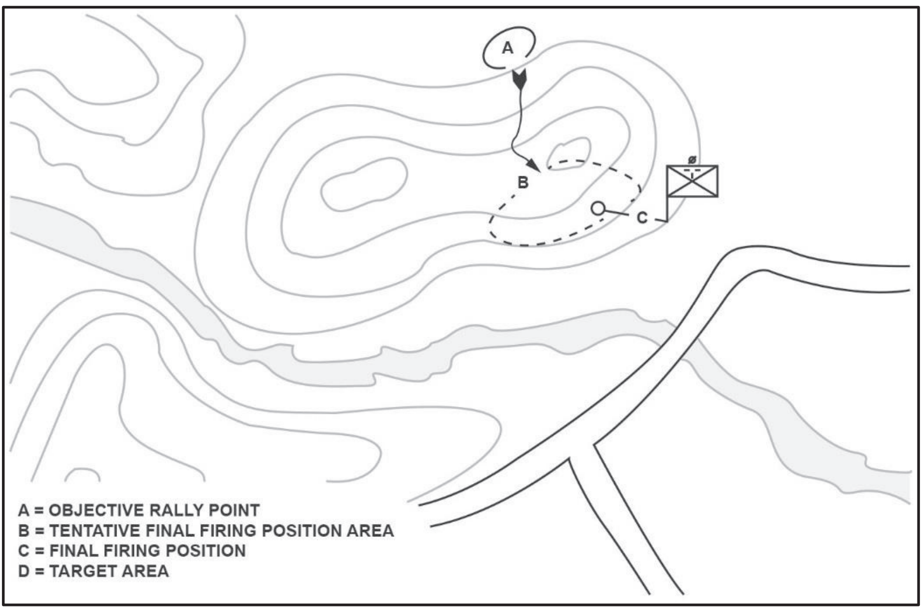

Figure 5-1. Objective rally point

5-2. Once the probable hide site is located, the senior sniper puts the team into a defensive position. The team conducts stop, look, listen, and smell. Once complete, they pinpoint their location on the map.

5-3. When stop, look, listen, smell, and pinpoint is complete, the senior sniper conducts radio communications with the TOC. If the communication line is sufficient, the senior sniper delegates tasks to the team. One team member conducts a clearance patrol with the senior sniper while the other members secure the area and maintain the radio.

5-4. The clearance patrol looks for any dead ground, tracks, water, wildlife, buildings and better positions for the hide. When selecting the location, the sniper team ensures the position balances—

- Maximum fields of fire and observation of the target area.
- Concealment from enemy observation.
- Covered routes to and from the position.
- Locations at least 400 to 700 meters or 438 to 766 yards from the target area.
- Natural or man-made obstacles between the position and the target area.

BEST LOCATIONS

5-5. The sniper team must use imagination and ingenuity when choosing a good location for the position. The location must allow the team to be effective, but must appear to the enemy to be the least likely location for a team position, such as—

- The undersides of logs in a deadfall area.
- Tunnels bored from one side of a knoll to the other.
- Swamps.
- Deep shadows.

WORST LOCATIONS

5-6. A sniper team must remember that a position in a seemingly ideal location may have the same appeal to the enemy. Therefore, the team avoids choosing locations at, on, or near—

- A point or crest of prominent terrain features.
- Isolated objects.
- Bends or ends of roads, trails, or streams.
- Populated areas.

DIRECTION OF SUNRISE AND SUNSET

5-7. A sunrise and sunset overlay enables a team to plan a line of advance or tentative hide sites to take advantage of the light. The sniper team tries to maximize the effects of sunlight by placing the light in the enemy's eyes, thus preventing detection during movement or while in the hide site. Sniper teams consider light directions in their mission planning so they are not forced into risky movements around the objective area to prevent compromise. The sniper team must create an overlay showing the true azimuth of the rising sun and the relative bearing of the setting sun for the mission. Refer to the planning chapter on the sunrise and sunset table to create the overlay (figure 5-2).

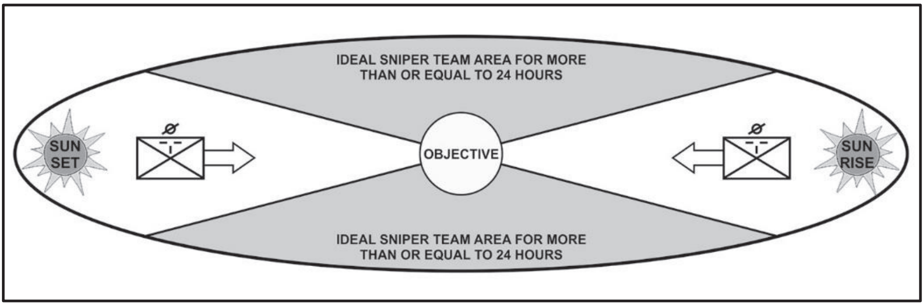

Figure 5-2. Sunrise and Sunset

OTHER CONSIDERATIONS FOR POSITION SELECTION

5-8. The sniper team must consider the following when finalizing the selection of a position.

COVER

5-9. Cover is protection from the fire of enemy weapons. Natural (such as ravines, hollows, and reverse slopes) and artificial cover (such as fighting positions, trenches, and walls) protect the sniper from flat trajectory fires and partly protect them from high angle fires and the effects of nuclear explosions.

5-10. Snipers must always seek and use all the cover the terrain provides. Even the smallest depression or fold in the ground might provide some cover when the sniper needs it most. Properly used, a six-inch depression can provide enough cover to save a sniper under fire. Snipers can use the most difficult terrain available, because enemy patrols are less likely to move through these areas.

CONCEALMENT

5-11. Concealment is protection from enemy observation. The sniper can use natural (such as bushes, grass, and shadows) or artificial (such as materials like burlap and camouflage nets) concealment. Snipers must consider the effects of seasonal changes on the materials used for natural and artificial concealment.

5-12. The sniper must choose a position enabling maximum application of field craft skills during the firing sequence.

DEPTH

5-13. Vegetation between the sniper's position and the enemy creates the appearance of depth. This helps conceal the sniper and can even offer some cover. The sniper should use the amount, type, and placement of vegetation giving the greatest appearance of depth without interfering with their sight picture or the flight of the round.

OBSTACLES

5-14. When choosing the firing position, the sniper must consider the consequences of enemy detection. The position must protect them from small arms fire and allow for concealed withdrawal under fire. The position must be located in an area making use of the natural terrain features and man-made features to impede enemy pursuit, create choke points for enemy personnel, and generally restrict the enemy's ability to maneuver on the sniper team. Note the river in figure 5-1, page 5-1, creates such an obstacle it encourages enemy movement along the bridge. The bridge creates a choke point in which the sniper team could inflict severe casualties should the enemy attempt to use it to maneuver on the sniper team.

CONSTRUCTION PLAN

5-15. Once in location, the sniper team assesses the factors that impact the safety and potential success of constructing a positon. The sniper team needs to factor in area security.

5-16. Irrespective of the type of hide that the team is going to construct, there is one absolute rule that the team must adhere to. As soon as the hide site is identified, no team member should walk on the ground in front of it. If a hide is going to be compromised, it is likely through ground sign and bad discipline.

5-17. The senior sniper identifies one team member to overwatch the target area as the hide site is being constructed. This role is rotated throughout the team and whomever is manning this role, also monitors the radio, maintains a log of the target area and looks out for possible compromise.

SUBSURFACE HIDES

5-18. The decision to construct a subsurface hide should be taken with consideration. A subsurface hide is a massive task and depending on the team size, it could take multiple nights to complete. The top soil may look workable but after the sniper team digs only one to two feet, the soil could turn into slate, rocks, and tree roots.

5-19. Items required to construct a subsurface hide are—

- Spades and picks.
- Saws and secateurs.
- Sandbags.
- Ponchos and ground sheets.
- Thermal sheets (if applicable).

- Wire roof sections (if applicable).
- Cords and stakes.
- Camouflage netting.
- 550 cord.

Note. All digging tools should have a tie-down or cord sling, so when not in use, they can be slung across the body and not lost or cause injury to other team members.

Ground Preparation and Digging

5-20. The sniper team marks the area of the hide with empty sandbags. Next, the sniper team takes their ponchos and lays them on the ground to protect the surface area around the hide in preparation to remove soil.

5-21. Before any soil is removed, the sniper team must find a suitable location to discard it. The team must conceal as best as possible any soil removed. The sniper team must not use ponchos to carry the removed soil as ponchos rip and tear. The team uses ponchos to waterproof the hide only. Sand bags are recommended for soil removal.

5-22. The depth of the subservice hide needs to be a minimum of 1.5 meters deep and 2 meters wide (observer area). The overall size must be large enough to support a rear sentry, rest and administrative area, and observer’s area.

5-23. With the sandbags marking the shape of the hide and the ponchos protecting the ground around the hide from disturbance, the next task is to de-turf the topsoil. The team replaces top soil at the end of construction to conceal the hide.

De-turfing

5-24. Cut the turf larger than the hide needs to be to give it a more natural appearance. To de-turf, the sniper team—

- Rolls the forward section onto the sandbags in front protecting the ground.
- Cuts and rolls from the center outwards to both sides, preventing any obvious cuts in the ground.
- Ensures when cutting the turf that it is neither too thick nor too thin.
- Ensures all turf is rolled onto the sandbags with care.

Cross Section

5-25. The sniper team first creates a lip around the hide site to help disperse the weight of the roof away from the edges of the hide wall, which makes it stronger and safer to operate. Once the lip is created, the sniper team digs for the required depth of the hide. Once they have the floor of the hide established, the sniper team can dig a little deeper for the observer area to create a seated position. Doing so aids in comfort and better observation.

Roof and Aperture Construction

5-26. When constructing the roof, the sniper team aims for a roof that does not dip with the weight of the top soil. The roof needs to be waterproofed with the poncho ends tucked in place by the top soil. The thicker the roof the smaller the thermal signature emitted.

5-27. The roof can be constructed in two ways. First by materials that the sniper carries, poles and wire roof sections. Second, the sniper team can use natural resources such as branches or thin tree trunks.

5-28. When constructing the roof, the sniper team makes a grid system by crossing the support material over and under one another using cord to tie some of the material together. The team places the thermal sheet, if using, between the roof material and poncho. The team pulls the ponchos as tightly as possible to prevent sagging when securing the ponchos. The roof of a subsurface hide must support the weight of a grown man.

Rear Door

5-29. To construct the rear door, snipers use a precut wire section and attach natural vegetation to it, replenishing as needed. Snipers attach a cord on the inside of the panel to assist in pulling down the door once inside the hide site.

Aperture

5-30. The sniper team observes and shoots from an aperture hole created in front of the hide. Snipers must remember to make the aperture only as big as needed. An oversized aperture could result in a compromise.

5-31. When making the aperture, snipers make a small incision into the turf and pull it back into the hide to create the opening. They use screens behind the observing line to block out any light and use a screen in front of the observation device to prevent any shine. They ensure all optics have the appropriate antireflection device attached.

SURFACE HIDES

5-32. The surface hide is the primary hide position. A surface hide affords concealment for a short period of time.

SUITABLE LOCATIONS

5-33. The characteristics on the ground, line of sight to the target, and clearance to engage a target dictate the location of the surface hide.

5-34. The sniper team can use a variety of terrain profiles (ditches) or vegetation (large thick shrubs) to create a hide location. The sniper team can create screens within the vegetation by cutting loopholes in the vegetation and then standing behind the vegetation screen.

Necessary Equipment

5-35. The sniper team's best piece of equipment for a surface hide is their ghillie suit. The sniper team must pay close attention to their surroundings and attach natural vegetation (away from their position) to blend in with their surroundings. The sniper uses the 70/30 rule.

5-36. The sniper can use a tripod to adjust the height of their observation. By using a tripod, the sniper takes advantage of the terrain and creates greater standoff between the sniper and the target.

5-37. The sniper can use the tree stack technique, in which the sniper uses a series of trees and aligns them to create a loophole (line of sight) to the target. The sniper needs to be cautious of setting up against a tree, because this creates an abnormal effect known as tree cancer.

OCCUPATION

5-38. Once the hide site is complete, all members must be silent and take final preparations before occupation. They must ensure all equipment is secured and that the surrounding area has been checked one final time for any errors. The sniper team can also lay out a kinetic defense such as claymore mines, trip flares, and ambush lights.

COMMUNICATIONS

5-39. The team must have established communication with the TOC before constructing the hide. If unable to establish communications, then the senior sniper must find a new hide site. Once the team has occupied the hide site, they must be aware of how the antenna is deployed, and if using an antenna source that is located outside of the hide site, that antenna must be secured and concealed and the cables must be dug into the ground so it is not visible or disturbed by wildlife.

5-40. Once inside the hide site, all communication must be sent and received while wearing a headset to prevent any outside sources from hearing the team. The team must keep all signaling equipment dry, clean, and in one area so the team can grab all the communication equipment during exfiltration, in the event of a compromise.

ROUTINE

5-41. Although the construction of positions may differ, the routines while in position are the same. The sniper takes the following actions—

- When rotating observation duties, the sniper weapon must remain in place on the firing platform, and the optics must be handed from one team member to the other.
- The sniper data book, observation logs, range cards, and the radio must be placed between the team members so both have easy access to them.
- The team members must establish a system of observing, eating, resting, and making latrine calls.

BREAK CONTACT

5-42. When reacting to an attack from a subsurface hide position, snipers react to an attack using break contact drills from the front, right, left, and rear. The team leader is the last sniper to leave the hide. The team leader ensures personnel and equipment are accounted for and initiates the destruction plan. Break contact drills need to be rehearsed thoroughly. Destruction plans are initiated based on METT-TC. All claymores are detonated simultaneously while team leaders report their hard compromise, and the team moves into their escape and evasion plan.

Chapter 6

Observing and Reporting

The sniper team's success depends upon its power to observe, analyze, and report accurate and timely information to higher command. Chapter 6 highlights the elements of observation and analysis, how to record what the sniper sees and how to report that information to higher command; therefore, chapter 6 is organized into three sections—observing, reporting, and introduction to photography.

OBSERVING

6-1. The sniper team should report all target activity to provide a realistic picture of the objective, which allows intelligence analysts to determine what information is pertinent. The sniper team may not be aware of activity or changes occurring in other areas. Information they report can lead to a more holistic intelligence picture of the battlefield. The sniper employment officer should receive raw information from the sniper team and package it for the intelligence staff.

Note. Types of visual searches, target detection, and range estimation are covered thoroughly in chapter 7.

ELEMENTS OF OBSERVATION

6-2. The purpose of observation is to gather facts and provide information for a specific intent. The elements of observation are—

- Awareness. Awareness means consciously tuning into a specific act. It is attained by staying aware of the surroundings.
- Understanding. Understanding comes from education, training, practice, and experience.
- Recording. Recording is the process of capturing data or translating information to a recording format. The sniper can use the following forms to record combat information that they observe within their target area:
  - Observation log.
  - Range card.
  - Military sketch.

- Responding. Response is the sniper team's action toward information. It may be as simple as recording events in a sniper data book, making a communications call, or firing a well-aimed shot.

6-3. There are seven components of visual perception, why objects are seen. They are—

- Shape (line, edge, and outline).
- Contrast or value.
- Color.
- Texture.
- Light (reflection, sunlight, shadow).
- Movement.
- Rhythm and flow.

6-4. There are five components of visual deception, why objects are unseen. They are—

- Perceptual limitations of the eye (distance, light).
- Context and relevance.
- Masking.
- Distractions (boredom, fatigue).
- Negative space.

6-5. In visual perception, change blindness is a phenomenon of the brain. Snipers should consider the following when encountering change blindness:

- The brain does not have a precise representation of the world but an incomplete one, made up of partial details.
- Change blindness does not affect the eyes, but the brain.
- The brain estimates the importance and usefulness of information prior to deciding whether to store the information.

6-6. When someone is visually or mentally focused on a specific item, changes in that item can be missed, and the observer may not notice changes. The sniper team can combat this by developing mental file folders of people, places, and things. The sniper should use resources such as recognition of combatants, or request other recognition material from the Recognition of Combatants website via email to build mental file folders to aid them in observation.

Baseline and Anomalies

6-7. Snipers collectively measure knowns and unknowns against the baseline to determine the anomalies. Context and relevance defines a baseline as described below:

- Context. This is the background, environment, framework, setting, or situation surrounding an event.
- Relevance. This is the relation of anomaly to the context.

6-8. When three anomalies are detected, a decision must be made. Decisions must be legal, moral, and ethical. Choices are to—

- Kill (engage).
- Capture (record).
- Contact (report).

SNIPER OBSERVATION LOG

6-9. The sniper log book is a written, chronological record of all activities and events taking place in a sniper team's area. The sniper team records the information on DA Form 7639 (*Sniper's Observation Log*) (see figure 6-1, page 6-4).

SNIPER'S OBSERVATION LOG

For use of this form, see TC 3-22.10; the proponent agency is TRADOC.

SHEET 1 OF 1 SHEETS

ORIGINATOR'S NAME	DATE *(YYYYMMDD)*	LOCATION
Landon Chey	20170404	GL 1234 5678

SERIAL	TIME	GRID COORD	EVENT	ACTIONS OR REMARKS
1	0330	GL12345678	occupied position	position set, start log
2	0340	same	ID YR limits	Range card
3	0351	Same	Comms check	Conducted w/ TOC & QRF
4	0515	GL10055000	3 MAMS	3 MAM's enter Bldg 4; called in SALUTE
5	0610	GL10055000	HVT ID	Target ID, called SALUTE,
6	0611	same	call QRF	called QRF, notify HVT in Bldg 4
7	0611	same	HVT reduced	called in Sitrep, QRF enroute
8	0613	GL12345678	Begin exfil	begin Exfil, link up
9	0703	GL11112134	link up w/ QRF	link up complete / Mission complete

SAMPLE

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Figure 6-1. Completed DA Form 7639, example

6-10. When filling out an observation log, the sniper must remember to include observations on the categories of information listed below:

- Size, activity, location, unit and uniform, time, and equipment.
- Observation and fields of fire, avenues of approach, key terrain, obstacles, and cover and concealment (known as OAKOC).
- Terrain, vegetation, structures, and tactical importance categories below:
  - Terrain. Describe the general layout of the terrain. Include terrain features, bodies of water, and composition of the soil.
  - Vegetation. Describe the composition of the local vegetation. Include if it is groomed grass, whether the trees are hard or soft wood, or leafy or pine, average height of the grass and the trees.
  - Structures. Describe the general layout of the structures that pertain to the objective. Add the dimensions, composition of the buildings, describe how many floors, windows, doors, stairways
  - Tactical importance. Add possible infiltration and exfiltration routes, last cover and concealed positions, breach points, possible landing zones, or anything else that the sniper may feel is important to the mission.

6-11. When reporting on human activity use size, activity, location, unit/uniform, time and equipment. When reporting on terrain, use observation and fields of fire, avenues of approach, key terrain, obstacles, and cover and concealment. Use terrain, vegetation, structures, and tactical importance in conjunction with the target sketch.

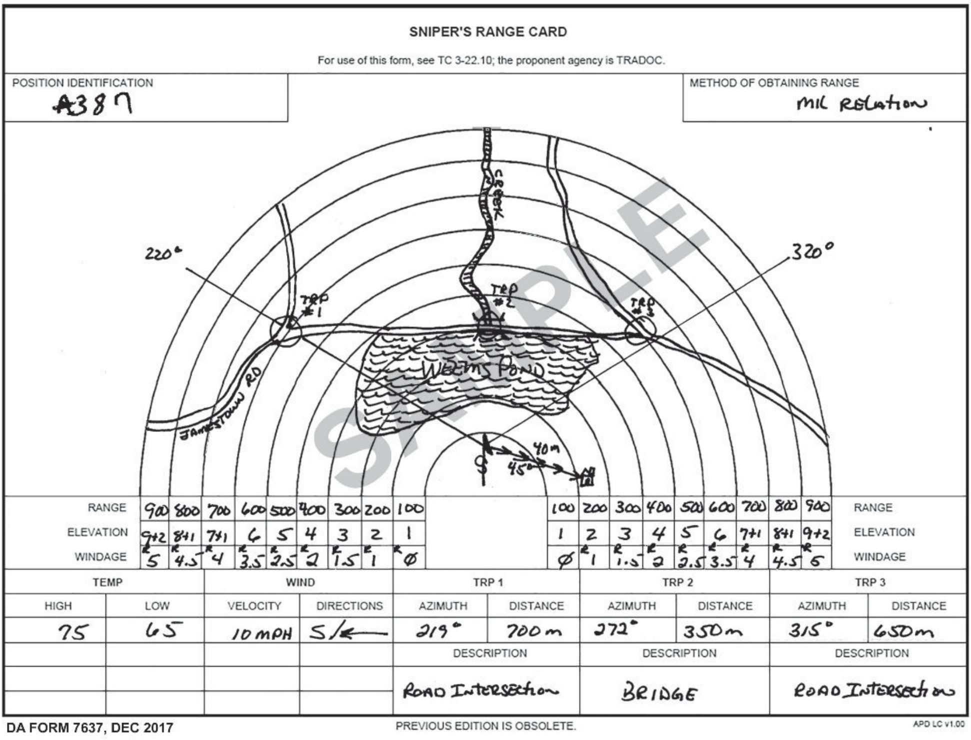
SNIPER RANGE CARD

6-12. There are two types of sniper range cards, an unprepared range card which can be drawn or sketched on anything or a prepared range card as seen in the example given on DA Form 7637, *Sniper's Range Card,* (figure 6-2, page 6-6), which is preformatted and printed. The range card shows the target area from above, with annotated distances to various locations. Range rings printed on the form give the sniper team a quick range reference and a means to record target locations. The team can draw dashed lines to indicate sectors of fire. If constructing an unprepared range card, the sniper must include all pertinent information.

6-13. The range card allows the teams to refer to target locations on the sectors, such as "the intersection in sector A." The team draws their own positions and distances to prominent objects and terrain features. They determine the maximum range for the range card, so they can add indirect fire targets to it. On DA Form 7637, the team must record the following—

- Method of obtaining range.
- Left and right limits of engaging area.
- Major terrain features, roads, and structures.
- Range, elevation, and windage settings needed at various distances.
- Distances throughout the area.

- Temperature and wind.
- Target reference points (azimuth, distance, and description).



SNIPER'S RANGE CARD

For use of this form, see TC 3-22.10; the proponent agency is TRADOC.

POSITION IDENTIFICATION: A387

METHOD OF OBTAINING RANGE: MIL RELATION

RANGE	900	800	700	600	500	400	300	200	100	100	200	300	400	500	600	700	800	900	RANGE
ELEVATION	9+2	8+1	7+1	6	5	4	3	2	1	1	2	3	4	5	6	7+1	8+1	9+2	ELEVATION
WINDAGE	R 5	R 4.5	R 4	R 3.5	R 2.5	R 2	R 1.5	R 1	R Ø	Ø	R 1	R 1.5	R 2	R 2.5	R 3.5	R 4	R 4.5	R 5	WINDAGE

TEMP		WIND		TRP 1		TRP 2		TRP 3	
HIGH	LOW	VELOCITY	DIRECTIONS	AZIMUTH	DISTANCE	AZIMUTH	DISTANCE	AZIMUTH	DISTANCE
75	65	10 MPH	S/←	219°	700 m	272°	350 m	315°	650 m
				DESCRIPTION		DESCRIPTION		DESCRIPTION	
				ROAD INTERSECTION		BRIDGE		ROAD INTERSECTION	

DA FORM 7637, DEC 2017 PREVIOUS EDITION IS OBSOLETE. APD LC v1.00

Legend

m	meter	TEMP	temperature
MPH	miles per hour	TRP	target reference point
S	south		

Figure 6-2. Completed DA Form 7637, example

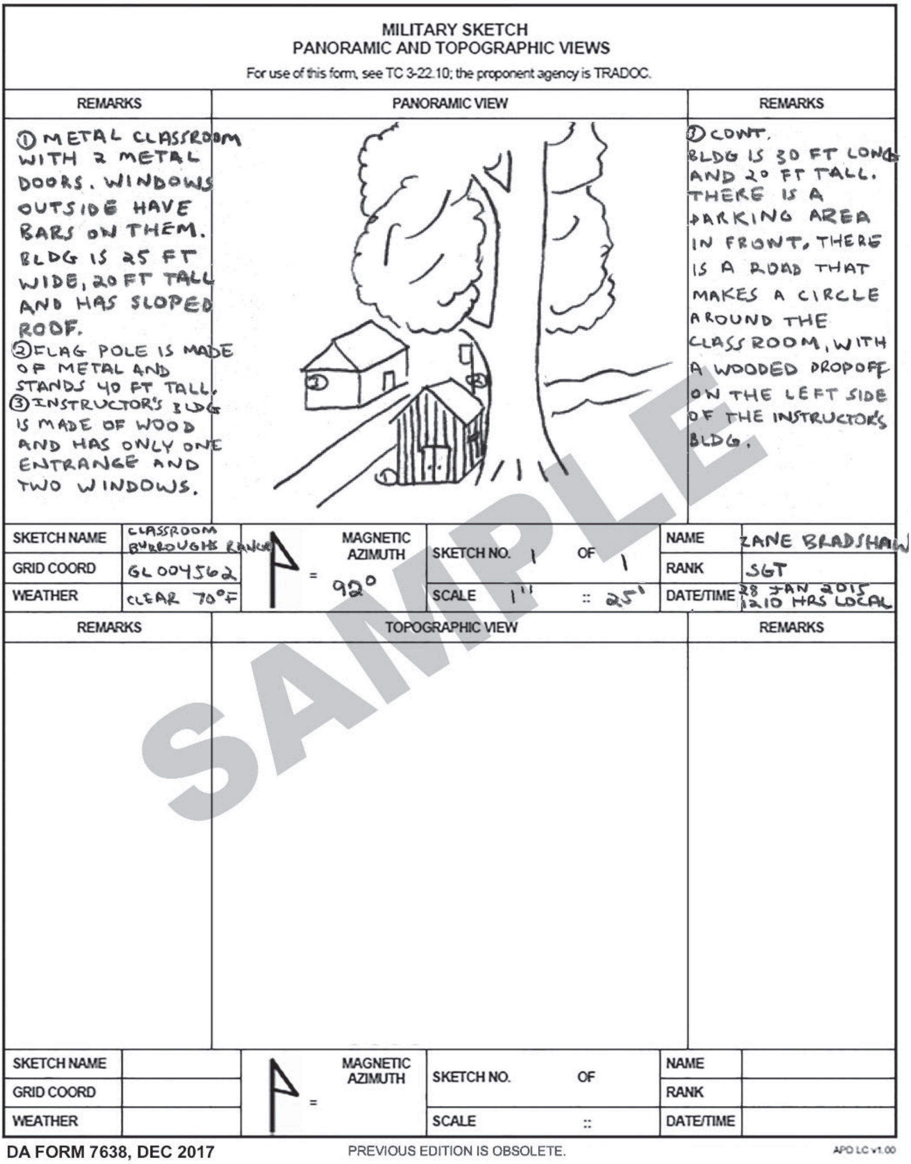
MILITARY SKETCH

6-14. The sniper records supplemental information about a general area, its terrain features, and its man-made structures on DA Form 7638, *Military Sketch, Panoramic and Topographic Views* (figure 6-3, page 6-8). Military sketches give intelligence sections a detailed, on the ground view of an area or object.

6-15. These sketches let the viewer see the area from a different perspective, include objects missing from the maps, allow for examination of areas shown in too little detail on the maps, and provide detail such as types of fences and number of telephone wires. TC 3-25.26 describes three types of military sketches: road, area, and field.

Panoramic Sketch

6-16. A panoramic sketch shows a scaled area or object from the sniper team's perspective. The sketch shows details about a specific area or a man-made structure.



MILITARY SKETCH
PANORAMIC AND TOPOGRAPHIC VIEWS
For use of this form, see TC 3-22.10; the proponent agency is TRADOC.

REMARKS	PANORAMIC VIEW	REMARKS
① METAL CLASSROOM WITH 2 METAL DOORS. WINDOWS OUTSIDE HAVE BARS ON THEM. BLDG IS 25 FT WIDE, 20 FT TALL AND HAS SLOPED ROOF. ② FLAG POLE IS MADE OF METAL AND STANDS 40 FT TALL. ③ INSTRUCTOR'S BLDG IS MADE OF WOOD AND HAS ONLY ONE ENTRANCE AND TWO WINDOWS.		① CONT. BLDG IS 30 FT LONG AND 20 FT TALL. THERE IS A PARKING AREA IN FRONT, THERE IS A ROAD THAT MAKES A CIRCLE AROUND THE CLASSROOM, WITH A WOODED DROPOFF ON THE LEFT SIDE OF THE INSTRUCTOR'S BLDG.

SKETCH NAME: CLASSROOM BURROUGHS RANGE	MAGNETIC AZIMUTH = 92°	SKETCH NO. 1 OF 1	NAME: ZANE BRADSHAW
GRID COORD: GL 004562			RANK: SGT
WEATHER: CLEAR 70°F		SCALE 1" :: 25'	DATE/TIME: 28 JAN 2015 1210 HRS LOCAL

REMARKS	TOPOGRAPHIC VIEW	REMARKS

SKETCH NAME	MAGNETIC AZIMUTH =	SKETCH NO. OF	NAME
GRID COORD			RANK
WEATHER		SCALE ::	DATE/TIME

DA FORM 7638, DEC 2017 PREVIOUS EDITION IS OBSOLETE. APD LC v1.00

Legend

Bldg	building	ft	feet
Cont	continue	Hrs	hours
Coord	coordinate	No	number
F	Fahrenheit	SGT	sergeant

Figure 6-3. Completed DA Form 7638, example

Contents

6-17. Snipers should use the acronym OAKOC to remember what details need to be included on the panoramic sketch, which are—

- Any natural or man-made terrain feature stopping, impeding, slowing, or diverting movement. (Identifying and reinforcing obstacles and hindering terrain (slow go/no go) that affects mobility, to include the shot).
- Observation and fields of fire.
- Observation. The ability to see over a particular area to acquire targets.
- Fields of fire. The area a weapon can cover effectively from a given point.

6-18. The analysis provides the commander with eyes on the objective and the finalization of their plan. The sketch allows the commander to identify potential engagement areas, defensible terrain, and weapon systems positions. The sketch also identifies where maneuvering forces are most vulnerable to observation and fires.

6-19. An *avenue of approach* is an air or ground route of an attacking force of a given size leading to its objective or to key terrain in its path (JP 2-01.3). The sniper should question how these avenues can sustain movement or the enemies' movement. What are the likely enemy counterattack routes?

6-20. Panoramic sketches include—

- Remarks sections (two).
- Sketch name.
- Grid coordinates of the sniper team's position.
- Weather.
- Magnetic azimuth through the center of sketch.
- Sketch number and scale of sketch or photo number.
- Sector area (width and depth).
- Date and time.
- Name and rank of originator.
- Buildings in panoramic sketches should appear to have a three-dimensional view.
- Description of the size and composition of buildings in a panoramic drawing. Measurements should be three dimensional with units of measure and composition to the best of the sniper's ability.

Key Terrain

6-21. Decisive terrain (natural or man-made) if held or controlled, has an extraordinary impact on the mission. Decisive terrain is often selected for uses as battle positions or objectives and may be controlled with either fires or maneuver.

Obstacles and Movement

6-22. The sniper first identifies existing and reinforcing obstacles in their area of operation, limiting mobility with regards to the mission. The sniper identifies the following:

- Ravines, gaps, and ditches over 3 meters or 10 feet wide.
- Tree stumps and large rocks over 18 inches high.
- Forests with trees 8 inches or more in diameter with less than 4 meters or 13 feet between trees.
- Man-made existing obstacles (for example, buildings, or power and telephone lines).
- Reinforcing obstacles.
- Minefields (conventional and situational).
- Antitank ditches.
- Wire obstacles.

Note. The sniper must identify if the obstacle hinders the movement of soldiers on foot, in vehicles, or by air. If possible, the sniper should give their "boots on ground" opinion to the commander to remedy the situation.

TOPOGRAPHIC SKETCH

6-23. A topographic sketch shows scaled topography (such as terrain features to include elevation and terrain types such as forests and swamps). On a topographic sketch, the sniper team can describe large areas such as road systems, streams, and rivers, and natural and man-made obstacles. Sketches can show accurate distances and azimuths between major features. The team can use topographic sketches as overlays on range cards.

Contents

6-24. A topographic sketch includes (figure 6-4, page 6-12)—

- Sketch name, number, and scale.
- Date and time.
- Grid coordinates of the sniper team's position.
- Remarks.
- Weather.
- Magnetic azimuth.

Key Terrain

6-25. Decisive terrain (natural or man-made) if held or controlled has an extraordinary impact on the mission. Snipers may select decisive terrain for use as battle position or objectives, which may be controlled through either fires or maneuver.

Obstacles and Movement

6-26. The sniper first identifies existing and reinforcing obstacles in their area of operation that could limit mobility with regards to the mission.

Existing Obstacles

6-27. The following is a list of existing obstacles:

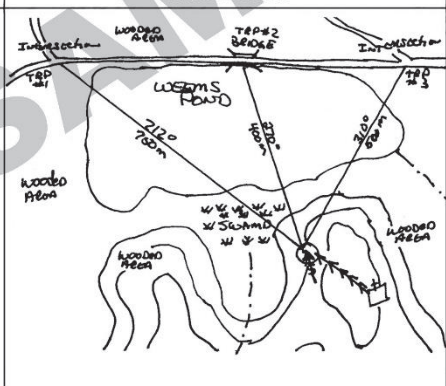
- Ravines, gaps, and ditches over 3 meters or 10 feet wide.
- Tree stumps and large rocks over 18 inches high.
- Forests with trees 8 inches or more in diameter with less than 4 meters or 13 feet between trees.
- Man-made existing obstacles (for example, buildings, or power and telephone lines).
- Reinforcing obstacles.
- Minefields (conventional and situational).
- Antitank ditches.
- Wire obstacles.

MILITARY SKETCH
PANORAMIC AND TOPOGRAPHIC VIEWS
For use of this form, see TC 3-22.10; the proponent agency is TRADOC.

REMARKS	PANORAMIC VIEW	REMARKS

SKETCH NAME		MAGNETIC AZIMUTH =	SKETCH NO. OF	NAME	
GRID COORD				RANK	
WEATHER			SCALE ::	DATE/TIME	

SAMPLE

REMARKS	TOPOGRAPHIC VIEW	REMARKS
① Range to Bridge is 400m. ② Pond is 200m Long. ③ Bridge is Reinforced Con-crete and can Hold 2 vehicles side by side. ④ Road is Asphault. ⑤ Road is 3 FT Above water Level with soft Shoulders on Both sides.		⑥ water is NOT Potable. ⑦ vegetation is sparce with Some Trees. ⑧ woods on All sides. ⑨ TRP #1 is Intersection 750m Left of position ⑩ TRP #2 is Bridge at Pond 400m Away. ⑪ TRP #3 is 500m at inter-section ⑫ Rear Reference Point is a Church

SKETCH NAME	Weems Pond	MAGNETIC AZIMUTH = 270°	SKETCH NO. 1 OF 1	NAME	ZANE BRADSHAW
GRID COORD	PL 427648			RANK	SGT
WEATHER	Clear/Cool 64°F		SCALE 1" 25	DATE/TIME	28 JAN 2015 1210 HRS LOCAL

DA FORM 7638, DEC 2017 PREVIOUS EDITION IS OBSOLETE. APD LC v1.00

Legend

Bldg	building	ft	feet
Cont	continued	Hrs	hours
Coord	coordinate	No	number
F	Fahrenheit	SGT	sergeant

Figure 6-4. Completed DA Form 7638, example

REPORTING

6-28. Reporting is an account or statement describing in detail an event or situation as the result of observation.

6-29. Upon successful infiltration into the objective area, the sniper team initiates a voice communication transmission with a grid location, during the first stop, look, listen, and smell security halt. The following reports are due after the successful infiltration:

- Situation report to include current location, initial orientation to the target, in position deficiencies, and next planned action.
- Grid overhead sector sketch.
- Grid structure sketch.

6-30. Miscellaneous enhancements or follow-on reports can be—

- Size, activity, location, unit/uniform, time and equipment reports.
- Reports of all personnel (enemy or friendly) on the objective. Send a report to the TOC upon each unique sighting.

INFORMATION REPORTS

6-31. There is a balance between brevity and the need to give as much information as possible to avoid confusion in the sniper TOC. The use of a message log becomes a necessity at this point.

6-32. The significance of targets or activity, regardless of whether the target is engaged, can be determined only by considering the overall intelligence picture. Available communication methods vary between missions. The sniper team should coordinate with the intelligence cell to determine the best method of reporting information to be utilized in intelligence production.

UNMANNED AIRCRAFT SYSTEMS REPORTING

6-33. The modern operational environment consists of an enemy who employs UAS systems as part of a broader target acquisition cycle. Near peer enemies have perfected a deadly target acquisition cycle that includes enemy snipers, UAS systems, and indirect fire. The sniper team must be aware of these emerging threats and must report enemy UASs to higher command in a timely manner.

6-34. Reporting is a crucial step in defeating enemy UAS systems and building an accurate enemy situation template. The sniper team must take the time to understand the key features of enemy systems and their capabilities to allow for effective reporting and intelligence preparation of the environment.

6-35. UAS reporting procedures should include:

- Team call sign and frequency.
- Team location.
- Date and time of observation.
- Estimated time on site.

- Flight characteristics (direction of travel, pattern of travel).
- Estimated size, elevation, and physical description.

INTRODUCTION TO PHOTOGRAPHY

6-36. Not all sniper missions terminate in taking a shot with a rifle, but all sniper missions terminate with reporting information. The skillful use of digital single-lens reflex cameras enables the sniper to provide much needed information to higher in a clear, concise manner in near real time.

6-37. Surveillance equipment requires periodic training to remain proficient and to be able to work the equipment under austere conditions. Surveillance equipment must also be precombat inspected prior to every mission. Not having something as small as a cable, memory card, recharged batteries, lens adapters, and so forth can make a piece of equipment useless. This could lead to mission failure.

6-38. One of the primary tasks for the sniper team is to gather and report battlefield intelligence to the battalion TOC, where the information can be disseminated to the appropriate company.

6-39. The sniper employment officer can submit a memorandum for an operational needs statement for the tactical support equipment Media Kit 1000 and Media Kit 625 for sniper sections.

PROCUREMENT OBJECTIVE EXAMPLE

Receive the Media Kit 1000 and the Media Kit 625 that enables the battalion sniper teams the ability to effectively conduct all aspects of reconnaissance and surveillance. Due to the current operating and operations tempo, the 3rd Brigade Combat Team requires fielding of the above listed equipment in 1st Quarter FY18. This gives the sniper teams enough time to train on the systems and utilize them during mission readiness exercises in 1st Quarter FY18 and 2nd Quarter FY18.

6-40. Point and shoot cameras are easy to use digital cameras. Point and shoot cameras require very little camera knowledge and photography skill to produce a decent, usable picture. Snipers can mount NVDs for night photography without the flash.

Note. Refer to the camera's manual for step-by-step guidance on how to properly setup and employ the camera.

TACTICAL CONSIDERATIONS

6-41. Some tactical considerations that the sniper team needs to review before using the camera are proper light discipline. The sniper needs to be aware of several camera features to evade detection.

Disable the Flash

6-42. Prior to departure, the sniper must disable the flash on all cameras to prevent accidental use.

Liquid Crystal Display Screen

6-43. The sniper needs to adjust the illumination emitted from the liquid crystal display (commonly known as LCD) screen by adjusting the color scheme through the camera's settings.

Lens Reflection

6-44. The sniper team must take the appropriate measures to mask their lens from reflecting back outwards toward the enemy. Refer to chapter 3, for ways to prevent unwanted shine from the lens.

Camera Support

6-45. The sniper team needs to have a strong understanding of how to properly hold and support the camera with various tools, such as a tripod. Tripods provide the sniper team with the ability to move or pan the camera in all directions and under control.

6-46. The sniper team can also use a shutter remote to aid in taking still images without inducing any movement.

For a more in-depth analysis of camera employment, sniper teams should contact their public affairs office at their unit and seek out the advice from cameramen employed in those positions or they can seek additional assistance by contacting the 55th Signal Company (Combat Camera) located at Fort Meade, MD.

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Chapter 7

Direct Fire Engagement Process

This chapter describes the engagement process for all direct fire sniper weapon systems. The engagement process has five distinct steps that the sniper team executes: detect, identify, decide, engage, and assess. These steps are part of a constant cycle in which snipers execute decisive action tasks with direct fire to defeat threats, eliminate the potential for fratricide, and reduce collateral damage. The sniper team uses the detect, identify, decide, engage, and assess process and the techniques described in Appendix C to control the battlefield.

OVERVIEW

7-1. The goal of the direct fire engagement process is to provide a standardized method of engagement for sniper weapons on the battlefield. The method allows snipers and leaders to maximize the effects of lethal fires against the enemy while at the same time reducing or eliminating the effects of fires on friendly or neutral personnel, equipment, or facilities.

7-2. The sniper's ability to acquire targets rapidly under any condition is critical to survivability and mission success. This skill is vital to maintain overmatch against any adversary. It starts with the sniper's ability to quickly detect the threat and posture themselves to defeat it with the appropriate amount of force based on the mission, ROE, and the operations order.

7-3. Effective target detection requires a series of skills that snipers master. Detection is an active process during combat operations, with or without a clear or known threat presence. All direct fire engagements are enabled by the sniper's detection skills. These skills are built upon four core fundamentals described below:

- Scan and search. A rapid sequence of various techniques to identify potential threats.
- Scanning skills. Skills to determine potential areas where threats are most likely to appear.
- Acquire. A refinement of the initial scan and search based on irregularities in the environment.
- Locate. The ability to determine the general location of a threat to engage with accuracy.

SCAN AND SEARCH

7-4. Scan is the act of observing designated areas in the assigned sector, while search is a thorough, deliberate method of observation of a refined area. Sectors of observation for target acquisition are assigned by the senior sniper or as outlined in the team SOP to each team member.

7-5. The goal of the scan and search is deliberate detection of potential threats based on irregularities in the surrounding environment. This includes irregular shapes, colors, heat sources, movement, or actions the sniper views as being "out of place," as compared to the surrounding area. Search techniques provide a general area where a potential threat might be and the sniper focuses efforts to acquire that threat (see paragraphs 7-20 to 7-31). When conducting their scan, the sniper asks, "Where would I be if I were the threat?"

7-6. When operating as a team, snipers apply various scan techniques in an overlapping manner, termed the sector search. This ensures the least amount of dead space to the team, and maximizes the use of the snipers' optics and thermals to increase the overall ability of the sniper team to detect threats as rapidly as possible.

7-7. Guidelines for the team are—

- The sniper scans different locations. Initial scanning can be done without optics.
- The target acquisition is continuous. Any possible target missed on the first or second scan may be seen on the third or fourth scan.
- The sniper should look for targets and target locations using proper scanning methods within their assigned sectors.
- The sector discipline is vital for the sniper to ensure constant coverage of the assigned sectors.
- The sector discipline is vital for the sniper and team members to ensure constant coverage of the assigned sectors.
- The sniper should scan in areas where targets are most likely to appear, such as avenues of approach, wood lines, and reverse-slope firing positions.
- The sniper should not use digital zoom functions or high magnification when using rapid scan to detect targets.

7-8. Snipers can use the thermal optics, infrared NVDs, sniper weapon system optics, naked eye, and binoculars for scanning during good and limited visibility conditions. Snipers must train to use all available optics and sensors and become extremely proficient, switching between types of optics or sensors, particularly during limited visibility operations.

INDIVIDUAL SCAN AND SEARCH METHODS

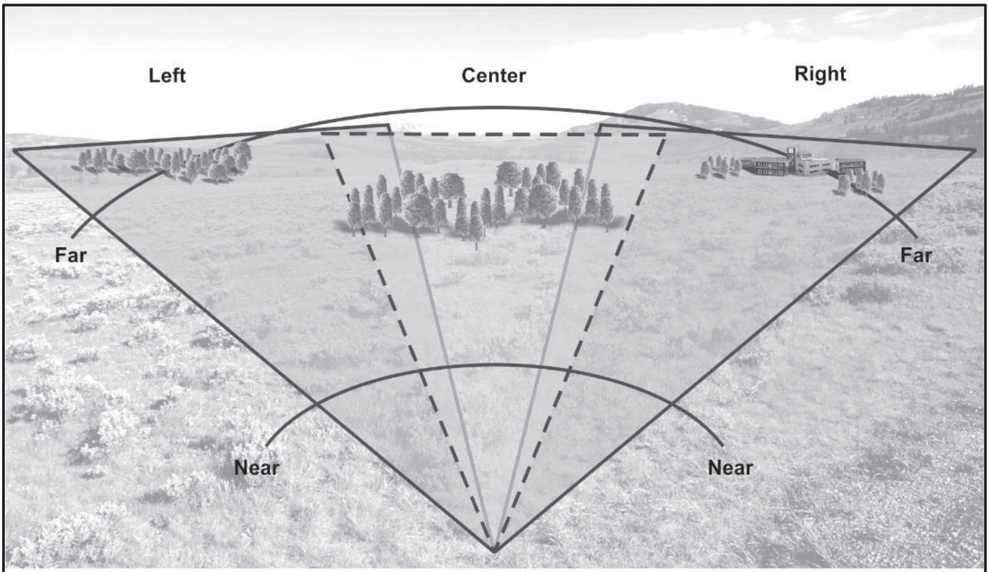
7-9. There are five detection methods to determine potential threat locations: rapid, slow, horizontal, vertical, and detailed. The sniper team can simultaneously employ varied multiple scan or search methods to maximize the potential of acquiring threats.

Snipers should ensure ground reference points are always within their field of view to maintain directional control and situational awareness while scanning.

Rapid Scan

7-10. The rapid-scan method is used to detect obvious signs of enemy activity quickly (figure 7-1, page 7-4). The rapid-scan method is usually the first method used. The sequence of the rapid-scan is as follows:

- The sniper starts scanning in the center of the sector and rapidly scans from the nearest to the farthest point.
- The sniper then orients left or right and conducts a rapid scan, near-to-far. This sweep overlaps the center of the previously scanned sector.
- Once one side of the center is completed, the remaining side is scanned in the same manner.
- When more than one sniper is scanning, the firer should always scan from near to far while the spotter scans from far to near.



Individual Sniper

a. Start center sector and conduct a rapid scan from nearest to farthest sector.

b. Orient to either left or right sector, conduct rapid scan from nearest to farthest sector. Ensure the rapid scan overlaps center of previously scanned sector.

Multiple Sniper Members

a. Start center sector. One sniper member conducts rapid scan from nearest to farthest while the other sniper member conducts rapid scan from farthest to nearest.

b. One sniper member orients to the left sector while the other sniper member orients to the right sector. Conduct rapid scan from nearest to farthest sector. Ensure the rapid scan overlaps center of previously scanned sector.

Figure 7-1. Rapid scan

Slow Scan

7-11. If no targets are detected in the rapid scan, snipers conduct a more deliberate scan of the terrain by using optics (day or thermal mode) or hand-held vision enhancers (figure 7-2) as follows:

- The sniper pauses at short intervals to give their eyes time to focus and searches a strip of the target area 50 to 100 meters deep from right to left.
- The sniper then scans a strip farther out from left to right, overlapping the first area scanned.
- When another sniper is scanning, that sniper uses the same technique starting from the opposite side.

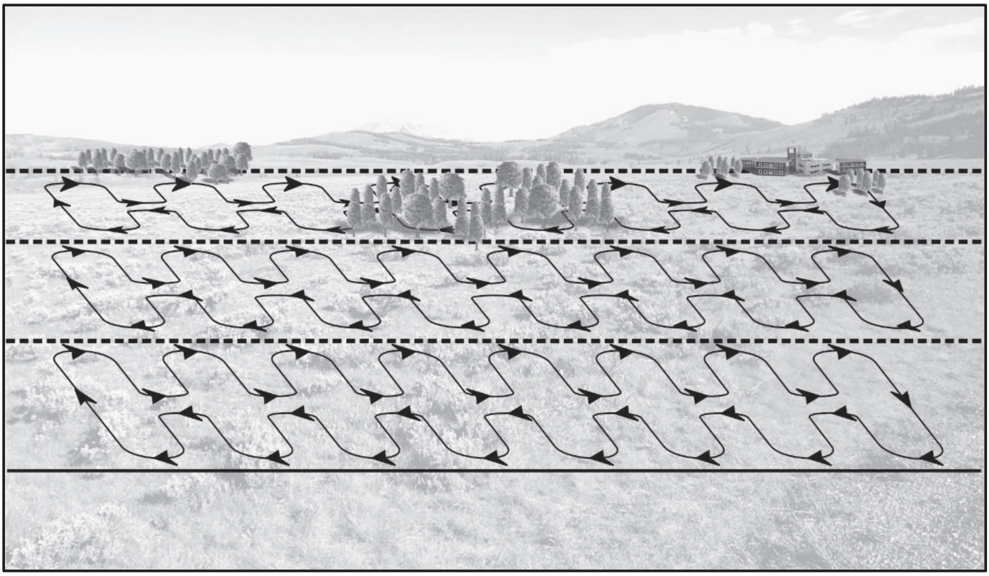


Figure 7-2. Slow scan

Horizontal Scan

7-12. The sniper scans up to 20 degrees above the horizon by moving their eyes in short movements across the sky, working them up and across.

7-13. For scanning larger buildings in an urban environment, snipers should use the horizontal scan for open and urban or restricted terrain (figures 7-3 and 7-4, page 7-6).

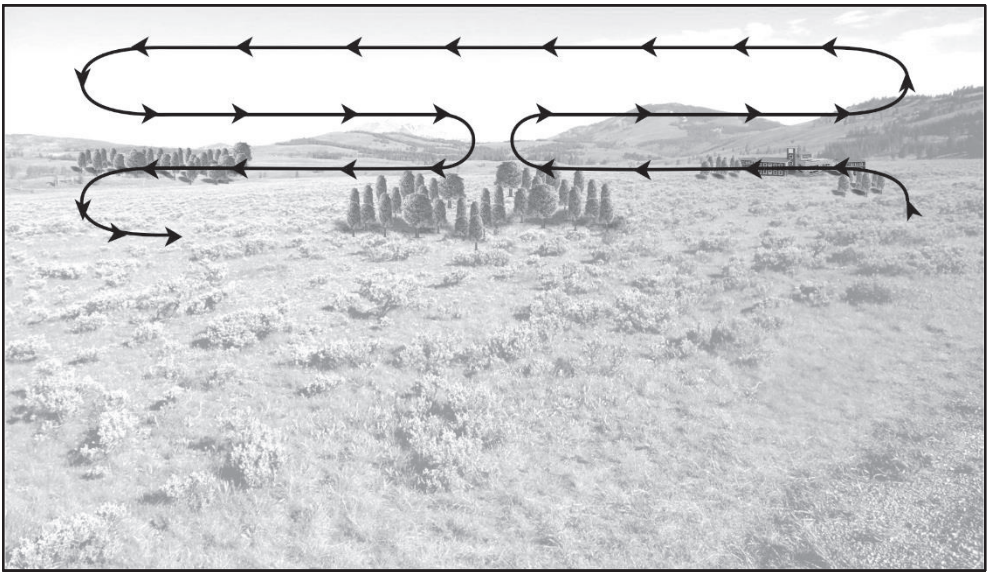


Figure 7-3. Horizontal scan, open terrain

Figure 7-4. Horizontal scan, urban or restricted terrain

Vertical Scan

7-14. Snipers scan the sky using the horizon as a starting point and prominent terrain features as points of reference (figures 7-5 and 7-6).

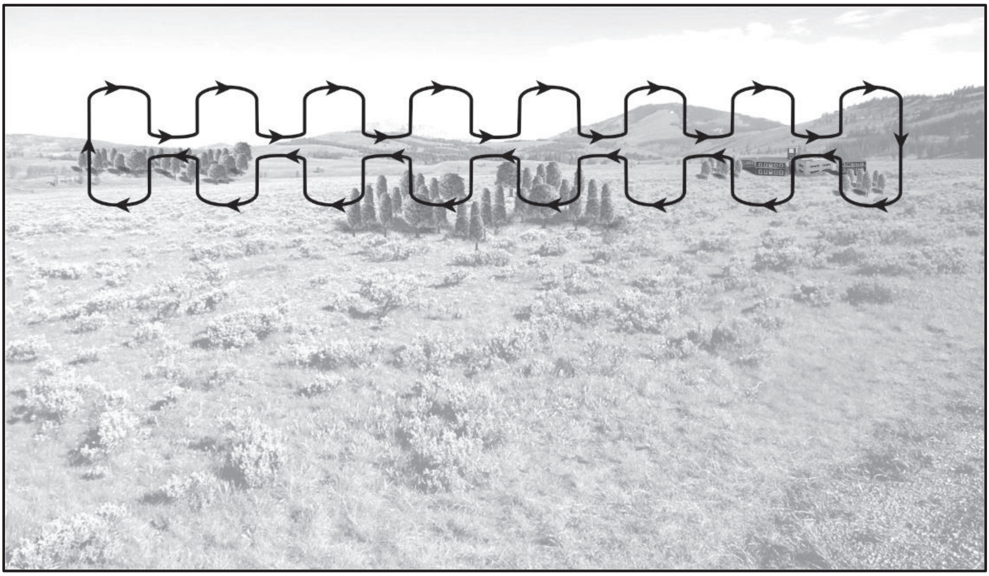


Figure 7-5. Vertical scan, open terrain

Figure 7-6. Vertical scan, urban or restricted terrain

Detailed Search

7-15. If no targets are detected using other scanning methods, snipers should use the available optics (day and night) to make a careful, deliberate search (figure 7-7). Snipers use this method to search small areas or suspected avenues of approach in detail as follows:

- Concentrate on one specific area or location and study that area intensely.
- Look for direct or indirect target signatures (discussed later in this chapter) in a clockwise manner around the focal point area. When using more than one optic, one sniper scans clockwise and the other scans counterclockwise.
- Magnify optics as needed to cover detailed scan areas.

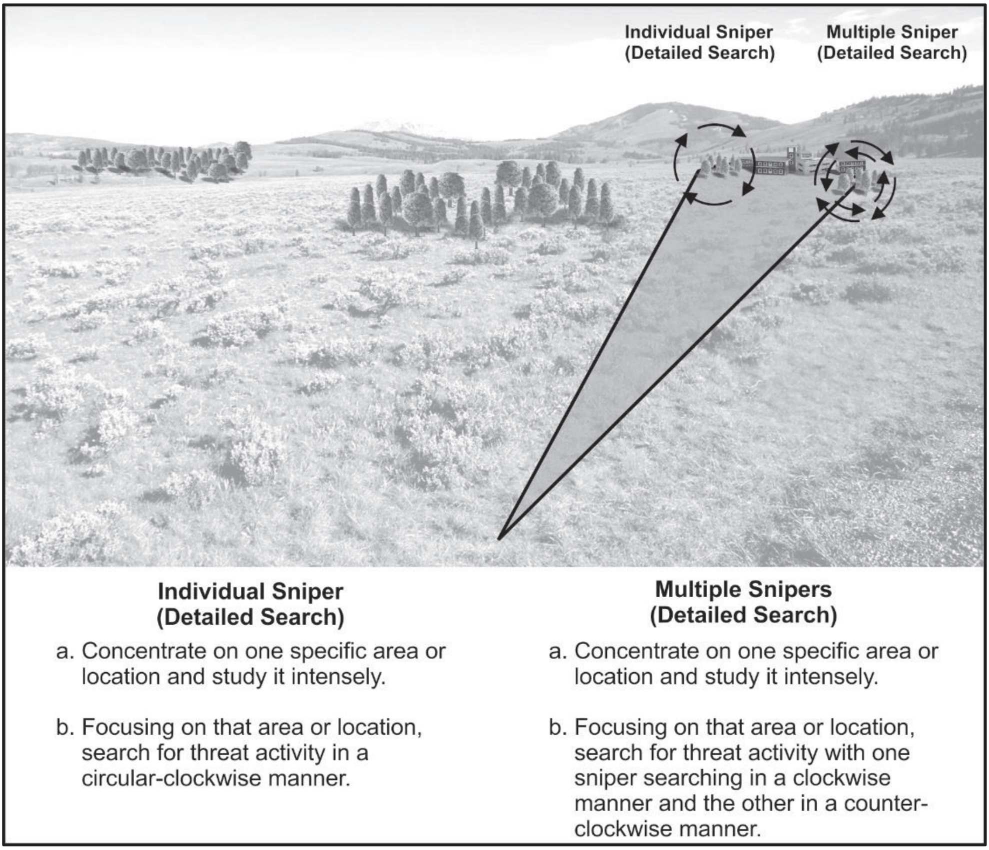


Figure 7-7. Detailed search

COLLECTIVE SEARCH TECHNIQUES

7-16. The sector search provides sniper teams with techniques to apply their individual scan methods in a collective manner. The primary goal is to eliminate possible dead space and unobserved areas to maximize the team's threat detection capabilities.

7-17. Three basic techniques are used to search as a collective team. Each team member is assigned a specific sector (area) to apply their scan methods. The combined sectors may overlap, be divided, or specify a distance from the friendly force to focus their efforts. Teams may combine all three techniques into their threat detection routines.

Overlapping Sectors

7-18. Snipers ensure the sectors they scan overlap those that have already been scanned or overlap those of other snipers that are scanning. This includes overlapping scanning or search efforts of adjacent teams.

Divided Sector

7-19. The sniper team divides the sector between them. One sniper scans one half of the sector and another scans the other half, ensuring the entire sector area is overlapped at the center of the sector (figure 7-8).

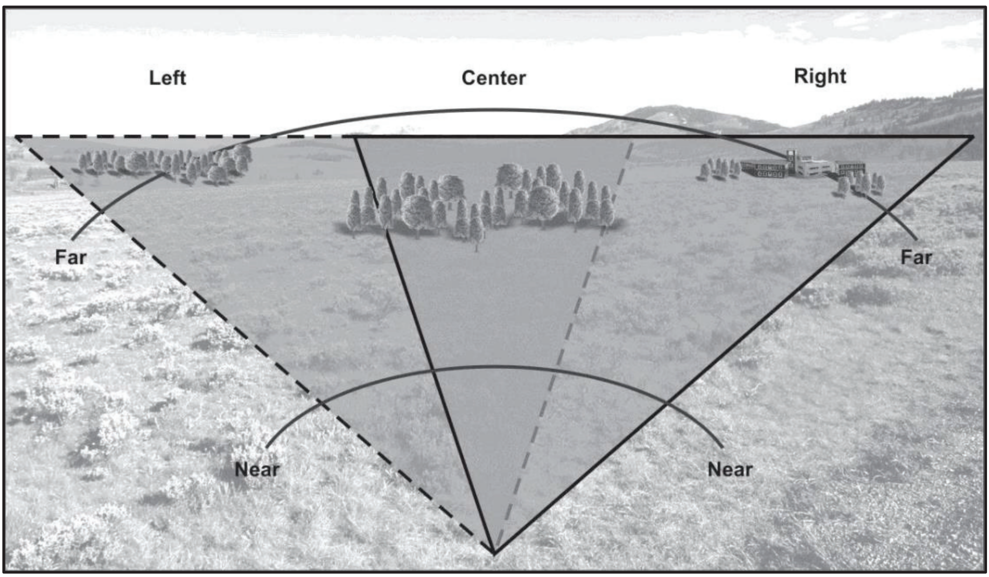


Figure 7-8. Divided sector

AQUIRE

7-20. Target acquisition is the discovery of any object in the operational environment such as personnel, vehicles, equipment, or objects of potential military significance.

Target acquisition occurs during target search as a direct result of observation and the detection process.

7-21. To accurately and effectively acquire targets, snipers are efficient and effective in recognizing the various target signatures and adapting to the detection challenges of the environment, equipment, and other factors.

> ***Note.*** Snipers are required to be well-trained in identifying potential threats such as surface- or subsurface-laid mines, obstacles, booby traps, unexploded ordnances, and improvised explosive devices. This requires attention to detail and identifying threats beyond the obvious or known enemy systems.

TARGET SIGNATURES

7-22. Target signatures are indicators or clues that aid an observer in detecting potential targets. Most threats (personnel, weapons, and vehicles) have identifiable signatures. These signatures may be the result of their design or the environment where the equipment is operating.

7-23. Target signatures are categorized by threat type to describe their key characteristics using sight, sound, and smell (table 7-1). The target signature categories are personnel, obstacles or mines, vehicles, antitank, artillery, and aircraft (known as POVA3). The following table shows the general characteristics of each type to target signature group and common factors that assist snipers in identifying potential threats. The most common factors are listed by the observer's senses; sight, sound, and smell.

Table 7-1. Target signatures

	Sight	Sound	Smell
Personnel	Hasty/deliberate fighting positions. Broken vegetation. Footprints. Trash. Spent brass. Audio or video recording equipment.	Voices. Noises associated with movement (breaking vegetation, entering water). Personal equipment. Identifiable phrases.	Fire. Cooking. Tobacco. Body odor.
Obstacles or Mines	Loose or disturbed dirt in a regular pattern. A destroyed or disabled vehicle that appears to have struck a mine. Dead animal carcasses. Piles of dirt or trash.		Previous explosive device use. Burned vehicles or rubber.
Vehicle	Dust signature. Smoke from engine exhaust. Tracks marks on terrain. Thermal hot spots. Maneuver damage. Flash from muzzle. Reflections off of glass.	Engine noise (at close distance). Weapon discharge. Track noise.	Engine exhaust. Fuel or oil spills. Running engine (at close distance).
Antitank	Fast moving hot spot with a vapor trail. Long thin wires from previously fired antitank guided missiles. Recently destroyed armored vehicles.	Sharp crack of the antitank guided missile being fired. Missile launch "swish" sound.	
Artillery	Grayish-white smoke cloud. Bright orange flash and black smoke from airbursts.	Loud, dull sound. Rushing noise several seconds before round impacts.	
Aircraft	Reflections from aircraft. Vapor trails from engine exhaust and fired missiles. Dust and movement from foliage from hovering aircraft.	Aircraft engine noise.	

7-24. Potential areas with threat personnel may be identified by fighting positions with disturbed earth, small arms spent brass, ripped or torn clothing, trash from food items, or footprints in soft or muddy soil. Personnel threats in groups of civilians can be identified by extended interest in friendly forces or action, digital recording equipment, or personnel writing or sketching while casually observing friendly forces. Dismounted threats using civilians for concealment may have bulky or bulging clothing, excessive clothing for the environment, or darker colored clothing. These may be indicative of threat personnel attempting to conceal weapons or explosive devices.

7-25. Obstacles, mines, and improvised explosive devices can be identified by disturbed earth, discolored ground in small shapes, small dirt piles, and stacked or piled garbage. Some explosives may be hidden in the carcass of larger animals common to the region. Single or twin large craters, craters with broken track blocks or wheels nearby, or craters with remaining electrical wires or explosive residue may identify mines or improvised explosive devices that have been detonated.

7-26. Vehicles can be wheeled or tracked with varying identifying signatures. Wheeled or tracked vehicle signatures are likely to be detected in open areas and rolling terrain. Key signatures include an imprint of the wheel or track in soft, muddy, or loose terrain; exhaust smoke plumes; diesel engine sounds; and sharp angles in their profile. When using thermal optics, heat on the wheels or tracks, engine compartment, and any vehicle occupants assist in defining the shape and size of the vehicle.

Note. In general, when considering the size and shape of a vehicle, straight lines or right angles are not consistent in nature. Varying angles and distinct straight lines are indicative of a man-made object, whether camouflaged, masked, or hidden.

7-27. Threat antitank positions visually cover primary avenues of approach where tanks and personnel carriers are likely to be used. They typically use the surrounding environment to mask or conceal their position. Optics for their guidance systems may provide reflections from the sun during daytime operations.

7-28. Artillery signatures are specific to previous indirect fires in a specific area. (Self-propelled and towed artillery pieces are covered in the vehicle group.) Recent indirect fires signatures include craters, white lingering smoke, acidic smells, and burning vehicles or man-made objects. Indirect missile strikes may have fragmented missile bodies or component assemblies, and create a linear-type crater.

Detection Challenges

7-29. Some threats are more difficult to detect than others. Snipers are required to be well-trained to detect and locate targets including a comprehensive understanding of the detection challenges they're facing and how to overcome them. Some examples of these more difficult targets and challenges are—

- Peripheral targets (targets on the edge of the field of view).
- Targets that are camouflaged, masked, appear innocuous, or blend in to the environment.
- Targets that can be heard but not seen.

- Targets under less than ideal indirect fire illumination. Snipers must know the following:—
  - If the illumination is in front of the target, the resulting shadow is darker than the target.
  - If the illumination is behind the target (and not in position to “wash out” the team’s optics), the target should stand out distinctly from the background.
  - During illumination search, snipers always keep one eye closed and never look directly into the illumination source to retain their own night vision.
- Mirage effects caused by high temperatures and heat waves near the ground (heat shimmers present in the line of sight).
- Small single targets such as lone dismount threats, antitank guided missile or rocket propelled grenade (RPG) firing positions.
- Small targets in complex detection environments (such as urban or jungle environments).
- Natural and man-made obscurants or surroundings.
- Behavioral or physical deficiencies of the observer (fatigue and eye reaction to gun flashes).

7-30. These detection challenges can be overcome but slows the target detection process, regardless of the level of training. It is critical snipers understand why the challenges occur as much as how to overcome them.

LIMITED VISIBILITY

7-31. It is important that snipers are extremely familiar with their assigned optics and which stimulant they can detect. This includes their ability to manipulate the optic’s controls, switching between wide field of view and narrow field of view, and transitioning between thermal and image intensifier optics. This builds sniper proficiency in employing multiple sensors or optics to detect threats efficiently within their sector as rapidly and accurately as possible. Our current optics, thermals, sensors, and illuminators may compound threat detection challenges by how they function.

Note. For this section, the term optics applies to all glass, thermal, illuminator, sensor, and NVDs.

ELECTROMAGNETIC SPECTRUM

7-32. The electromagnetic spectrum contains various frequencies and wavelengths of energy (radiation) including radio waves, microwaves, infrared, visible light, ultraviolet light, x-rays, and gamma rays. For detection challenges, infrared and visible light found within the electromagnetic spectrum are crucial for understanding how to employ various types of optics best.

7-33. Each wavelength of energy is assigned a place in the spectrum according to its frequency, from lowest to highest. As the frequency changes, the characteristics change. To best understand those changes, the types of energy are bundled into groups of frequencies, or bands, which have similar characteristics.

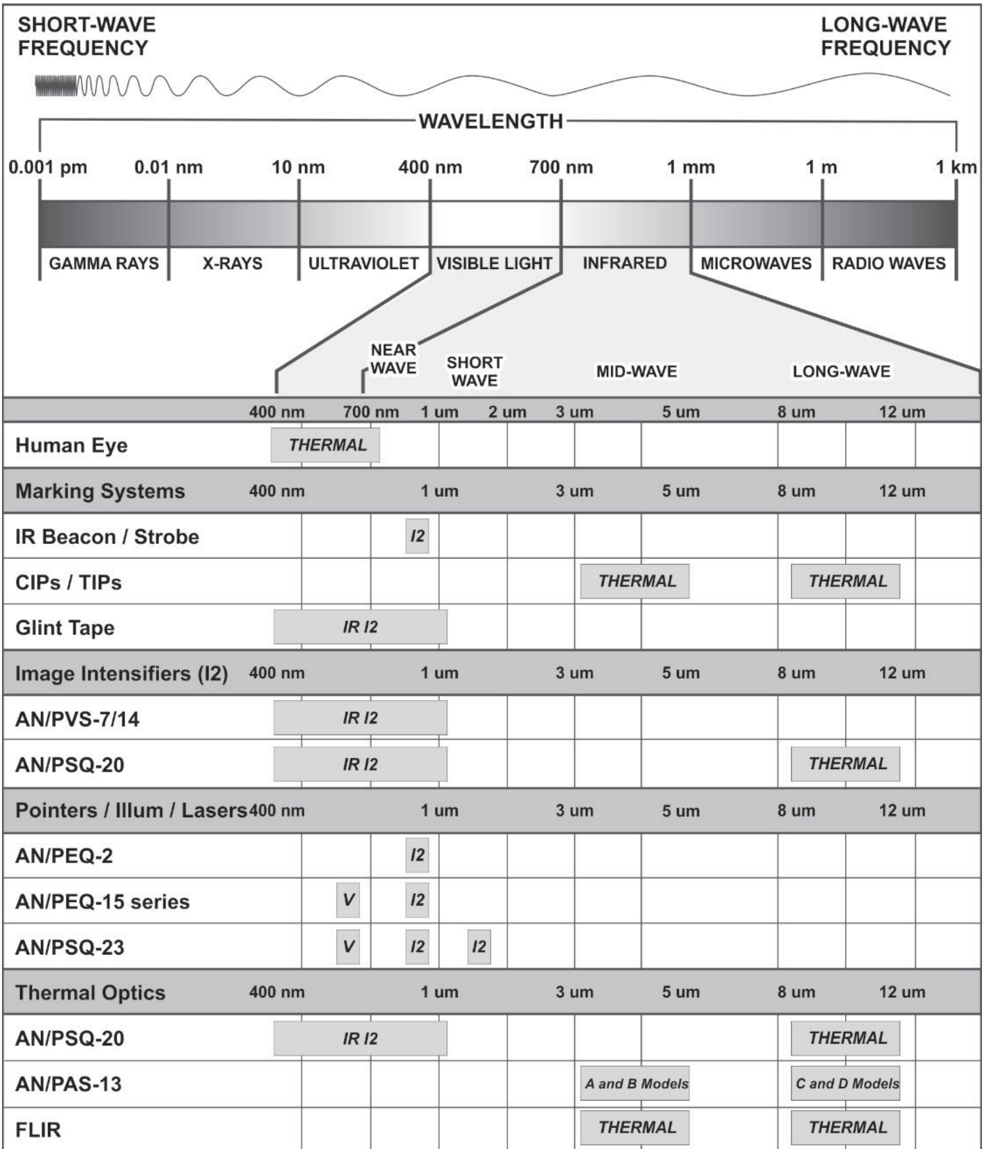
7-34. A major concern for the planning and use of thermal and other optics to aid in the detection process is understanding how they function, and what they can see. Each device develops a digital representation of the scene or view it is focused on based on the frequencies or wavelengths it can detect within the electromagnetic spectrum.

7-35. Thermal optics operates in the far to middle area of the infrared band, which is the farthest of the infrared wavelengths from visible light. Thermal optics cannot translate (see) visible light.

7-36. Thermal optics cannot see infrared equipment such as infrared strobe lights or chemical lights, illuminators, or laser pointers. Thermal optics can only identify emitted radiation in the form of heat.

7-37. Image intensifiers, such as NVDs, use the near area of the infrared spectrum closest to the frequencies of visible light, as well as visible light to create a digital picture of the scene. These systems cannot see or detect heat or heat sources. For example, they cannot detect the heat caused by a fire; however, they can detect the flames (light) from it.

7-38. Figure 7-9 depicts the areas of the electromagnetic spectrum. The figure details the infrared and visible light wavelengths within the spectrum and provides the various optics and equipment and their specific operating range.



LEGEND

km	kilometer	1 km	1000 m	TIP	thermal identification panel
m	meter	1 m	1000 nm	IR	infrared
mm	millimeter	1 mm	1000 um	I2	image intensifier
um	micrometer	1 um	1000 nm	FLIR	forward looking infrared
nm	nanometer	1 nm	1000 pm	V	visible beam
pm	picometer	CIP	combat identification panel		

Figure 7-9. Electromagnetic spectrum

Thermal Optics

7-39. Thermal optics can detect some camouflaged targets that are difficult for day optics to detect. Thermal optics operate within the 3- to 30-micrometer frequency of the infrared range. Emitted radiation (heat) is translated into a digital image that replicates the scene with gradient colors defining those specific temperatures. These optics cannot discern reverse polarity paper; infrared beacons, strobes, or chemical lights; or other equipment that operates outside the 3- to 30-micrometer range.

Image Intensifier Optics

7-40. Typically, an image intensifier-based sensor is an Army/Navy Portable Visual Search (known as AN/PVS)-7B or AN/PVS-14 type equipment. These systems operate within the 400- to 920-nanometer frequency of infrared range. The image intensifier optics are limited to shorter ranges, require ambient light to amplify or intensify for operation, and cannot discern thermal signatures.

7-41. Snipers should keep image intensifier optic usage to a minimum due to the effects on the wearer’s night vision versus gain. Snipers must consider proper adjustment, brightness, and utilization on their nondominant eye.

> ***Note.*** When equipped, Soldiers should use thermal optics to acquire targets during all visibility conditions. When actively detecting threats, Soldiers switch between other optics and sensors (day, thermal, and image intensifier) ensuring most of the visible and infrared ranges are observed.

Hybrid and Enhanced Optics

7-42. These optics combine the capabilities of the thermal (infrared) and image intensifier systems into a single sensor. These systems, such as the AN/PSQ-20 enhanced night vision goggle, provide a wider view of the spectrum of light and a digitally enhanced replication of the scene that includes thermal and intensified signatures within the 30 micrometer to 400-nanometer range.

> ***Note.*** Depending on the equipment, the maximum observable distance may be significantly less than the maximum effective range of the weapon or system the Soldier is using. Soldiers can manage or mitigate this capability gap between the optic and weapon using multiple optics and sensors, as appropriate.

Detection Best Practices

7-43. Threat detection is a critical skill that requires thoughtful application of the sensors, optics, and systems at the sniper’s disposal. Finding potential threats as quickly and effectively as possible provides the maximum amount of time for friendly forces to defeat the threat. Snipers should be familiar with the following best practices to increase target detection:

- Scan with the unaided eye first, then with a magnified optic.
- Practice using image intensifier and thermal optics in tandem during limited visibility.
- Understand the difference between image intensifier and thermal optics; what the equipment can see and what they can't.
- Use thermal optics, which are the preferred sight for target acquisition and engagement, day or night.
- Understand the capabilities and limitations of the optics and sensors.
- Don't search in the same area as others in the team. Overlap, but do not focus on the same sector.
- Protect and shield the eyes from the blinding effects of the sun, particularly in light colored environments such as sand and snow.
- Practice extreme light discipline during limited visibility.
- Think as the threat. Search in areas that would be most advantageous from their perspective.

LOCATE

7-44. Target location is the determination of where a target is in the operational environment in relation to the final firing point. Locating a target or series of targets occurs as a result of the search and acquisition actions of the sniper team.

7-45. Once a target is located, the target location is rapidly and efficiently communicated to the rest of the team. Methods used to announce a located target depend on the individual's specific position or platform, graphic control measures for the operation, unit SOP, and time available.

TARGET INDICATION

7-46. The three methods of indicating targets are the direct method, the reference-point method, and the clock ray method. It is easier to recognize a target if the area of ground in which it is likely to appear is known. Such an area of ground is called an arc of fire.

Direct Method

7-47. The sniper uses this method to indicate obvious targets. The range, where to look, and a description of the target are given. Terms used for where to look include the following:

- Axis of arc—for targets on or very near the axis (centerline of weapon).
- Left or right—for targets 90 degrees from the axis.
- Slightly, quarter, half, or three-quarters and left or right—for targets between the axis and the left or right limits.

Reference Point

7-48. These should be as permanent as possible (woods, mounds), a reasonable distance apart, and easy to identify. A specific point of the object is nominated and given a name and range (mound–bottom left corner; to be known as mound-range 400) the same as on the range card.

Clock Ray Method

7-49. Use the following to determine the clock ray method:

- Combine with reference point.
- Imaginary clock on reference point.
- Indicate clock direction and range.
- Describe target.
- May use mil measurement instead of range.
- "Intersection bravo" (reference point).
- "3 o'clock, 200 meters" (direction and range).

IDENTIFY

7-50. Identification is the process of attaining an accurate characteristic and discriminatory aspect of detected objects on the battlefield. Identification begins with range determination, classifies the target appropriately, positively identifies the potential target, and ends with the discrimination between friend, foe, and noncombatant. The sniper's ability to process the target information accurately and quickly is critical to their success on the battlefield. Accurately and quickly processing target information enables the sniper to achieve rounds on target first, enhances their overmatch against the threat, and ultimately increases the lethality and combat power of the team and the unit they are supporting.

7-51. A sniper team must accurately determine distance, properly adjust elevation on the sniper rifle, and prepare topographical sketches or range cards. The team must know the considerations and limitations of range estimation techniques and must know range determination methods in both passive and nonpassive forms (table 7-2).

Table 7-2. Effect of target conditions on range estimation

Target Conditions	
Seems Closer	***Seems Farther***
Bright, clear day.	Fog, rain, haze, twilight.
Large targets.	Camouflaged targets.
At sea.	Sun behind target.
Sun in front of target.	Small targets.
Targets at higher elevations	Targets at lower elevations.
Bright colors; white, red, yellow	Dark colors.
Contrast.	
Desert.	
Looking across ravines, hollows, rivers, depressions	

7-52. There are three considerations that are directly tied to range determination and the trajectory of the bullet in flight. These are—

- Danger space.
- Danger range.
- Swept space.

Danger Space

7-53. Danger space is a horizontal measurement expressed in meters or yards. As the projectile goes past maximum ordinate and travels downward toward impact with the ground, the danger space is the measurement that begins at the point where the bullet is equal to the height of the target and continues to when the projectile impacts the ground. The extent of danger space is dependent on—

- The height from which the weapon is fired.
- The height of the target.
- The flatness of the trajectory.
- The angle of the line of sight.
- The slope of the ground at target location.

7-54. A long danger space is less sensitive to errors in range determination and muzzle velocity variation. If the team wants to increase the chances of hitting the target, choose a system (rifle and ammunition) that has the trajectory with the greatest danger space.

7-55. The sniper can use ballistic software online or issued ballistic software to compute danger space. The sniper can compute danger space for a particular target size by—

- Inputting the variables associated with the rifle, ammunition, target, and environment.
- Setting the zero range for desired distance to do the danger space comparison.
- Setting max range 100 meters past the zero range.
- Setting range step size to 1 meter.
- Calculate.

7-56. Once the output is calculated, scroll down to the zero range and look for where the projectile came within ½ of target size. Note at what distance before and after the projectile drops below target size. Add the two distances together. The sum is the danger space.

Danger Range

7-57. Danger range describes a part of the trajectory where the projectile is traveling below the height of the target. Where the maximum ordinate is lower than the height of the target, the entire distance from the gun to the target is danger range.

7-58. The difference between danger range and danger space is that with danger space, there is a portion of the trajectory where the projectile has risen above the height of the target. It is because of this high flight that the projectile is on a steeper fall (falling branch) angle, resulting in a shorter danger space figure.

Swept Space

7-59. Swept space is the space of terrain at, and behind the target location in which the slope of the terrain increases or decreases the duration of a bullets flight. Swept space is—

- Smaller on terrain that slopes up behind the target.
- Larger on terrain that slopes down behind the target.

7-60. The sniper team can use swept space to their advantage if they setup their final firing point in relation to the target and the target is on a downhill slope from the gun target line. Swept space doesn't apply when the sniper team is located on higher ground and looking down at the target that is standing on flat ground.

LIMITATIONS OF RANGE ESTIMATION WHEN USING MIL RELATION

7-61. When estimating smaller (human) targets at longer ranges, little errors can result in huge misses.

Example

A human target that is 6 feet (1.83 meters) tall using the standard mil relation formula has the following potential error:

1.82-meter target milled at 1.6 mil = 1.83 x 1000 / 1.6 = 1143 meters (estimated range to target).

1.83-meter target milled at 1.5 mil = 1.83 x 1000 / 1.5 = 1220 meters (estimated range to target).

Difference = 77 meters.

True range to target = 1181 meters.

This is a result of only 1/10th of a mil error, which is small but still results in a 77-meter range error.

7-62. Another example of a ranging problem when using a known size or height method for a human target is as follows:

Example

Difference in range when the target height is 6″ shorter than the actual height of the target.

Target estimated at

6′ 0″ = 1.83 meters x 1000 = 1830 / 2.5 mil = 732 meters.

Target actual height

5′ 6″ = 1.67 meters x 1000 = 1676.4 / 2.5 mil = 670.56 meters.

Difference of 62 meters due to a 6″ target size error.

NONPASSIVE RANGE ESTIMATION METHODS

7-63. The sniper team can use an LRF to accurately determine the range to a target. The sniper has to be aware of what the enemy has for detection capabilities as the LRF can be detected with commercial, off-the-shelf hardware that is easily available to the enemy.

7-64. A laser finder uses a pulse of light that a laser emits, starting a timer. The target reflects the light and a large collection aperture receives the light. The received light focuses onto a sensor. When the sensor receives the pulse of light, the timer stops. Since the speed of light is a constant, the distance is calculated.

7-65. Beam divergence is an important characteristic of a range finder. The greater the beam divergence, the more the light spreads out as it leaves the transmission optics. Depending on the distance to the target, the target may return only a fraction of the light as the beam is larger than the target. A smaller beam divergence means that a greater amount of light is focused on the target and not reflecting off other unintended surfaces.

7-66. Platform stabilization is paramount to achieve maximum performance out of such a system. Snipers must understand that the laser pulses between one-half second to a full second. Without a properly stabilized platform, the result is that the beam moves beyond the intended target during the measurement period. A tripod with a sturdy mount or even a weapon-mounted LRF is **required** to stabilize the beam on the target, successfully.

PASSIVE METHODS FOR RANGE ESTIMATION

7-67. Passive methods of range determination allow the sniper team to accurately range the target or target area without being detected by the enemy.

MIL-RELATION FORMULA FOR RANGE ESTIMATION

7-68. This method uses a mil-scale reticle located in the sniper's binoculars and day optic sight. There are two ways to manipulate the mil-relation formula. In the first, the sniper calculates the distance to the target. In the second, the sniper calculates the target size (figure 7-10, page 7-24).

Estimating Target Range in Meters

7-69. To use this method—

- Note the target's size in inches or meters.
- Using the mil-scale reticle, estimate the target's height.

25.4 (constant for meters) x target size / mil read = target range in meters.

Note. When estimating the range to a target partially hidden by glare, foliage, obstacle, or position, measure the size of the portion of the target for which height is needed.

Estimating Target Height or Width in Inches

7-70. Backward manipulation of the formula enables a sniper to determine the size of the object or area. To estimate the target height in inches—

Formula for Backwards Manipulation

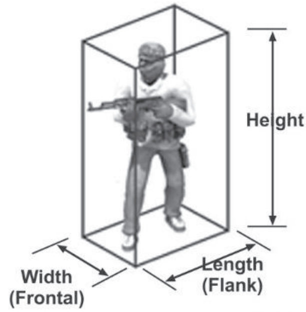
Divide the range to the target by 25.4 (the inches to meters conversion factor of 0.0254 x 1000) by the target size in inches. This gives the constant.

Example

A target or area is located 825 meters from the team's location and has a mil reading of .8. To determine the size of the target or area, divide the range to the target by 25.4 and multiply by .8. The answer is 26 inches.

825 meters / 25.4 x .8 mil = 26 inches

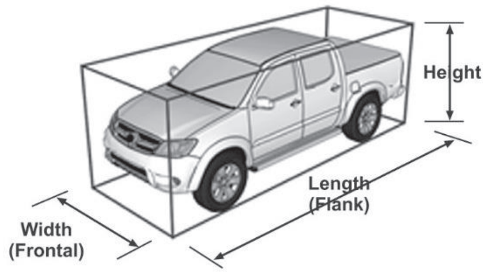
NOTE: The height is measured from the ground to the head. The width and length are measured from the shoulders. Do not include any weapon the individual is holding.



DISMOUNT	LENGTH		WIDTH		HEIGHT	
	AVERAGE		AVERAGE		AVERAGE	
	12 IN	30 CM	20 IN	50 CM	70 IN	177 CM

The measurements listed above are the average approximate measurements of a dismounted insurgent and should be used as a guideline. in = inch, cm = centimeter

NOTE: The height is measured from the ground to the top of the vehicle. Do not include any weapon systems that might be mounted on the truck that are higher than the cab.



UNARMORED TRUCK	LENGTH		WIDTH		HEIGHT	
	AVERAGE		AVERAGE		AVERAGE	
	196 IN	500 CM	78 IN	200 CM	72 IN	182 CM

The measurements listed above are the average approximate measurements of most unarmored trucks. in = inch, cm = centimeter

Figure 7-10. Standard dismount threat dimensions

Map (Paper Strip) Method

7-71. The paper strip method is useful when determining longer distances (1000 meters or greater) (figure 7-11). To perform this method—

- Place the edge of a strip of paper on the map and ensure it is long enough to reach between the two points.
- Pencil a tick mark on the paper at the team's position and another tick mark at the distant location.

- Place the paper on the map's bar scale, located at the bottom center of the map. Align the left tick mark with the 0 on the scale.
- Read to the right to the second mark and note the corresponding distance represented between the two marks.

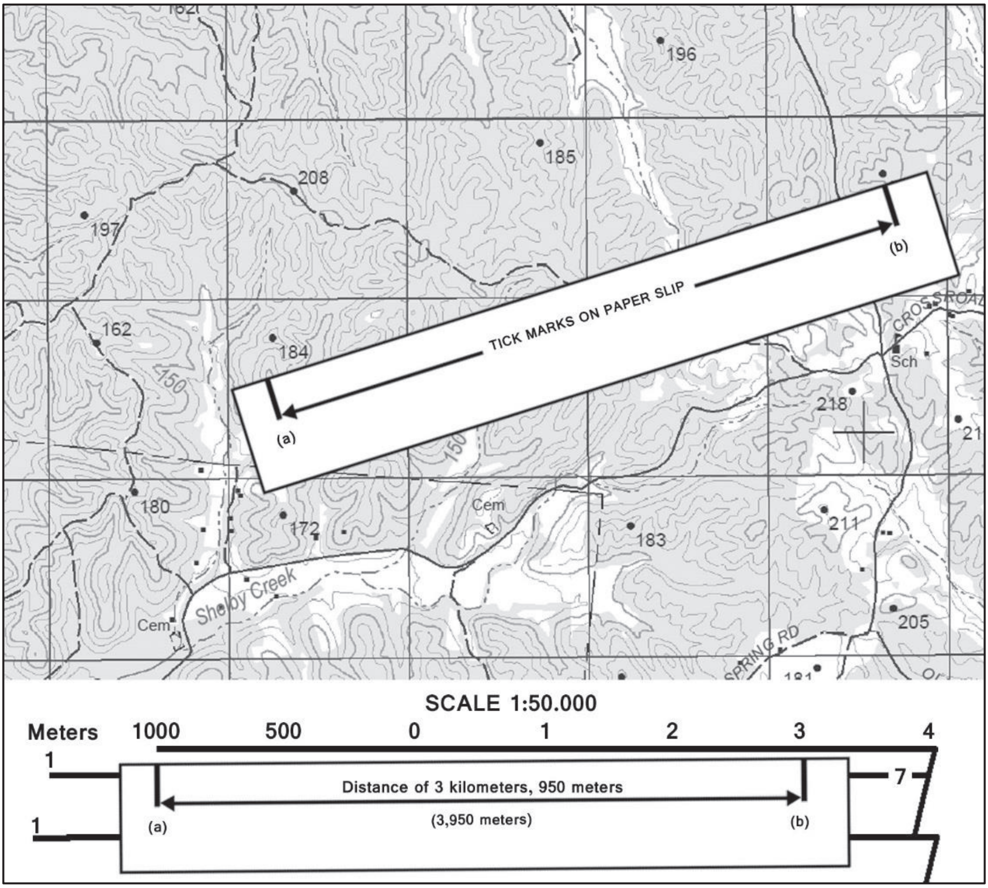
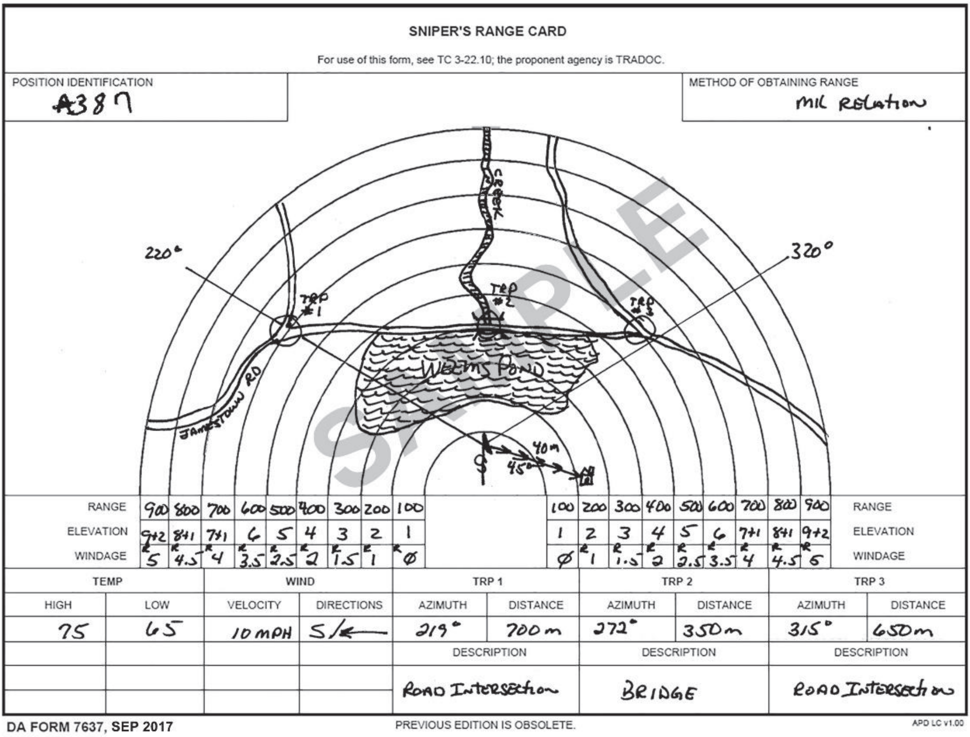


Figure 7-11. Map method

Range Card Method

7-72. The sniper team can use a range card to quickly determine ranges throughout the target area. Once they see a target, the team determines where it is located on the card, and then they read the range to the target (figure 7-12).



Legend:

m – meter
mph – miles per hour
S – south
TEMP – temperature
TRP – target reference point

Figure 7-12. Range card method

DATA BOOK RECORDINGS

7-73. The sniper team must keep a sniper data book complete with the following measurements—

- Height of road wheels.
- Length of (tank) main gun tubes.
- Dimensions of weapon systems.
- Average height of human targets in the area of operations.
- Average size of doorways.

- Average size of windows.
- Average width of streets and lanes.

Note. As the sniper team develops a sniper data book, they convert all measurements into constants and compute them with different mil readings. Refer to appendix I of this TC for more information on the data book.

LINE OF SIGHT (VISUAL) METHODS

7-74. Three factors affect line of sight (visual) range estimation, which are described below:

- Nature of target:
  - Outline. An object of regular outline, such as a house, appears closer than one of irregular outline, such as a clump of trees.
  - Contrast. A target that contrasts with its background appears closer than it actually is.
  - Exposure. A partly exposed target appears more distant then it really is.
- Nature of terrain:
  - Contoured terrain. Looking across contoured terrain makes a target seem farther.
  - Smooth terrain. Looking across smooth terrain, such as sand or water, makes a target seem nearer.
  - Downhill. Looking downhill at a target makes it seem farther.
  - Uphill. Looking uphill at a target makes it seem nearer.
- Light conditions:
  - Sun behind observer. A front lit target seems nearer.
  - Sun behind target. A back lit target seems farther away.

100-METER UNIT OF MEASURE METHOD

7-75. To use this method (figure 7-13, page 7-28)—

- Visualize a distance of 100 meters on the ground.
- For ranges up to 500 meters, determine the number of 100-meter increments between the two objects to measure.
- Beyond 500 meters—
  - Select a point halfway to the object.
  - Determine the number of 100 meter increments to the halfway point.
  - Double this number to estimate the range to the object.

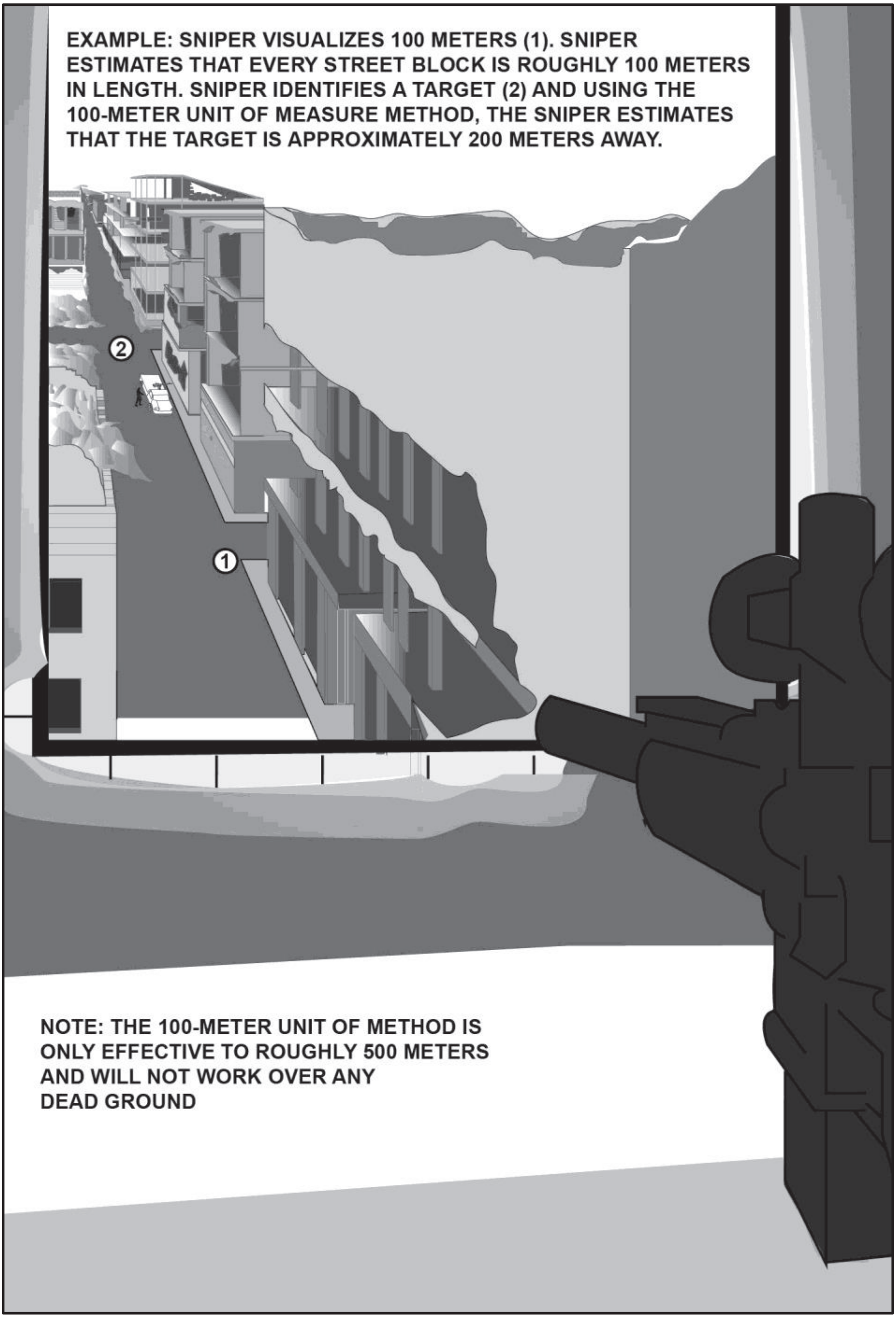


Figure 7-13. 100-meter unit measure method

Appearance of Object Method

7-76. The appearance of object method (described below) enables the sniper to determine range using the size and other details about an object. To use this method, the sniper team must know the details, described below, characterizing objects at various ranges:

- 200 meters. Clear in all detail such as equipment, skin color.
- 300 meters. Clear body outline, face color good, remaining detail blurred.
- 400 meters. Body outline clear, other details blurred.
- 500 meters. Body tapered, head indistinct from body.
- 600 meters. Body a wedge shape, with no head apparent.

Bracketing Method

7-77. Using this method, the sniper team assumes the target is between X and Y meters or yards away. Averaging these values gives an estimate of the distance to the target (figure 7-14, page 7-30).

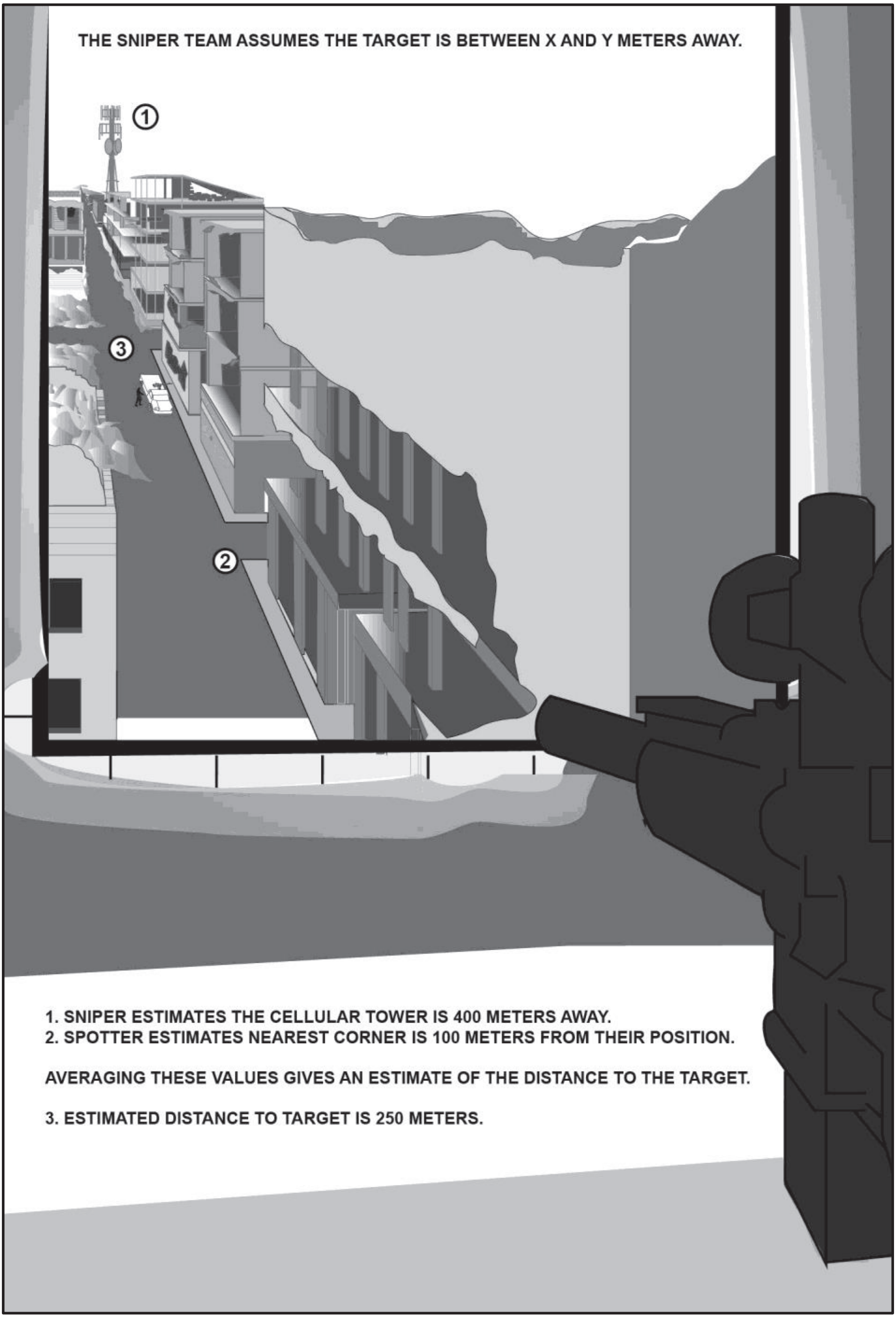


Figure 7-14. Bracketing method

TARGET INDEX

7-78. To index targets and reduce engagement time, the sniper team refers to the completed DA Form 7637.

7-79. The observer locates a prominent terrain feature near the target and provides this and other useful information to the sniper to help them find the target. Information the team members share varies with the situation.

7-80. The sniper team indexes targets for the following reasons:

- The team can occupy the final firing position before an attack. While there, they locate, index, and record possible target locations; then they decide the priority of the targets.
- Indiscriminate firing might alert closer, more valuable enemy targets.
- Engagement of a distant target might disclose the final firing position to a nearby enemy.
- Sighting of several targets at the same time requires a system for remembering all the locations.

7-81. When indexing targets, the sniper team considers—

- Exposure times.
- Number of targets.
- Spacing or distance between targets.
- Evaluation of aiming points.

Exposure Times

7-82. Moving targets might only be exposed for a short time. The sniper team must note where each target disappears before the engagement. This allows the team to fire at several targets in rapid succession.

Number of Targets

7-83. If several targets appear and disappear at the same time, the sniper team has a hard time determining each target's point of disappearance. Therefore, sniper teams must concentrate on the most important targets.

Spacing or Distance Between Targets

7-84. The greater the distance between targets, the more difficult it is to see their movement. In such cases, the team must locate and engage the nearest targets.

EVALUATION OF AIMING POINTS

7-85. Targets that disappear behind good aiming points are easily recorded and remembered; targets with poor aiming points are easily lost. Assuming two such targets are of equal value and danger, the team must engage the one with the most dangerous aiming point first.

LOCATION OF HIDDEN FIRES

7-86. To locate hidden fires, the team uses the crack thump method. When using this method, the team listens for the crack of the round and the thump of the weapon being fired to obtain the distance to and location of the shooter.

Distance to Firer

7-87. The time difference between the crack and the thump can be converted into an approximate range. A one second lapse between the two is about 550 meters or 602 yards with most calibers.

Location of Firer

7-88. By observing in the direction of the thump and near the predetermined range, the sniper team has a good chance of seeing the enemy's muzzle flash or blast from subsequent shots.

Limitations

7-89. The crack thump method has the following limitations—

- Isolating the crack and thump is difficult when many shots are fired.
- Mountainous areas, tall buildings, and other high, restrictive terrain can cause echoes, which render this method ineffective.

DISCRIMINATION

7-90. Target discrimination is a determination whether a target is friend, foe, or noncombatant (neutral). The following list defines each:

- Friend. Any force, U.S. or allied, that is jointly engaged in combat operations with an enemy in a theater of operation.
- Foe (enemy combatant). Any individual who has engaged in antagonistic activities against a friendly force and opposes the views and goals of friendly or allied forces.
- Noncombatants. Personnel, organizations, or agencies that are not directly engaged in combat operations. This includes individuals such as medical personnel, chaplains, United Nations observers, or media representatives. Organizations like the Red Cross or Red Crescent can be classified as noncombatants. In a theater of operation, most individuals fall into this category.

7-91. Although Russian-designed equipment has been sold in large numbers worldwide, Soldiers could find themselves facing British, French, and American-made equipment operating as a threat force. As in the past, it is likely in any future conflict that U.S. forces may deploy as part of a coalition of allied nations which may use a wide variety of equipment. The discrimination process is complicated by the increasing likelihood of having to discriminate between friend or foe and combatant or noncombatant in urban settings or restricted terrain. To mitigate fratricide and unnecessary collateral damage, snipers use all of the situational understanding tools available and develop tactics, techniques, and procedures for performing target discrimination.

DECIDE

7-92. Once the target has been identified, the decision is made to engage. The engagement decision process is a series of progressive and interdependent steps (or actions) making rules of engagement decisions, determining threat levels, selecting weapon systems or ammunition, and making confirmation. The senior sniper is ultimately responsible for the actions of the team; however, when the senior sniper is unavailable, the responsibility of target identification and engagement is relinquished to the firer.

7-93. The decide element of the engagement process defines four critical functions: determine the level of threat; prioritize the threats presented; determine the appropriate weapon, ammunition, or system to employ to eliminate the threat; and confirm the threat is identified, classified, and discriminated correctly before executing the fire command(s).

THREAT LEVEL

7-94. Three target threat levels are used to articulate which threat of multiple threats presented require immediate attention; the most dangerous targets are engaged first. The three target threat levels described below are most dangerous, dangerous, and least dangerous:

- Most dangerous. An identified threat that has the capability to defeat the friendly force and is preparing to do so. These targets are defeated immediately.
- Dangerous. An identified threat that has the capability to defeat the friendly force, but is not prepared to do so. These targets are defeated after all most dangerous targets are eliminated.
- Least dangerous. Any threat that does not have the ability to defeat the friendly force, but has the ability to coordinate with other threats. These targets are defeated after all threats of a higher threat level are defeated.

7-95. Commanders may provide a critical or high value target list with corresponding actions in the operations order, fragmentary orders, or warning orders. These are included in the leader and sniper's determination of the presented target threat levels and may be included as engagement priorities within the orders given to the unit.

7-96. All snipers know the engagement priorities of their unit; however, the leader is responsible for determining the immediate target threat level based on the threat type and posture when time is available. When time is not available, the responsibility falls on the firer.

7-97. Each situation may change how snipers perceive a target including the level of threat the target poses to the friendly force.

7-98. Leaders and snipers quickly adapt and react to the changing threats and the level of danger they present.

7-99. Snipers must have a working knowledge of the threat's armament and maximum effective range to classify targets accurately and engage in the most efficient manner.

TARGET PRIORITIZATION

7-100. Weapon and ammunition selection is the logical selection of the appropriate measure to defeat or eliminate a given target. When selecting the appropriate weapon and ammunition for use against threats, the team considers the determined threat type and the range to target established during the detect and identify processes. These are tied to the classification, positive identification, and prioritization of the existing threats.

7-101. When selecting the appropriate weapon or ammunition, leaders and snipers should choose the weapon, system, or ammunition that—

- Has the capability to achieve target effect.
- Causes minimal collateral damage in any environment including potential hazards beyond the target area.
- Eliminates the possibility of fratricide when considering the proximity of friendly forces.

7-102. Leaders may decide to use external warfighting functions to engage and defeat the threat presented for a number of reasons. This includes deciding to conduct target hand-off to attack aviation assets, coordinate for indirect fires (mortar or artillery), or coordinate for adjacent unit hand-off.

Note. If the sniper detecting a target cannot destroy it or rules of engagement preclude using the only available effective weapon, snipers report the target immediately so other military options and weapons systems can be brought to bear.

TARGET CONFIRMATION

7-103. Target confirmation is the rapid verification of the initial identification and discrimination of the target, and is usually done by the leader. Confirmation takes place during decide, and again as an implied task to the sniper and leader prior to the command of execution.

7-104. Snipers also complete a target confirmation step as they make their final, precise lay by ensuring the target is hostile.

7-105. If the sniper confirms that the target is hostile, they complete their final lay and engage the target on order (command of execution). If the sniper determines that the target is friendly or neutral, they announce their confirmation to the leader by announcing, FRIENDLY or NEUTRAL, as appropriate. If they cannot determine the nature of the target, they announce, UNKNOWN.

ENGAGE

7-106. The engagement cycle consists of four steps. Steps one and two (identification and acquisition) were discussed earlier in this chapter. Steps three and four (engage, assess) are discussed in the remaining sections of this chapter.

Step 1. Target identification. The sniper team identifies and determines that engagement is needed or a leader has directed it.

Step 2. Target acquisition. The sniper team makes the following assessment:

- Positive identification.
- Weapon capability.
- Individual proficiency.

Step 3. Target engagement. Sniper teams use the shot process and the functional elements of the shot process to engage a target.

Step 4. Target assessment. Sniper teams assess the effects on target and situation.

7-107. Regardless of the sniper weapon system, the goal of shooting remains constant—well-aimed shots. To achieve this end state there are two truths. Sniper's must—

- Properly point the weapon (sight alignment and sight picture).
- Fire the weapon without disturbing the aim.

7-108. The sniper must master sight alignment, sight picture, and trigger control described below to accomplish well-aimed shots:

- Sight alignment is the relationship between the aiming device and the sniper's eye. To achieve proper and effective aim, the focus of the sniper's eye needs to be on the front sight post or reticle. The sniper must maintain sight alignment throughout the aiming process.
- Sight picture is the placement of the aligned sights on the target.
- Trigger control is the skillful manipulation of the trigger that causes the rifle to fire without disturbing the aim.

SHOT PROCESS

7-109. The shot process (table 7-3, page 7-36) is the basic outline of an individual engagement sequence all snipers consider during an engagement, regardless of the weapon employed. The shot process formulates all decisions, calculations, and actions that lead to taking the shot.

7-110. The shot process has three distinct phases:

- Pre-shot.
- Shot.
- Post-shot.

7-111. To achieve consistent, accurate, well-aimed shots, snipers must understand and correctly apply the shot process. The sequence of the shot process does not change;

however, the application of each element varies based on the conditions of the engagement.

7-112. Every shot that the sniper takes has a complete shot process. The shot process allows the sniper to focus on one cognitive task at a time. The sniper must maintain the ability to mentally organize the shot process's tasks and actions into a disciplined mental checklist, and focus their attention on activities which produce the desired outcome—a well-aimed shot.

Table 7-3. Shot process

Pre-shot	Position
	Natural Point of Aim
	Sight Alignment/Picture (parallax)
	Hold Determination (elevation and wind)
Shot	Refine Aim (wind call)
	Breathing Control
	Trigger Control
Post-shot	Follow-Through
	Recoil Management
	Call the Shot (shot correction)
	Evaluate

FUNCTIONAL ELEMENTS OF THE SHOT PROCESS

7-113. Functional elements of the shot process are the linkage between the sniper, the weapon system, the environment, and the target that directly impact the shot process and ultimately the consistency, accuracy, and precision of the shot. When used appropriately, they build a greater understanding of any engagement.

7-114. The functional elements are interdependent. An accurate shot, regardless of weapon system, requires the sniper to establish, maintain, and sustain—

- Stability. The sniper stabilizes the weapon to provide a consistent base to fire from and maintain through the shot process until the recoil pulse has ceased. This process includes how the sniper holds the weapon, uses structures or objects to provide stability, and the sniper's posture on the ground during an engagement.
- Aim. The continuous process of orienting the weapon correctly, aligning the sights, aligning on the target, and the appropriate lead and elevation (hold) during a target engagement.
- Control. All the conscious actions of the sniper before, during, and after the shot process that the sniper specifically is in control of. The first of which is trigger control. This includes whether, when, and how to engage. It incorporates the sniper as a function of safety, as well as the ultimate responsibility of firing the weapon.

- Movement. The process of the sniper moving during the engagement process. It includes the sniper's ability to move laterally, forward, diagonally, and in a retrograde manner while maintaining stabilization, appropriate aim, and control of the weapon. (Applicable on infiltration and exfiltration of operation.)

7-115. The functional elements define the tactical engagement that requires the sniper to make adjustments to determine appropriate actions, and compensate for external influences on their shot process. When all elements are applied to the fullest extent, snipers can rapidly engage targets with the highest level of precision.

7-116. Time, target size, target distance, and the sniper's skills and capabilities determine the amount of effort required of each of the functional elements to minimize induced errors of the shot.

7-117. Each weapon, tactical situation, and sight system has preferred techniques for each step in the shot process and within the functional elements to produce precision and accuracy in a timely manner. How fast or slow the shooter progresses through the process is based on target size, target distance, and shooter capability.

7-118. Each of the functional elements and the sniper actions to consider during the shot process are described below.

STABILITY

7-119. Stability is provided through four functions: support, muscle relaxation, natural point of aim, and recoil management. These functions provide the sniper the means to stabilize their weapon system during the engagement process.

7-120. Stability includes the placement or arrangement of sandbags, equipment, or structures that directly support the upper receiver of the weapon to provide increased stability. This includes the use of a tripod, bipod, bone, and muscle support provided by the sniper to stabilize the rifle.

SUPPORT

7-121. Support can be natural or artificial or a combination of both. Natural support comes from a combination of the shooter's bones and muscles. Artificial support comes from objects outside the shooter's body. The more support a particular position provides, the more stable the weapon.

ARTIFICIAL SUPPORT

7-122. Artificial support comes from objects outside the sniper's body. The more support a particular position provides, the more stable the weapon. The sniper has material and field expedient solutions to assist in building a sound position and making the shot. Some of these solutions include, but are not limited to—

- Sand sock.
- Sling.
- Tripod (manufactured or field expedient).
- Bipod (manufactured or field expedient).

Sand Sock

7-123. The sand sock is a tool the sniper can use to support the rear of the weapon, or use for cushion to separate the weapon from direct contact with hard surfaces when shooting alternate positions off of barriers. Insulating the weapon from hard surfaces dampens vibrations to the weapon during firing. Such vibrations can impede accuracy, complicate follow through, and delay follow-up shots.

7-124. Snipers can construct a sand sock using a real sock, but ideally real sand is not used. The sniper can purchase a commercially made sand sock or construct one.

Sling

7-125. Snipers may use a sling to maximize support in all firing positions (figure 7-15). A cuff sling has hook and pile tape and clip buckles to enable the sniper to rapidly attach the sling to the weapon and remove it.

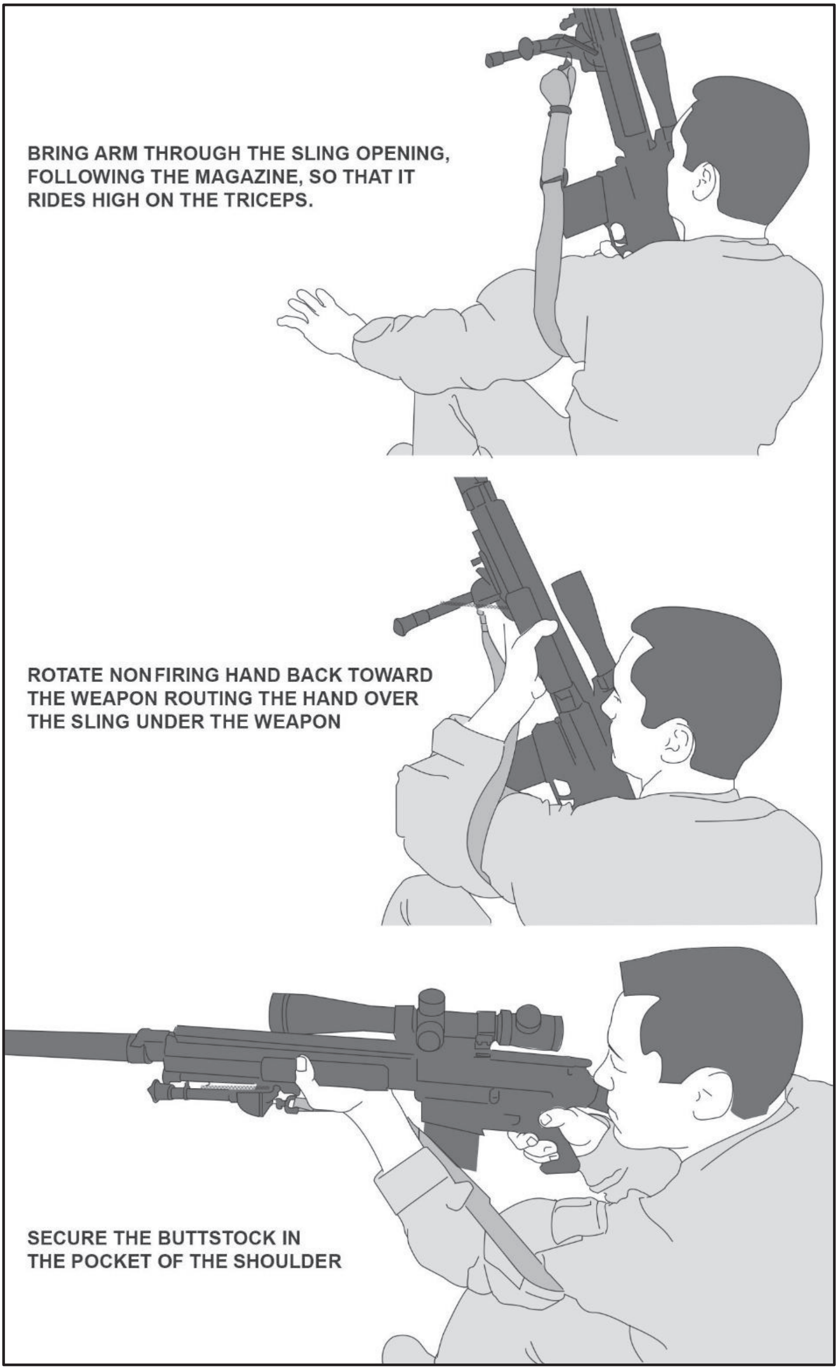
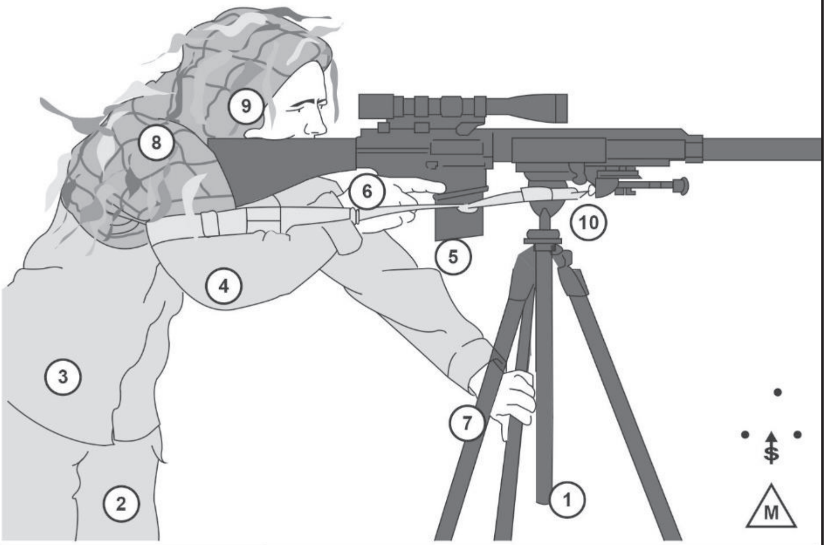


Figure 7-15. Sling

Sniper Weapon Tripod

7-126. The sniper weapon tripod (NSN 1005-01-601-7458) is highly adjustable allowing the sniper to deploy a sniper weapon system in a multitude of battle space environments (figure 7-16).



1	SUPPORT:	WEAPON IS SUPPORTED WITH A TRIPOD AND A SLING.
2	LEG POSITION:	FEET SHOULD BE COMFORTABLY SPREAD SLIGHTLY WIDER THAN SHOULDER WIDTH APART FOR RECOIL MANAGEMENT.
3	STANCE/CENTER OF GRAVITY:	HIPS REARWARD PROVIDING AGGRESSIVE FORWARD LEAN.
4	FIRING ELBOW:	TUCKED TOWARD THE SNIPER'S SIDE.
5	NONFIRING ELBOW:	NONFIRING ELBOW LOCKED TO SUPPORT THE WEIGHT OF THE FORWARD LEAN.
6	FIRING HAND:	GRASPING THE PISTOL GRIP, FINGER OFF THE TRIGGER UNTIL READY TO FIRE.
7	NONFIRING HAND:	GRIPPING THE TRIPOD TO SUPPORT THE WEIGHT OF THE FORWARD LEAN.
8	BUTT PLATE:	HIGHEST POINT OF SHOULDER TO ABSORB RECOIL IMPULSE.
9	STOCK WELD:	FIRM STOCK WELD.
10	SNIPER-GUN ANGLE:	SNIPER IS SQUARED UP TO THE GUN-TARGET LINE.

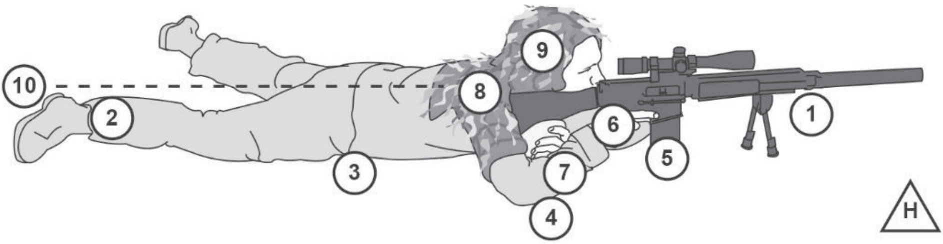
Note: Raising the tripod center column will degrade center of gravity, making the position less stable. Extend tripod legs first, before making center column adjustments.

Figure 7-16. Sniper weapon tripod

Bipod

7-127. The bipod is an additional means to stabilize the weapon in various shooting positions. Snipers use the bipod primarily in prone position; but they can use the bipods for additional support in alternate shooting positions while using barricade supports (figure 7-17).

7-128. The sniper needs to adjust the bipod height to accommodate their body type and comfort. If the sniper keeps their bipod height on the lowest setting, it could lead to increased fatigue, poor support, and an improper cheek to stock weld.



1	SUPPORT:	SUPPORTED WITH BIPOD, EQUIPMENT OR STRUCTURE.
2	LEG POSITION:	SPREAD WITH HEELS FLAT AGAINST THE GROUND.
3	STANCE/CENTER OF GRAVITY:	PRONE POSITION MAXIMIZES THE SNIPER'S FRAME AGAINST THE GROUND FOR MAXIMUM STABILITY.
4	FIRING ELBOW:	USED TO PROVIDE STABILITY TO THE WEAPON.
5	NONFIRING ELBOW:	USED TO PROVIDE STABILITY TO THE WEAPON.
6	FIRING HAND:	GRASPING THE PISTOL GRIP, FINGER OFF THE TRIGGER UNTIL READY TO FIRE.
7	NONFIRING HAND:	GRASPING THE REAR BAG. SNIPER WILL MANIPULATE THE REAR BAG TO ADJUST ELEVATION AND SUPPORT THE WEAPON.
8	BUTT PLATE:	MIDPOINT OF SHOULDER TO ABSORB RECOIL IMPULSE.
9	STOCK WELD:	FIRM STOCK WELD.
10	SNIPER-GUN ANGLE:	SNIPER IS NEARLY IN-LINE WITH THE GUN-TARGET LINE.

Figure 7-17. Bipod

Muscle Relaxation

7-129. Muscle relaxation is the ability of the sniper to maintain orientation of the weapon appropriately during the shot process while keeping the major muscle groups from straining to maintain the weapon system's position. Strained or fatigued muscles detract from stability. The more skeletal support, the more stable the position, as bones do not fatigue or strain.

> ***Note***. As a rule, the less muscle support required, the longer the shooter can stay in position.

Natural Point of Aim

7-130. To check a sniper's natural point of aim, the sniper should assume a good, steady position to include placement of firing hand and finger on the trigger while checking natural point of aim. Snipers close their eyes, go through one cycle, and then open their eyes on the natural pause. Where the sights are laying at this time, is the natural point of aim for that position. If it is not on their point of aim for their target, they should make small adjustments to their position to get the reticle or front sight post back on their point of aim. The sniper repeats this process until the natural point of aim is on the point of aim on their target.

Recoil Management

7-131. Recoil management is the result of a sniper assuming and maintaining a stable firing position which mitigates the disturbance of one's sight picture during the weapon's cycle of function.

7-132. The sniper's firing position manages recoil using support of the weapon system, the weight of their body, and the placement of the weapon during the shot process. Proper recoil management allows the sights to rapidly return to the target and allows for faster follow-up shots.

Stabilized Firing

7-133. To create a stabilized platform, snipers must understand the physical relationship between the weapon system, the shooter's body, the ground, and any other objects touching the weapon or shooter's body. The more contact the shooter has to the ground determines how stable and effective the position is. The situation and tactics determine the actual position used.

7-134. When a sniper assumes a stable firing position, movement from muscle tension, breathing, and other natural activities within the body transfer to the weapon. The sniper must compensate for their body's movement.

7-135. As a rule, positions that are lower to the ground provide a higher level of stability. When the center of gravity elevates, the level of stability decreases as shown in figure 7-18A and figure 7-18B (page 7-46).

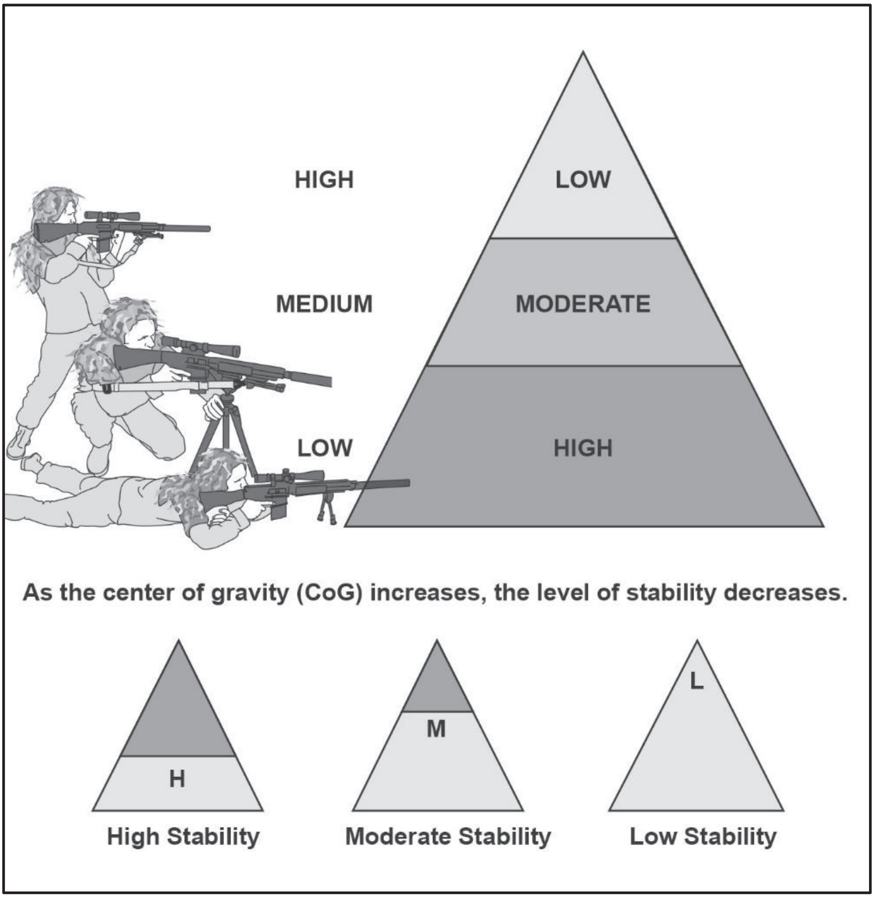


Figure 7-18A. Position stability rating

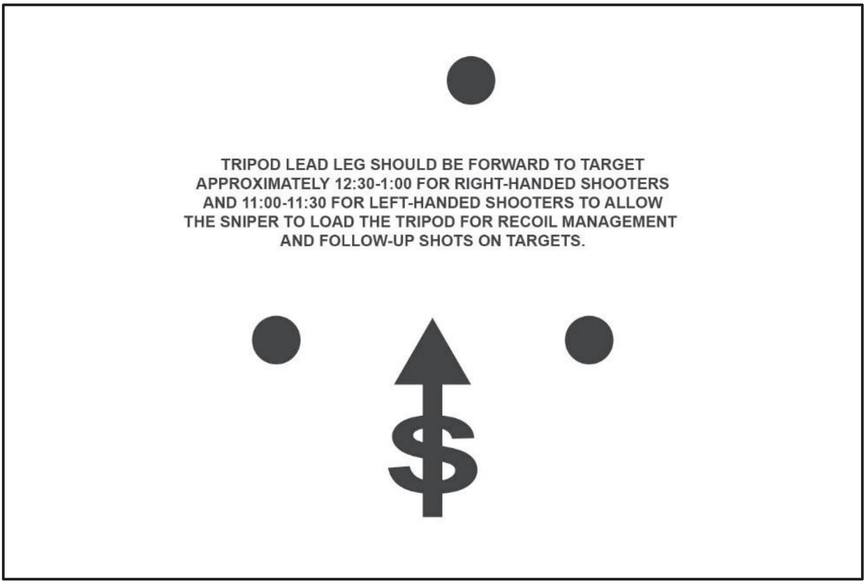


Figure 7-18B. Tripod setup

AIM

7-136. Aiming is the application of perfectly aligned sights on a specific part of a target. Sight alignment is the first and most important part of this process.

SIGHT ALIGNMENT

7-137. Sight alignment is the relationship between the aiming device and the firer's eye. The process the sniper uses depends on the aiming device employed with the weapon as defined below:

- Iron sight. The relationship between the front sight post, rear sight aperture, and the firer's eye. The firer aligns the tip of the front sight post in the center of the rear aperture and their eye. The firer maintains focus on the front sight post, simultaneously centering it in the rear aperture.
- Optics. The relationship between the reticle and the sniper's eye including the appropriate eye relief, or distance of the sniper's eye from the optic itself. The sniper ensures they have a full-centered field of view with no shadow on magnified optics.
- Thermal. The relationship between the firer's eye, the eyepiece, and the reticle.
- Pointers, illuminators, lasers. The relationship between the firer's eye, the NVD placement and focus, and the laser aiming point on the target.

SIGHT PICTURE

7-138. The sight picture is the placement of the aligned sights on the target itself. The sniper must maintain sight alignment throughout the positioning of the sights. This is not the same as sight alignment.

7-139. There are two sight pictures used during the shot process: pre-shot and post-shot. Snipers must remember the sight pictures of the shot to complete the overall shot process, which are—

- Pre-shot sight picture–encompasses the original point of aim, sight picture, and any holds for target or environmental conditions.
- Post-shot sight picture–what the sniper must use as the point of reference for any sight adjustments for any subsequent shot.

POINT OF AIM

7-140. The point on the target that is the continuation of the line created by sight alignment. The point of aim is a point of reference used to calculate any hold the sniper deems necessary to achieve the desired results of the round's impact.

DESIRED POINT OF IMPACT

7-141. The desired point of impact is the location where the sniper wants the projectile to strike the target. Typically, this is the center of visible mass.

FIELD OF VIEW

7-142. The field of view is the extent that the human eye can see at any given moment. The field of view is based on the sniper's view without using magnification, optics, or thermal devices. The field of view is what the sniper sees and includes the areas where the sniper can detect potential threats.

ERRORS IN AIMING

7-143. The sniper needs to be cautious of errors in aiming. Common causes for aiming errors include—

- Shadow effects.
- Cant.
- Parallax.

Shadow Effects

7-144. During aiming, the sniper must ensure that the riflescope's field of view is clear and shadow-free. Incorrect eye relief creates a circular shadow that reduces the size of the field of view hindering observation. Crescent-shaped shadows cause the bullets to strike on the side opposite from the shadow (figure 7-19, page 7-48) only if parallax is present. If a shooter eliminates parallax, then shadowing effects do not cause a shift on the point of impact since the reticle and target are on the same focal plane. It only causes a hinder for the shooter.

7-145. If the sniper notices a shadow on the edges of the field of view, then they must find a head position where they can clearly see the entire field of view.

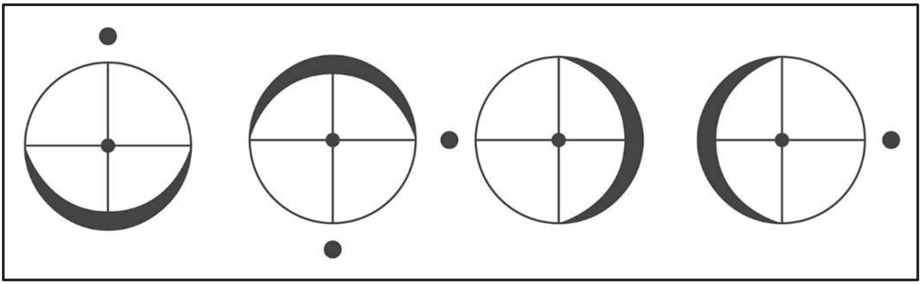


Figure 7-19. Effects of scope shadow on the fall of the shot

Weapon Cant

7-146. Eliminating weapon cant may not be critical for large or close proximity targets but is crucial for accurate engagement of small targets, long distance targets, and moving targets.

7-147. As a general rule (for common cartridges), a 1-degree cant produces 5 inches of lateral displacement at 1000 yards in the direction of cant and also produces a small vertical point of impact displacement.

7-148. Weapon cant should be identified and corrected using an anti-cant device for all engagements. Scope should be set with plumb bob to ensure the reticle is perpendicular to the ground.

7-149. When the only firing position is from a canted position and the sniper might have to take a shot, the sniper can use the following rule of thumb to estimate where the shot will fall when firing from a canted rifle:

- Determine the elevation required to engage the target at the given range.
  - Add 3 minutes of angle or 1 mil to the elevation correction that the sniper uses to engage the target.
  - Multiply this sum by the sin of the cant angle. The result is the horizontal displacement of the shot. The sine is the length of the y-component (the opposite to the angle or the rise) of the triangle.
  - Multiply the sum by the cosine of the cant angle to approximate the effective elevation. The cosine gives the length of the x-component (the adjacent of the angle or the run).

EXAMPLE

Target at 600 meters. Sniper is shooting at a 5 degree cant. Required elevation is 4.6 mil for 600 meter target.

Add 1 mil to 4.6 mil = 5.6 mil

5 sin x 5.6 = .48 mil (This is how far to the side you would hit at 600 meters with a 5 degree cant.

5 cos x 5.6 = 5.5 mil (This is your effective vertical adjustment.)

If you're shooting from a position where the rifle is titled 90 degrees, you would turn your elevation down 3 MOA or 1 mil, then use your windage dial as the elevation and vice versa.

MOA = minutes of angle; sin = sine; cos = cosine

Note. The rifle has a fundamental shift in zero when supported on its side. The sniper needs to establish a 90-degree zero if planning to shoot from this angle.

Parallax

7-150. Parallax adjusts the reticle's focal plane. Improper parallax adjustment causes the target image and the reticle to seem to be in two separate places within the scope. This makes the reticle seem to move across the target.

7-151. The sniper follows the following steps to eliminate parallax in side focus adjustment scopes:

- The reticle must be clear (focused) before turning the objective focus knob. If it is not, follow the instructions in appendix A.
- With the rifle in a stable position, look through the scope, concentrating on the center aiming point of the reticle.
- Move head slightly up and down and left and right. It is important to not move the weapon while making these head movements as it can cause the appearance of parallax when there is none.

7-152. The aiming point must remain in exactly the same position against the target; if it moves, turn the objective focus knob until it becomes stable.

7-153. Other causes of parallax that the sniper must be aware of are—

- Shooting glasses or prescription contacts or glasses can cause parallax.
- Air turbulence and mirage, which makes optimum focus very difficult. It can exacerbate parallax errors.

CONTROL

7-154. The control element of employment considers all the conscious actions of the sniper before, during, and after the shot process that the sniper is in control of. It incorporates the sniper as a function of safety, as well as the ultimate responsibility of firing the weapon.

7-155. Regardless of how well-trained or physically strong a sniper is, a wobble area (or arc of movement) is present when the sniper does not have adequate support of the weapon. The wobble area or arc of movement is the extent of lateral, horizontal, and front-to-back variance in the movement that occurs in the sight picture (figure 7-20).

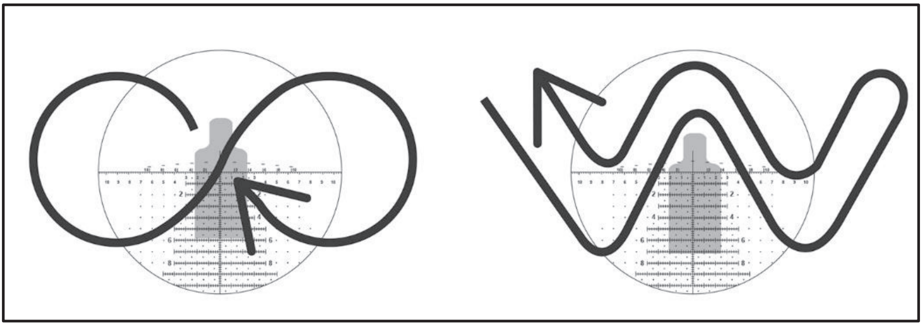


Figure 7-20. Arc of movement

7-156. The control element consists of several supporting sniper functions including all the actions to minimize the sniper's induced arc of movement. Executed correctly, the control element provides for the best engagement window of opportunity to the firer. The sniper physically maintains positive control of the shot process by managing—

- Trigger control.
- Breathing control.
- Workspace.
- Calling the shot (firing or shot execution).
- Follow-through.

TRIGGER CONTROL

7-157. Trigger control is the act of firing the weapon while maintaining proper aim and adequate stabilization until the bullet leaves the muzzle. Trigger control and the sniper's position work together to allow the sights to stay on the target long enough for the sniper to fire the weapon and the bullet to exit the barrel.

7-158. Stability and trigger control complement each other and integrate during the shot process. A stable position assists in aiming and reduces unwanted movements during trigger squeeze without inducing unnecessary movement or disturbing the sight picture. A smooth, consistent trigger squeeze, regardless of speed, allows the shot to fire at the sniper's moment of choosing. When both a solid position and a good trigger squeeze are achieved, any induced shooting errors can be attributed to the aiming process for refinement.

7-159. The sniper places their finger where it naturally lays on the trigger to facilitate smooth trigger control. Natural placement of the finger on the trigger allows for the best mechanical advantage when applying rearward pressure to the trigger as described below:

- Trigger finger placement. The trigger finger lays naturally across the trigger after achieving the proper grip. There is no specified point on the trigger finger that must be used. This is not the same for all snipers due to different hand sizes. This allows the sniper to engage the trigger in the most effective manner.
- Trigger squeeze. The sniper pulls the trigger in a smooth consistent manner adding pressure until the weapon fires. Regardless of the speed at which the sniper is firing, the trigger control is always smooth.
- Trigger reset. It is important that the sniper retains focus on the sights while resetting the trigger.

Breathing Control

7-160. During the shot process, the sniper controls their breathing to reduce the amount of movement of the weapon. During training, the sniper learns a method of breathing control that best suits their shooting style and preference. Breathing control is the relationship of the respiratory process (free or under stress) and the decision to execute the shot with trigger squeeze.

7-161. Breathing induces unavoidable body movement that contributes to wobble or the arc of movement during the shot process. Snipers cannot completely eliminate all motion during the shot process, but they can significantly reduce its effects through practice and technique. Firing on the natural pause is a common technique used during grouping and zeroing.

7-162. Vertical dispersion during grouping is most likely not caused by breathing but by failure to maintain proper aiming and trigger control.

Workspace Management

7-163. The workspace is a spherical area, 12 to 18 inches in diameter centered on the sniper's chin and approximately 12 inches in front of their chin. The workspace is where the majority of weapons manipulations take place.

7-164. Conducting manipulations in the workspace allows the sniper to keep their eyes oriented towards a threat or their individual sector of fire while conducting critical weapons tasks that require hand and eye coordination. Use of the workspace creates efficiency of motion by minimizing the distance the weapon has to move between the firing position to the workspace, then returning to the firing position.

7-165. Location of the workspace changes slightly in different firing positions. When operating in the prone position, snipers still orient their eyes toward the threat as they work through a function.

7-166. Workspace management includes the sniper's ability to perform functions using the following parts:

- Selector lever. Changes the weapon's status from safe to fire.
- Charging handle. The sniper uses the charging handle during operation. This includes any corrective actions to overcome malfunctions, loading, unloading, or clearing procedures.
- Bolt handle. Allows the sniper to use the bolt handle to load a round into the chamber and to extract a round once it is fired. (M2010).
- Bolt catch. Allows the sniper to operate the bolt catch mechanism on the weapon during operations.
- Ejection port. Allows the sniper to close the ejection port cover to protect the bolt carrier assembly, ammunition, and chamber from external debris upon completion of an engagement. This includes observation of the ejection port area during malfunctions and clearing procedures.
- Magazine catch. Allows smooth functioning of the magazine catch during reloading procedures, clearing procedures, or malfunction corrective actions.
- Chamber check. The sequence used to verify the status of the weapon's chamber.

CALLING THE SHOT

7-167. Knowing precisely where the sights are when the weapon discharges is critical for shot analysis. Errors such as flinching or jerking of the trigger can be seen in the sights before discharge.

7-168. Calling a shot refers to a firer stating exactly where they think a single shot strikes by recalling the sights relationship to the target when the weapon fired. Normally, this is expressed in clock direction and inches (or mil) from the desired point of aim.

7-169. The shooter is responsible for the point of impact of every round fired from their weapon. This requires the sniper to ensure the target area is clear of friendly and neutral actors in front of and behind the target. Snipers must be aware of the environment in which the target is positioned. Particularly in urban settings, friendly or neutral actors may be present in other areas of a structure where the projectile penetrate.

FOLLOW-THROUGH

7-170. Follow-through is the continued mental and physical application of the functional elements of the shot process after the shot has been fired. The firer's head stays in contact with the stock, the firing eye remains open, the trigger finger holds the trigger back through recoil and then eases enough to reset the trigger, and the body position and breathing remain steady.

7-171. Follow-through consists of all actions controlled by the shooter after the bullet leaves the muzzle. Follow-through is required to complete the shot process.

MOVEMENT

7-172. The movement functional element is the process of the sniper moving tactically during the engagement process. The functional element includes the sniper's ability to move laterally, forward, diagonally, and in a retrograde manner while maintaining stabilization, appropriate aim, and control of the weapon.

ASSESS

7-173. The skill of the observer makes or breaks the sniping mission. The sniper depends on the observer for information about the target, environmental conditions, and observation of shot. Observer training is vital and must be an integral part of sniper training.

7-174. The observer must accurately tell the sniper where they have shot. Snipers expect to make first round hits; however, should they miss, a good observer can give a correction that almost ensures a second round hit. The four ways to observe the point of impact include—

- Trace.
- Splash.
- Strike.
- Tracer.

TRACE

7-175. Trace is the visible trail created by the shockwave of a supersonic bullet (for example, one that travels faster than sound). This trail, or trace, looks like small waves along the bullet's flight path. Factors that affect trace are—

- Range. As range increases, so does the distance between the trace and the point of impact.
- Conditions. Atmospheric conditions.
- Location. Height above sea level.

SPLASH

7-176. The observer can sometimes see the splash of a round depending on terrain. The observer might see a piece of bark fly off a tree or a piece of earth fly up when the bullet strikes.

7-177. Splash is an excellent indicator of the fall of shot. Unfortunately, depth perception can keep the observer from determining distance between the target and the strike of the round. To compensate, observers must use trace and splash together.

STRIKE

7-178. When a round hits a solid surface, the observer can see the effect of range on the target. For example, on a conventional range, when the round strikes a figure target, slivers of wood fly out the back of the target. With steel targets, the round chips off fresh paint and dings the metal target.

TRACER

7-179. Tracer rounds have a phosphorus compound in the trailing end of the bullet, which glows red when fired. This allows the observer to follow the flight of the bullet. Using tracer ammunition has some grave disadvantages. They are—

- Differences in mean point of impact.
- Position compromise.

Note. 7.62-mm ball tracer ammunition is not ballistically balanced to sniper match ammunition and normally fires less consistently.

SNIPER AND OBSERVER DIALOGUE

7-180. Once in the firing position or hide, both the sniper and the observer are responsible for ensuring the sniper hits the target with one shot. The key to success is communication. The sniper team may communicate however they feel comfortable, as long as their communications are effective and concise (figure 7-21).

OBSERVER

7-181. The observer does the following:

- Is in line with the sniper's gun-target line.
- Locates, describes, and talks the sniper on the target.
- Advises the sniper to mil the target.
- Advises the sniper to aim center of target, "quarter the target," so the target is broken into four even sections.
- Calculates and communicates holdover or hold under and windage (wind calls are given as wind changes). Confirms hit or gives necessary correction in the same fashion.

SNIPER

7-182. The sniper does the following (figure 7-21):

- Acknowledges the target indicates when acquired with a brief description for confirmation.
- Gives mil reading to the spotter.
- Applies aiming or scope adjustments provided by the spotter.
- Fires the shot.
- Calls the shot and awaits spotter corrections, if needed.

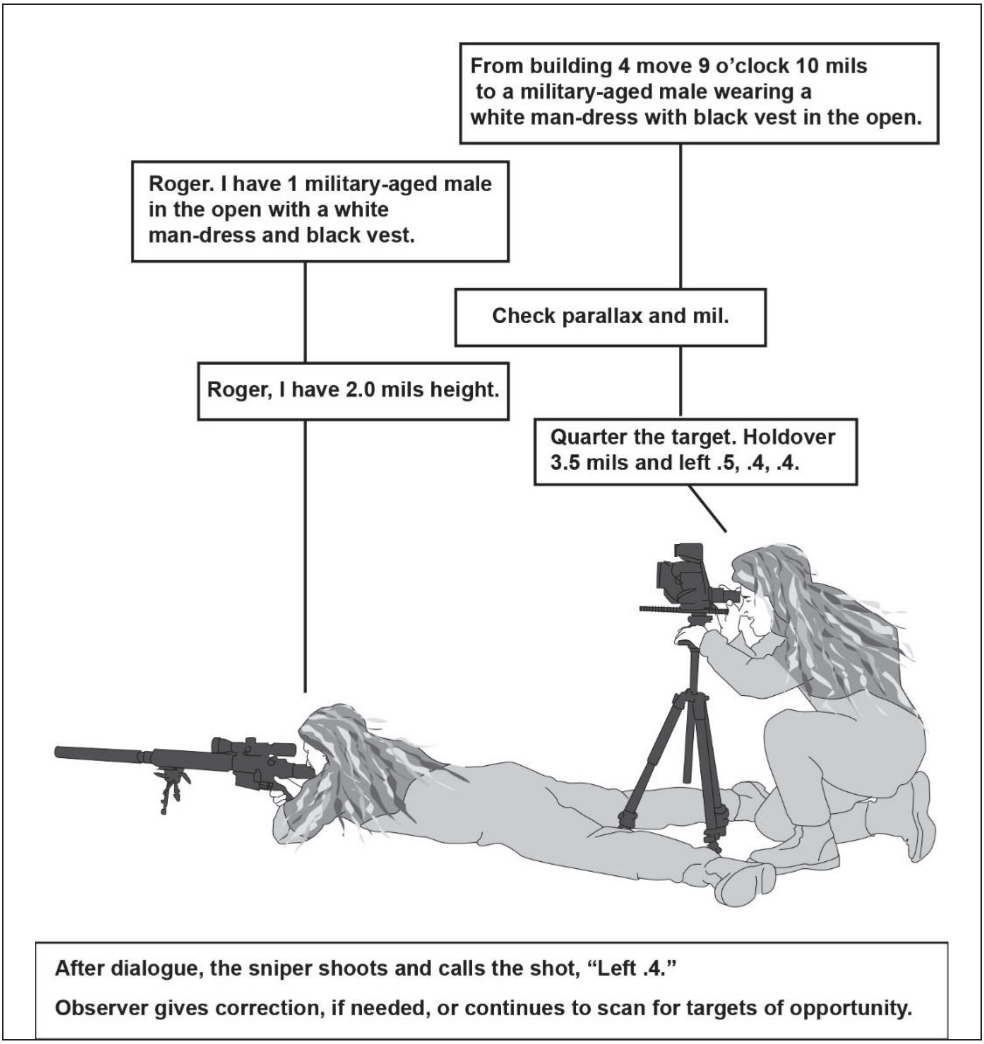


Figure 7-21. Sniper team dialogue example

7-183. After the sniper has engaged a hostile target with direct fires, the sniper and leader collectively assess the effects of their fires. The accurate assessment of the effects of fires determines further courses of action to eliminate the target in the event the fires were unsuccessful, or to shift their fires to additional targets on the battlefield. Accuracy in the assessment phase of the detect, identify, decide, engage, and assess process. Systematic reporting of their fires effects to a higher headquarters provides the maneuver commander with critical information necessary to make key decisions for the unit.

Chapter 8

Exfiltration

Chapter 8 covers the exfiltration sequence that the sniper team executes when the mission is complete and the debrief phase once the team returns.

EXFILTRATION PHASE

8-1. The extraction site is coordinated with supporting forces before the mission. However, the situation dictates whether the sniper team extracts at the planned site or exfiltrates. Determining factors include—

- Distance. Distance can prohibit an all land exfiltration. The initial phase may be by land, ending in extraction by air or water.
- Terrain. The terrain at the extraction site must offer favorable tactical, tidal, and pickup zone conditions, and it must offer cover from enemy direct fire weapons. The sniper team must use the least likely terrain for extraction, such as swamps, jungles, and mountain areas.
- Enemy. The sniper team must plan in detail for extracting under enemy pressure.
- Escape and evasion. Pre-insertion planning must include a viable escape and evasion plan. The sniper team must establish this using current survival, evasion, resistance, and escape doctrine.

8-2. Once the sniper team has executed their mission, the sniper team withdraws or relocates as quickly as possible.

8-3. When conducting an extraction, it is important that the sniper team adheres to the time frame that was planned. The sniper team must stay alert and free from distractions. The sniper team cannot afford to be complacent. The extraction needs to be carried out in the controlled phase.

8-4. Pack away all nonessential gear and equipment first. The optics being used at the hide aperture and the radio are the last items packed. Once all items inside of the hide site are packed and secure, the team begins to exit the hide.

8-5. Team members exit the hide site one at a time, starting with the sniper team member responsible for security first (deploy the most casualty producing weapon first out of the hide, such as a member with an M249). The team members do the following:

- The security sniper pushes to the side of the hide that has the greatest field of view of the target area.
- The second member of the team exits and pushes to the opposite side of the security sniper and observes the rear.

- The next sniper team member exits and interlocks their sector of fire with the other members.
- The last step is the team leader who exits the hide site and conducts a sweep of the hide to ensure all weapons and equipment have been secured. Once the team leader is complete, the team conducts a stop, look, listen, and smell before stripping the hide site down and securing any communication antennas and cables used. Keep any defense devices in place until the hide site has been dismantled and communication equipment has been secured.
- Once all of the equipment has been secured, the team secures any defense devices (claymores). Once all has been accounted for, the sniper team leader radios to higher that the hide site is secured, and the team is ready to exfiltrate. The team leader and compass man confirms the exfiltration route and proceeds to move out in a tactful manner. The route should be different from what was used on the approach. Do not rush the movement.

8-6. The sniper team observes the principles of route selection and movement security.

8-7. Snipers can exfiltrate to an extraction site for extraction by a wheeled or tracked vehicle. This requires planning and coordinating during the pre-insertion phase. If all else fails, the sniper team must know exfiltration techniques so they can do a tactical foot movement out, singly or together.

LAND EXFILTRATION

8-8. The sniper team must be prepared to exfiltrate over predetermined land routes to friendly lines together or separately and to decide whether to exfiltrate to an area for extraction by air or water.

8-9. Land exfiltration is used when—

- Snipers are near friendly lines or lack other means of extraction.
- Terrain provides cover and concealment for foot movement, but limits enemy mobile units.
- Areas along exfiltration routes are uninhabited.
- The enemy force is widely dispersed or under such pressure they have trouble concentrating against the exfiltrating team.
- The enemy force could stop an air or water extraction.

8-10. Once the team has arrived at the pickup point, the team moves into cover and conceals themselves. The team postures themselves into a security halt formation, facing out and interlocking sectors of fire. The team conducts stop, look, listen, and smell. Once the team completes stop, look, listen, and smell, the team leader radios to the TOC that the team is in position and the extraction site is secured.

8-11. The TOC informs the team of the pick-up platform's estimated time of arrival. The team leader acknowledges and deploys the pickup marker and continues to provide security until the extracting team arrives.

RECOVERY, DEBRIEF STAGE

8-12. Recovery is the last phase of a sniper operation. Recovery comprises the sniper team's return to the operations base; debriefing; repair; maintenance; turn in of equipment; and stand down. At the end of the recovery phase, the sniper team prepares for future missions.

8-13. After the mission, the sniper squad leader or S-3 representative directs the sniper team where to prepare for debrief. The team stays there until called to the operations center. Then, they take with them their equipment, the sniper data book and log sheet, field sketch, range card, and road or area sketches.

8-14. When based on a solid pre-briefing, the debriefing feeds the company intelligence support team with data to meet the commander's requirements. The debriefing should provide feedback on all areas covered in the pre-briefing, as well as updated pictures, and may include data from detainee operations and tactical site exploitation.

8-15. The purpose of a post-mission debriefing is to identify and record data pertaining to assigned information collection tasks and any additional information and observations concerning the area of operations, as well as to collect any fliers, pamphlets, media, or pictures the patrol found or obtained. Company intelligence support team members, with participation from patrol or convoy leader and members, normally conduct the post-mission debriefing.

8-16. The sniper team, sniper employment officer, and intelligence cell conducts an after action review to analyze what went well and how to improve future training or operations and effectiveness. The after action review should also address the moral-ethical aspects of the decision to shoot or kill and the effects on the psyche of the sniper team. Post combat after action reviews should allow the squad leader to facilitate candid discussions within the team that help prevent or mitigate moral injury. Combat commanders and leaders need to incorporate guidance from professionals on their responsibilities to prevent, detect, mitigate, or heal moral injury resulting from the combat stress of killing other humans.

8-17. The S-3 or their representative controls the debrief and directs the team to—

- Discuss any enemy sightings since the last communications with the base radio station.
- Explain step-by-step each event listed in the mission logbook to include details of all enemy sightings.
- Perform the following:
  - Inventory and account for all team and individual equipment.
  - Consolidate all captured material and equipment.
  - Review and discuss the events in the mission logbook.
  - Make an overlay of the team's route, area of operation, insertion point, extraction point, and significant sighting locations.

Appendix A
Setup a Sniper Weapon System

The sniper weapon system is an invaluable tool that aids the sniper in delivering accurate and precise fires onto targets. This appendix has omitted technical detail for the individual systems as the sniper can access the technical manuals for each sniper weapon system through their arms room or through the Logistics Support Activity.

SNIPER WEAPON SYSTEM

A-1. Setting up a sniper weapon system to the individual shooter is an important process that enables the sniper to employ their weapon more effectively.

A-2. A sniper weapon system must fit well if a sniper is expected to be mission capable at all times. The butt stock on a sniper weapon system is a primary component that if not setup properly will hinder the sniper in a multitude of ways.

BUTT STOCK COMB

A-3. The comb on the butt stock is used to adjust the snipers head to be in alignment with the rifle scope. The sniper will encounter muscle fatigue, ache, and exhaustion if the comb is not adjusted properly.

Comb Height

A-4. The comb height can be set for deliberate shooting where the sniper is behind the sniper weapon system for a long period of time. The comb also can be set for speed, positional shooting, and possible weak side shooting.

A-5. A low comb height predicated by a nonadjustable comb relies on muscular tension to keep the sniper’s head in position behind the scope.

Comb Adjustments

A-6. The sniper should check their weak side to assess difficulty in obtaining a correct stock weld after the adjustment. The sniper should check comb height in both vertical and lateral positions as described below:

- Vertical. Provides optimal height without requiring muscular input.
- Lateral. Accounts for different head types. Round face head types can adjust the comb away from the face and narrow face head types can pull the comb towards the face.

Note. For .300 Winchester Magnum or higher, set the comb for strong side prone. For .308 semi, set the comb for general field use (speed and positional).

LENGTH OF PULL

A-7. Length of pull is the distance between the butt and the trigger. The sniper must determine the proper length of pull in all firing positions to achieve the ability to press the trigger without disrupting the lay of the rifle. The sniper should check length of pull in all positions.

OPTIC

A-8. The optic is the gateway to the battlefield. The optic must be setup properly so the sniper can efficiently engage the target. An optic that is not calibrated and properly mounted renders the sniper weapon system useless. Section II of this appendix covers scope calibration and zeroing.

EYE RELIEF

A-9. The eye relief of an optical instrument (such as a riflescope or binoculars) is the distance from the last surface of an eyepiece at which the user's eye can obtain the full viewing angle. If a viewer's eye is outside this distance, the viewer has a reduced field of view. The sniper must know the scope eye relief range changes with magnification. Knowing this can assist in awkward firing positions making obtaining appropriate eye relief challenging. Reducing scope magnification can increase the amount of eye relief required to obtain a full field of view, where increasing the magnification can have the opposite effect.

A-10. To setup proper eye relief, the sniper does the following—

1. With the scope as far forward in the mounts as possible, holds the rifle in a normal shooting position. (Variable power scopes should be set at the highest magnification for this process.)
2. Slowly moves the scope to the rear just until a full field-of-view is acquired.
3. Without disturbing the optimal eye relief position, rotates the scope until the elevation adjustment dial is at the top of the scope. From a firing position, checks to be sure that the vertical hair of the reticle aligns with the vertical axis of the firearm. (Use a level and reconfirm reticle levelness with the tall target test, which is covered later in this chapter.)
4. Tightens the ring screws evenly and securely. (Consult sniper weapon system TM for torque guidance.)

RETICLE FOCUS

A-11. The sniper makes all reticle focus adjustments with the eyepiece. The sniper must focus the reticle before initiating any live-fire events. To begin, the sniper—

1. Ensures the weapon is clear. Secures the scope and firearm in a firm rest. The sniper gets behind the rifle and the spotter sets up to their firing side to assist in adjustments.
2. If the eyepiece has a lock ring, grasps the eyepiece with their hand and rotates it counterclockwise until the lock is loose.
3. Begins adjustments at the positive side of the eyepiece. The eye focuses faster from the negative side and by starting at full positive, the end result is a more refined reticle.
4. Positions themselves behind the rifle. The spotter blocks the scope with a piece of white paper in front of the objective lens without blocking the sniper's downrange view with their nonfiring eye.
5. Focuses on a downrange object at least 100 meters away with the nonfiring eye, then shifts focus to the firing eye to check reticle sharpness. The spotter adjusts the eyepiece in small increments (+ to -). Continues to rotate the eyepiece and rechecks focus repeatedly until the reticle is sharp.
6. Once complete, retightens the lock ring against the eyepiece and annotates focused point with a paint marker.

A-12. To shoot with both eyes open and scan for targets with the nonfiring eye, the sniper must have instant acquisition on the glass when shifting focus back into the scope and onto the reticle. To accomplish this, the sniper needs to setup the ocular focus on the reticle while both eyes are open and focused at a neutral point outside the scope.

A-13. If the sniper looks into the scope with their firing eye and allows the eye time to focus on the reticle, it will. The constant refocusing when going from outside the glass to back in, or a large disparity between the master eye and the nonfiring eye is what causes eye fatigue and headaches and limits the sniper's time on the glass.

STOCK WELD

A-14. Stock weld is the placement of the sniper's head on the stock of the weapon. Correct stock weld is critical to eye relief. The sniper rests the full weight of the head on the stock. The head position is as upright as possible to give the best vision through the aiming device. The head position allows for scanning additional targets not seen through the aiming device.

A-15. The sniper brings the rifle up to their head, not their head down to the rifle when establishing the stock weld. The sniper's head remains in the same location on the stock while firing, but the location may change when positions are changed. The bony portion of the cheek placed on the stock is the basic starting point. Snipers adapt to their facial structure to find the optimal placement that allows for both eye relief and repetitive placement.

A-16. Figure A-1, page A-4, shows the differences in head placement, which effects eye relief. The sniper on the right is NOT resting the full weight of their head on the stock. The picture on the left shows the skin of the sniper's head being pushed down by the full weight of their head. A peer coach can quickly observe and correct this error.

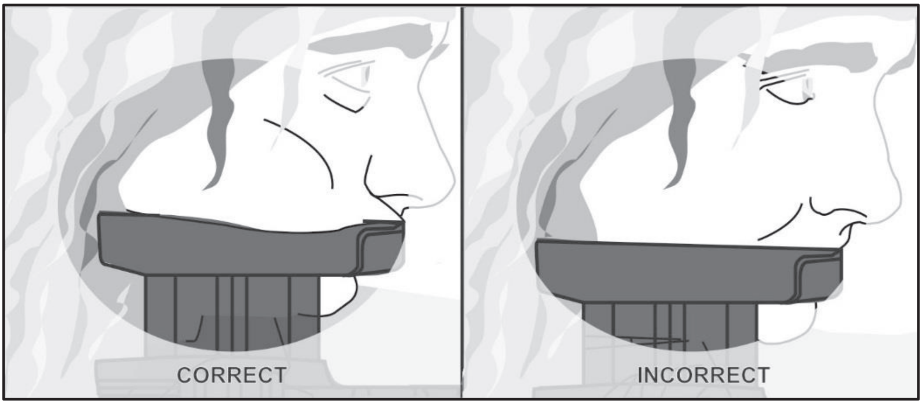


Figure A-1. Stock weld placement

ATTACHMENTS

A-17. The sniper attaches various tools that augment the sniper weapon system so it can engage a target efficiently.

WEAPON MOUNTED LASER RANGE FINDER

A-18. For weapon-mounted laser rangefinders (figure A-2), the direct-view optics are decoupled from the laser rangefinder itself. The sniper must manually align the laser rangefinder.

A-19. Improper alignment results in poor ranging capability as well as inaccurate range measurements. To take full advantage of LRF performance, snipers want to ensure that a maximum amount of the laser energy is focused on the target and not scattering off of adjacent areas (figure A-3).

> ***Note.*** At 1000 meters, if the laser rangefinder is misaligned 0.5 mil low, this could result in an error in the range measurement of up to 5 meters, which could drop the probability of hitting the target by as much as 30 to 40 percent.

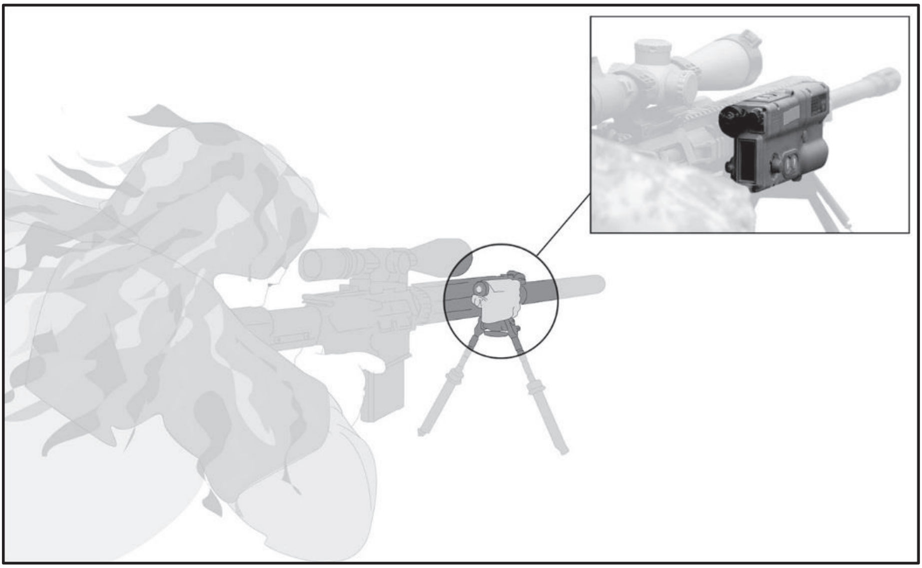


Figure A-2. Weapon-mounted laser range finders

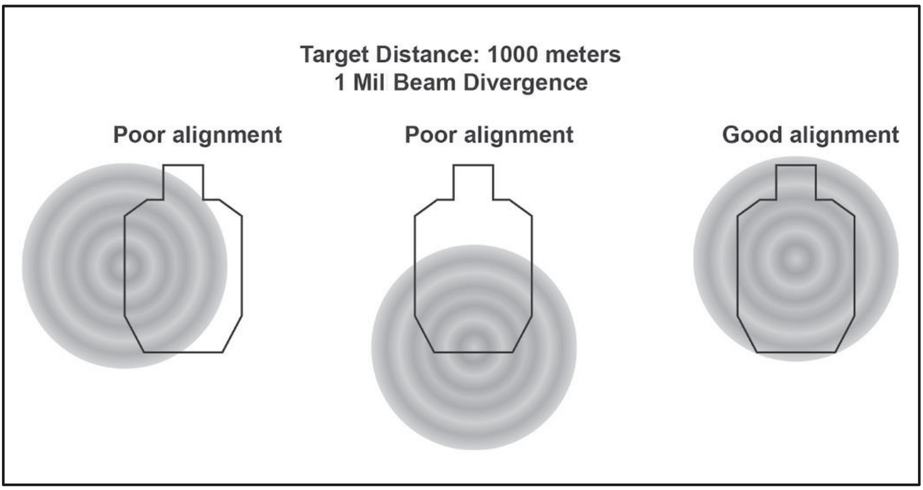
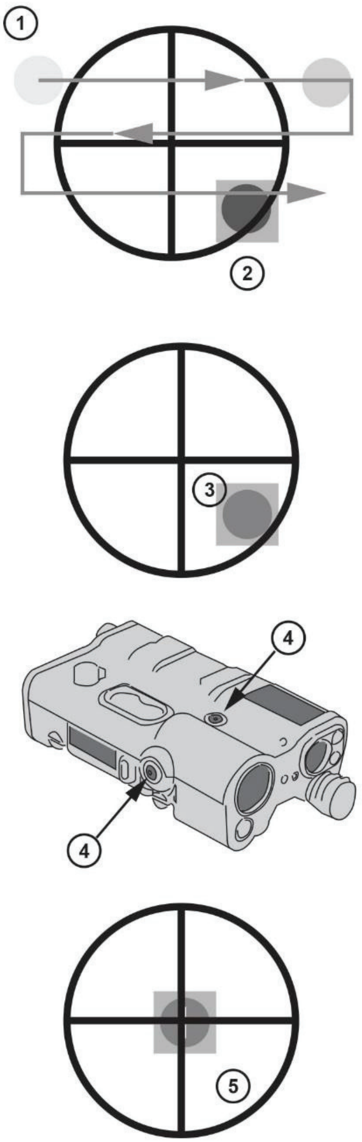


Figure A-3. Scattering effect

A-20. The proper way to align the weapon mounted LRF to the riflescope is to effectively perform a co-alignment at infinity. This requires a course alignment at a short range, at 25 meters, then a fine adjustment at long range, between 800 to 1000 meters (figure A-4, page A-6).



CONDUCT CALIBRATION WITH THE VISIBLE LASER DURING THE DAY AND THE IR AT NIGHT. DON'T TRY THE IR WITHOUT YOUR NVS. DAMAGE COULD RESULT TO YOUR EYE.

Legend

LRF	laser range finder	IR	infrared	NVS	night vision system

Figure A-4. Performance actions, calibrate weapon mounted LRF

A-21. At this point, there is a great amount of parallax that has been induced into the setup, so the sniper cannot expect to effectively range past 500 meters if stopping at this point. The sniper needs to perform a fine alignment at infinity to complete the process.

A-22. To complete the process, the sniper places the reflective target at 800 to 1000 meters away ("infinite" distance when referring to the optical system). The sniper repeats steps 1 through 5 (figure A-4) and the weapon mounted LRF is now calibrated.

A-23. Weapon-mounted LRFs rely on the riflescope's reticle for alignment. If the sniper dials windage or elevation corrections for ballistics, it will ruin the reticle's alignment with the laser.

SUPPRESSOR

A-24. A suppressor (figure A-5) is meant to diminish the report of a discharged round, or make its sound unrecognizable. Other sounds emanating from the weapon remain unchanged. Even subsonic bullets make distinct sounds as they pass through the air and strike targets. Supersonic bullets produce a small sonic boom, resulting in a "ballistic crack." Semi-automatic and fully automatic firearms also make distinct noises as their actions cycle, eject the fired cartridge case, and load a new round.

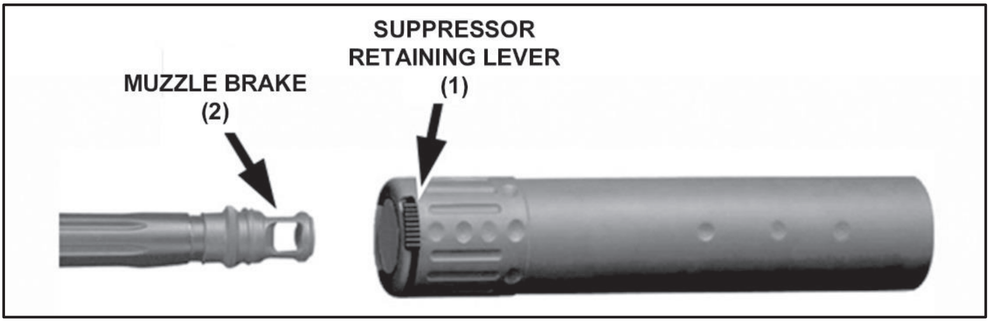


Figure A-5. Suppressor

A-25. Aside from reductions in volume, suppressors tend to also alter the sound to something that is not identifiable as a gunshot. This reduces or eliminates attention drawn to the sniper. Suppressors are particularly useful in enclosed spaces where the sound, flash, and pressure effects of a weapon being fired are amplified.

A-26. As the suppressed sound of firing is overshadowed by ballistic crack, observers can be deceived as to the location of the sniper, often from 90 to 180 degrees from their actual location. However, countersniper tactics can include gunfire locators, where sensitive microphones are coupled to computers running algorithms using the ballistic crack to detect and localize the origin of the shot. The U.S. Boomerang System is one such example.

A-27. There are many advantages in using a suppressor other than sound. Suppressors reduce firing recoil significantly, primarily by diverting and trapping the propellant gas. Usually, the gas has much less mass than the projectile, but it exits the muzzle at multiples of the projectile velocity. Reducing the speed and quantity of the gas expelled can significantly reduce the total momentum of the matter (gas and projectile) leaving the barrel.

ZEROING

A-28. Snipers must first sight in their optic using a bore sighting tool or preliminary bore sighting methods.

A-29. The sniper must follow the directions included with the collimator for instructions on its proper use.

A-30. Snipers can accomplish preliminary sighting-in by bore-sighting at the firing range using a target from 25 to 100 meters away (figure A-6). Snipers perform the following steps:

Step 1. Position the firearm downrange onto a target. Use sandbags or other means of support to steady the rifle.

Step 2. Remove the bolt from the firearm. (If using semi-automatic-type platform, release the rear receiver pin of the firearm, separate the upper and lower receiver halves, and remove the bolt.)

Step 3. Look through the bore itself, move the firearm to center the target inside the barrel.

Step 4. Hold the rifle steady. With the target centered when viewed through the bore, make windage and elevation adjustments to the scope until the very center of the reticle aligns with the bull's-eye of the target.

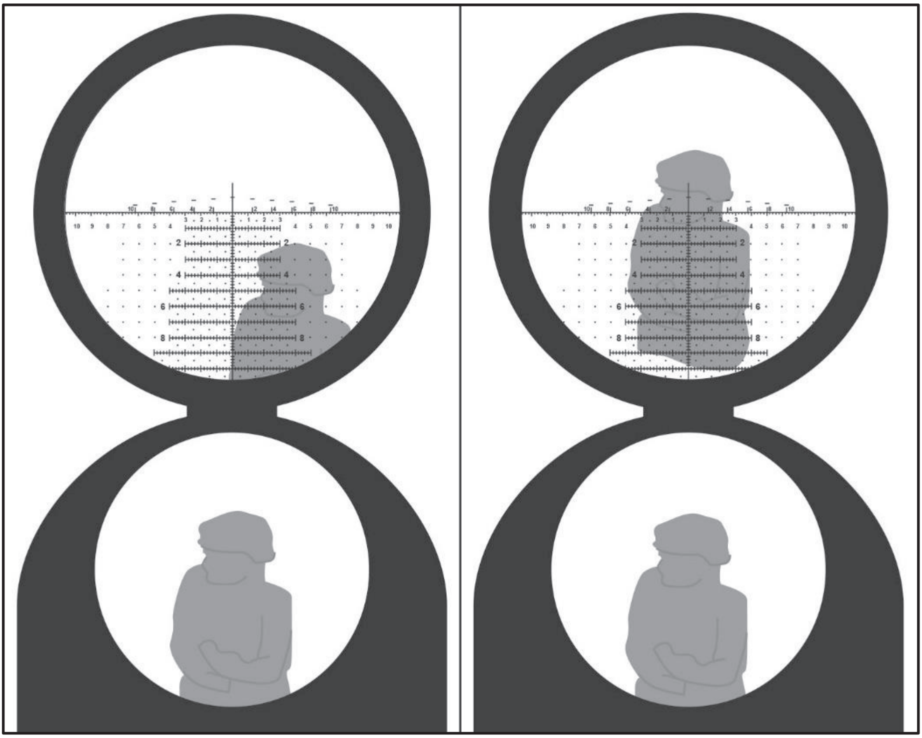


Figure A-6. Bore sighting

ZEROING PROCESS

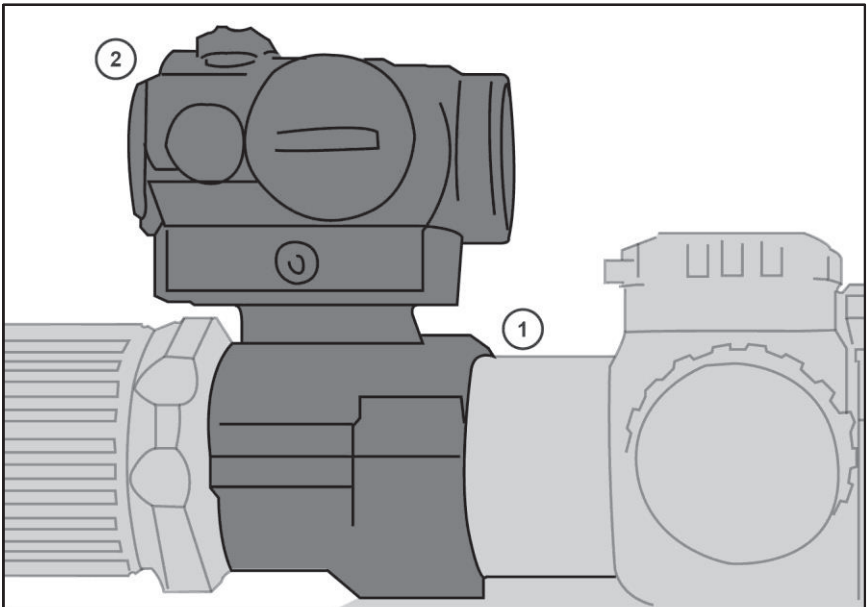
A-31. Zeroing a weapon is not a training exercise, nor is it a combat skills event. Zeroing is a maintenance procedure to place the weapon in operation, based on the sniper's skill, capabilities, tactical scenario, aiming device, and ammunition. Its purpose is to achieve the desired relationship between the line of sight and the trajectory of the round at a known distance.

A-32. For snipers to achieve a high level of accuracy and precision, it is critical they zero their aiming device to their weapon correctly. The sniper must first achieve a consistent grouping of a series of shots, then align the mean point of impact of that grouping to the appropriate point of aim. Snipers use the process described in their weapon and equipment's technical manuals to complete the zeroing task.

A-33. The preferred method is to use a five-shot grouping, which allows the sniper to accurately analyze their shot group. If all the shots were taken into account in the three-shot group, the firer would probably adjust their zero from the right edge of the four-centimeter circle. It is possible that the shot on the right was a poor shot and should not be counted in the group. The five-shot group on the right is in the same place as the one on the left with the exception of the one shot out to the right. With four out of five shots in a tight group, the wide shot can be discounted and little or no change to the windage is necessary.

A-34. Zero height (elevation) and zero offset (windage) are used when the addition of a suppressor, a change in ammunition, or the addition of night vision optics changes the point of impact of the zero.

A-35. If the sniper has a red dot sight (figure A-7 [NSN 1240-01-620-2463]), the sniper conducts a co-witness with their primary rifle optic. To do this, the sniper points the primary rifle optic at an object 500 meters or more in distance, and adjusts the red dot sight to identical aim point as 100 meter zero in riflescope.



1	RED DOT IS DESIGNED TO BE MOUNTED AT THE 12 O'CLOCK POSITION.
2	SNIPERS CAN USE THE RED DOT TO INTERDICT CLOSE IN TARGETS WITHIN POINT-BLANK RANGE AND USE THE RED DOT TO RAPIDLY ORIENT TO STATIONARY AND MOVING TARGETS AND TRANSITION QUICKLY INTO THE PRIMARY DAY OPTIC AT HIGH MAGNIFICATION.

Figure A-7. ECOS-O

A-36. The sniper can conduct a precombat check, as their red dot should align with their 100 meter zero (figure A-8).

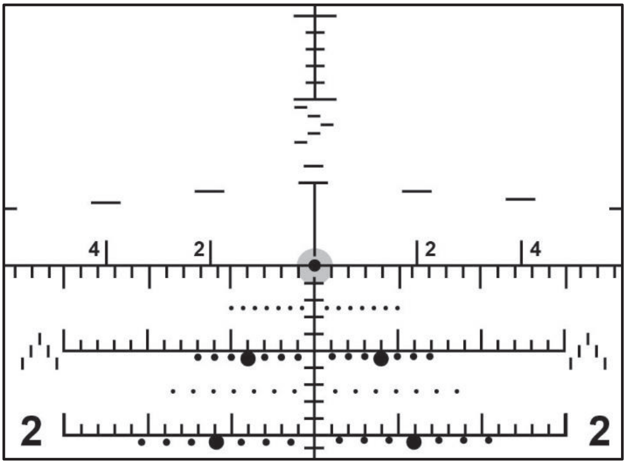


Figure A-8. Precombat check

TREMOR 3 WIND DOTS

A-37. The speeds associated with the markers increase by a specific value from one marker to the next, moving outward from the reticle center. The specific value between wind markers depends on the ballistic coefficient and muzzle velocity. Different sniper weapon systems have different wind marker values. There are seven time of flight wind dots.

A-38. For example, a M2010/M110 has a wind value of 4, resulting in the following speeds from center outward: 4 miles per hour, 8 miles per hour, 12 miles per hour, 16 miles per hour, 20 miles per hour, 24 miles per hour, ending at 28 miles per hour. It is crucial to recognize that the wind speeds are the same for each drop line. As the example in figure A-9 shows, the third wind marker speed equals 12 miles per hour for an M2010/M110 weapon system regardless of which drop line it occurs on. This means that no further calculations are required to place wind holds for different drop adjustments.

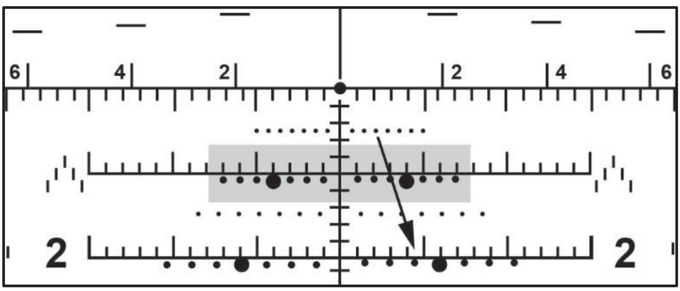


Figure A-9. Wind dots

MINUTE OF ANGLE

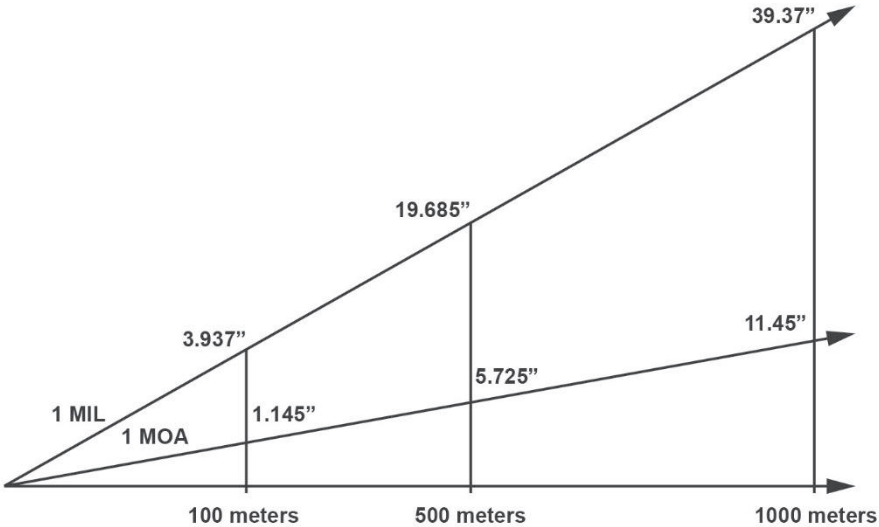
A-39. MOA is an angular unit of measurement equal to 1/60th of a degree (figure A-10). The most common use of an MOA is when describing that one MOA equals 1.047 inches per 100 yards. For most applications, a sniper can round this to 1 inch at 100 years or 1.1 inches at 100 meters to simplify their arithmetic

MIL

A-40. The mil is a common unit of angular measurement that is used in direct fire and indirect fire application. The sniper's reticle and scope turrets are commonly in mil increments (figure A-10). This allows the sniper and spotter to communicate with a high degree of uniformity between what the spotter sees with their mil-based reticle and what the sniper sees and adjusts with their mil-based reticle and system.

MIL AND MOA
1 MIL = 3.438 MOA 1 MOA = 1.145" AT 100 METERS (FIELD USE: 1" EVERY 100 METERS) 1 MOA = 0.291 MIL (FIELD USE: 1 MOA = .3 MIL) 1 MIL = 10 CM AT 100 METERS (1 MIL = 1 METER AT 1000 METER) 1 INCH = 2.54 CM 1 INCH = .254 MIL AT 100 METERS .1 MIL MOVES POI 1 CM AT 100 METERS

CONVERSION FORMULA:
MIL X 3.438 = MOA
MOA / 3.438 = MIL



*ANGLE DIMENSIONS EXAGGERATED FOR CLARITY

NOTE: STICK TO DOING RANGE ESTIMATION IN METERS WITH A MIL-BASED SYSTEM, AND IN YARDS WITH A MOA-BASED SYSTEM.

Legend
CM centimeters MOA minute of angle POI = point of impact

Figure A-10. Mil and MOA

Scope Calibration

A-41. Uncalibrated sight adjustments are one of the most common problems in shooting. In most cases, there is some amount of error in a scopes turret. Like every measurement instrument, the sniper needs to verify the scope and determine if the adjustments are accurate.

A-42. The tall target test is a calibration exercise. The test must be conducted at exactly 100 meters.

A-43. Shooting with a verified level riflescope promotes better wind reading because the sniper has eliminated any unknown components of cant. The sniper performs a tall target test as follows—

1. Level target at 100 meters. Confirm distance with tape measure or LRF.
2. Visually check horizontal and vertical stadia line alignment with target.
3. Dial zero mil elevation (100 meter zero).
4. Group at lowest target circle first. Ensure proper sight zero.
5. Dial 10 mil of elevation.
6. Group again, but maintain same aiming point as step 4.
7. Measure vertical distance in centimeter from group to 100 centimeter line.

Note. Every 1 centimeter equals 1 percent elevation error. For groups above the 100-centimeter line, subtract from 100, and for groups below the 100-centimeter line, add to 100. The answer equals correction factor percentage. The sniper can also use the formula below (figure A-11) to calculate their scope correction factor.

---

8. Measure horizontal distance (in centimeters) from group to vertical stadia line.

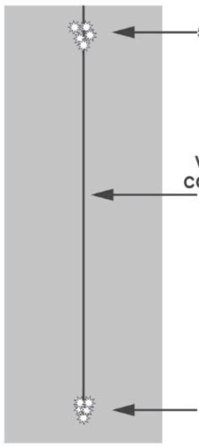
Note. Every 1 centimeter equals 0.1 mil (0.348 MOA) scope cant.

---

9. Apply correction factor to any raw ballistic solution to account for scope tracking error.

EXPECTED POI SHIFT = DIALED X RANGE X CONSTANT

CF (CORRECTION FACTOR) = EXPECTED POI SHIFT ÷ TOTAL POI SHIFT



Range Units	Adjustment Units	Constant
Yards	MOA	0.01047
Yards	MILS	0.03599
Meters	MOA	0.01145
Meters	MILS	0.03936

Figure A-11. Scope correction factor formula

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Appendix B

Ballistic Programs

Appendix B covers the inputs needed for a ballistic program and how to conduct a trajectory (truing) correction. Appendix B has three sections—ballistic program overview, applied ballistic program, and Atrag program.

PROGRAM OVERVIEW

B-1. Each sniper is responsible for placing accurate and effective fires on threat targets with their individual weapon. In the context of shooting, accuracy is the measure of how close the shots are to the center of the target, and precision is how tightly the shots are grouped together (figure B-1).

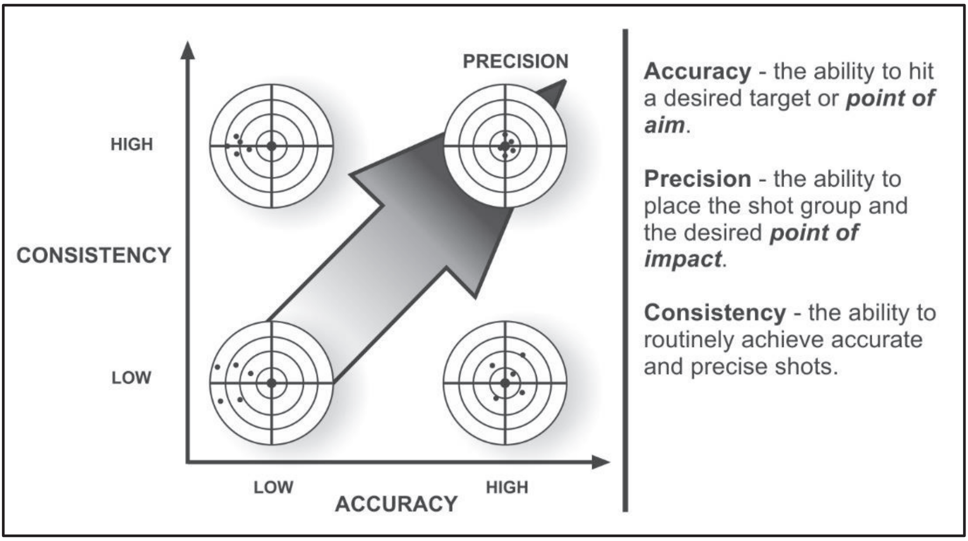


Figure B-1. Accuracy and precision

B-2. Accuracy and precision are influenced by two types of variables—

- Deterministic.
- Nondeterministic.

Deterministic Variables

B-3. Deterministic variables can be measured and accounted for. Most variables involved in military sniping are deterministic. Gravity drop and spin drift are two examples. Deterministic variables are all the things that can be entered into a ballistics program and accounted for.

Nondeterministic Variables

B-4. Nondeterministic variables cannot be directly measured, and affect the trajectory of the bullet. Wind is an example. The most challenging elements of long range shooting are the nondeterministic variables.

B-5. Table B-1 shows a list of the top priorities that the sniper needs to account for and input into a ballistic program to minimize the sniper's chance of missing the target.

Table B-1. Priorities

VARIABLES	*ATTRIBUTE OF*
Range to Target	Environment
Zero Range	Rifle
Muzzle Velocity	Ammunition
Ballistic Coefficient	Ammunition
Station Pressure	Environment
Scope Adjustment	Rifle
Target Speed	Environment
LESS PRIORITIES	
VARIABLES	*ATTRIBUTE OF*
Air Temperature	Environment
Slant Angle	Environment
Sight Height	Rifle
Latitude and Azimuth (Coriolis)	Environment

B-6. To hit targets at long range, the sniper needs to understand what causes them to miss targets and how to properly use a ballistic program.

B-7. The sniper's bullet follows a trajectory path that natural forces influence which include aerodynamic drag, gravity, and wind. Secondary considerations are Coriolis effect and spin drift.

Note. Refer to TC 3-22.9, appendix B, for a complete overview of characteristics and descriptions for internal, external, and terminal ballistics.

B-8. The basic principle of trajectory modeling is that if the sniper input all of the variables correctly into the ballistic program, that program will return an accurate ballistic solution. The sniper has to be aware of the true value of all the inputs. This manual has already covered the principles of zeroing and calibrating the snipers rifle's optic by conducting a tall target test in appendix A of this publication. That calibration exercise gave the sniper the true value for their rifle's optic and reticle.

INPUTS

B-9. The minimum required inputs for a ballistic program are bullet caliber, bullet weight and bullet coefficient, muzzle velocity, atmospherics to include wind speed and direction, sight height, and zero range. These inputs are all that the sniper needs to calculate a basic trajectory.

MUZZLE VELOCITY

B-10. Muzzle velocity is one of the most important inputs for a ballistic program. The sniper needs to understand that the muzzle velocity of each shot will be different. The best way for the sniper to take advantage of this is to measure the average and input that number into the ballistic program. The sniper employment officer needs to obtain a chronograph from supply—this is a requirement. The instrument used to measure muzzle velocity is a chronograph NSN 1005-01-645-8136 (figure B-2). The sniper employment officer must ensure the chronograph is setup properly before firing.

Note. Five feet per second has an equivalent of 1 percent error in the ballistic coefficient. Take caution in measuring the motion vector. Fifteen feet per second error = 3 percent ballistic coefficient error.

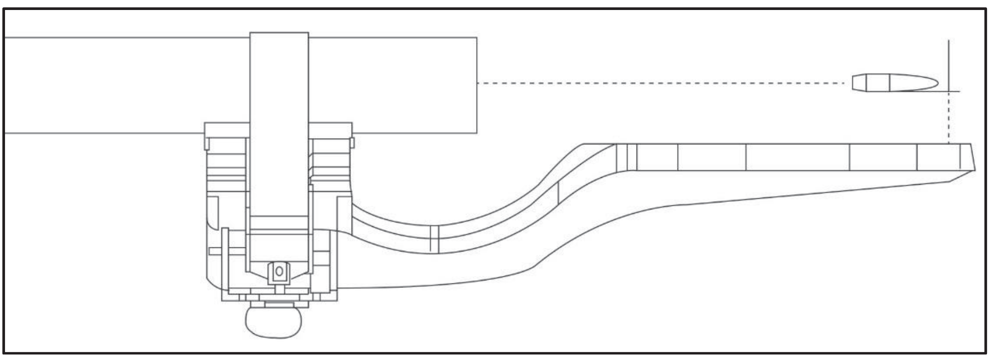


Figure B-2. Chronograph

BALLISTIC COEFFICIENT

B-11. The ballistic coefficient is the metric used to model the bullets mass, cross sectional area, and drag. The ballistic coefficient determines how well a bullet can maintain velocity and kinetic energy. Bullets that have a high ballistic coefficient maintain velocity better. Downrange ballistic performance is dependent on how much velocity the bullet retains (table B-2).

Table B-2. Ballistic coefficient

	Drag Model	***Drag Model***
AA11 (.308)	G1 of 0.475	G7 of 0.243
A191 (.300 WM)	G1 of 0.523	G7 of 0.267
A606 (.50 API MK 211)	G1 of .701	G7 of 0.359
Legend API armor-piercing incendiary MK mark WM Winchester magnum		

Note. It is extremely important to use the correct drag model (G1, G7, or Custom Drag Model) when using a ballistic program. G1 is a flat-based bullet. A G7 is a long-range boat tail bullet. A custom drag model is not a G1 or G7, it is a true flight model using drag versus Mach.

ATMOSPHERICS

B-12. The atmospheric inputs are used to determine the air density through which the bullet is flying through. The sniper team uses their kestrel wind meter to measure atmospherics.

B-13. Atmospheric inputs are used to calculate air density and speed of sound. The speed of sound will be used later to help determine calibration (truing) ranges. Speed of sound is dependent on air temperature. The colder the air, the denser it is.

B-14. Density altitude and ballistic coefficient have a 1:1 ratio. A three percent error in density altitude is equal to a 3-percent error in ballistic coefficient. A 3-percent error is equivalent to one of the following:

- 682 feet altitude.
- 0.87 inches hectogram.
- 15 degree Fahrenheit.
- 15 feet per second muzzle velocity shift.

Note. Humidity is not included. Humidity from 0 to 100 percent will only effects air density by 0.7 percent.

B-15. The sniper must account for each variable. These errors can quickly compound. Air pressure and altitude go hand in hand. The sniper needs to make sure they are using station pressure. The sniper can extract this measurement with extreme accuracy by using a kestrel wind meter.

Note. Barometric pressure is calibrated at the location where it is taken and only truly valid at that point.

SPIN DRIFT

B-16. Spin drift is the gradual drift that a bullet experiences due to, and in the direction of rifling twist. The drift typically amounts to around 5 to 8 inches to the right for right twist barrels at 1000 meters for most .30 caliber weapon systems.

B-17. Before the sniper sees an improvement in hit percentage from accounting for spin drift, the sniper must eliminate the other known sources of error in the horizontal plane to include rifle cant and nonvertical scope tracking.

CORIOLIS EFFECT

B-18. The Coriolis effect is the apparent drift of a trajectory due to the bullet flying from one point to another on a rotating sphere (the planet earth). The effect has both vertical and horizontal components which are independent of each other.

AERODYNAMIC JUMP

B-19. Aerodynamic jump is a mechanism by which a bullet can have a vertical deflection when fired into a purely horizontal crosswind. The deflection is a constant angular deflection, roughly equal to 0.04 MOA per mile per hour of crosswind speed. The deflection is down for a left-to-right crosswind, and up for a right-to-left crosswind.

DIRECTION OF FIRE

B-20. The sniper needs to take direction of fire into consideration when conducting a ballistic calibration. To be more specific, the vertical component of Coriolis effect. Horizontal Coriolis and spin drift are both lateral effects which will not affect the drop and are not part of a ballistic calibration.

CALIBRATING A FIRING SOLUTION

B-21. Before calibrating a ballistic firing solution, the sniper needs to ensure that all variables and device settings are inputted and setup correctly. The primary error in a ballistic firing solution is inputting the wrong information.

B-22. It is critical that the range the sniper zeroed their sniper weapon system is precise and set correctly under gun zero range settings. The sniper must determine the mean point of impact (known as MPI) of downrange shots to an accuracy of 0.1 mil to have a successful calibrated solution.

B-23. The sniper must—

- Do an environmental update; turn on and off to prevent heat or cold loading the device.

- Swing the kestrel wind meter at its end of the lanyard to get true air temperature.
- Find target transonic + or – 10 percent (for high ballistic coefficients > G1 .65 can push into transonic 20 to 40 percent).
- Input range to target within 1 meter. Double check range, confirm with LRF and map.

B-24. The sniper—

- Needs to see exact bullet impact. It is critical that the sniper determines actual bullet strike elevation to within .1 mil.
- Must re-true when changing lots of ammunition.
- Calibrates for the ranges beyond subsonic.
- Changes direction of fire when shooting over 600 meters to capture wind direction and wind speed.
- Conducts environmental updates as environment changes.

B-25. For extreme long range shots, the sniper must update for shot as well as input actual direction of fire and latitude, wind speed, and wind direction.

Calibrate Muzzle Velocity

B-26. The sniper should always calibrate the muzzle velocity first, since this is the variable with the greater uncertainty. The muzzle velocity calibration is done with the round still inside the supersonic realm of flight. Figure B-3 is an example of a truing data sheet with calculations for realms of flight and figure B-4, page B-8 shows the inputs on the kestrel screen for calibrating muzzle velocity. Figure B-5, page B-9, is an example of calibrating muzzle velocity.

TRUE DATA SHEET	***GUN***	***SUPP: YES / NO***

LOT:	BC:	MV:	BT:	ZR:
BUL:	BD:	BW:	BL:	BH:
DA:	ALT:	BP:	TEMP:	RH

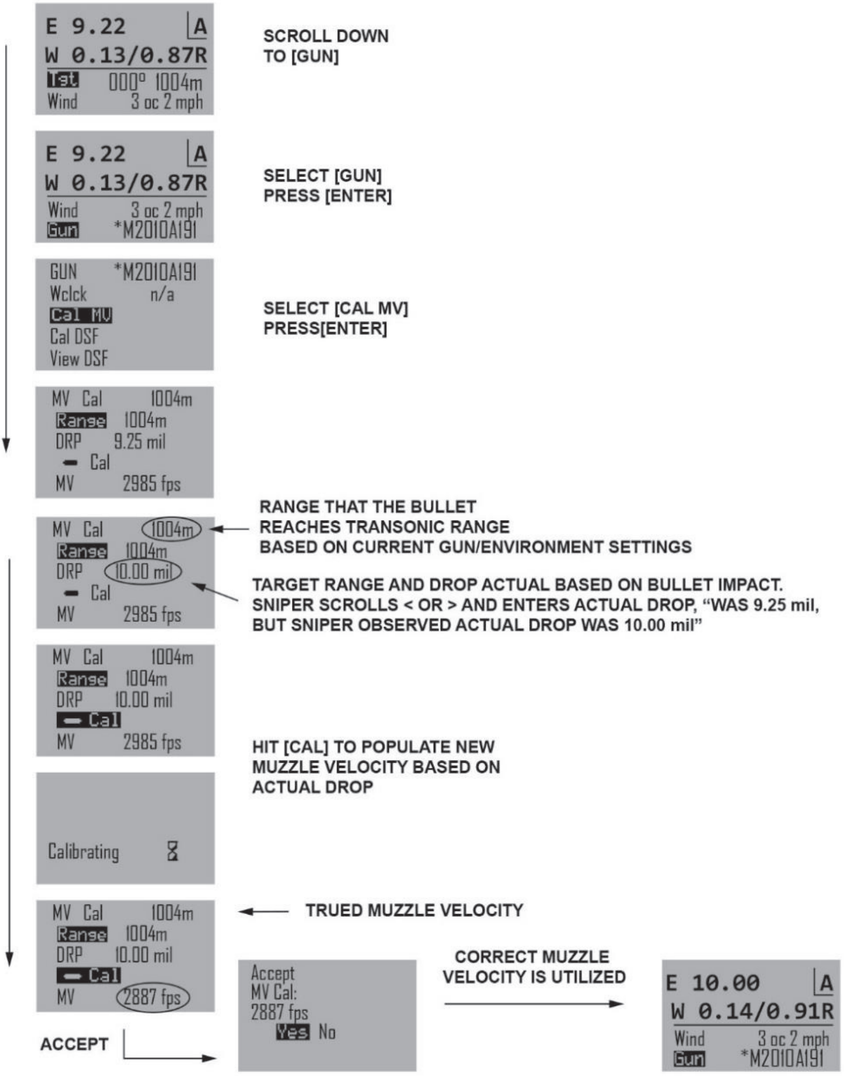
STEP		REM. VEL.	RANGE	ACTUAL DATA	CALCULATIONS
2	TRANSONIC				MACH 1.0 X 1.2 = MACH 1.2
3	INTERMEDIATE				[(MACH 1.2 – 1.0) X 0.75]+MACH 1.0
1	SUBSONIC				1061 FPS+ TEMP(F) = MACH 1.0 331.4 M/S + 0.6*TEMP(C) = MACH 1.0
4	SUBSONIC 1				MACH 1.0 + 300 METERS
5	SUBSONIC 2				MACH 1.0 + 600 METERS

CALCULATE REMAINING VELOCITIES USING THE GIVEN CALCULATIONS.
DETERMINE RANGE TO EQUIVALENT REM. VEL. USING BALLISTIC COMPUTER.

Legend

ALT	altitude	F	Fahrenheit
BC	ballistic coefficient	FPS	feet per second
BD	bullet diameter	MACH	air speed
BH	bore height	M/S	meters per second
BL	bullet length	MV	muzzle velocity
BP	barometric pressure	REM VEL	remaining velocity
BT	bullet type	RH	relative humidity
BUL	bullet	TEMP	temperature
BW	bullet weight	SUPP	suppression
C	Celsius	ZR	zero range
DA	density altitude		

Figure B-3. Truing data sheet, example



Legend

A	screen A	mph	miles per hour
Cal	calibrate	m/s	meters per second
DRP	drop	MV	muzzle velocity
DSF	drop scale factor	n/a	not applicable
E	elevation	oc	o'clock
fps	feet per second	Tgt	target
m	meter	W	windage
		Wclck	windage click

Figure B-4. Calibrate muzzle velocity

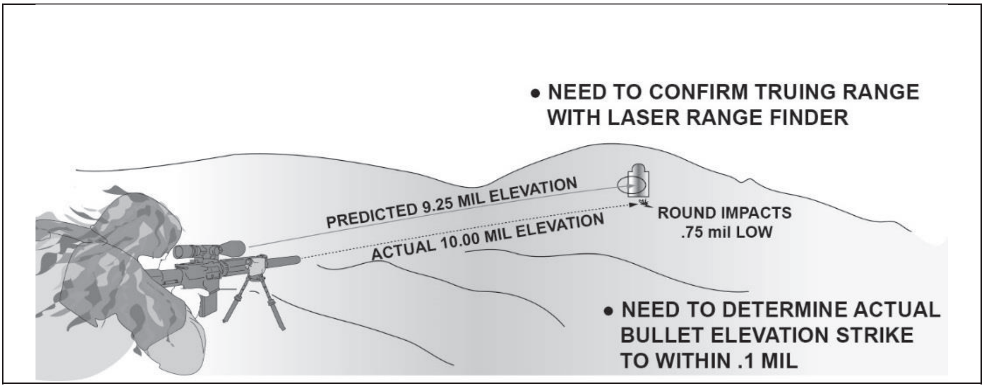


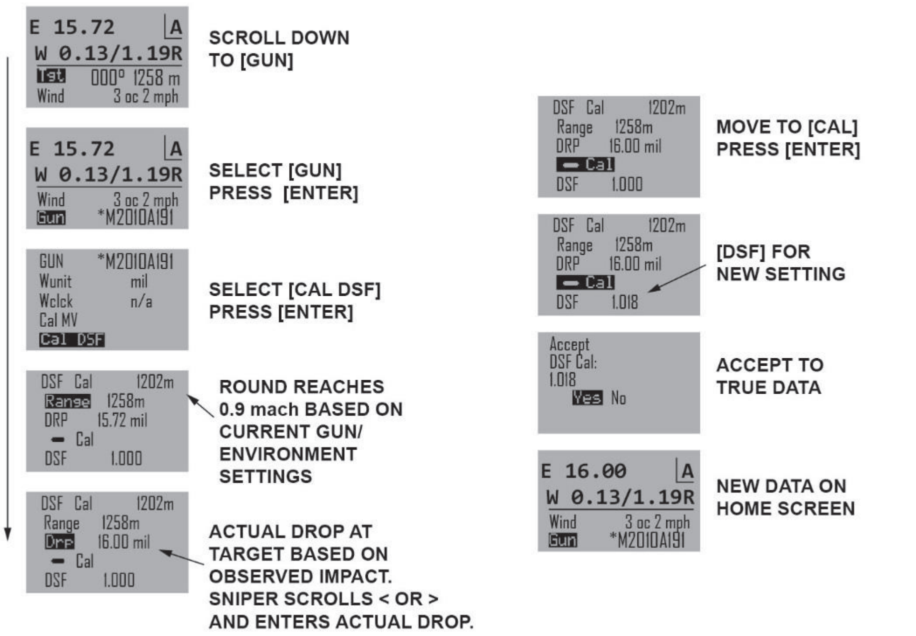
Figure B-5. Calibrate muzzle velocity, example

Calibrate Drop Scale Factor

B-27. The drop scale factor is a piecewise scaling and does not apply the drop scale factor to the entire flight (figures B-6 and B-7, pages B-10 and B-11). The drop scale factor is referenced against Mach and not range. This ensures that no matter the drop, the scaling still applies.

B-28. The concept of drop scale factor is as follows:

1. Sniper shoots to 1000 meters and the predicted drop is 10 mil.
2. The sniper observes that the actual drop is 11 mil.
3. The sniper enters this into the drop scale factor calibration screen and the computed drop scale factor is 1.100 at the Mach at which the bullet is at when hitting 1000 meters.
4. The predicted drop was 10 mil. The observed drop was 11 mil. Therefore, there is 11/10 mil of drop or 1.100 (10 percent more drop). So when shooting to that point, the drop is scaled by 10 percent more (multiplied by 1.1).



Legend

A	screen A	mph	miles per hour
Cal	calibrate	MV	muzzle velocity
DRP	drop	oc	o'clock
DSF	drop scale factor	R	right
E	elevation	Tgt	target
m	meter	W	windage
Mach	speed	Wclck	windage click
		Wunit	windage unit

Figure B-6. Calibrate drop scale factor

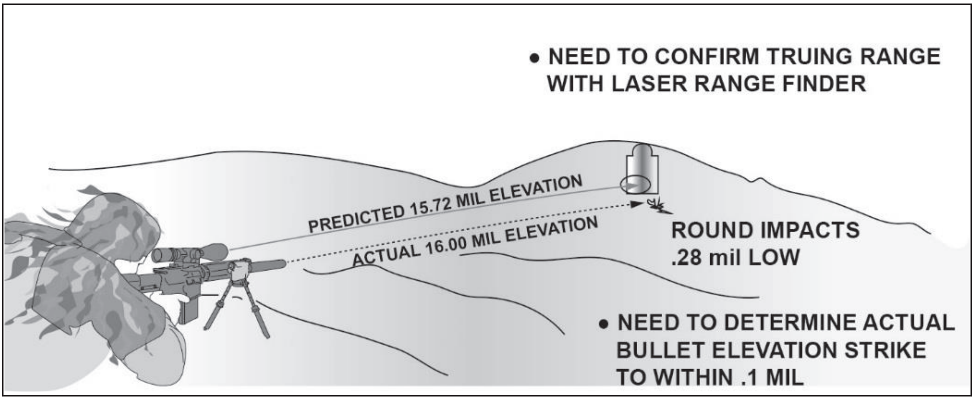
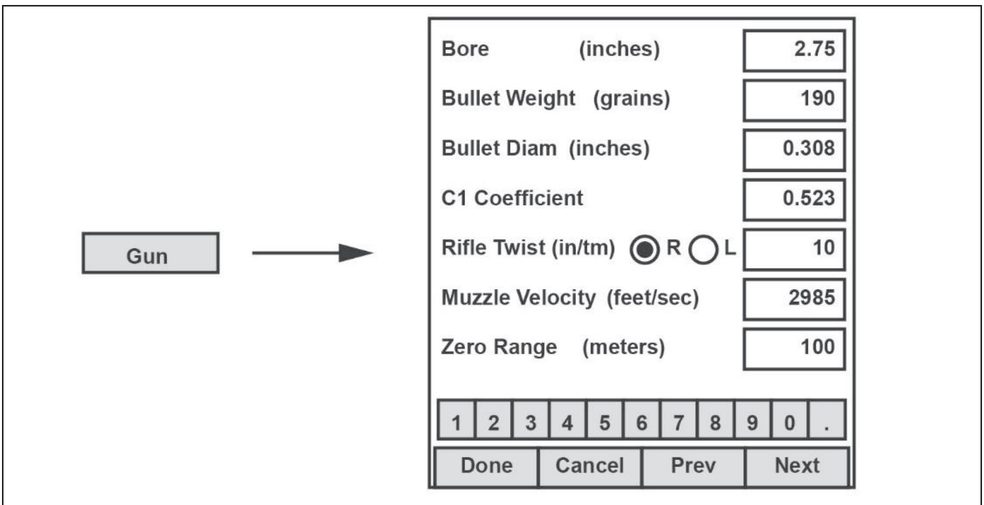


Figure B-7. Calibrate drop scale factor, example

ATRAG BALLISTIC PROGRAM

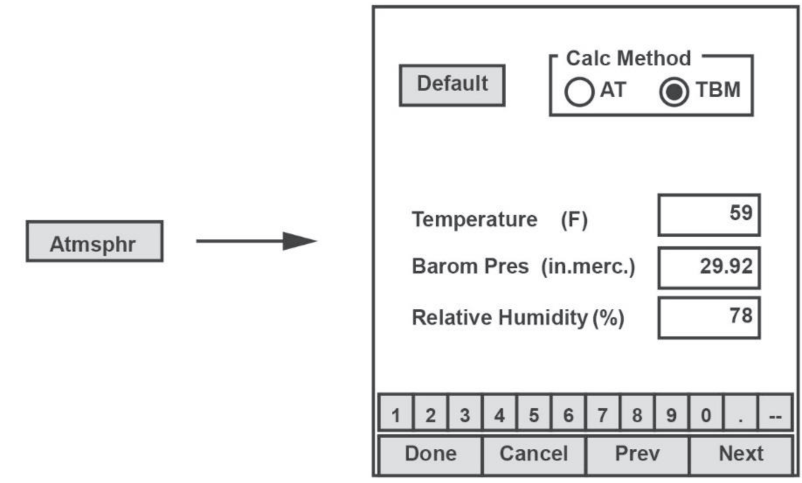
B-29. There are three main data input groups for the Atrag (NSN 7021-01-571-1374) program (figure B-8, and figures B-9 and B-10, page B-12).



Legend

diam	diameter	prev	previous
in	inches	R	right
L	left	sec	second
		tm	rifle twist

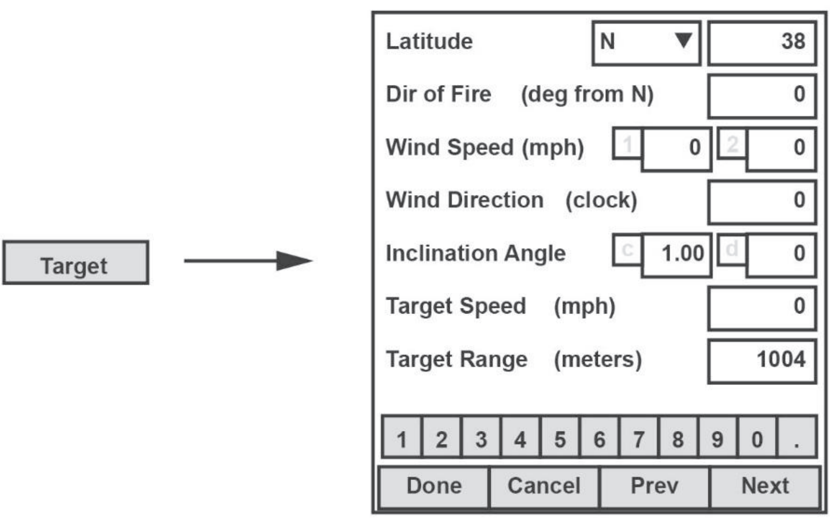
Figure B-8. Data input groups



Legend

Atmsphr	atmosphere	F	Fahrenheit
AT	altitude/temperature	in	inches
Barom Pres	barometric pressure	Merc	mercury
Cal	calculate	Prev	previous
		TBM	temperature/barometric pressure/relative humidity

Figure B-9. Data input groups, example



Legend

deg	degree	mph	miles per hour		
Dir	direction	N	north	Prev	previous

Figure B-10. Data input groups, example

GUN INPUT

B-30. The sniper will need to enter the following information:

- Bore (height over bore).
- Bullet weight.
- Bullet diameter.
- Bullet coefficient. (Atrag only accepts G1 scale.)
- Rifle twist.
- Muzzle velocity (use a chronograph to obtain this, if possible).
- Zero range (must be accurate; even off 1 meter, it can have dire consequences).

ATMOSPHERE INPUT

B-31. Tap on the atmosphere tab and enter all the atmospheric conditions. AT means altitude and temperature; TBH means temperature, barometric pressure, and humidity. TBH is a better calculation for air density and is a closer resemblance to what the round experiences in flight. Reference hand-held weather station for current atmospherics (kestrel) as listed below:

- Temperature. Needs to be as close to actual temperature for accurate predictions in data.
- Barometric pressure. Measured in inches of mercury. Needs to be referenced from 0 feet in altitude.
- Humidity. Measured in percent.

TARGET INPUT

B-32. Target inputs are as follows:

- Latitude. Used to calculate Coriolis effect.
- Direction of fire. Used to calculate Coriolis effect.
- Wind speed. Measured in miles per hour. There are two input boxes; one for what speed the wind is lulling to and the second for what the speed is gusting to.
- Inclination angle. Used to calculate adjustments for angle firing. The (c) box stands for cosine and the (d) box stands for degree. Cosines can be measured using an angle cosine indicator (known as the ACI).
- Options. Drag coefficient table used to run “trued ballistic coefficients” in subsonic flight.

Note. Refer to the program’s instructional booklet for additional material to include initial setup and use of additional features.

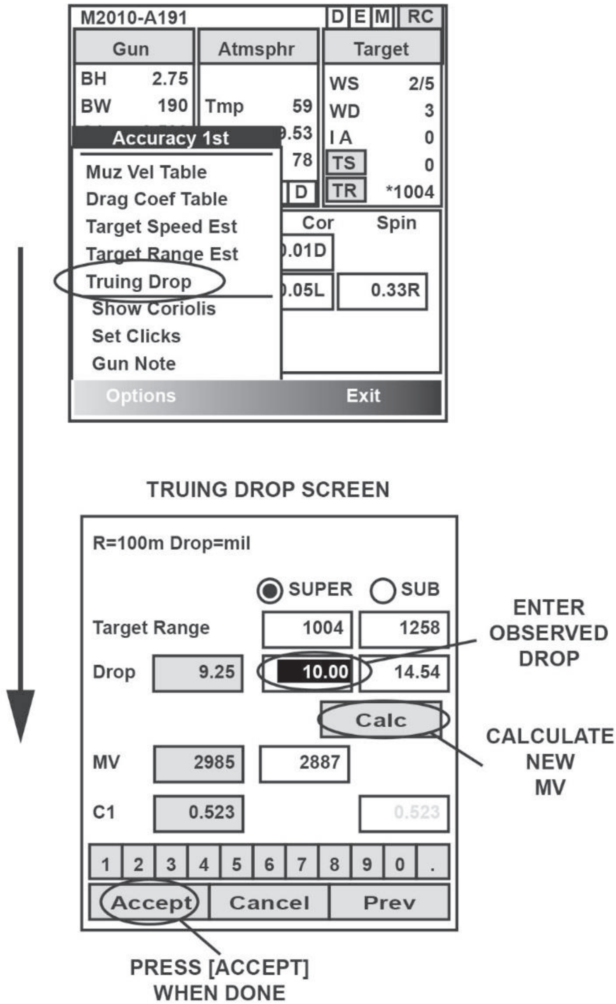
ATRAG TRUING CALIBRATION

B-33. Atrag software scales do an artificial scaling of the ballistic coefficient. The artificial scaling not only affects the drop but also the time of flight. This changes the wind deflection as well.

Note. Snipers tend to overestimate the wind's influence on a shot if ballistic coefficient is scaled.

B-34. If the sniper changes their density altitude significantly from where they did their "truing," their ballistic coefficient table becomes invalid. The sniper must re-true at their new location (figure B-11 and figure B-12, page B-16). The following steps must be applied when truing—

- Choose a target as close to where the bullet reaches 1340 feet per second as possible.
- Truing example. Target is at 1004 m = 9.25 mil of elevation. Sniper fires five shots and the group strikes .754 mil low, which would equal an elevation of 10 mil to hit point of aim. Enter 10.00 in the truing drop table, press CALC, and then press use MV (for muzzle velocity). The live column reflects the new elevation setting of 7.9 and an MV of 2486. The trajectory algorithm is now trued. Atrag reads correct elevation settings out to the transonic zone.
- To true for ranges beyond transonic, the sniper must ideally choose a location 200 meters past the subsonic range (200 meters past where the bullet passes 1121 feet per second).



Legend

Atmsphr	atmosphere		
BH	bore height	Muz Vel	muzzle velocity
BW	bullet weight	MV	muzzle velocity
Calc	calculate	Prev	previous
Cor	Coriolis effect	R	right
D	drop	RC	rifle component
Drag Coef	drag coefficient	SUB	subsonic
E	elevation	Tmp	temperature
Est	estimate	TR	target range
IA	inclination angle	TS	target speed
L	left	WD	wind direction
m	meter	WS	wind speed

Figure B-11. Truing for Atrag

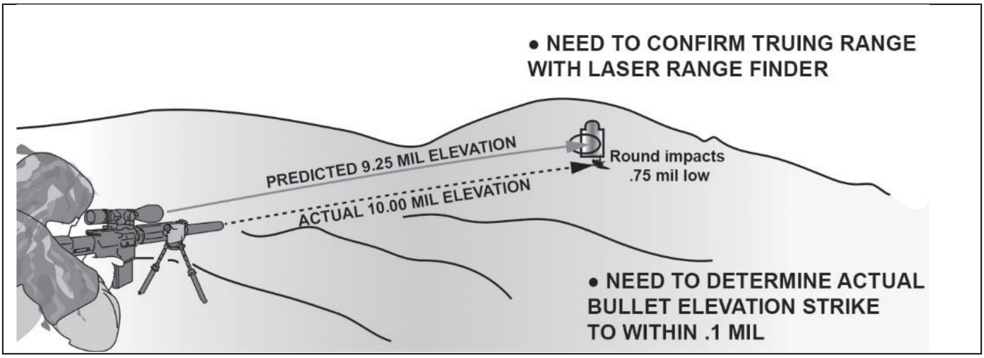


Figure B-12. Truing for Atrag, example

Appendix C

Complex Engagements

Appendix C provides detailed information on firing solutions for complex engagements and team engagement techniques. The topics specific to complex engagements are—

- Moving targets.
- Wind.
- Angled firing.
- Rapid target engagement.
- Team engagement techniques.

MOVING TARGETS

C-1. Human targets are rarely stationary for a long time; therefore, the sniper team must establish a lead and engage the target with accuracy and speed. Once the sniper team has identified a threat and has estimated the range to that target, the team establishes a lead for that target.

C-2. Establishing proper leads for engagement of a moving target depends on the variables below:

- Projectile time of flight based on target range.
- Target speed.
- Target direction of movement.
- Wind speed and direction.

TIME OF FLIGHT

C-3. Time of flight is time from when the round is fired until the round impacts the point of aim. The time of flight can be long enough that a moving target can move out of the projectile's path if the round was fired directly at the target. The time of flight varies depending on range to target, muzzle velocity, environment, and flight characteristics of the bullet. The time of flight can be determined by utilizing various charts or ballistic computers.

TARGET SPEED

C-4. Target speed is difficult to estimate. The lead needed to engage a moving target increases as the speed and distance of the target increases, thus the value of mil in unit of measure is relative to distance. The sniper can use their mil reticle to determine target speed (covered later in this section).

TARGET DIRECTION (OR ANGLE) OF MOVEMENT

C-5. Target angle of movement relative to firing position changes the amount of lead required for target engagement (figure C-1). The portion of the target that is visible determines the angle of movement. Target angle of movement need not be done to exact degrees of angle. There are primarily three types of lead values for hasty application or from which to refine target angle of movement as discussed below:

- Full lead.

Only one arm with half the body visible (90 degrees).

- 3/4 lead.

Only one arm and more than half of the back or chest surface area are visible while moving to or away from firing position at an oblique. As the cosine of 45 degrees is .707, the recommended lead for an oblique target at this angle and speed is .75 of the lateral lead.

- No lead.

Both arms, full surface area of back or chest. Moving directly towards or away from firing position (0 degree).

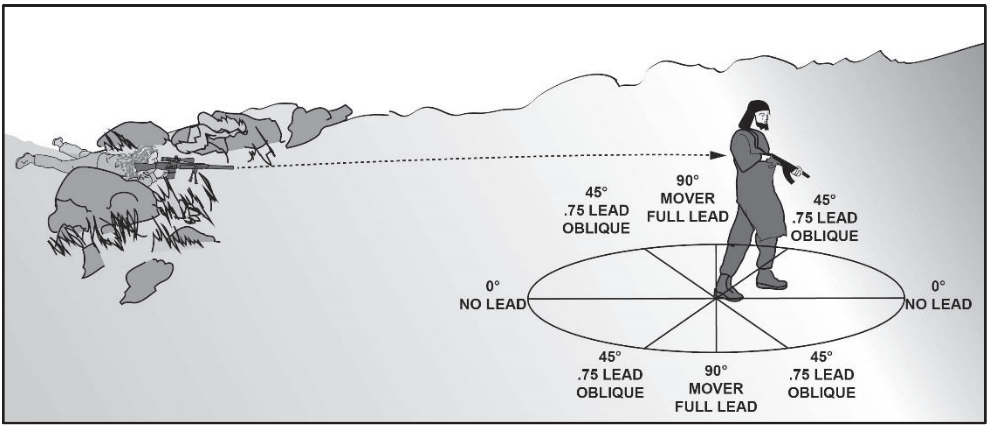


Figure C-1. Target direction of movement

WIND SPEED AND DIRECTION

C-6. Wind and lead must be added together or subtracted based on the direction of relevant movement (figure C-2).

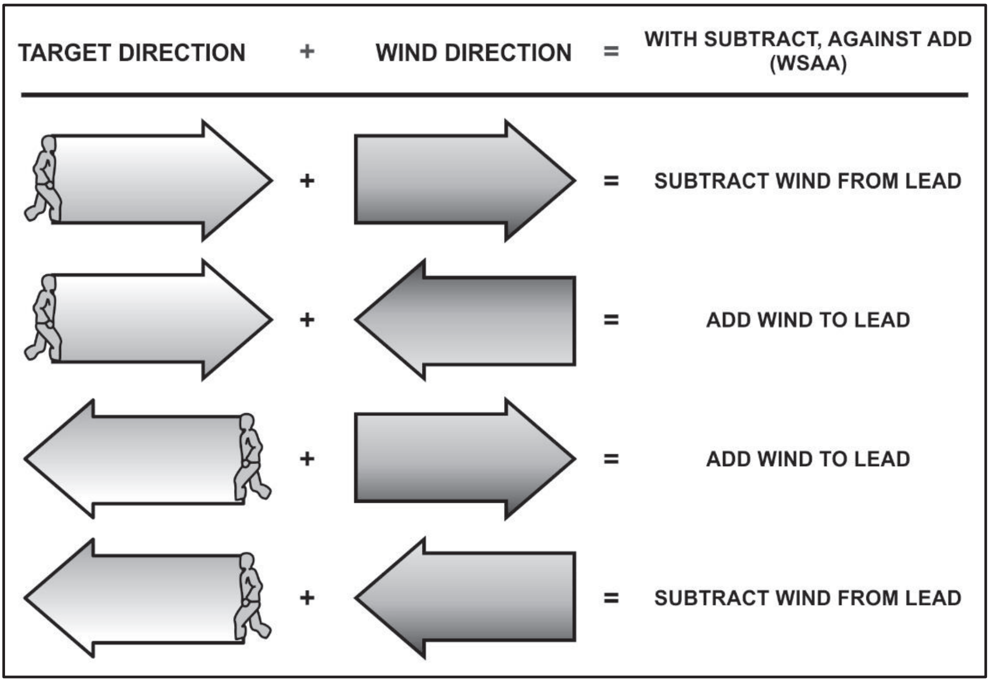


Figure C-2. Moving targets and the wind

MOVING TARGET LEAD CHART

C-7. Snipers make and use a moving target lead chart for the area of operations with predetermined leads based on the weapon's current chronographed muzzle velocity and environmental factors. They use technological devices and applications to develop predetermined firing solutions when preparing for employment, rather than developing the solution once in the firing position. Snipers develop firing solutions for moving target engagement to save time in the firing position.

CALCULATE LEAD (MOVER FORMULA)

C-8. To calculate a lead (hold) while in the field, the speed of the target must be known or the sniper can use their mil reticle (figure C-3).

Conversions

Time of flight (seconds) x target speed (feet per second) = lead in feet.

To convert lead in feet to meters:

Lead (feet) x .3048 = lead (meters)

To convert lead in meters to mil:

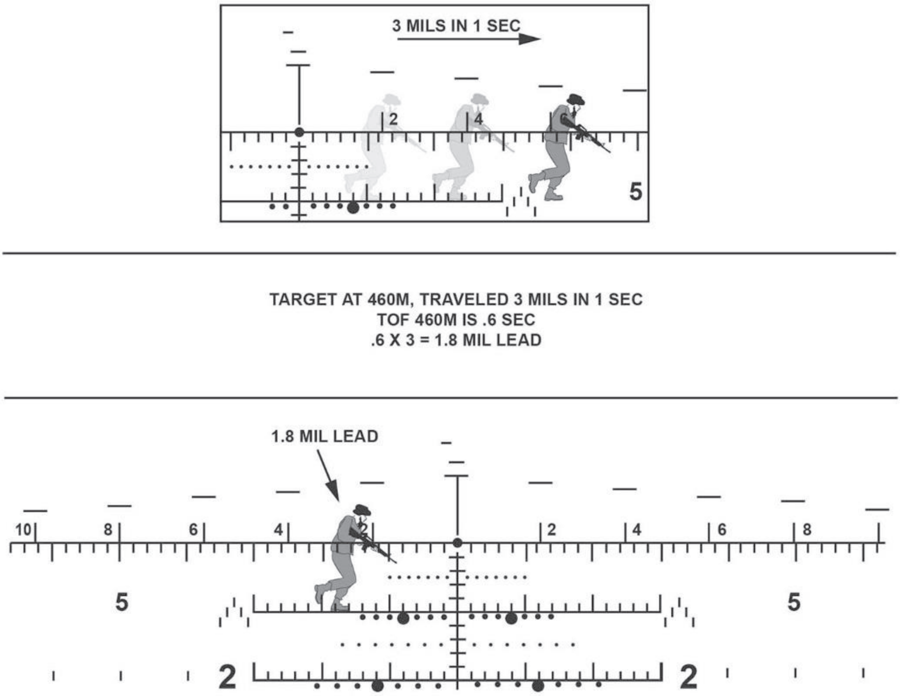
Lead (meters) x 1000 = lead (mil)

Moving target formula using mil-based reticle

Target speed in mil (1 second) x TOF (in seconds) = mil hold.

Snipers can find a word that they can say in their head, under duress that equals 1 second.

Legend: TOF = time of flight



Legend

M	meter
SEC	second
TOF	time of flight

Figure C-3. Moving target formula

TARGET ENGAGEMENT

C-9. Two techniques are employed to engage moving targets: tracking and ambushing. The terrain, situation, target speed, and proximity of target combined with training and experience dictates which technique to employ.

TRACKING TECHNIQUE

C-10. Snipers follow the target with the cross hairs placed ahead of the target with the required lead using the mil scale as a reference point. This technique is marked by continuous movement of the weapon with the target through the trigger press and follow-through (figure C-4, page C-7).

C-11. The sniper performs the following actions to execute the tracking technique:

- Move the muzzle of the rifle through the target to the desired lead (point of aim).
- Point of aim (lead) may be on the target or some point in front of the target depending on the target range, speed, and angle of movement.
- Track and maintain focus on the scope reticle. It may be necessary to shift focus between the reticle and the target while acquiring the correct lead.
- Engage once the proper lead has been attained. Follow-through so the lead is maintained as the bullet exits the rifle.
- Watch through rifle scope for impact.
- Continue to track in case a second shot needs to be fired.

C-12. The tracking technique—

- Is effective for engagements where the target is in close proximity and moving rapidly.
- Is the recommended technique for follow-up shots on moving targets.
- Can compensate for a scope's limited field-of-view and minimize the time needed to align the cross hairs on a moving target. When establishing a lead on a moving target, the rifle scope may not be centered on the target but will be held in front of the target based on the established lead.

First Focal Versus Second Focal Plane Scopes

C-13. With first focal or front focal plane scopes, the reticle will have the same measurements throughout magnification changes. When having to lower magnification to engage a target moving at high speed, it may be necessary to lower scope power to see more of the target. Second focal or rear focal reticles do not change size as you change power. The reticle will not have the same measurements throughout the magnification changes.

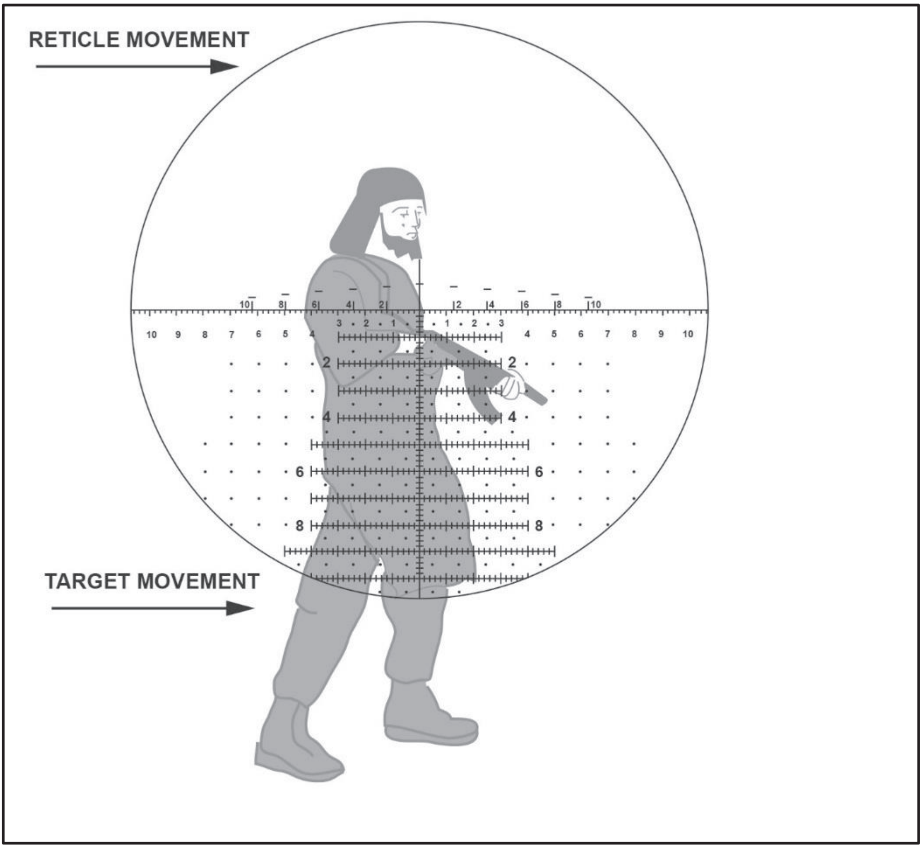


Figure C-4. Tracking technique

AMBUSH TECHNIQUE

C-14. The sniper places the weapon's point of aim ahead of the target and holds in a stationary position. The sniper fires the weapon when the target reaches a predetermined point on the horizontal reticle line (lead).

C-15. A sniper performs the following steps to execute the ambush technique:

1. Select an aiming point with the lead ahead of the target—where to set the ambush.
2. Obtain scope alignment on the aiming point.
3. Hold the scope alignment until the target moves into the desired scope picture and the lead is established with a center mass lead ambush point.
4. Engage target once sight picture is correct in the scope with the proper lead and the target has hit the ambush point.
5. Follow through so the rifle is not disturbed as the bullet exits the muzzle.
6. Watch through rifle scope for impact.

7. Use the tracking method to obtain the correct lead on the target if second shot is needed on target.

C-16. The ambush technique (figure C-5)—

- Is generally the more effective technique for engaging moving targets.
- Is an effective technique for predictable, limited-exposure moving targets.
- Should be used when engaging targets moving 6 to 8 miles per hour.

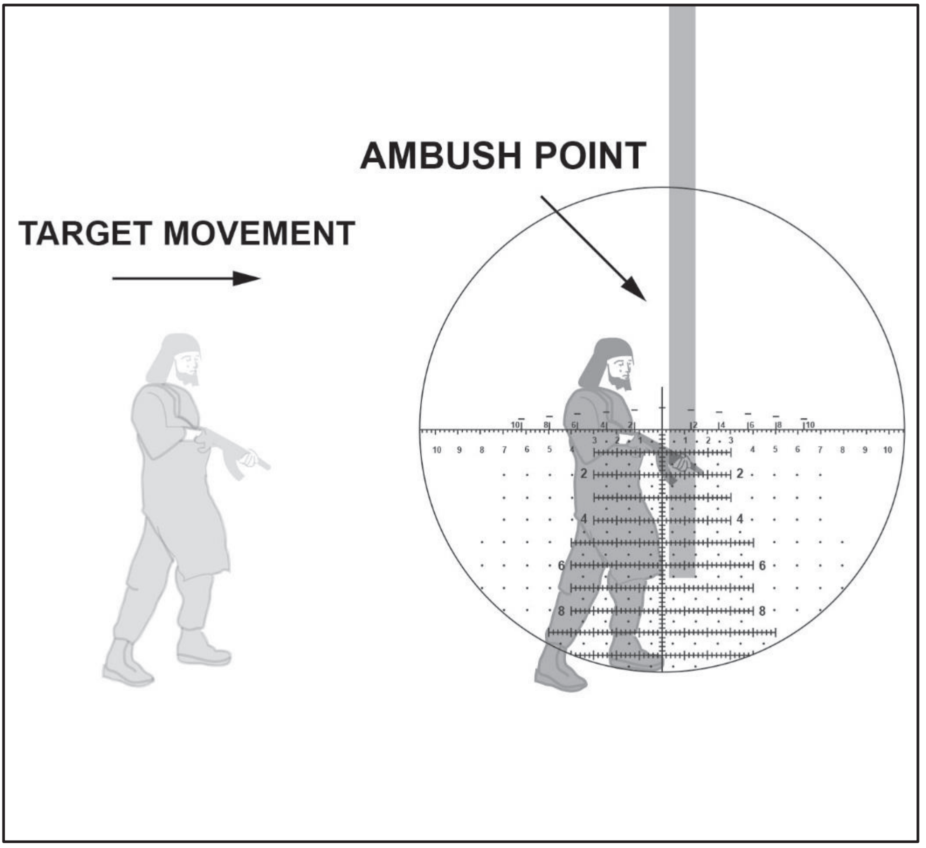


Figure C-5. Ambush technique

WIND

C-17. Wind deflection is the most influential nondeterministic element in long range exterior ballistics. When judging the effects of wind, the sniper considers the major terrain features and how they affect the wind patterns along the line of sight.

C-18. Wind does not blow on the side of the bullet to cause deflection. The bullet weathervanes into the oncoming airflow. A crosswind will make the bullet fly at a small angle to the line of sight. The aerodynamic drag applied to the bullet acts directly back along the bullets axis, which effectively pulls it away from the line of sight.

FORECASTING SURFACE WINDS

C-19. The condition that constantly presents the greatest problem to the sniper is the wind. The sniper can use forecasting tools or visual techniques to help them forecast surface winds. Some common tools are—

- Kestrel wind meter (NSN 1005-01-560-0128).
- Observation device (spotting scope).
- Flag method.
- Pointing method.
- Smoke method.

KESTREL WIND METER

C-20. The kestrel wind meter measures wind speed, barometric pressure, density altitude, temperature, and humidity. The device will augment ballistic calculations for sniper missions requiring medium and long range target engagement. The kestrel wind meter can also be employed in a weather vane and setup in the area of the sniper team to continuously monitor the weather.

Vane Mount (Continuous Capture)

C-21. To utilize the full capability of the unit, snipers can place the kestrel in continuous capture mode in the rotating vane mount on a tripod, which places the kestrel in good airflow and allows it to update wind speed and wind direction in real time. To put the kestrel in continuous capture mode, snipers first select a gun profile and input direction of fire as explained earlier. Then highlight wind on the ballistics menu and press the capture button (top-center). The word wind changes to W> and the buttons on the kestrel are locked until the capture button is pressed again. Putting the kestrel in continuous capture mode does not override the environmental update setting (which could be set to on or off) but updates the ballistics solution based on real-time wind values.

Determine Wind Direction With Kestrel

C-22. While measuring the wind, keep the kestrel high above the ground and pay attention to terrain features and obstructions that may put the kestrel in "dirty" or unrepresentative air. A bad wind call is the most common reason a sniper misses so the sniper must take care to measure these values as accurately as possible using the information below:

- Wind direction. At the Gun. Measured in degrees or hours from the direction of fire, this variable can be input manually or captured automatically together with the other wind variables when making a wind capture.

- WS1–Average wind speed. At the Gun. This variable can be input manually or captured automatically together with the other wind variables when making a wind capture.
- WS2–Maximum wind speed. At the Gun. This variable can be input manually or captured automatically together with the other wind variables when making a wind capture.
- Capturing wind–To capture all the wind values together automatically, enter any of the submenus for wind direction, WS1, or WS2 and select capture. Next, point the back of the kestrel into the wind and while holding the kestrel vertical, press the select button and hold the position for at least 5 seconds, then press select again.

Note. Remember, because the wind direction is relative to the direction of fire, if the sniper changes their direction of fire, they need to update the inputs for both and wind direction.

C-23. Perform the following steps to determine wind direction with a kestrel wind meter:

Step 1: Find the wind's general direction.

Step 2: Rotate the wind meter 90 degrees so that the wind is impacting the side (and not the back) of the wind meter, while still being able to see the impeller.

Step 3: Fine-tune the direction until the impeller drastically slows or comes to a complete stop (a complete stop is preferred). If the impeller won't come to a complete stop, find the direction which has the lowest impact on the impeller. When the impeller comes to a complete stop, it is because cross wind is no longer a factor in the direction the side of the kestrel is facing. The side of the kestrel facing the wind is depicting the winds true direction.

Step 4: Turn the BACK of the kestrel towards the direction from which the wind is blowing (found in step 3). Then press the capture button, and record your wind speed.

Note. DO NOT simply point the kestrel's back into the wind to get the highest wind speed—that is not the correct method.

Observation Device

C-24. The sniper team can use their observation scope to observe mirages. Mirages can be observed mainly on days when the ground and air are different temperatures. A mirage is simply a reflection of heat through layers of air at different temperatures and densities (figure C-6). Properly reading the mirage with a spotting telescope lets the sniper estimate wind speed and direction accurately for up to 12 miles per hour; winds beyond this speed cause the mirage to move too fast to detect minor changes.

C-25. The sniper can identify the direction of the mirage by turning their spotting scope into the wind until they identify a boil. The boil shows the sniper where the wind is coming from.

C-26. A sniper can determine velocity of the wind as follows:

- Look in the direction of the target.
- Turn diopter ring until focused on an area that is closer than the target.
- Identify the mirage and note speed.
- Transition back to the target and find mirage at target location to confirm.

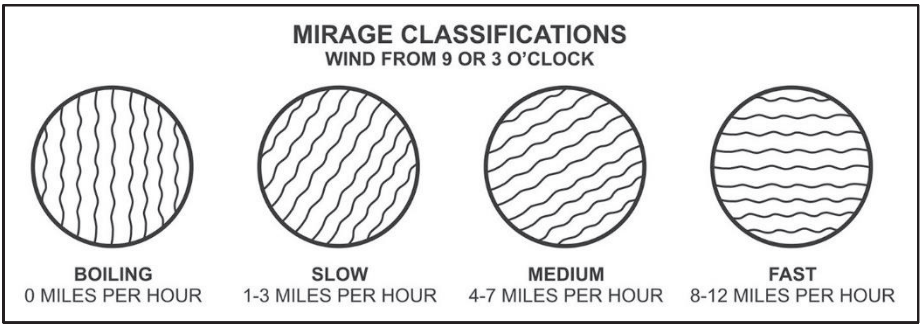


Figure C-6. Types of mirages

C-27. Mirage solves the total shooting solution when it can be seen. The value of the mirage is the total effect on the bullet.

> ***Note.*** A 10 miles per hour wind running at 45 degrees from the gun target line would look like a 7 miles per hour wind.

C-28. At longer ranges, the sniper might see several mirage bands. The sniper takes the average of the bands and makes a wind call.

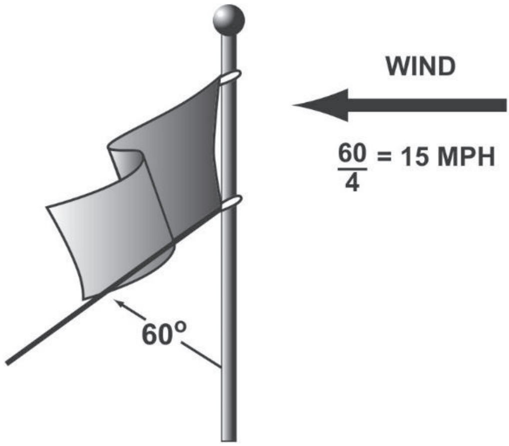
C-29. Barrel mirage is a condition occurring when multiple successive rounds are fired allowing little time for the barrel to cool. Barrel mirage commonly occurs when firing semiautomatic or suppressed rifles. Heat escaping from the barrel is seen as an additional mirage when viewed through the telescopic sight. There are several ways to reduce visible barrel mirage. One method is to wrap the barrel or suppressor with either heat dissipating or insulating material. Another method is to reduce the magnification on the variable-powered scope.

> ***Note.*** Do not confuse barrel mirage from ground mirage.

FLAG METHOD

C-30. The sniper and observer can use the flag method to gauge wind speed. Having approved range flags on the range during training can assist the sniper with building proficiency in wind reading (figure C-7).

C-31. The flag method below pertains only to cotton flags as nylon is lighter and reacts differently.



Note. To determine the wind speed, estimate the angle of the object from the pole and divide by the constant 4.

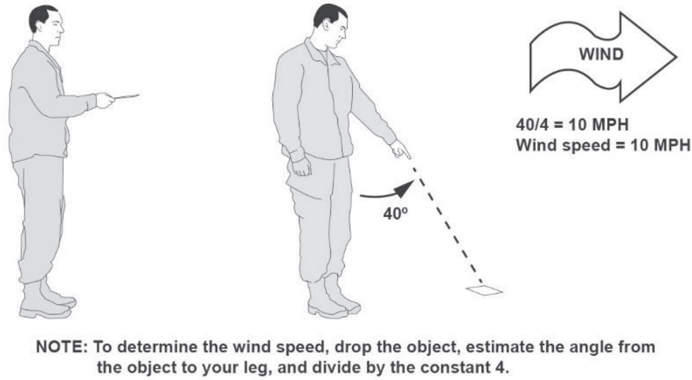
Legend

MPH	miles per hour

Figure C-7. Flag method

POINTING METHOD

C-32. The pointing method can be used to help gauge wind speed by using an object of relatively light weight and pointing it in the direction of where the object falls (figure C-8).



Legend

MPH miles per hour

Figure C-8. Point method

SMOKE METHOD

C-33. The sniper can use smoke as a visual indicator to gauge wind speed. Smoke can give both wind direction and strength. The sniper uses the top angle and not the bottom to gauge speed (figure C-9). The sniper uses the following information:

- Under 45 degrees = 0 to 4 miles per hour. (weak wind).
- 45 degrees = 5 to 10 miles per hour (middle wind).
- Straight to ground (90 degrees) = 11 to 20 miles per hour (strong wind).

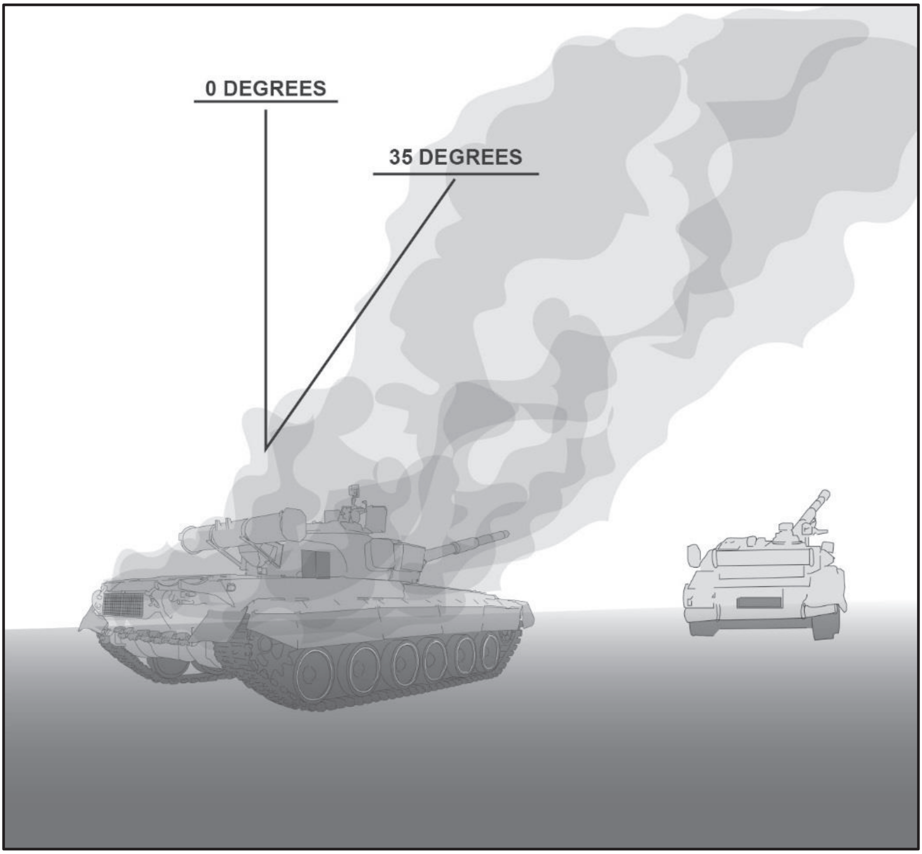


Figure C-9. Smoke method

WIND CHARACTERISTICS

C-34. Wind is nothing more than moving air, which tends to flow from regions of high pressure to regions of low pressure. The greater the difference in pressure between the two locations, the greater the pressure gradient and the faster the air moves.

C-35. Wind behaves vastly different at varying elevations above the ground. Wind gradient refers to the tendency for air currents to move more swiftly farther off the ground. The smoother the ground is (flat desert), the less altitude is required for the wind to develop its full velocity. If thick vegetation covers the ground, the wind may not reach full speed until a much higher altitude. Snipers can only sample wind speed from their location, and only as high as their arm can hold a kestrel wind meter.

C-36. The bullet's trajectory towards a distant target can rise 10, 15, even 20 feet above the ground and sometimes even greater if shooting over a valley. With knowledge of wind gradients, the sniper can add a few miles per hour to the wind speed reading from the kestrel wind meter from the location on the ground.

Terrain Influence on Wind

C-37. After using the macro-level wind forecasting techniques found in the planning chapter, snipers should fine-tune their wind forecasts based on micro-level effects, many of which are described below.

C-38. Knowledge and training that will benefit the sniper are—

- Basic understanding of the atmosphere and how the weather works.
- Understanding how terrain influences the weather and wind patterns in different environments.
- An understanding of how to interpret weather changes once out in the field.

C-39. Snipers can seek out training by contacting their local Air Force Weather Squadron or civilian training from Mountain Weather or their local meteorology news station.

Note. The appendixes cover in greater detail on how specific terrain (urban, mountain, desert, and jungle) influences the wind.

C-40. Snipers need to study the terrain in their operating area. They need to know the prevailing winds in the area. Figure C-10 illustrates common wind and terrain.

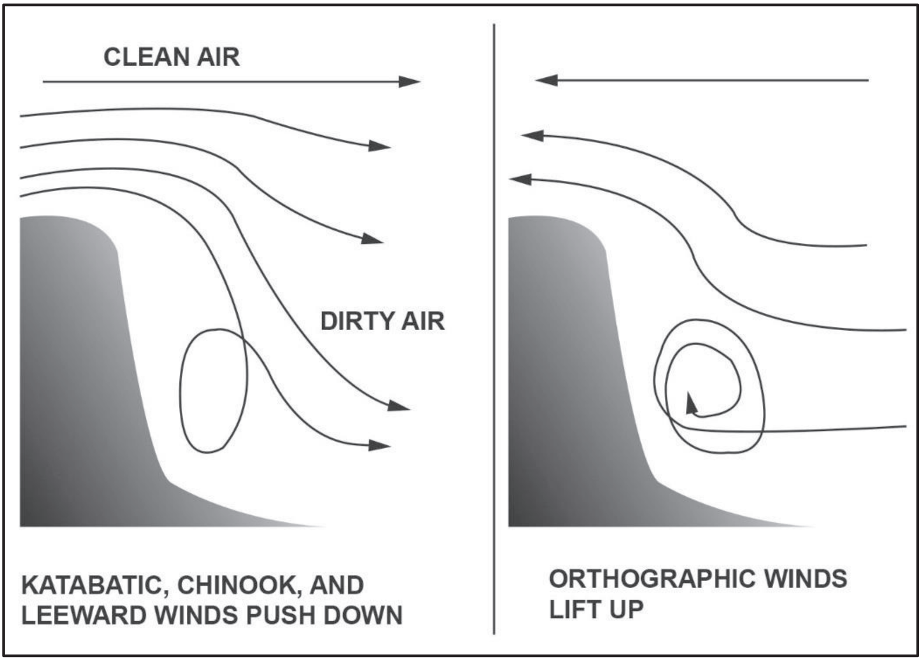


Figure C-10. Terrain and wind

COMPRESSION OF THE WIND FROM TERRAIN

C-41. Like water, forcing wind into a smaller space causes the wind value to rise (figure C-11).

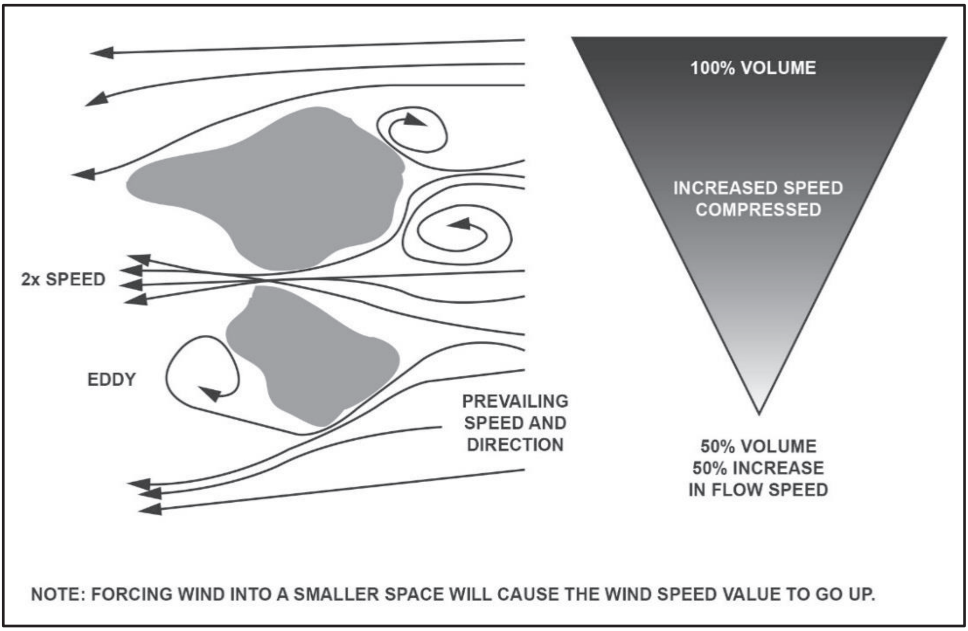
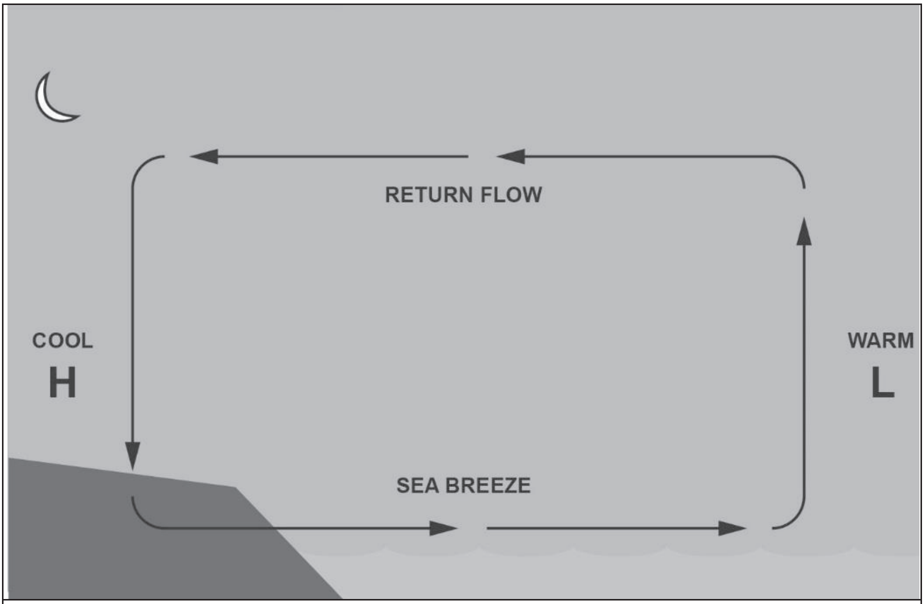


Figure C-11. Terrain and wind compression

Sea Breeze

C-42. A sea breeze sets up along coastlines on warm days when there is a weak pressure gradient (figure C-12). Land heats and cools much faster than the water. This creates a temperature difference between the land and water. When the warmer air over the land rises, the cooler air over the water rushes inland to replace the rising warm air. The wind direction will be perpendicular to the coastline coming from the water toward the land.

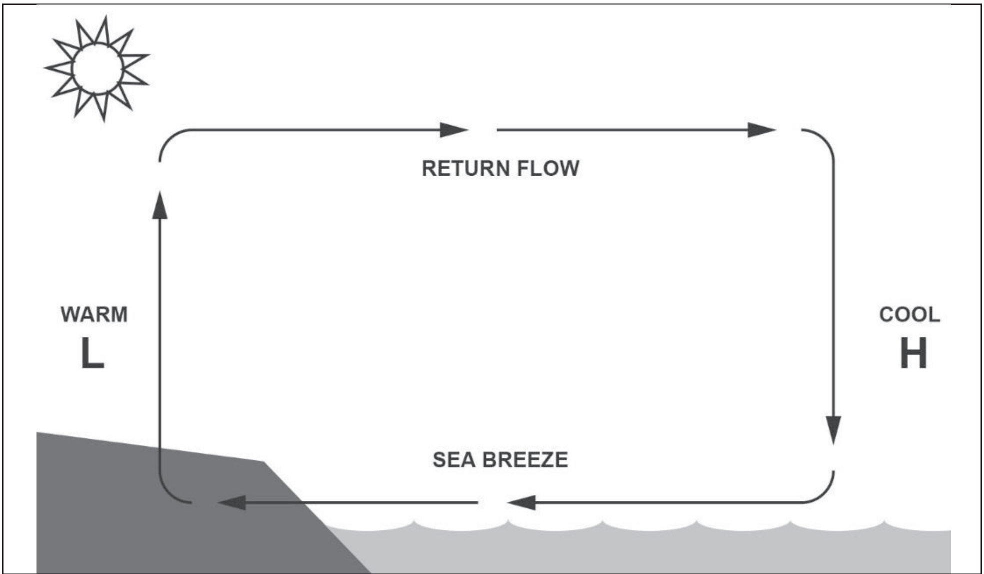


Legend
H high L low

Figure C-12. Sea breeze

Land Breeze

C-43. A land breeze sets up along coastlines when there is a weak pressure gradient at night (figure C-13). Land cools much faster than the water and at night the water eventually becomes warmer than the land. During this time, the cooler air over the land rushes out to sea to replace the rising warmer air over the water. Land breezes are generally weaker than a sea breeze due to the weaker temperature contrast. The wind direction is perpendicular to the coastline coming from the land to the water.



Legend
H high L low

Figure C-13. Land breeze

Air Mass Fronts

C-44. Frontal passage can cause sudden shifts in wind direction. It is not uncommon for the wind direction to change by 100 degrees in less than a minute when a front sweeps through a given location. With that, it is important to understand the basic wind directions associated with each side of an air mass front, or "front." Specifically, cold and warm fronts, which are discussed below.

Cold Front

C-45. The wind direction ahead of cold fronts is generally out of the southwest. The wind direction behind cold fronts is generally from the northwest. The sniper can determine the amount of time before the winds suddenly shift from the southwest to the northwest if they know the approximate location of a cold front.

Warm Front

C-46. The wind direction ahead of a warm front is generally from the east. The wind direction behind a warm front is generally from the southwest. Behind a warm front is the same area as ahead of a cold front—hence the same wind direction.

CALCULATING A WIND CALL

C-47. Before a mission, sniper teams need to apply modern methodology to building an appropriate data card to their respective sniper weapon system and ammunition. Use technological devices and applications to develop predetermined firing solutions when preparing for employment, rather than developing the solution once in the firing position. By preparing a ballistic card with wind holds that are calculated from their ballistic program, the sniper has a more accurate means to reference "hard" data. The sniper can tape the data card to their rifle stock or laminate it and keep it in their pocket or data book. The preferred method is to have the sniper setup an armband with all pertinent information. It is vital that the sniper team takes the time to collect data for their respective weapon system and correctly follow the zeroing, calibrating and ballistic programming tutorials that are laid out in appendices A and B.

C-48. The sequence for calculating wind is—

DIRECTION

C-49. Wind values (table C-1) are—

- Full value. Full value, + or - 30 degrees, gives the sniper lots of forgiveness on cosine changes. It takes 10-20 seconds for a cross wind's total path to change 5 inches at 1000 meters.
- Half and quarter value. This means that the wind has the same speed, but affects the round only half or quarter value as much as full value wind. Snipers must apply cosine to wind call.
- No value. Head and tail winds change path near instantly and can be difficult to shoot in.

Table C-1. Wind direction

Degrees off gun target line	*Position relative to 12 o'clock*	*Portion of wind used for wind call (cosine)*
90	3/9	100 percent (%) (1.0)
75	2:30/3:30/8:30/9:30	96% (0.96)
60	2/4/8/10	86% (0.86)
45	1:30/4:30/7:30/10:30	70% (0.70)
30	1/5/7/11	50% (0.50)
15	12:30/5:30/6:30/11:30	25% (0.25)

C-50. The clock positions in figure C-14 provide a visual representation of wind values. In low wind environments, snipers can generally use only full value and half value winds. In long range engagements and high-wind environments, snipers must use the correct percentage (cosine) of wind to hit the target.

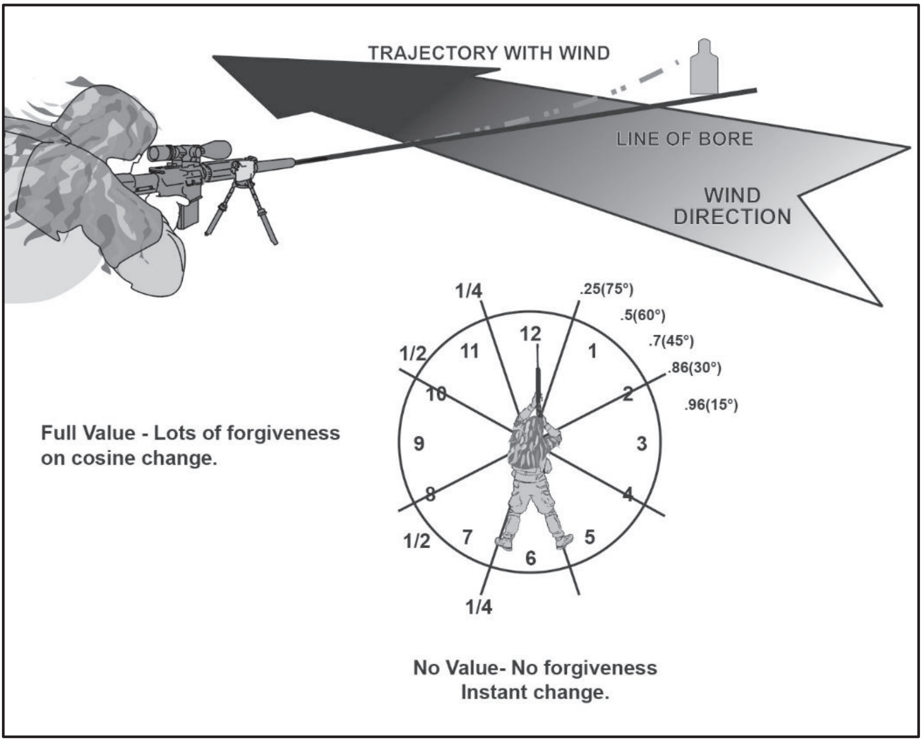


Figure C-14. Wind effects

SHORT WIND FORMULA

C-51. In combat, a sniper can use a rule of thumb formula to calculate a wind call if unable to use a ballistic program or a printed data card. Currently, snipers use a short wind method of making wind calculations. It is based on the efficiency of a particular bullet (G1 ballistic coefficient scale).

C-52. Wind formula example. Establish wind brackets by using the first number of a particular bullet's G1 ballistic coefficient. An example follows:

- AA11 (.308) has a G1 of 0.475. Use the 4 as the baseline and establish wind brackets of 4/8/12/16/20.
- A191 (.300 Winchester magnum [referred to as WM]) has a G1 of 0.527. Use the 5 as the baseline and establish wind brackets of 5/10/15/20.

C-53. The formula below describes a method for determining accuracy. The formula can be used with the range values in table C-2.

FORMULA FOR WIND

Range Value x Wind + Wind Remaining

Table C-2. Range value

RANGE	***VALUE***
100 meters	.1
200 meters	.2
300 meters	.3
400 meters	.4
500 meters	.5
600 meters (bump up .1)	.7
700 meters	.8
800 meters	.9

EXAMPLE

1. The sniper acquires the range to target. 400 meters.
2. Applies value .4 (value for 400 meters)
3. The sniper then takes the first number of the ballistic coefficient .4 (AA11-0.475).
4. The sniper then estimates the wind 8 miles per hour full value from left to right.
5. The sniper divides 4 into 8. The answer is 2 with nothing remaining. The sniper brings back decimal.

.4 x 2 + 0 = .8 (sniper holds .8 left for wind).

If wind is angular to gun line, multiply by angular cosine.

Note. If wind is just short of the multiple, round to the next multiple.

Strength

C-54. To determine the wind velocity, the sniper can use certain indicators such as flags, smoke, trees, grass, rain, and their sense of feel to match velocities with such indicators. Snipers use the Beaufort scale (table C-3), which is a method for ranking wind speeds, to summarize the indicators that they observe and feel.

C-55. The sniper needs to be aware that not all vegetation acts the same in wind. Vegetation in a semi-arid environment tends to be more rigid and does not move as easily. The best course of action for the sniper is to observe the vegetation in their area of operation and to use their kestrel wind meter to record the wind speed and how that particular vegetation is reacting to the corresponding wind speed value.

Table C-3. Beaufort scale

Beaufort Scale Number	*Wind miles per hour (mph)*	*Common Name*	*Clues on Land*	*Clues On Water*
0	less than 1	Calm	None	Mirror-like
1	1 to 3	Light air	Smoke drifts	Scale-like ripples
2	4 to 7	Light breeze	Wind felt on face, leaves rustle	Small wavelets, glassy crests
3	8 to 11	Gentle breeze	Leaves, small flags in motion	Few crests begin to break
4	12 to 18	Moderate breeze	Dust swirls, small branches sway	Wave rows lengthen, half of crests break into spilling white wave crests
5	19 to 24	Fresh breeze	Small trees begin to sway	Most waves marked by white horses, some spray
6	25 to 31	Strong breeze	Large branches sway, whistling heard in trees	Extensive spray, streaks blown parallel to wind

Note. The Beaufort scale assists in assessing wind speeds; it does not allow the sniper to anticipate changes in wind speed.

C-56. The sniper uses the kestrel wind meter to monitor changes in air pressure. A change in air pressure leads to a change in wind speeds. Careful attention to such changes can provide early warning of high winds. The sniper watches for a continuous drop in air pressure. If using an altimeter, which is used in mountaineering, the altimeter shows a continuous increase in altitude, even if the sniper is stationary or descending (table C-4).

Table C-4. Air pressure chart

Three-hour Pressure Decrease	*Altimeter Increase*	*Recommended Action*
.02 to .04 inches (in) .6 to 1.2 millibars (mb)	20 to 40 feet 6 to 12 meters	None, except to continue normal monitoring.
.04 to .06 inches 1.2 to 1.8 millibars	40 to 60 feet 12 to 18 meters	Watch sky carefully for thickening clouds. See if wind is increasing, shifting to east or southeast.
.06 to .08 inches 1.8 to 2.4 millibars	60 to 80 feet 18 to 24 meters	Possible high winds.
.08 inches or more 2.4 millibars or more	80 feet or more	High winds approaching. Reassess position and engagement.

Range

C-57. Range is a factor when calculating a wind solution. The sniper has to start by establishing a base reading at their location, then adjust based on the indicators that they see downrange at the target. The sniper needs to get a verifiable reading at the firing point that is within 1 mile per hour. The sniper can use the kestrel wind meter to achieve a verifiable reading.

C-58. The front portion (rising branch) of the trajectory plays a significant role in determining the bullet's deflection, but if the bullet goes transonic during its flight, that dictates where the bullet is most sensitive.

C-59. The best strategy for shooting in the wind is making a critical assessment of the features unique to each range (terrain between the shooter and the target).

C-60. For targets between 0 and 600 meters and with no obstacles, the sniper team calls wind speed and angle at their location. (Open fields, desert environments.)

C-61. It takes roughly 10 to 20 seconds for a crosswind total path average to change five inches at 1000 meters. A pure crosswind is very forgiving. Head and tail winds change paths almost instantly and are the most difficult to shoot in. Winds can change faster than that of the sniper being able to shoot a rapid shot correction based on error.

Note. When engaging targets at long range, by measuring the wind at the sniper's location, it can increase the hit probability of the target by 30 percent.

ANGLED FIRE

C-62. Firing uphill or downhill at angles greater than 30 degrees, the sniper must account for the change in the strike of the round from a horizontal trajectory.

COMPENSATION FACTORS

C-63. The sniper compensates for the differences resulting from their zero on level terrain and firing at an angle by (figure C-15, page C-26)—

- Estimating the line of sight distance to the target.
- Determining the angle to the target.
- Choosing the compensation factor for the angle.
- Multiplying the estimated range by the compensation factor.
- Holding or dialing the compensated range on the scope.

FLAT GROUND DISTANCE

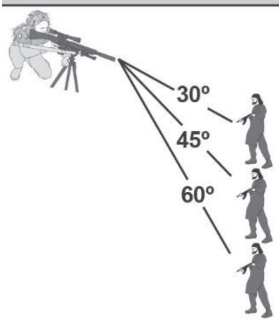
C-64. The flat ground distance is the distance between the sniper and the target if they were at the same elevation, or the horizontal range. This is the distance used for elevation compensations due to the gravity's effect over the lateral movement of the bullet.

LINE OF SIGHT DISTANCE

C-65. The line of sight distance is the actual distance from the sniper to the target not the horizontal range, or flat ground distance. This is the distance the sniper must use for wind compensations since it can vary greatly from the flat ground distance.

C-66. Care must be taken when measuring the target with the reticle. The sniper's perspective to the target can cause the target to be skewed, and an improper measurement to be taken. When measuring the target from different vertical perspectives, it is best to measure laterally. When measuring the target from different lateral perspectives, it is best to measure vertically.

QUICK HIGH ANGLE FORMULA



DOWN ANGLE	MOA ADJUSTMENT/ 100 METERS	Mil ADJUSTMENT/ 100 METERS
30º	-1/2 MOA	0.15 mils
45º	-1 MOA	0.3 mils
60º	-2 MOA per 100 meters, then add 1 MOA	0.6 mils per 100 meters, then add 0.3 mils

MINUTE OF ANGLE (MOA) EXAMPLE at 500 meters

DEGREES	RANGE HOLD		ANGLE OFFSET (-)		60 DEGREE OFFSET (+)		HIGH ANGLE HOLD
30º	5.5 MOA	-	2.5 MOA	+		=	3 MOA
45º	5.5 MOA	-	5 MOA	+		=	1/2 MOA
60º	5.5 MOA	-	10 MOA	+	1 MOA	=	-3 1/2 MOA

MILS EXAMPLE at 500 meters

DEGREES	RANGE HOLD		ANGLE OFFSET (-)		60 DEGREE OFFSET (+)		HIGH ANGLE HOLD
30º	1.6 mils	-	0.75 mils			=	+0.85 mils
45º	1.6 mils	-	1.5 mils			=	+0.1 mils
60º	1.6 mils	-	3 mils	+	0.3 mils	=	-1.1 mils

60º Rule of Thumb is Range Hold -2 MOA / 0.6 mil + High Angle Hold

Figure C-15. High angle fire

PYTHAGOREAN THEOREM

C-67. The sniper can use the Pythagorean theorem to enage an enemy when the sniper knows two of the distances. The sniper can use the formula below to find the third. The sniper needs a map and an LRF. The sniper can manipulate the formula as follows:

> FORMULA FOR PYTHAGOREAN THEOREM (SNIPER USE)
>
> A2 + B2 = C2
>
> A: Elevation. The height of the sniper position above the target.
>
> B: Flat ground distance. The map distance from the sniper's position to the target.
>
> C: Actual range. Actual distance from the sniper to the target.
>
> B = (C2-A2) 2√x = Data line to engage target

ANGLE COSINE INDICATOR

C-68. The angle cosine indicator, NSN 1005-01-560-0130, was designed to be a redundant system (figure C-16).

Figure C-16. Angle cosine indicator

C-69. The most accurate method is to input the cosine number (left side number on figure C-16) into the ballistic software. Other ways to use the angle cosine indicator are—

Multiply	The cosine number to your slope distance to target
.7 cosine x 1000 meters = 700 meters	
Multiply	The cosine number to your hold as depicted on your data card
.7 cosine x 3 MIL = 2.1 MIL	

RAPID TARGET ENGAGEMENT

C-70. Rapid target engagement techniques provide the sniper with the ability to effectively and quickly engage targets of opportunity in an environment where the sniper team does not have the necessary time to conduct standard range estimation procedures.

C-71. The 12-inch drill is a rapid target engagement method using a mil based reticle to quickly measure a limited exposure target, giving the shooter hold off data to quickly engage the target without knowing the target's range.

C-72. The measurement from the top of someone's head to the break of their shoulders is approximately 12 inches (figure C-17). This can be measured no matter what direction the target is facing (right, left, front, or back) as long as the head and shoulders are exposed.

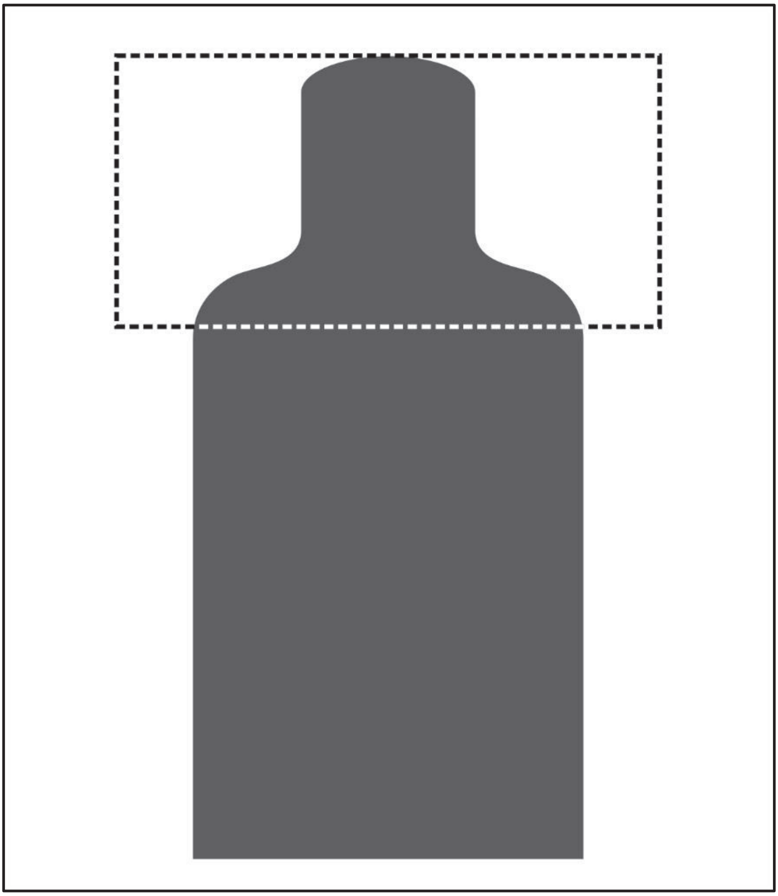


Figure C-17. Head to shoulder target

C-73. The Horus reticle incorporates the accuracy 1st speed shooting formula. This is the staircase looking pattern in the upper half of the reticle (figure C-18, page C-32). This allows the sniper to quickly establish a hold for their rifle. These increments are in 1/10 mil and start at .5 from the outside and go up to 1 mil at the middle line. The mover numbers under each speed mil mark can be used to associate which mil to hold.

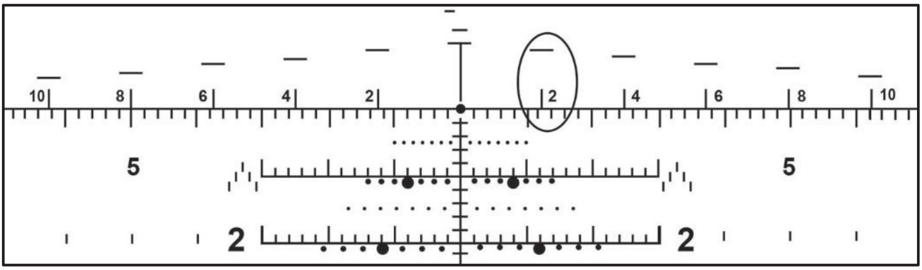


Figure C-18. Reticle pattern for rapid target engagement

C-74. To establish a rifle number for a sniper weapon system, the sniper uses ballistic software to build a speed shooting formula for the rifle. After zeroing and truing the rifle, the sniper inputs a target size of 12 inches under TARGET in the ballistic software, then looks up the associated holds for the ranges below (note numbers below are used as an example):

- .8 = 381 m = 2.2 mil.
- .7 = 435 m = 2.9 mil.
- .6 = 508 m = 3.9 mil.
- .5 = 610 m = 5.2 mil.

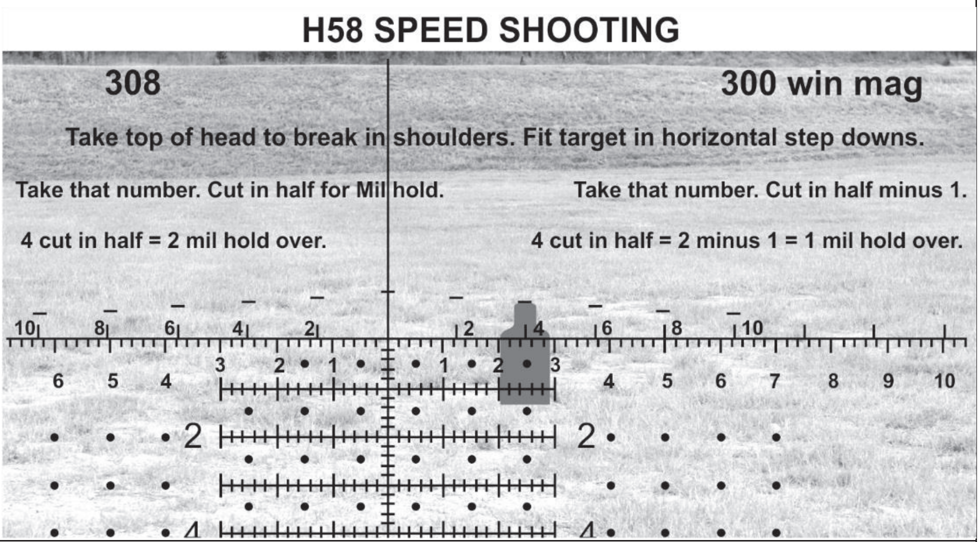
C-75. Looking at the dope sheet, the sniper can see that the actual holds are nearly equal to 10. This particular rifle has a rifle number of 10. The following list is an example:

- Target mil .6, hold 4 mil: 6 + 4 = 10.
- Target mil .7, hold 3 mil: 7 + 3 = 10.

Note. For the M2010, that rifle number is closer to 9. The M110 rifle is closer to 10. The M4A1 rifle number is closer to 11.

C-76. The Horus reticle moving target lead lines help the sniper rapidly determine an elevation hold for the target without using the traditional mil relation formula for range-finding. The steps for determining an expedient hold are as follows:

- Align top of target's head to top of shoulders.
- Find the line above the horizontal stadia that best brackets the 12″ target between the moving target lead line and the horizontal stadia, as shown in (figure C-19).
- Note the number corresponding to the lead line in step 2; divide that line value in half. For example, if the head to shoulders area fits between the 4 miles per hour lead line and the horizontal stadia line, divide that in half to get a value of 2.



Legend
win mag Winchester magnum

Figure C-19. H58 speed shooting, example

TEAM ENGAGEMENT TECHNIQUES

C-77. The most complex engagements occur when multiple shooters work in tandem to engage a single or multiple threats in both daytime and darkness.

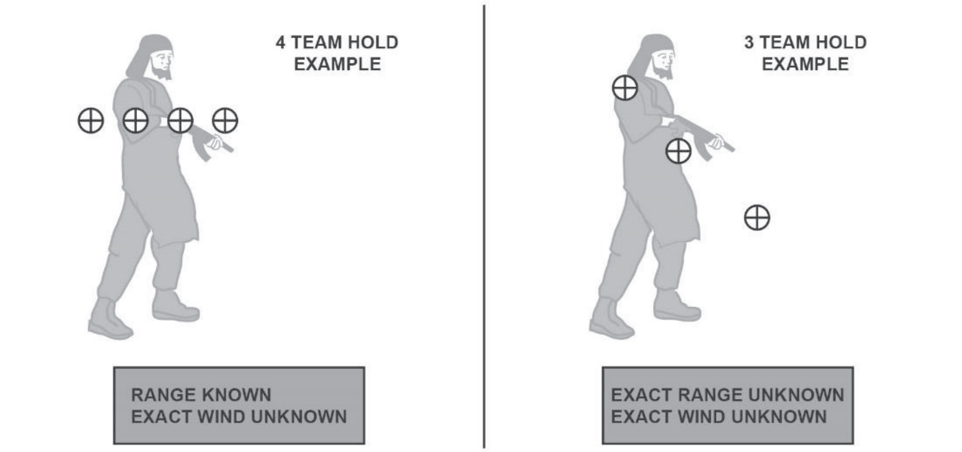
C-78. The sniper team can employ various techniques to eliminate a threat. The cover shot is the preferred method when working in three or four man teams as the team leader can have multiple shooters on target and can command and control the shooters as they see fit.

Cover Shot

C-79. The team obtains the correct dope (hold) for the target. The team moves onto target and obtains an initial wind hold. The team leader designates a primary and secondary shooter. The team leader initiates fire with the primary shooter as the secondary shooter watches for trace or impact. If the first shot should fail, the secondary shooter immediately follows up with a corrected shot. The primary shooter moves back onto target to follow suit.

Frame Shooting

C-80. Snipers use the frame shooting technique in an environment where it is very difficult to read wind or judge range and the team needs to guarantee a hit on the target and a follow-up shot is not feasible due to if the team would miss, the target could seek cover. Frame shooting consists of two or more shooters engaging the same target on a countdown, each shooter with a different call (hold). This ensures a target hit (figure C-20).



1. Sniper team leader assigns each sniper a “specific hold” for the target.
2. Snipers will give an “up or ready” once hold is acquired.
3. Sniper team leader will conduct a countdown, “5…4…3…2…” on the T of two, snipers engage target.

Figure C-20. Frame shooting

BOXING IN

C-81. Snipers use the boxing in technique when multiple threats are within the team's field of view. Shooters work from the outside in eliminating targets in a quick and efficient manner (figure C-21).

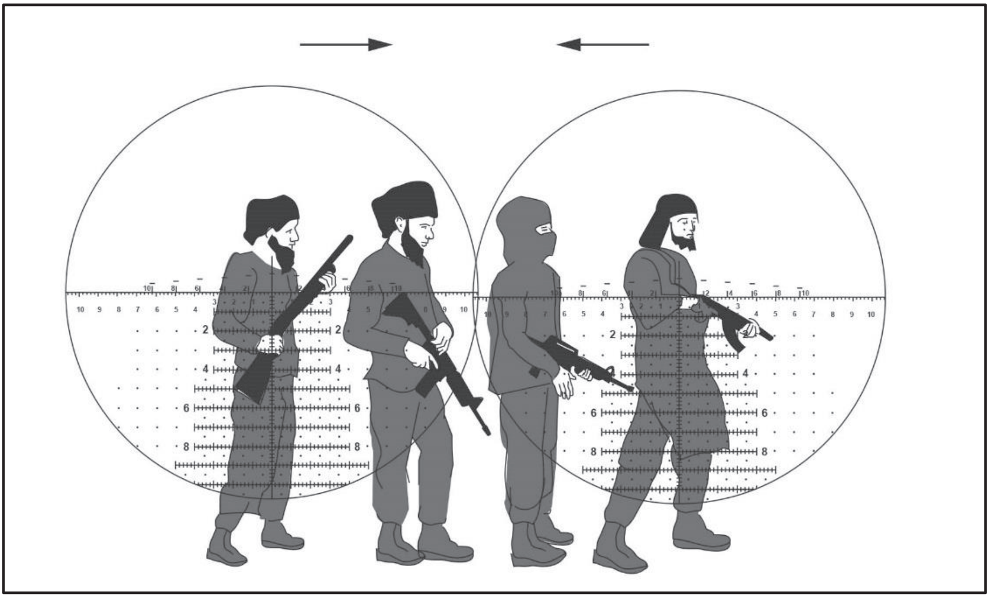


Figure C-21. Boxing in

NIGHT DESIGNATION

C-82. One shooter or observer uses their infrared flood light to illuminate the target and backdrop so it stands out to the primary shooter's optic and infrared pointer (figure C-22).

Figure C-22. Night designation

Appendix D

Drills

Appendix D describes drills for the sniper weapon system that enforce and enhance gun handling skills needed to succeed in tables IV through VI of the Integrated Weapon Training Strategy.

The drill structure is standardized for all individual weapons to reinforce the most common actions all Soldiers routinely execute with their assigned equipment.

Soldiers use the drills in this appendix during table III of the Integrated Weapons Training Strategy, as well as during routine maintenance, concurrent training, and during deployments. The drills in this appendix build and maintain skills needed to achieve proficiency and mastery of the weapon. The drills are to be ingrained into daily use with the weapon.

Note. The drills listed in this appendix are for DRY-FIRE purposes only. Units may add to the drills listed in this appendix. Units are encouraged to develop additional drills, including pistol LIVE-FIRE drills that they can use to augment the Army Sniper Weapon System Training Strategy.

BUILDING CONFIDENCE

D-1. Each drill is designed to develop confidence in the equipment and Soldier actions during training and combat operations. As the drills are reinforced through repetition, they become second nature to the Soldier, providing smooth, consistent employment during normal and unusual conditions. The drills provided are designed to build the Soldier's proficiency with the following principles:

- Mindset. Perform tasks quickly and effectively under stress.
- Efficiency. Ensure the drills require the least amount of movement or steps to complete correctly. Make every step count.
- Individual tactics. Ensure the drills are directly linked to employment in combat.
- Flexibility. Provide drills that are not rigid in execution.

MINDSET

D-2. Continuous combat is inherently stressful. Continuous combat exhausts the Soldier and causes physiological changes that reduces their ability to perform tasks as quickly or effectively as necessary. The Soldier's ability to function under stress is the key to winning battles since, without the Soldier, weapons and tactics are useless. Individual and unit military effectiveness depend on the Soldier's ability to think clearly, accurately, and quickly; all with initiative, motivation, physical strength, and endurance.

D-3. The impact of physiological changes caused by the stress of combat escalates or deescalates based on the degree of stimulation, causing the Soldier to attain different levels of awareness as events occur in the continually transitioning operational area around them. Maintaining a tactical mindset involves understanding and transitioning among levels of awareness as the situation requires escalation or de-escalation.

Note. Stress can be countered using the principles associated with Soldier resilience and performance enhancement. The Comprehensive Soldier and Family Fitness (CSF2) program is designed to increase a Soldier's ability and willingness to perform an assigned task or mission and enhance their performance by assessing and training mental resilience, physical resilience, and performance enhancement techniques and skills. The initiative introduces many resources used to train Soldiers on skills to counter stress.

EFFICIENCY

D-4. Efficiency is using the least resources to achieve an end. Efficient movements are fast because they include only necessary actions. Allowing the Soldier to repeat the movement until they can predict the effect reduces mental and physical effort. Thus, the Soldier can focus on tactics while still producing accurate and precise fires.

INDIVIDUAL TACTICS

D-5. Individual tactics are actions independent of unit standard operating procedures or situations that maximize their chance of survival and victory in a small arms direct fire battle. Examples of individual tactics include cover and standoff or manipulation of time and space between the Soldier and their enemy.

FLEXIBILITY

D-6. The techniques are not prescriptive; multiple techniques can be used to achieve the same goal. In fact, there is no single way to use a pistol; different types of enemies and scenarios require different techniques. However, the techniques presented are efficient and proven techniques for conducting various pistol-related tasks. Should other techniques be selected, they should meet the following criteria:

Reliable Under Conditions of Stress

D-7. Techniques should be designed for reliability when it counts—during combat. The technique should produce the intended results without fail under any conditions and while wearing mission-essential equipment. The technique also should be tested under as high stress conditions as allowed in training.

Repeatable Under Conditions of Stress

D-8. As combat is a stressor, a Soldier's body responds much as it does to any other stressful stimulus. Physiological changes begin to occur, igniting a variable scale of controllable and uncontrollable responses based on the degree of stimulation. The technique should support or exploit the body's natural reaction to life-threatening stress.

Efficient in Motion

D-9. The technique should create efficiency and it should contain only necessary movement. Extra movement wastes time. Time can make the difference between life and death. Consider how fast violent encounters occur: an unarmed person can cover 20 feet in about a second (applicable to pistol).

Develop Natural Responses Through Repetition

D-10. When practiced correctly and in sufficient volume, the technique should build reflexive reactions that a Soldier applies in response to a set of conditions. Only with correct practice does a Soldier create the muscle memory necessary to serve them under conditions of dire stress. The goal is to create automaticity; the ability to perform an action without thinking through the steps associated with the action.

Leverage Overmatch Capabilities

D-11. Fast and efficient presentation of the sniper weapon system leaves more time to refine aim. Soldiers develop speed throughout the training cycle and maintain it during operations.

D-12. The sooner a Soldier can get their weapon pointed at the target, the more time they have to refine their aim. The closer the target gets, the less time they have to refine their aim. Soldiers must make every second count.

CONDUCT DRILLS

D-13. To build the skills necessary to master the functional elements of the shot process, certain tasks are integrated into drills. The drills are designed to capture the routine, critical tasks, or actions that Soldiers must perform fluently and as a second nature to achieve a high level of proficiency.

D-14. Drills focus on the Soldier's ability to apply specific weapons manipulation techniques to engage a threat correctly, overcome malfunctions of the weapon or system, and execute common tasks smoothly and confidently.

Drill A, Weapon Check

D-15. The weapon check is a visual inspection of the weapon by the Soldier. A weapon check includes (at a minimum) verifying the following:

- Weapon is clear.
- Weapon serial number.
- Aiming device serial number.
- Attachment points of all aiming devices, equipment, and accessories.
- Functions check.
- Proper location of all attachments on the adaptive rail system.
- Zero information.
- Serviceability of all magazines.

D-16. The Soldier initiates a weapon check when they receive the weapon from the arms room or storage facility. Soldiers also perform weapons checks after recovering the weapons when they are stacked or secured at a grounded location.

D-17. Units may add tasks to drill A as necessary. Units may direct Soldiers to execute drill A at any time to support the unit's mission.

Drill B, Equipment Check

D-18. Drill B is a precombat check that ensures the Soldier's aiming devices, equipment, and accessories are prepared as follows:

- Batteries.
- Secured correctly.
- Equipment does not interfere with tactical movement.
- Basic load of magazines are stowed properly.

Drill C, Load And Conduct Status Check

D-19. Drill C is predominantly an administrative loading function. Drill C allows the Soldier to develop reliable loading techniques and conducting a status check of their weapon system.

Note. Refer to the technical manual of the sniper weapon system being employed for loading procedure.

D-20. The Soldier must remember to load and conduct a status check on their secondary weapon first, then load and conduct a status check on their primary weapon.

Drill D, Fight Down

D-21. The fight down drill builds the Soldier's understanding of how to move effectively and efficiently between firing postures. The drill starts at a standing position, and, on command, the Soldier executes the next lower position or the announced position by the leader. The fight down drill requires the Soldier to perform the following positions in sequence:

- Standing.
- Kneeling.
- Sitting.
- Prone.

D-22. Each position should be executed a minimum of three times. Leaders use drill F in conjunction with drill G. Leaders can augment natural and artificial support to the drill.

DRILL E, FIGHT UP

D-23. The fight up drill builds the Soldier's timing and speed while moving from various positions during operations. The drill starts in the prone position, and, on command, the Soldier executes the next higher position or the position announced by the leader. The fight up drill requires the Soldier to perform the following positions in sequence:

- Prone.
- Sitting.
- Kneeling.
- Standing.

D-24. Each position should be executed a minimum of three times. Leaders use drill F, fight down, in conjunction with drill G, fight up. Leaders can also augment natural and artificial support to the drill.

DRILL F, PRONE READY

D-25. The prone ready drill develops the Soldier's ability to quickly execute a series of tasks that are required to successfully execute a shot. (For table III, this drill can be completed as a dry fire exercise.)

DRILL G, RELOAD

D-26. The Soldier executes the tactical reload drill when they are wearing complete load bearing equipment. Drill G provides exercises to assure fast, reliable reloading through repetition at all firing positions or postures. The Soldier should perform drill G from each of the following positions at a minimum of seven times each:

- Standing.
- Kneeling.
- Prone.

D-27. Leaders may include other drills while directing drill G to the Soldier to reinforce the training as necessary.

DRILL H: TRANSITION TO SECONDARY

D-28. The Soldier transitions to their secondary weapon when two conditions occur at the same time: they engage targets within 25 meters with their primary weapon and their primary weapon malfunctions. The Soldier—

1. Tries to put the rifle on safe.
2. Moves their firing hand to the pistol to defeat holster retention and establishes a high, firm grip on the pistol.
3. Uses their supporting hand to move the rifle out of the way.

Note. Ensure rifle is out of the way of pistol magazines and does not impede the draw.

4. Draws pistol with their firing hand.
5. Moves supporting hand to meet and greet position.
6. Presents pistol.
7. Holsters the pistol and clears the malfunction of the rifle once they have presented the pistol and neutralized the target.
8. The Soldier may use the pistol light to observe the chamber of the primary weapon after the engagement, because the primary weapon experienced a malfunction. If clear, the Soldier places the weapon back into operation, then reloads, makes safe, and holsters the secondary weapon.

DRILL I, CLEAR MALFUNCTION

D-29. Drill I includes the three methods to clear the most common malfunctions on a sniper weapon system in a rapid manner, while maintaining muzzle and situational awareness. Soldiers should perform all variations of clearing a malfunction based on the commands from their leader. Once complete, leaders should incorporate drill I with other drills to ensure the Soldier can execute the tasks at all positions fluently.

DRILL J, UNLOAD AND SHOW CLEAR

D-30. When the Soldier is unloading, they should always unload and show clear with whatever weapon is in their hands. If the rifle is loaded and in their hands, the Soldier should unload and show that the rifle is clear first, then transition to pistol, and unload and show it clear.

Note. This drill can be executed without ammunition in the weapon. Leaders may opt to use dummy ammunition.

Appendix E

Urban Considerations

The world becomes more urbanized each year; therefore, it is unlikely that all fighting will be done in rural settings. Appendix E has six sections: planning and coordination, urban combat skills, urban hide operations, intermediate barriers and loopholes, and urban wind effects.

PLANNING AND COORDINATION

E-1. Planning and coordination for urban sniper operations must be clear and concise as the urban landscape is an ever changing environment. Leadership for the sniper team needs to establish a strong presence within battalion intelligence cells to procure information for upcoming missions and to offer expertise and considerations for sniper employment.

E-2. For insertion, leaders need to establish a strong relationship with the insert crew (helicopter, boat, and vehicle) to successfully execute a sniper operation. Sniper teams must rehearse in accordance with unit SOPs on insertion with respected platform.

URBAN INFILTRATION

E-3. Prior to infiltration, sniper teams need to conduct a detailed, in-depth route analysis to include study of imagery; intelligence, surveillance, and reconnaissance feeds; gridded reference graphics; and any other intelligence information of their route. Sniper teams make primary and alternate insert points with their own corresponding primary and alternate infiltration routes and rally points. The sniper team ensures there are both pre- and post-objective rally points assigned on easily identifiable locations.

E-4. Leaders brief the entire team on the insert method and infiltration route in detail. All team members must know SOPs, ROEs, routes, rendezvous, and missing or lost sniper plans.

> ***Note***. To observe the route ahead, request fixed wing or UAS coverage during insert and infiltration. If possible, use these assets during the entire infiltration process.

E-5. Use intelligence, surveillance, and reconnaissance assets to ascertain the typical street activity and illumination at night. The darkness of night is the biggest advantage towards a successful insert or infiltration. Consider the cultural habits of the local populace before infiltrating an urban area. Streetlights along the infiltration route can make or break a night urban infiltration. If street lights are present during the entire infiltration route, attempt to use alleys and side streets.

Foot Mobile Urban Infiltration

E-6. There are advantages and disadvantages to approaching and infiltrating an urban area solely on foot. Each is discussed below:

- Advantages:
  - Less chance of compromise.
  - Increased ability to retain situational awareness.
  - More freedom to divert route. The patrol may easily detour around obstacles, cut through buildings, or cross over walls.
- Disadvantages:
  - Vulnerability to hostile fire. This includes blast, fragmentation, and exposure to inclement weather.
  - Difficulty carrying mission-essential gear. Reaction time, fighting ability, and survival speed decreases with more weight on the sniper.
  - Difficulty carrying enough water for mission. When operating in an extreme hot weather climate, the weight and capacity of water required is too much to carry if the mission is longer than 24 hours.

Mechanized Urban Infiltration

E-7. Military mechanized assets may transport the sniper team to the objective area. The objective area may be either to a rural area outside the city, or deep into the city in the vicinity of the hide site. It is recommended that vehicles drop off the teams several blocks or even several kilometers away so the infiltration to the hide building is unobserved and undetected. The advantages and disadvantages are described below:

- Advantages:
  - High mobility. The team can save time and energy getting in the vicinity of the infiltration route.
  - Heavy armament. In the event of contact, weapons mounted in the vehicles may defend and defeat an enemy infantry or armor ambush.
  - Equipment and water payload. With less foot mobile distance required, the urban sniper team may be able to safely carry more equipment and ordnance that increase effectiveness, such as rockets, ammunition, communication, and optics.
- Disadvantages:
  - Audible signature. Audible compromise or movement tracking may occur due to the sounds of the turbo diesel engines, gas engines, and gas turbines of mechanized military vehicles. Track noise and chassis noise may also emit loud signatures.

- Visual signature. The outlines of vehicles, accidental discharge of light, tracks, and dust emitted from heavy vehicles may compromise the route and presence.

URBAN COMBAT SKILLS

E-8. Entry is a key phase of urban sniper infiltration. The sniper team needs to be proficient at urban combat skills, which includes movement, breaching and clearing buildings, survivability, and subterranean operations.

MOVEMENT

E-9. Maintaining situational awareness of both the inside and outside of structures during movement in urban terrain is critical.

E-10. Movement in an urban area exposes a Soldier to all the dimensions of urban terrain. An enemy could be on the outside or the inside of any building or on any floor, to include below ground or the roof. Typical external sectors of fire orient on specific external open areas—a length of a street or a small section of a street—that is visible from either inside a nearby building or from down an adjoining side street. Typical internal sectors of fire orient on specific internal open areas—large open rooms, doorways, or hallways.

Note. See ATTP 3-06.11, paragraphs 7-1 through 7-48, for urban movement skills for navigation, communication, movement outside of buildings, and movement inside of buildings.

BUILDING AND ROOM BREACHING

E-11. An integral part of clearing buildings, floors, and rooms is the ability to gain access to the area quickly. Breaching techniques for building or room entry points vary based on the mission variables; the construction of the entry point; and the availability of breaching equipment, munitions, or demolitions. Techniques range from the simple method of kicking in a door to the complex use of specialized demolitions.

Note. See ATTP 3-06.11 paragraphs 7-49 through 7-85 for building and room breaching skills to include methods of breaching, breach points of entry, and executing the breach.

ROOM CLEARING

E-12. Room clearing involves seizing control of a room and its inhabitants (both hostile and other) rapidly and methodically by eliminating the enemy, dominating the room, and controlling the situation. Typically, a squad leader or higher finalizes the plan for clearing a room. This plan—

- Identifies the room to be cleared.
- Determines the location and method of entry.
- Directs the organization of the room clearing team.
- Dictates the assault conditions (surgical, precision, or high intensity).
- Enforces the ROE.
- Positions overwatching forces, breaching elements, and supporting fires.
- Maintains control of any follow-on team.
- Determines the activity after the room is cleared.

Note. See ATTP 3-06.11 paragraphs 7-86 through 7-128 for room clearing fundamentals, fire and movement, and controlling the room.

URBAN HIDE AND CONSTRUCTION

E-13. An urban hide is a concealed, defensible position established in a building or obstacle within an urbanized area. An urban hide may be established in either a populated or abandoned metropolitan, residential, or industrial area with observation of a specific target or location.

SEVEN HIDE REQUIREMENTS

E-14. Every urban hide must facilitate the following elements:

- Positive communications.
- Concealment.
- Observation and fields of fire.
- Escape route.
- Method of entry.
- Interlocking sectors of fire.
- Hide security.

SELECTION CONSIDERATIONS

E-15. During planning and mission study, snipers attempt to determine if the building is occupied or unoccupied. They must have a plan for both. Snipers determine previous recent occupation (enemy or friendly) and how it relates to the chance of compromise in the building the team plans to occupy. Examine the distance to the target area and any obstacles that might hinder the mission.

E-16. Snipers examine the building’s entry points and plan to examine it in person upon arrival. Always regard the entrances and exits as possible sites of booby-trap or ambush and ensure that entry into that structure is safe.

E-17. Snipers determine the building’s construction and composition and how much cover it provides from small-arms fire and explosive ordnance blast and fragmentation.

Snipers have an idea of the level of protection it provides and make a safety risk management decision.

> If the walls would stop 7.62 mm but not RPGs or 14.5 mm, the team might reconsider where to place the observation post and final firing position or choose a new building altogether. Today's modern battlefield contains weapon systems beyond 7.62 AP and RPG-7s. Leaders may have to assess the building's level of protection against modern rockets such as the RPG-29, RPG-32, or antitank guided missiles such as the AT-5, HJ-8, and AT-14.

E-18. To remain in alignment with the urban baseline, snipers determine angles and levels of natural and artificial shadow and light (sunlight, street lights). With buildings in cities, the level of light filtering through a room changes throughout the day based on the changing angle and amount of sunlight. In the event a room remains darker than all other rooms throughout the day, the team may be compromised if the enemy and or residents take notice of the solitary dark room.

E-19. Snipers must know the dead space and threat gaps in the observation windows, but try to avoid having too large or small of a field of view. If using a loophole instead of a window, ensure that the loophole field-of-view is wide enough to see enough of the desired target area. Snipers must remember that light transmission is a dangerous loophole trait.

E-20. Baseline is important in an urban area, much like studying the vegetation or natural terrain before snipers use camouflage. Snipers must know the average battle damage and urban baseline of the buildings in the area.

HIDE CATEGORIES

E-21. Hides can be broken down into three categories; hasty, detailed, and vehicle. There are no textbook answers to authorized or standard hides; the team is limited only by the situation, their imagination, and the natural baseline. The three typical hide categories are—

Hasty

E-22. A hasty hide is something that does not take much time and effort to erect. A hasty hide can be as simple as a periscope and rifle. A hasty hide is usually the most compliant with the natural urban baseline around them. In cluttered cities full of windows, simplicity is camouflage. The point of a hasty hide is to blend in with the natural clutter of the room without creating unnatural shadow.

Detailed

E-23. A detailed hide site is usually more permanent and level, built for a mission more than 24 hours in duration. A hide site is also useful for operating in a high traffic area when additional concealment from shadow and darkness is needed. Detailed hides involve the use of tools, screens, and deception devices. Detailed urban hides should only be used when extra shadow and deception is required. Snipers must understand that a mistake in hide construction could compromise their position.

Vehicle

E-24. Successful urban hides have been conducted from tint-windowed vehicles, dump trucks, and even car trunks. Vehicle hides are difficult to remain clandestine in, since sniper units operate in accordance with the law of armed conflict and are not disguised. There are also security gaps and vulnerabilities to hostile fire when operating from vehicle hides.

Essential Equipment

E-25. Camera and optic. Never be without the instant ability to take a photograph. Also, have a high-powered optic with zoom capability for facial recognition and detailed searches of buildings and vehicles.

E-26. Periscope. It is a lightweight, highly concealable, easily-camouflaged, cover-enabling device. The periscope has variable zoom, a decent field of view, and presents very little target indicator to the enemy. For these reasons, the periscope should be considered the preferred primary observation optic. The urban environment poses many concealment problems due to the close proximities involved. As with any hide in any terrain, the observer should maintain the smallest profile possible. Consider first attempting a periscope, hasty hide instead of constructing a complex, detailed hide. Always use the periscope with a tripod. An enemy observer can detect the movement of a hand-held periscope.

E-27. Observation log, Joint Prioritized Effects List (known as the JPEL), and a gridded reference graphic. The observation log should stay in the OP room and the communication log should stay with the primary radio. If available, keep a Joint Prioritized Effects List or be-on-the-lookout list in the final firing position, and always have building identification materials (gridded reference graphic, imagery) available.

E-28. Sniper weapon system and tripod. A sniper weapon system should always be stood by in the event of a target of opportunity, emergency action, or emergency assault sniper support. During darkness, a night optic should be affixed.

E-29. Furniture and drapes. Make use of existing support and concealment. Remain in accordance with the natural baseline around the hide. Drapes in windows are ideal for natural screening and concealment. Furniture is also an asset. In many cases, furniture offers the sniper many opportunities for shooting supports and concealment screens. Do not position furniture in a fashion that would seem out of the ordinary. Do not place furniture in the immediate vicinity of the window.

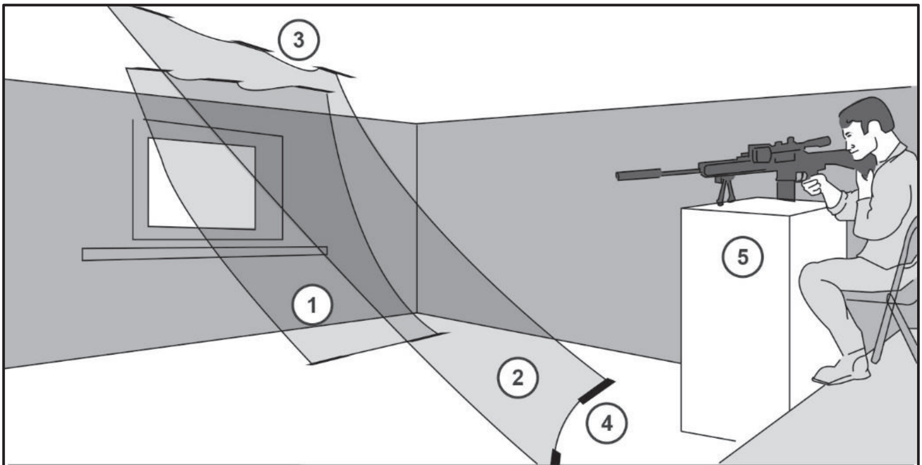
E-30. Intra-team radio with headset. Remain linked via voice communication with the hide security team at all times. In the event of danger-close enemy scouting and contact or civilians in close proximity to the hide building, the security element can only communicate in low volumes and whispers and cannot shout warnings to the OP team.

While conducting urban hide operations, people may be right outside the door all day and a chance-contact situation could arise at any second. It is recommended to wear noise-cancelling headsets due to the deafening of indoor gunfire and explosions.

DETAILED URBAN HIDES

E-31. As discussed, there are no standardized urban hide types. However, the following is a short list of construction suggestions and common hide styles.

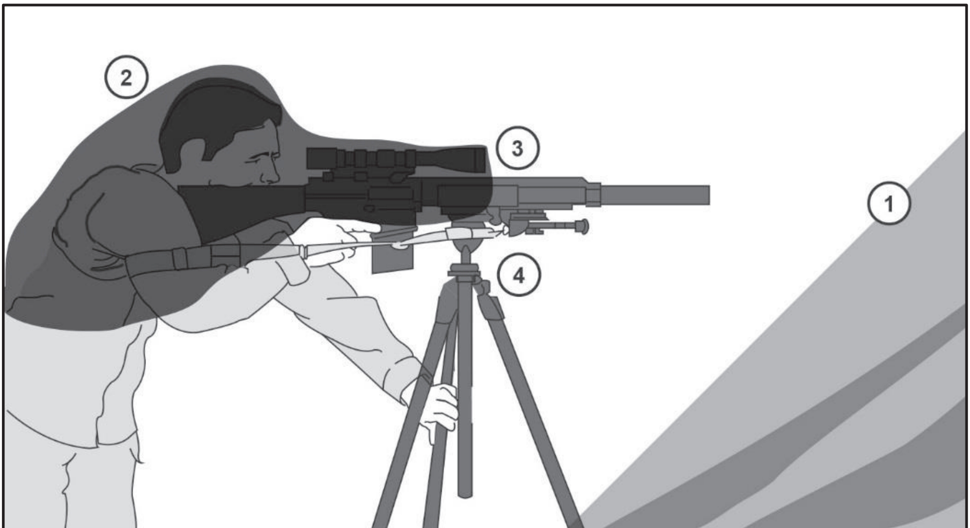
E-32. Double or triple drape system**.** A double or triple drape is a front screen set at approximately a 45-degree angle, with the second or third screen behind the first at a 45 to 90-degrees angle. These drapes are hung from the ceiling or at a point above the viewing aperture to the floor. They can be attached to the ceiling by means of tacks, rigger's tape, and staple guns or hung on 550 cord. The bottom should be attached to the deck to prevent movement of the front drape that might give away the team's position. Teams can also position netting at opposite angles to catch light at two separate angles. Teams can and should employ upward of three nets to use. Teams should attempt to hang screens or nets as tightly as possible to prevent unwanted movement and wrinkles that may be seen from the outside (figure E-1, page E-8).



1	FRONT SCREEN:	FRONT SCREEN SET AT APPROXIMATELY 45° ANGLE.
2	SECOND SCREEN:	SECOND SCREEN SET AT 45 to 90° ANGLE.
3	ATTACHMENT:	SCREEN ATTACHED TO CEILING BY MEANS OF TACKS, RIGGERS TAPE, STAPLE GUN OR 550 CORD.
4	ANCHOR:	BOTTOM OF SCREEN ANCHORED TO FLOOR TO PREVENT MOVEMENT OF SCREENS.
5	SUPPORT:	SNIPER WILL USE ANY FURNITURE OR EQUIPMENT TO STABILIZE FIRING POSITION.

Figure E-1. Double drape system

E-33. Front screen and body veil method**.** The front screen and body veil technique is very basic, yet still involves emplacing screens and shades. The hide is built by first emplacing a single-layer screen behind the observation window or loophole (mosquito netting is ideal for this as it can be spray painted either lighter or darker as the light and baseline dictates), then covering the shooter and rifle with a mesh or screen-type material worn over the observer's entire body and optic to break up the observer's outline. The shooter may also wear an opaque sheet with their lens poking through (figure E-2). Most optics can burn through screen haze, therefore, draping a screen over the lens may not be a hindrance.



1	FRONT SCREEN:	FRONT SCREEN SET AT APPROXIMATELY 45° ANGLE.
2	SCREEN COVER:	SNIPER USES A MESH/SCREEN/SNIPER VEIL TO COVER HEAD, SHOULDERS AND RIFLE TO BREAK UP THEIR OUTLINE.
3	OPTICS:	MOST OPTICS WILL BURN THROUGH SCREEN HAZE.
4	STABILITY:	SNIPER WILL USE ANY FURNITURE OR EQUIPMENT TO STABILIZE THEIR FIRING POSITION.

Figure E-2. Front screen and body veil method

E-34. Window blackout technique. In some cases, too much light may enter the room from the windows, backlighting the observer. If this light needs to be subdued, dark blackout material can block light from entering. This material should not be light permeable; it can be felt, a dark blanket, or a painted sheet. Place the material inside the room behind existing drapes, in interior doorways, or in any natural placement and pattern that assists in blacking out the room (figure E-3.) Remember to not place blackout material directly in windows, as this creates an obvious target indicator. The major drawback to blacking out hides is the unnatural darkness it creates. Remember to remain in compliance with the natural baseline around you. Changing sunlight conditions and shadow placement is a universal constant. If the hide site is the darkest, blackest room on the façade of the building in the middle of the day, the sniper has just indicated their position to an enemy observer.

E-35. Another technique to accomplish a window black out is to build a false room within the hide room. This can easily be done with sheets of the same color as the walls in a hide site room. A small loophole can be cut in the sheet to allow observation.

E-36. Placing hide sites two rooms deep in a building or utilizing hallways is another way to accomplish this.

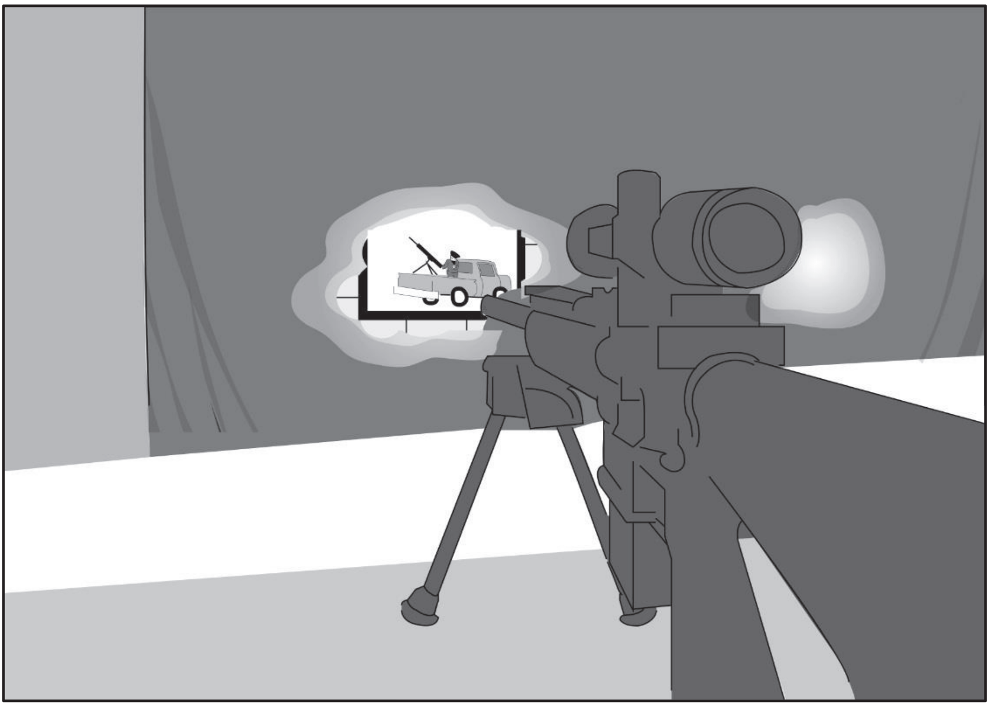


Figure E-3. Window blackout technique

MATERIALS FOR URBAN HIDE CONSTRUCTION

E-37. In most cases, the sniper team cannot hammer nails, drill screws, modify walls, or make loud noises. A system is needed that will conceal from enemy detection and observation, not leave behind target indicators, and not create changes in the baseline. The materials list below is not all inclusive. There are different material requirements for every mission. A suitable starting point would include:

- Screen or mosquito netting.
- 550 cord.
- Hand drill.
- Hammer and nails.
- 8 to 12 colored sheets.
- Nonlight permitting sheet.
- Roofing felt.
- Rigger's tape.
- Thumbtacks.
- C- clamps.
- Bungee cords.
- Fiberglass tent poles.
- Rubber mallet.
- Empty kit bag (stuffed with blankets).
- Small pry bar.
- Zip ties.
- Bolt cutters, pliers, wire cutters.
- Tape measure.
- Small foxtail broom (broken glass).

URBAN HIDE OPERATION

E-38. The urban hide is not just a position, it is a system. A series of security positions cover the OP teams as they observe an area. The OP teams, in turn, provide information to the radio telephone operator. To attain this system, operation of the hide is performed in the following order:

Step 1. Clear and occupy. As discussed previously, an urban hide building is to be cleared and dominated. The goal is to completely clear and dominate the structure.

Step 2. Establish constant eyes-on, begin logs. From this point on, observation of the target remains constant. A sniper remains in the OP or final firing position room for the duration of the operation with eyes-on the target area. Immediately begin an observation log and refinement of range cards, and continue to update and reference it.

Step 3. Construct range cards, continue OP rotation. Include sniper engagement plan and glass-defeat plan. Sketching urban areas (street layout, buildings, and so forth) takes time. Ensure 3-dimensional target reference points are included. The use of optics is fatiguing to the eye. Therefore, observation time is limited to approximately 30 minutes to an hour before the human eye is adversely affected and observation suffers. To mitigate this problem, the team should use a rotation plan that maximizes efficiency of the team. An example of this is to rotate by station. The team establishes four stations; OP, communication, security, and rest. Rotating to another station every hour breaks the monotony. Another example is to simply have an OP team and a security team. Each section handles their own rest plan to get as much rest as possible.

Step 4. Report data, develop the situation. Answer critical information requirements and information requirements, and always be prepared to receive critical information or follow-on tasking. Cities are usually bustling with activity, so keep up with the baseline and report any obvious changes in the urban atmosphere. Keep situational awareness up and stay on top of the situation to best support the mission.

Step 5. Break down, exfiltrate, and extract. Three situations can result in extraction of the team: relief of the team, mission complete, and emergency. Generally, the same procedures used in infiltrate are used for exfiltrate.

Step 6. Mission complete. When the team is ready to vacate the hide site, they notify the TOC or higher headquarters. The team ensures that everything is left exactly as it was when the hide was first occupied. All equipment not in use and any trash should be packed as soon as its use is no longer needed. This minimizes the team's signature and allows for a speedy exfiltration in the event that compromise occurs. A final check of the hide should be conducted before departure.

Relief of Team

E-39. If a mission or operation is still ongoing and the team must be rotated out, it requires very detailed planning and rehearsals by the sniper teams involved to avoid the chances of compromise. Brief each team on the link-up plan and signals. The relieving team need only take into the hide site sufficient equipment to continue the operation. The outgoing team may leave behind all camera and optics equipment. This begins with the outgoing team preparing all of their equipment for extraction before the last light. When ready, the team leader leaves one man on observation duty and centralizes the rest of the team for departure. The incoming team, on entry to the hide site, positions one man as observer and places the rest of the team on security to aid in link up procedures. Both team leaders go over the operational hand-over and on completion, the teams change over. The new team resets any early warning devices after the outgoing team has departed.

Emergency

E-40. An emergency situation generally arises as a result of the team being actively compromised or engaged. An emergency requires the team to either stay in the building and fight while waiting for quick reaction force extract, or exit the building with haste and perform urban evasion to an emergency extract point or link-up. While operating in support of large occupying military forces, it is better to remain in place (as the building is defendable) and have the quick reaction force move to the building where the team is located. SOPs and rehearsals should be specific to that particular type of urban terrain prior to conducting the mission.

INTERMEDIATE BARRIERS AND LOOPHOLES

Note. Ammunition REQUIRED to defeat barriers is Department of Defense Identification Code (known as DODIC) AB50, NSN: 1305-01-572-8492.

E-41. There are seven main types of glazing that snipers encounter in an urban environment. All seven glazing types are listed below:

- Float or annealed glass. Weakest type of glass. Will break into large, sharp shards when it fails.
- Toughened or tempered glass. Ten times stronger than float glass. Found in shopping and commercial sectors and vehicle side windows. Any glass that has a tinted or colored finish almost certainly is toughened glass.
- Heat strengthened glass. Not very common. Only used when extra thermal performance is required. Achieves half the strength of toughened glass.
- Wired safety glass. Old type of safety glass found in older buildings. The steel wires that run through the glass contribute no additional strength, they merely hold the glass together when it breaks.
- Laminated glass. Constructed of layers, usually float glass and a soft interlayer of translucent plastic. It is found in modern commercial windows, vehicle windscreens, and bullet resistant glass.
- Applied plastic films. A plastic film is applied to the window to upgrade the safety of existing structures. The film aids in keeping the shards of glass together when it breaks.
- Transparent polycarbonate. This material is not glass, but it is used in mass transit vehicles. It is very strong, tough material that can be used in windows. It does not have the brittle characteristics of glass and is stronger and lighter than untampered glass.

DEFLECTION AND DISINTEGRATION

E-42. Bullets that impact glass are deflected as they pass through the harder medium. The level of deflection depends on the various factors listed below:

- Type of glass.
- Type or design of bullet.
- Thickness or layers of glass.
- Angle of incidence of the bullet to the glass.
- Range from sniper to the glass.
- Distance to the target from the glass.

E-43. The least deflection of the bullet occurs when it strikes as near to 90 degrees perpendicular as possible. As the bullet impacts at a steeper angle, 45 degrees, it is deflected the shortest distance through the glass. To minimize this effect, the target should be as close to the glass as possible. The bullet starts to deflect as soon as it exits the glass, therefore, the bullet deflects from the point of aim the further it travels from the glass. The effect the glass has on the bullet causes it to break up and deform, often with the core and jacket separating.

Glass Spalling and Secondary Hazards

E-44. Spalling refers to the cloud of dust and glass fragments that are ejected from both surfaces of the glass as the bullet passes through it. Observations from prior tests conclude—

- The spalling forms a cone-shaped pattern with the tip at the bullet hole, spreading out as the distance increases from the glass.
- The potential for injury is reduced the further the innocent is from the glass.
- The spalling occurs at, or very near to, 90 degrees from the surface of the glass, irrespective of the angle of incidence to the bullet.
- The greatest hazard from spalling is from toughened glass, least hazard is from laminated glass, and no hazard from polycarbonate or other plastic windows.

E-45. Secondary hazards include bullet fragments or glass hazing, which is a concern with only toughened glass. Glass hazing happens once the bullet makes contact causing the glass to become opaque instantly. When the glass beads, it becomes covered with a haze of tiny cracks, which prevents any view through the glass, thus preventing any follow-up shots.

Firing From Behind Glass

E-46. In an urban hide, the sniper team may often be positioned close to a closed window. It is highly discouraged to engage a target by shooting through a window.

Note. A bullet fired through glass, placed close to the muzzle, can miss a target up to 50 meters away by several feet.

E-47. Whenever possible, snipers should locate urban hide sites so that snipers are not firing through glass. The following guidelines should be employed when this is not possible:

- If possible, open window covertly.
- If unable to open the window, a "brake and rake" method can be employed. This method requires a team member to break the glass prior to the sniper taking the shot. This would have to be well-rehearsed and planned accordingly.
- Removal of glass with a glass cutter or similar tool.

- Explosive methods can be used for laminated glass, but this method is beyond the scope of this training circular.

SYNCHRONIZED FIRE

E-48. The synchronized fire technique requires two snipers to fire a coordinated shot at the same point of aim. Coordinated shooting must be practiced and rehearsed. A sniper controller verbally coordinating a sniper pair by audible cue achieves coordinated shooting.

E-49. This method relies on the first round destroying much of the tensile strength of the glass prior to impacting the target. The second round then impacts the same target with a greater proportion of its original mass and energy. This method does not guarantee that the second round will not pass through without deflection.

Note. The two snipers must be close together to ensure both have as near to 90° line of fire as possible.

E-50. The shot command must be rehearsed and practiced prior to mission departure. The command is unit SOP dependent. If firing from behind glass, the method of opening and breaking the glass must also be coordinated within the sequence.

GLASS DEFEAT PLAN CHECKLIST

E-51. Snipers use the checklist below (figure E-4) prior to taking a shot through glass.

CHECKLIST FOR SHOOTING THROUGH GLASS

Ser	Factor	Operational Situation		Equipment/Aiming Considerations
1	Ammunition Type			
2	Range to glass	*optimum 100m		
3	Distance of target behind glass			
4	Angle of shot to glass	*optimum 90º		
5	Type of Glass	Confirmed YES | NO		
6	Is ammunition type suitable for glass?			
7	Backstop/proximity of innocents			
8	Degree of Accuracy Required			
9	Lighting/Identification			
10	Test Fired?			
11	Secondary Missile Hazard			
12	Firing from behind glass?	YES	NO	
13	Method of breaking glass available			
14	Clear secondary danger area			

Legend m meter SER series

Figure E-4. Checklist for shooting through glass

LOOPHOLES

E-52. Observers must ensure that they are well back from the window or open doorway and in the shadows when observing and firing through windows and exterior doors. Snipers must be aware of lens flare and reflection. They should leave windows exactly as they are and observe around curtains or through blinds if possible.

E-53. The enemy sniper, observer, or sentry will usually notice a new loophole in the side of a building so snipers should use existing shot holes (prior battle damage) whenever possible. If using this type of observation aperture, the sniper should stay back behind the loophole to deny their outline or shine from being detected. Snipers should ensure enough clearance is present to take a shot.

WIND EFFECTS IN URBAN TERRAIN

E-54. Urban winds can become confusing, contradictory, and difficult to estimate. Winds that flow through major cities have winds that vary direction and speed, gusting perplexedly at one moment, then blowing steadily at another. Winds that flow through a city are like winds that flow through a canyon or valley, the winds become compressed and decompressed depending on the structural layout (figure E-5, page E-18).

E-55. A building will block the prevailing wind. There is clean air above the building, and very dirty air next to the building. Avoid these areas when possible due to turbulent and unforgiving winds.

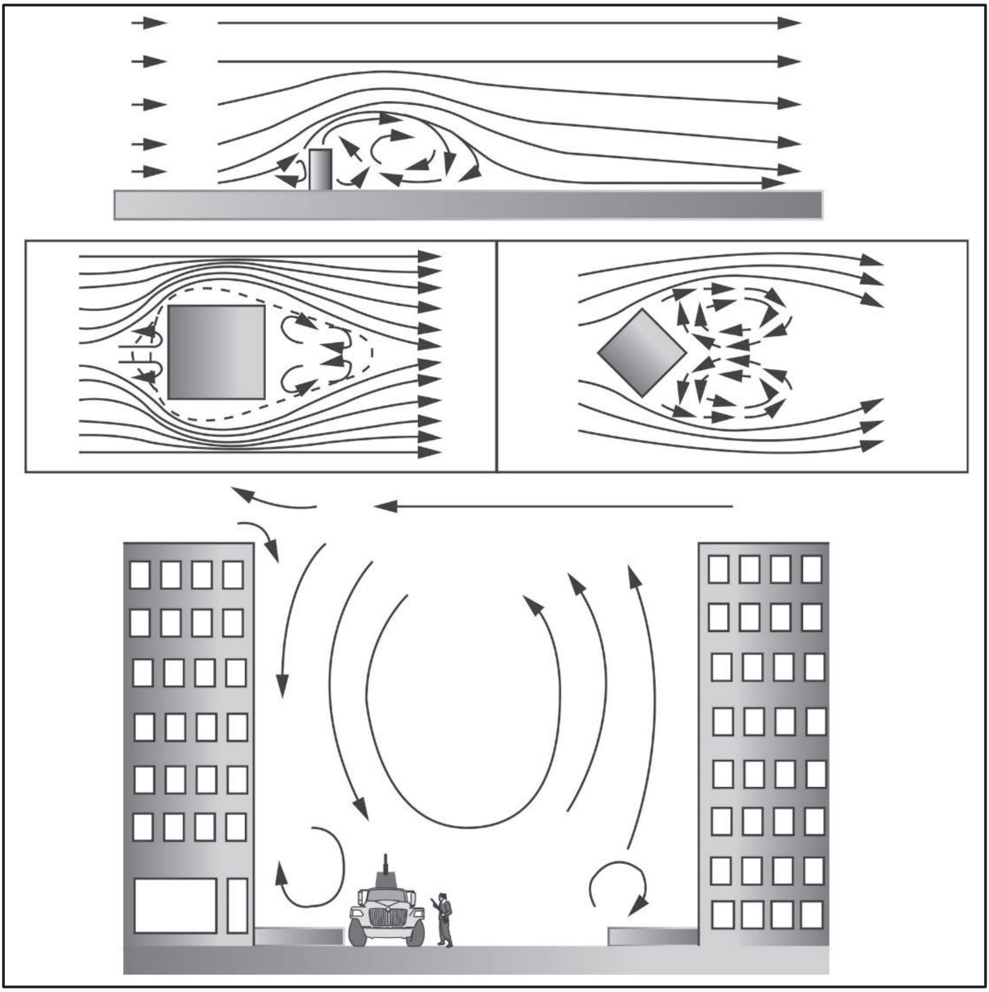


Figure E-5. Wind in urban terrain, example

Appendix F
Mountain Considerations

The height of mountainous terrain permits excellent long-range observation. However, rapidly fluctuating weather with frequent periods of high winds, rain, snow, or fog may limit visibility.

Reduced mobility, compartmented terrain, and the effects of rapidly changing weather increases the importance of understanding micro relief interpretation, detailed terrain analysis, and other limiting factors that can affect the mission. When planning and conducting a sniper mission, the sniper team and leadership need to pay particular attention to the topics covered in this appendix.

TRAINING CONSIDERATIONS

F-1. If deploying to a mountainous area, additional emphasis should be placed on the following skills:

- Mountaineering techniques.
- Survival in mountainous terrain.
- Medical training that address extremity injuries, physiological effects of high altitude operations, and medical evacuation procedures particular to the terrain.
- Use of satellite communication devices and techniques.
- Rotary-wing training (insertion and extraction techniques).
- Target detection, identification, and engagement (chapter 8 of this publication).
- High angle shooting (appendix C of this publication).
- Danger space, swept space (chapter 8 of this publication).

F-2. If deploying to a mountainous environment snipers must have attended the U.S. Army Mountain Warfare School, Mountain Rifleman Course, or similar course, such as the U.S. Marine Corps [USMC] Mountain Scout Sniper Course, International Special Training Center [ISTC] High Angle Course.

F-3. The purpose of the Mountain Rifleman's Course is to train snipers in a combination of mountain specific skills and angle marksmanship fundamentals. The goal is improving mobility and lethality in mountainous terrain.

F-4. The U.S. Army Mountain Warfare School, Jericho, Vermont conducts the eight-day course. Snipers have extensive shooting opportunities at both flat and angle ranges. They are taught basic mountain mobility and navigation skills. The skills are then combined in practical exercises that test a student's ability to plan and execute missions in mountainous terrain.

F-5. The tasks taught are—

- Mountain travel techniques.
- Cold weather clothing.
- Environmental injuries.
- Soldier load management.
- Characteristics of mountain terrain.
- Basic mountaineering equipment.
- Long range marksmanship in mountainous terrain.
- Map reading in mountainous terrain.
- Terrain exploitation.
- Land navigation.

F-6. Upon graduation, students will have the following skills:

- Capable of providing long range precision rifle fire on targets in mountainous terrain under adverse environmental conditions.
- Ability to navigate and efficiently negotiate difficult mountainous terrain by foot.
- Proficient with technical rope methods used to negotiate high risk mountainous terrain setup for a target of opportunity.

EMPLOYMENT CONSIDERATIONS

F-7. Sniper teams need to take a great deal of consideration when it comes to planning and employment. Sniper teams must conduct a detailed map analysis to consider the following:

- Terrain and environmental weather (wind).
- Environmental effects on the weapon system and projectile.
- Terrain and environmental effects on sniper team movement.
- Terrain and environmental effects on sniper team communication.

TERRAIN ANALYSIS FOR WINDS

F-8. After using the macro-level wind forecasting techniques found in the planning chapter, snipers should fine-tune their wind forecasts based on micro-level local effects, many of which are described below. Knowledge and training that benefit the sniper are—

- A basic understanding of the atmosphere and how the weather works.
- An understanding of how terrain influences the weather, wind patterns, and its effects in different environments.
- An understanding of interpreting weather changes once out in the field.

Mountain Breeze

F-9. This breeze is simply a stronger case of drainage wind in a mountainous area. At night, radiation cools the mountainside air (figure F-1). As the cooler air becomes denser, it sinks toward the lower elevations and collects in the valleys

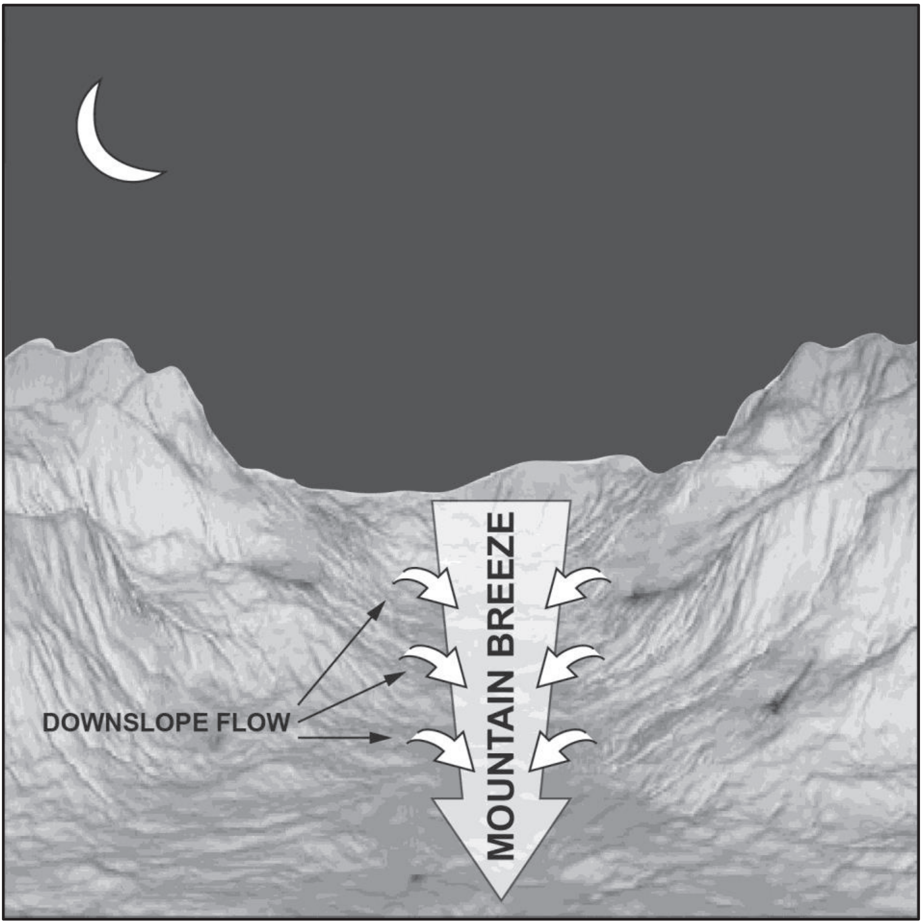
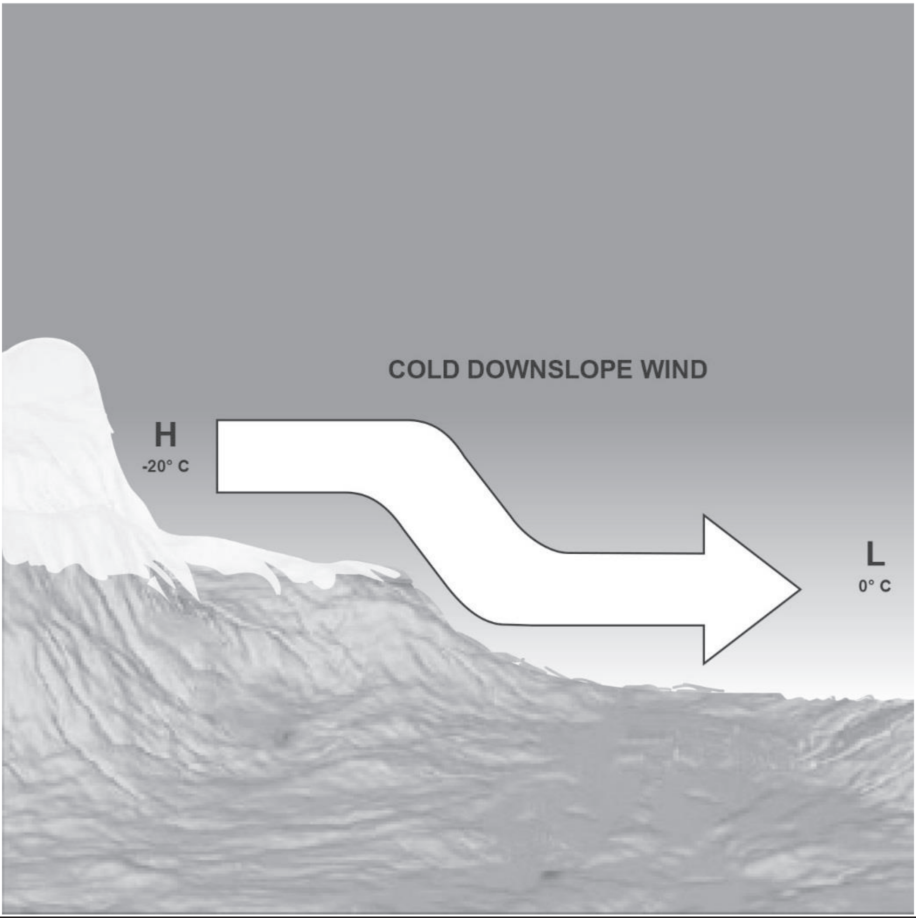


Figure F-1. Mountain breeze

Fall Wind

F-10. Typically, this cold wind originates in snow-covered mountains under high pressure. The air on the snow-covered mountains cools enough so that it remains colder than the valley air despite adiabatic warming upon descent. Near the edges of the mountains, the cold air flows rapidly through gaps and saddles down to the valley below. The glacier wind, one type of fall wind, is most noticeable during summer due to the large temperature differences (figure F-2).



Legend

C	Celsius
H	high
L	low

Figure F-2. Fall wind

Valley Breeze

F-11. These winds flow in the opposite direction to the mountain breeze described above. The valley breeze develops during the day as the sun rapidly heats the mountain slopes (more quickly than the protected valleys) (figure F-3). Air from the valley then slides upward to replace the buoyant, heated air rising from the mountain slopes. Consider the following:

- The breeze averages about 14 miles per hour.
- The stronger the heating, the stronger the wind. The early afternoon, therefore, is the most favorable time for the strongest winds.

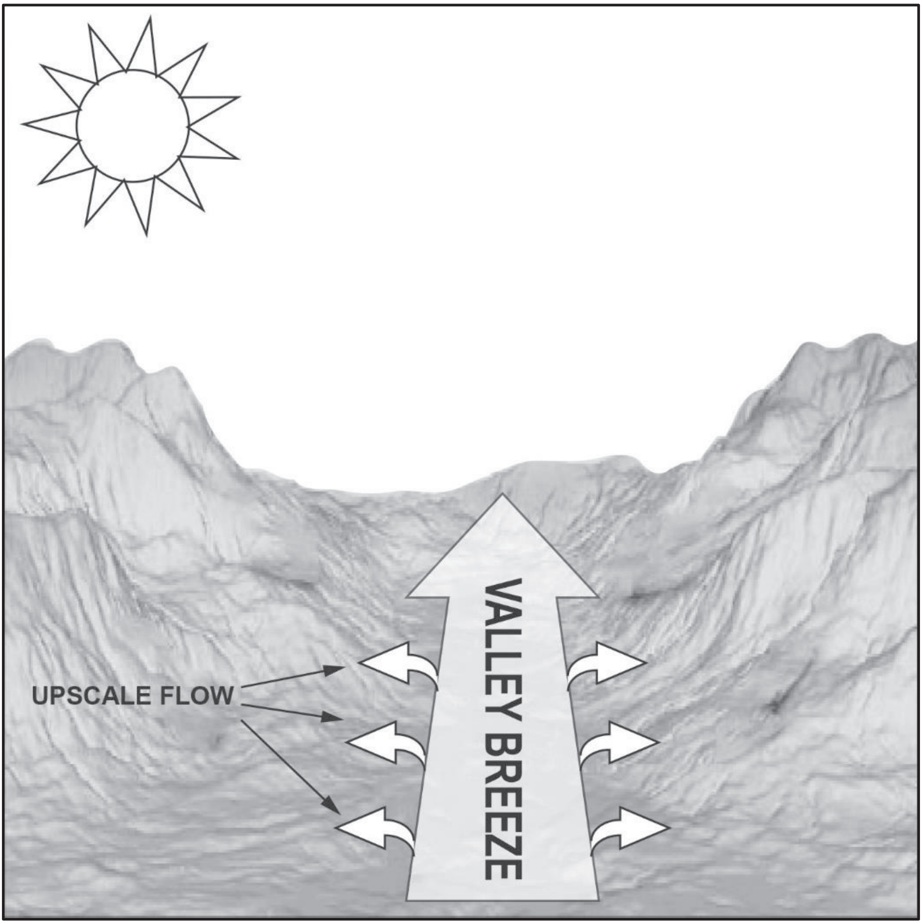
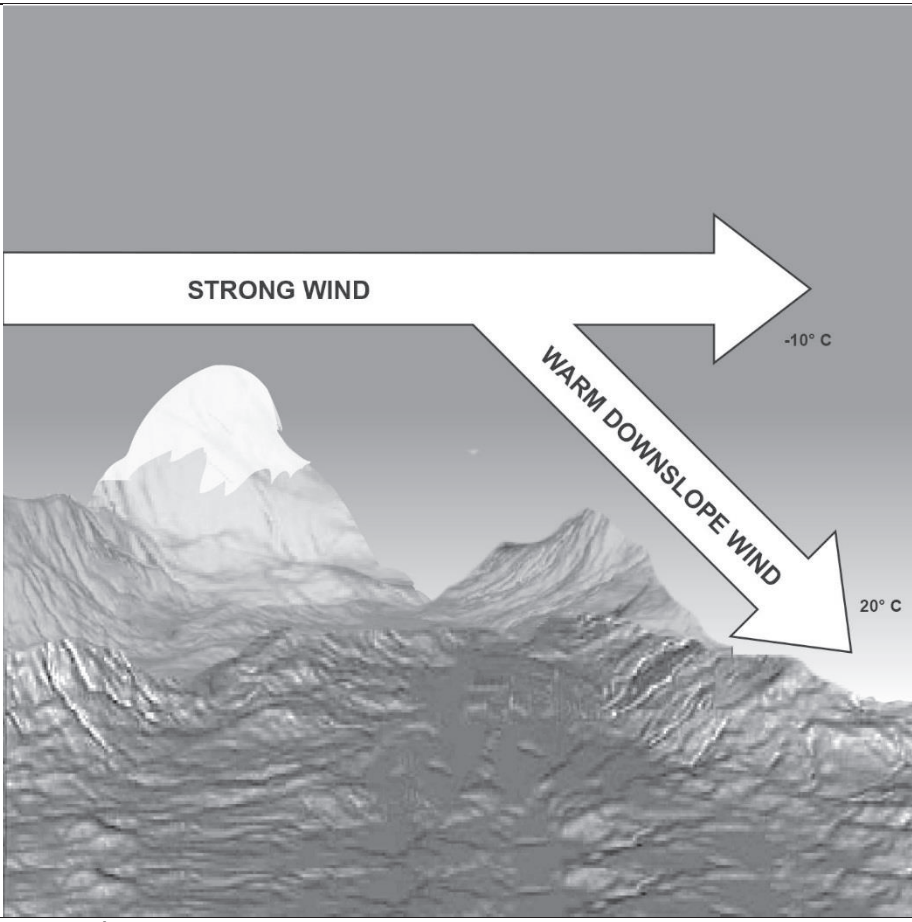


Figure F-3. Valley breeze

Foehn (Chinook) Wind

F-12. This warm wind flows down the leeside of mountains. The wind forms when moist air is forced to ascend on the windward side of a mountain and then descends on the leeward side. As the air rises on the windward side, it expands and cools at the relatively slow moist adiabatic cooling rate. The moisture in the air condenses into clouds (and precipitates out). As the now dry air descends on the leeward side, it is compressed and heated relatively quickly at the dry adiabatic heating rate. The result is a very strong, warm, and dry downslope wind (figure F-4).



Legend C centigrade

Figure F-4. Chinook wind

Channeled and Gap Winds

F-13. Wind channels through gaps in terrain (figure F-5). Wind speeds can double when moving through such constrictions in the terrain.

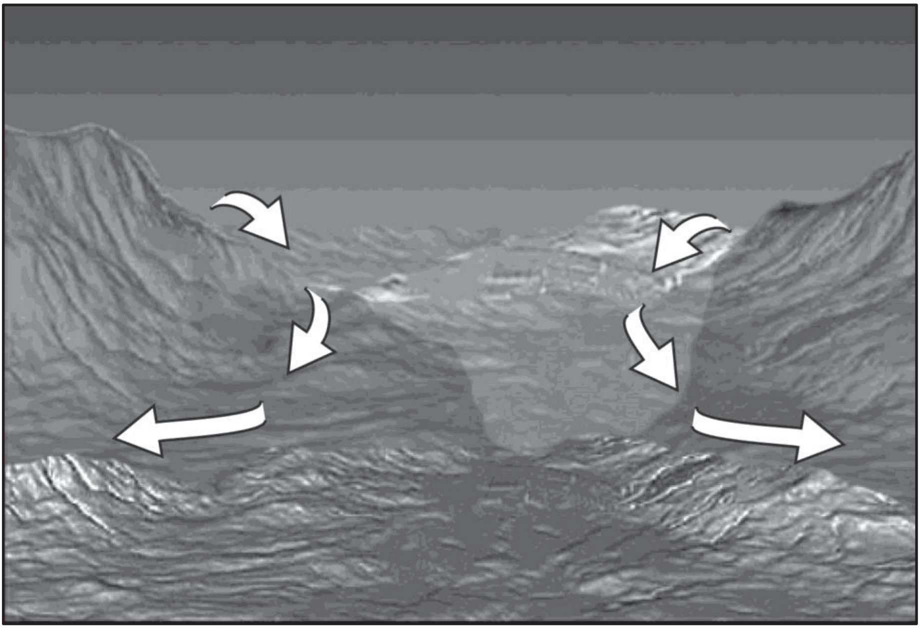


Figure F-5. Channeled and gap winds

Converging and Diverging Winds

F-14. The arrangement of mountain ridges, peaks, and valleys do more than just channel the wind in a new direction, it may split the wind flow, diverting it in two or more new directions. Converging winds will do the opposite and converge in the main valley (figure F-6).

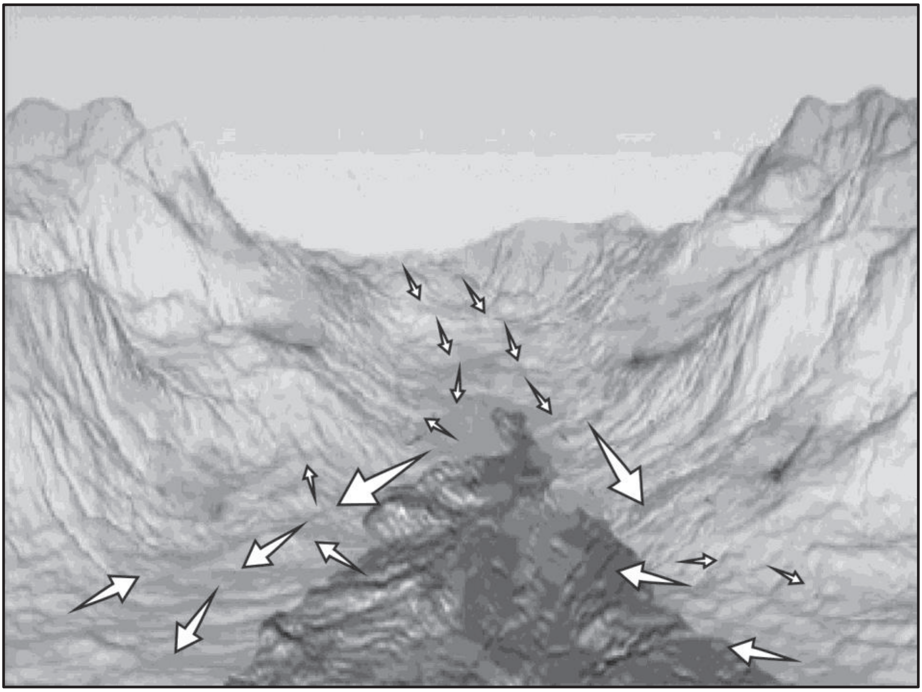


Figure F-6. Converging and diverging winds

Environment Analysis for Projectile And Weapon System

F-15. A system (sniper/rifle/ammo) and the combination of high altitude and long line of sights, can make sniper employment in mountainous terrain a much more efficient tactic. The higher elevations extend the effectiveness of a sniper weapon system substantially. The effect can be on the order of a 10 percent increase in hit percentage for every 5000 feet sea level gained.

F-16. Air density is 15 percent less at 5000 feet altitude when compared to sea level. This has the same effect as shooting a bullet with a 15 percent higher bullet coefficient at sea level. This means that the team can extend the effectiveness of the sniper weapon system. By extending the super-sonic portion of the flight of the projectile, sniper teams are able to push the transonic effects of the projectile further out.

Note. Transonic effects are a factor because the aerodynamics and stability of a bullet are less predictable at this speed.

Lubricants

F-17. Operations in mountainous terrain provide unique problems for the employment and function of sniper weapon systems. Most lubricants thicken at colder temperatures, causing weapons to become sluggish or freeze, which induces malfunctions (semi-auto sniper systems). The use of LAW (lubricant, artic weather, NSN 9150-00-292-9689) is the established cold weather lubricant for the Army.

Note. Refer to each sniper weapon's technical manual for appropriate temperatures to apply LAW or other lubrication procedures.

Condensation

F-18. Condensation forms on weapons when they are taken from a cold environment into a warmer environment. This process is known as sweating and can cause weapons under certain conditions to malfunction.

Note. Sweating process can continue for approximately 1 hour. It is advised to wait until the sweating process has concluded before cleaning.

Breakage and Malfunction

F-19. Breakage and malfunctions occur as the extreme cold causes metal and plastic to become more brittle then normal. Breakage usually occurs early in firing when the components are warming, expanding rapidly and unequally. Weapons should be kept free of snow and ice whenever possible to minimize the effect.

Visibility

F-20. Firing the weapon in temperatures below -20 degrees F can obscure visibility. As the round leaves the weapon, the water vapor in the air is crystalized creating small ice particles. If the air is still, the fog can remain along a snipers line of sight for several minutes.

Emplacement

F-21. Sniper weapon systems need a solid base of support to be effective. In winter environments, a soft snow base gives under recoil of the weapon. Be cautious of emplacing a weapon system on frozen ground, as it can result in slippage and breaking of the ice. Tripods or other means of support should be dug in. To solve the problem of deep snow, the sniper team can use snowshoes, skies, sleds, and other field expedient platforms to aid in the stability of the weapon.

F-22. Sniper teams need to consider the ground when constructing hide sites. The ground at higher elevation is often made up of rock and shallow dirt, which can be very difficult to dig, making construction of a long term, deliberate hide site difficult.

Terrain Analysis for Team Movement

F-23. The sniper team must consider before every movement the effects of canalizing and restrictive terrain and how it can force a team into enemy engagement zones. In mountainous terrain, the decision to climb to high ground should be made by using all available intelligence. Considerations must be given to all aspects of METT-TC with particular emphasis on the cumulative effects of altitude, extreme terrain, and weather. Sniper teams must develop flexible plans for control of fire, maneuver (navigation), communications, and logistics.

F-24. A pre-operation intelligence effort must include topographic and photographic map coverage and full motion video surveillance (when available) as well as a detailed weather data for the area of operation. Sniper teams need to know the characteristics of terrain and vegetation to plan their camouflage and concealment (hide sites) plans accordingly.

Sniper's Load

F-25. A sniper's load is a leadership responsibility regardless of the operating environment. Mountainous terrain taxes a sniper's strength and endurance, and can have a serious impact on the mission. The leader's involvement in analyzing the team's loadout and the level of risk involved is mission essential.

F-26. Each mission requires an analysis of the essential items that are necessary for survival and combat operations, including environment, weather, mission purpose, and duration. To assist in managing a sniper team's loadout, leaders can use the acronym DROP described below:

- **D** Decide mobility level.
- **R** Reduce unnecessary gear.
- **O** Organize resupply methods.
- **P** Police the team (inspection before departure).

Terrain Analysis for Team Communication

F-27. In very cold weather, ionospheric storms and night lights can degrade sky wave propagation and disable radio communications. Static can block frequencies for extended periods; changes in the density and height of the ionosphere can fade a signal for weeks. When these disturbances occur, radio operators must be ready to use alternate frequencies or other means of communication. To reduce the effects of these elements, the operator should—

- Install a counterpoise far enough above ground to prevent the snow from covering it. This improves ground wave transmission; frozen ground conducts electricity too poorly to propagate ground waves well.

- Handle the mast sections and the antenna cables carefully; they become brittle at very low temperatures.
- Run antenna cables overhead to avoid damage from heavy snow and frost. Use nylon rope for guy-wires rather than cotton or hemp. Nylon absorbs less moisture, so it is less likely to freeze and break.
- Use extra guy-wires, supports, and anchors to help antennas withstand heavy ice and wind loading.
- Allow radios to warm up for several minutes before use. Since extreme cold lowers the voltage output of a dry battery, try warming the battery before operating the radio set. This minimizes frequency drift.
- Cover all antenna elements with polystyrene tape and shellac. Flakes or pellets of high, electrically charged snow have been reported in northern regions. When these particles strike the antenna, the resulting electrical discharge causes a high-pitched static roar that can blanket all frequencies.
- Before cold equipment is brought into a heated area, wrap it in a blanket or parka to ensure that it warms gradually to reduce sweating. If the cold equipment is brought suddenly into contact with warm air, moisture condenses on its parts causing the equipment to sweat.
- Thoroughly dry all equipment before taking it back out into the cold. Otherwise, moisture caused by sweating will freeze the equipment.

F-28. Operation in mountainous areas presents many of the same problems as operation in northern or cold weather areas. It also makes selecting transmission sites a critical task.

F-29. Terrain restrictions often make relay stations necessary for good communications, and terrain obstacles often make line-of-sight transmission necessary.

F-30. Also, the dirt in mountainous areas seldom conducts electricity well. To reduce the effect of these elements, the operator should use a complete antenna system, such as a dipole or ground-plane antenna, with a counterpoise.

Note. Satellite communication and global positioning systems can be limited by terrain.

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Appendix G
Desert Considerations

There are various types of deserts that the sniper may encounter throughout the world. Snipers must be prepared to operate within the conditions of each type of desert.

TYPES OF DESERTS

G-1. The various types of deserts are described below:

- Dry desert. Very hot and dry climate from a lack of water. The Sahara desert in North Africa is an example.
- Ice desert. Very cold and dry desert found near the poles. Antarctica is an example of an ice desert.
- Stone or rocky deserts. Surface is made from rock and debris. During the day, it is extremely hot and at night, it is very cold. Hammadah du Draa in Western Sahara is an example.
- Gravel desert. Surface is made of small pebbles that lay together from the erosion of stone and rocky deserts. Parts of the Sahara are gravel deserts.
- Sandy deserts. Surface is made of sand and high dunes. The Rub al Khali in Saudi Arabia is an example.
- Salt deserts. Salt deserts exist on the surface of a salt crust and since no plant can grow, it is considered a life-threatening desert. Many of these deserts are located in Iran and Central Asia.

CAMOUFLAGE

G-2. The sniper should do an analysis of the terrain and vegetation prior to conducting the mission. In arid and semi-arid environments, the sniper might have natural vegetation to work from, whereas in a sandy-type desert, the sniper must utilize other methods of concealment. Some basic considerations the sniper can use are—

- Blend of tan, brown, and gray colors as a base for the ghillie suit.
- Spray paint over whites.
- White or tan bed sheets spray painted.
- Tarps and ponchos sprayed in spray glue adhesive then covered in sand or the ground that the sniper team is operating within. This is the preferred method as it allows the sniper to gain a direct imprint of the ground that they are operating in and doesn't give off a shine like artificial concealment tarps and nettings tend to do.

G-3. The sniper uses the same basic concealment techniques as in a "green" environment. The sniper must—

- Avoid sky-lining or paralleling the target.
- Alter familiar outlines such as the head, shoulders, and arms.
- Maintain strict noise discipline as sound can travel further in an open, desert environment.
- Avoid unnecessary movement.
- Avoid shiny reflections.

HIDE SITES

G-4. When constructing a prepared hide site, snipers must use common sense and imagination, while at the same time factoring in construction time and protection from the sun. Some considerations are—

- Don't try to dig into the ground. Time will be wasted as the ground in most deserts is too hard to dig in.
- Protection against the heat and sun. Snipers should use a layered approach to constructing a hide site. Several layers (spaced apart) can aid in maintaining a workable temperature within the hide site and can also aid in protection from thermal devices.
- Stay away from water spots and natural lines of drift.
- Be aware of hard edges and shadows. Snipers must use screens to their advantage and avoid dark spots.

ANALYSIS

G-5. The desert normally permits observation and fire to maximum ranges. The terrain is generally wide open, and the exceptionally clear atmosphere offers excellent long-range visibility. Combining this with a powerful sun and low cloud density results in nearly full light and visual clarity, which often contribute to gross underestimations of ranges. Errors of up to 200 or 300 percent are not uncommon. Sandstorms and mirages (heat shimmer caused by air rising from the sweltering daytime desert surface) may severely affect visibility conditions. Additionally, the spotter's ability to observe trace and provide follow-on corrections may be hindered by the percentage of humidity in the area. To accurately spot trace and not have to use the splash of the round for subsequent follow-on corrections, the relative humidity needs to be at or above 20 percent. This should be factored into the team's planning considerations as well as trained.

EMPLOYMENT CONSIDERATIONS

G-6. Range and wind estimation is particularly difficult in trackless desert environments. The desert offers few visible objects or terrain features to establish perspective or scale. Range estimation methods have to be altered to extract precision. Utilizing an LRF or map and global positioning system techniques provides the sniper team with better results than the other range estimation techniques. However, the LRF is easily defeated by the high level of sand and other particulate in the air causing regular false readings. It is recommended that the sniper use multiple range estimation techniques to ensure that the range of the LRF is correct. The use of constants acquired from the dope book are a good start. The team should measure standard military items (vehicles, weapons, equipment) in addition to indigenous items.

G-7. Wind direction is discernable at times by looking at how it sculpts sand drifts. Mirage is efficient when reading wind, but has a significant impediment to long range observation and aiming. The sniper team should look to locate their final firing point on high ground, so they are looking and firing downward through the mirage, where it's thinner.

G-8. The sniper must be cautious to use the same vegetation estimations for wind as they would in other parts of the world. The vegetation in arid environments is not the same as what a sniper might see at Fort Benning, GA. Snipers must develop a new estimate scale for each environment in which they operate.

G-9. Be prepared for the night. If concealment is perfect during the day, the bright tan or desert camo will reflect in the moonlight. The opposite can be said for the use of multi-cam or scorpion pattern uniforms. These uniforms appear as dark spots in the moonlight and under night vision. Prior planning for the illumination is paramount. It is recommended that the team tailor the mission uniform to suit their needs.

NAVIGATION

G-10. Dismounted movement in the desert is not efficient. Without natural concealment, dismounted movement over long distances risks compromise. Dismounted movement is limited to night to reduce the chance of being seen. Teams must be in place before sunrise to avoid being compromised.

G-11. When operating in the broad basins between mountain ranges or on rocky plateau deserts, there are frequently many terrain features to guide movement. Observing these known features over great distances may provide a false sense of security in determining the precise location unless snipers frequently confirm their location by resection or referencing close-in terrain features. It is not uncommon to develop errors of several kilometers when casually estimating a position in this manner. Obviously, this can create many problems when attempting to locate a small checkpoint or objective, calling for combat support, reporting operational or intelligence information, or meeting combat service support requirements.

G-12. When operating in an area with few visual cues, such as a sandy or dune desert, or when visibility is restricted by a sandstorm or darkness, snipers must proceed by dead reckoning. Understanding mobility and speed are keys to successful desert operations. The speed of execution is essential. Everyone moves farther and faster in the desert. Additionally, it is highly recommended when traversing desert dunes, to minimize following or moving along the peak of the dunes. This causes undue fatigue and considerably increases the duration of the movement.

COMMUNICATIONS

G-13. The factors that most affect radios and antennas in the desert are poor electrical grounding, temperature, humidity extremes, and wind-blown contaminants. For the best operation in the desert, the operator should locate radio antennas on the highest terrain available.

G-14. The high temperatures of the desert can affect radios. Radio sets can overheat and fail, so the operator should turn them on only when necessary and should keep air vents and filters clean. High temperature conditions also degrade radio wave propagation. A station that can be reached at night may not be reachable during the day.

Appendix H

Jungle Considerations

Jungles are rainy, humid areas with heavy layers of tangled, impenetrable vegetation. These large geographic regions are found in the tropics near the equator (Central America, along the Amazon River, South-Eastern Asia and adjacent islands, and vast areas in the middle of Africa and India).

ANALYSIS

H-1. Jungle warfare is unconventional. Planning is critical when conducting sniper operations. Orientation is on the enemy rather than on the terrain. Hills in the jungle are often too thickly vegetated to permit observation and fire, and therefore, do not always qualify as key terrain. In the jungle, roads, rivers and streams, fording sites, and landing zones are likely to be key terrain features. Snipers need to plan accordingly to maximize their field of fires when operating in the jungle.

H-2. Jungle areas are ideal for infiltration. Dense vegetation and rugged terrain limit the enemy's ability to detect movement. As a technique to move through the enemy's positions, infiltration can be used with other offensive maneuvers to gain an advantage in the jungle. Although jungle infiltrations are normally conducted on foot, under certain circumstances helicopters or watercraft may be used. Normally, infiltrations are difficult to control. Chances for success are better if snipers are well-trained, well-briefed, and well-rehearsed. Roads, trails, and streams should be avoided because they are frequently under enemy surveillance. Movement by stealth is usually slow and exhausting. Phase lines, infiltration routes, and adequate communications must be used to control the operation and to coordinate fires with movement.

H-3. All movements of animals and men are marked by tracks and signs. Snipers must learn to read signs left in soft ground, in streambeds, on roads and trails, and near watering places and salt licks. Animals seldom move without a reason; a few fresh tracks supply information about the track's maker, their direction, and probable intentions. Animals avoid humans. The animals, their tracks, and their behavior can reveal whether or not humans are in the area. Jungle fighters can listen to the cries of animals and learn to recognize their alarm calls. The ability to track and to recognize signs in the jungle are valuable skills. Snipers should practice these skills throughout their time in the jungle.

H-4. Rapid, reliable communications are essential in jungle operations. Command, control, fire support, resupply, and evacuation are all dependent on effective communications. The importance of establishing and maintaining reliable communications cannot be over emphasized.

EMPLOYMENT CONSIDERATIONS

H-5. If deploying to a jungle area, additional emphasis should be placed on all of the considerations for the areas previously covered (urban, mountain, and desert). Jungles present similar challenges; the sniper encounters the same remoteness as when deployed to a mountainous region and the same survivability aspect of deploying to an urban region. Additional training emphasis should be given to—

- Stalking.
- Camouflage.
- Movement techniques (river crossings).
- Communications (field expedient antennas).
- Advanced medical training appropriate to climate and region.
- Rotary-wing training (insertion and extraction).
- Amphibious training with water craft, including loading, unloading, and tip drills.
- Helocasting.
- Fast rope insertion and extraction system.

COMMUNICATIONS

H-6. Communications in jungle areas must be carefully planned. Thick jungle growth vertically polarizes radio frequency energy, which reduces transmission ranges. Heat and humidity increase maintenance problems. To reduce the effects of these elements, the operator should—

- Keep all cables and connectors (antenna, power, and telephone) off the ground to reduce damage from moisture, fungus, and insects. After repairs or damage, paint all surfaces of equipment with fungus-resistant, moisture-proofing paint.
- If possible, clear vegetation from antenna sites. Foliage touching an antenna will ground its signal.
- If vegetation cannot be removed, especially in dense or wet vegetation, always horizontally polarize the antennas.

Note. Snipers need to seek out training on setting up and employing field expedient antennas.

Appendix I

Sniper Data Book

The sniper data book contains a collection of data sheets. The sniper uses the data sheets to record firing results and to log the atmospheric and light conditions during a firing iteration. The sniper data book includes reference sheets on formulas, measurement conversions, target data, sketches, and so forth. The sniper uses these logs to have a better understanding of their weapon system and their performance while in the field.

DATA BOOK

I-1. The sniper records information on the data sheet before, during, and after firing. The sniper must maintain a shot log for their individual sniper weapon system. The shot log must stay with that weapon system. The sniper section leader and arms room noncommissioned officer monitors the shot log.

BEFORE FIRING

I-2. Before firing, record—

- Actual range used (for example, English or Porter).
- Date (YYYY/MM/DD).
- Time (HHHH).
- Rifle and scope serial numbers.
- Ammunition type and lot number.
- Temperature (Fahrenheit or Celsius).
- Humidity (percent).
- Light (for example, overcast, clear).
- Mirage (for example, good, bad, or fair).
- Direction the wind is blowing by drawing an arrow and record its cardinal direction.
- Average wind velocity.
- Direction the light is shining by drawing an arrow.

DURING FIRING

I-3. While firing—

- Record the elevation setting used and any correction needed.
- Record the windage setting used and any correction needed.
- Record the information for each shot in columns 1 through 10. Column 1 is for the first round; column 10 is for the tenth.
- Record the elevation setting.
- Record the windage used.
- Record the location of the aiming point at the time the weapon fired. Place a dot on the target or give a clock direction and distance.
- Record the exact impact of the round on the target. Write the shot's number in the same place where the target hit.

AFTER FIRING

I-4. After firing, the sniper should record their comments about the weapon, the firing conditions (for example, the time allowed for firing), or their condition (such as emotional or physical state).

COLD BORE

I-5. Cold-bore data collection is a method to determine where the first round will strike the target. This data is gathered at various ranges and in different environmental conditions to determine the settings needed to hit the target at a given distance. To fire for cold bore data collection—

- Select a target, and dial in the elevation and windage settings needed to hit it.
- Fire one round without correcting the scope.

I-6. Measuring the distance from the point of impact and the targets center of mass for the first two rounds of the day lets the sniper predetermine the corrections to apply their scope to achieve a first round hit. As part of this collection process, the team also gathers the data on previous engagements needed to successfully engage their target.

ANALYSIS

I-7. When the sniper leaves the firing line, they compare weather conditions to the information needed to hit the point of aim or point of impact. Since the sniper fires in all types of weather conditions, they must know how to handle the temperature, light, mirage, and wind. To analyze the shots—

- Compare sight settings with previous firing sessions.
- Compare ammunition.
- Compare all groups fired under each condition.
- Make corrections.
- Analyze a group on the target.

COMPARE SIGHT SETTINGS WITH PREVIOUS FIRING SESSIONS

I-8. If the sniper always has to fine-tune windage or elevation, they might need to change the sight (for example, slip a scale).

COMPARE AMMUNITION

I-9. The sniper must compare ammunition by lot number for the best rifle and ammunition combination.

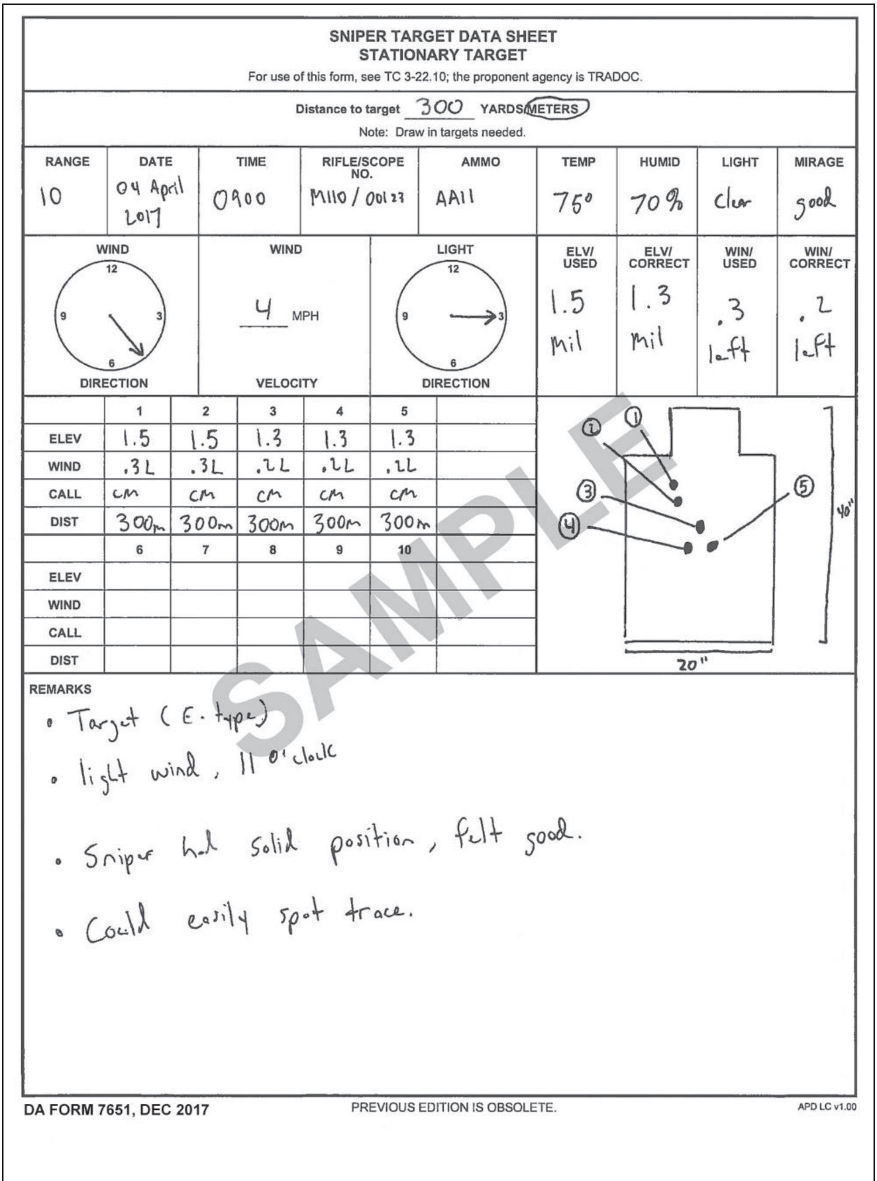
COMPARE ALL GROUPS FIRED UNDER EACH CONDITION

I-10. The sniper checks the low and high shots, including those to the left and the right of the main group. The less the dispersion, the better the shot is. The sniper can move tight groups to the center of the target easily. Loose groups can indicate a problem with the scope or rifle. The sniper checks the scope focus and ensures the rifle is cleaned correctly. Checking the remarks in the sniper data book might help the sniper to pinpoint the problem.

MAKE CORRECTIONS

I-11. For future reference, the sniper must record corrections, such as position and sight adjustment information, in the sniper data book.

I-12. Figure I-1, page I-4, and figure I-2, page I-5, are two examples of properly filled out data sheets: DA Form 7651, *Sniper Target Data Sheet Stationary Target*and DA Form 7636, *Sniper Target Data Sheet Moving Target*.



SNIPER TARGET DATA SHEET
STATIONARY TARGET
For use of this form, see TC 3-22.10; the proponent agency is TRADOC.

Distance to target 300 YARDS/METERS

Note: Draw in targets needed.

RANGE	DATE	TIME	RIFLE/SCOPE NO.	AMMO	TEMP	HUMID	LIGHT	MIRAGE
10	04 April 2017	0900	M110 / 00123	AA11	75°	70%	Clear	good

WIND DIRECTION	WIND VELOCITY	LIGHT DIRECTION	ELV/ USED	ELV/ CORRECT	WIN/ USED	WIN/ CORRECT
12 3 6 9	4 MPH	12 3 6 9	1.5 mil	1.3 mil	.3 left	.2 left

	1	2	3	4	5
ELEV	1.5	1.5	1.3	1.3	1.3
WIND	.3L	.3L	.2L	.2L	.2L
CALL	CM	CM	CM	CM	CM
DIST	300m	300m	300m	300m	300m
	6	**7**	**8**	**9**	**10**
ELEV					
WIND					
CALL					
DIST					

REMARKS

- Target (E-type)
- light wind, 11 o'clock
- Sniper had solid position, felt good.
- Could easily spot trace.

DA FORM 7651, DEC 2017 PREVIOUS EDITION IS OBSOLETE. APD LC v1.00

Legend

AMMO	ammunition	hrs	hours
DIST	distance	m	meters
ELEV	elevation	mm	millimeter
elv	elevation	WIN	windage

Figure I-1. Completed DA Form 7651, example

SNIPER TARGET DATA SHEET
MOVING TARGET

For use of this form, see TC 3-22.10; the proponent agency is TRADOC.

Distance to target 300 YARDS/METERS

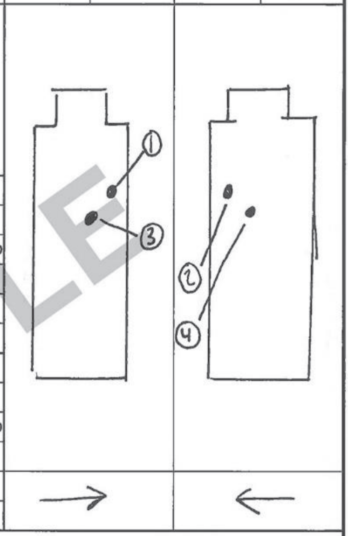
Note: Draw in targets needed.

RANGE	DATE	TIME	RIFLE/SCOPE NO.	AMMO	TEMP	HUMID	LIGHT	MIRAGE
10	04 April 2017	0930	M2010	A191	70°	40%	overcast	poor

WIND	WIND	LIGHT
12, 3, 6, 9	4 MPH	12, 3, 6, 9
DIRECTION	VELOCITY	DIRECTION

	1	3	5	7	9	
ELEV	.8	.8				
WIND	0	0				CORRECT LEAD
LEAD	1.2	1.1				
MILS						
DIR						

	2	4	6	8	10	
ELEV	.8	.8				
WIND	0	0				CORRECT LEAD
LEAD	1.2	1.1				
MILS						
DIR						



REMARKS

- Target speed in Mils (1 second) x TOF (in seconds) = mil hold
  3 x .4 = 1.2 mil lead
- Sniper used cm hold, ambush technique, felt rushed on 1st shot
- Target, stype cut in half.

DA FORM 7636, DEC 2017 PREVIOUS EDITION IS OBSOLETE APD LC v1.00

Legend

dir	direction	mph	miles per hour
ELEV	elevation		

Figure I-2. Completed DA Form 7636, example

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Appendix J

Training and Qualification

Snipers must be technically competent and tactically proficient in the employment of their sniper weapon systems to successfully conduct decisive action tasks in any operational environment. Snipers must develop and sustain tactical skills that allow them to maneuver effectively, observe, report information, employ accurate and precise fire onto targets, and survive on the battlefield. This combination of weapon system marksmanship and tactical skills training is essential for total weapon system proficiency.

SNIPER WEAPON SYSTEM TRAINING STRATEGY

J-1. The sniper weapon system training strategy uses a progressive and systematic methodology which is common for all weapons and weapon systems. The training events are provided in the standard Integrated Weapons Training Strategy format of six tables. Table J-1, page J-3, provides a visual overview of the sniper weapon system training strategy.

J-2. The integrated weapons training strategy (TC 3-20.0) describes how all weapon and direct fire system training activities interact as a holistic training strategy. The sniper must complete all gates to become qualified on the assigned sniper weapon system.

Note. Refer to TC 3-20.0 for more information.

J-3. The events listed in the strategy directly correlate to the sniper's assigned weapon and equipment including primary sights, secondary sights, pointers, illuminators, lasers, and thermal optics as assigned. The availability and assignment of these devices determines which training events and qualifications the sniper must successfully complete to be considered weapon system qualified.

J-4. Light–Light Sniper Marksmanship. This level is specific to 11B and 19D Snipers assigned a sniper weapon system chambered in 7.62 mm or .300 Winchester Magnum (known as Win Mag).

J-5. Heavy–Heavy Sniper Marksmanship. This level is specific to 11B, 19D, and 89D in modified table of organization and equipment units that are assigned a sniper weapon system chambered in .50 caliber.

UNIT SUPPORT

J-6. The intent of this training strategy is to improve U.S. Army tactical-level commanders' knowledge of what snipers are trained to do and what training is required to maintain their combat proficiency.

J-7. The organization of snipers is continiously evolving and is dicated by the current modified table of organization and equipment, unit commander, threat, and theater of operations. Therefore, the unit commander who is responsible for their assigned snipers must provide external support to the sniper section during their quarterly training.

RANGE SELECTION

J-8. Units must consider several factors to determine the training location for live-fire training events. Unit leaders and the sniper employment officer can identify the scope of the training event and identify the best facility to meet the training requirements. Once complete, the unit must conduct a range reconnaissance before requesting the facility to ensure it meets the intent of training.

J-9. The family of Army ranges provides the training venue for tables IV through VI. Each small arms range provides various capabilities based on the training focus of the facility. Sniper employment officers and planners must be familiar with the composition of each range type, the capabilities, intended use, and the range operations control area facilities associated with each.

J-10. For table VI, qualification, units can use a wide array of ranges to meet the requirement. Units can use a multipurpose range complex, a multipurpose machine gun range, a digital multipurpose range complex, or fire manuever ranges with stationary armored target/moving armored target (known as SAT/MAT) capabilities or other similair ranges to meet the standard.

Note. TC 25-8 provides detailed information on the Army's family of small arms ranges and their capabilities to include available targets for each facility.

Table J-1. Sniper weapon system training strategy overview

<table>
<tr><th rowspan="2">Weapon System</th><th rowspan="2">Track</th><th colspan="6">Table</th></tr>
<tr><th>I</th><th>II</th><th>III</th><th>IV</th><th>V</th><th>VI</th></tr>
<tr><td>LIGHT</td><td rowspan="2">A. Primary Optic (Day)

B. UNS, PIL, and Thermal Sight</td><td>PMI&E</td><td>CFFT</td><td>Drills</td><td>Group Zero True</td><td>Practice</td><td>Qualification</td></tr>
<tr><td>HEAVY</td><td>PMI&E</td><td>CFFT</td><td>Drills</td><td>Group Zero True</td><td>Practice</td><td>Qualification</td></tr>
</table>

***Notes*.**
1. All Soldiers conduct track A based on their DAY PRIMARY OPTIC
2. All Soldiers conduct track B when assigned a UNS to include thermal weapon sight.
3. There are no available virtual training systems for the sniper weapon system. Snipers conduct table II using the CFFT to conduct training on radio communication and recoding, range estimation, target acquisition, map reading and plotting, and indirect fire.

Units can also allocate time in table II to train field craft skills to include range estimation, target detection, concealed movement, land navigation, and hide site construction.

Legend

UNS	universal night sight
PIL	pointers, illuminators, and laser aiming devices to include weapon mounted laser range finders
PMI&E	preliminary marksmanship instruction and evaluation
CFFT	call for fire trainer

EQUIPMENT CONSIDERATIONS

J-11. The training strategy's six tables train, build, sustain, and assess the sniper's proficiency with their assigned sniper weapon system. The training strategy is designed to accommodate and train the weapon system's capabilities, based on the assigned or designated aiming devices and equipment. Sniper's train on the following aiming devices:

J-12. Track A, Primary Optic, Day. This track trains the skills required to use the primary optic for the weapon to include day optic and backup iron sight.

J-13. Track B, Universal Night Sight, Pointer, Illuminators and Laser Aiming Devices, and Thermal Weapon Sight. This capability track provides snipers with the skills in the use and employment of their sniper weapon system with an attached universal night sight sight to include thermal weapons sight and pointers, illuminators and laser aiming devices. Only snipers assigned a sniper rifle with an associated universal night sight or thermal weapon sight will execute this training plan. Snipers should complete track A, table VI, Qualification prior to conducting track B, table VI.

J-14. To meet the requirments to complete the sniper weapon system training strategy, units must provide all neccasary equipment to the sniper team. Units must provide all the required equipment to the sniper team so the team can complete the sniper weapon system training strategy. Equipment requirments include the following:

- Chronograph.
- Ballistic solver.
- Spotting scope.
- Spotting scope basic issue item that facilitates the combination of a spotting scope; tripod; and grip head with standard military, clip-on night-vision, thermal, and infrared illumination accessories.
- Long range thermal systems such as the Keyhole Sniper Optics and Route Clearance Optic Suite (known as RCOS).

FREQUENCY OF TRAINING

J-15. Snipers conduct the training tracks based on the weapon, primary optic, attachments, assigned aiming devices, and the Army component. Table J-2 shows the frequency of training. The numbers represent the times per year that a sniper conducts the qualification. All qualifications are valid for 12 months (referred to as the qualification duration or QD).

Table J-2. Frequency and qualification duration

	Track A	***Track B***
	Day	**UNS, PIL, Thermal**
AC	4	4
RC	2	2

Legend

UNS universal night sight
PIL pointer, illuminator, laser aiming device
AC active component
RC reserve component

Note. Snipers cannot change their qualification rating within 45 days from last qualification.

ANNUAL AMMUNITION ALLOCATION

J-16. Tables J-3 and J-4 show the authorized ammunition for the primary and secondary firers to execute table IV, V, and VI. If the firing unit requires additional ammunition, they must coordinate with their higher headquarters ammunition manager.

Table J-3. Primary firer annual ammunition allocation

Weapon System	*Table IV*	*Table V*	*Table VI*
M2010	Day: 180 rounds Night: 90 rounds	Day: 276 rounds Night: 138 rounds	Day: 92 rounds Night: 92 rounds
M110	Day: 180 rounds Night: 90 rounds	Day: 414 rounds Night: 138 rounds	Day: 184 rounds Night: 92 rounds
M107	Day: 80 rounds Night: 60 rounds	Day: 96 rounds	Day: 92 rounds Night: 92 rounds

Table J-4. Alternate weapon fire ammunition allocation

Second firer – M2010	Table VI, B	Day: 46 rounds	Night: 46 rounds
Third firer – M2010	Table VI, B	Day: 46 rounds	Night: 46 rounds
Second firer – M110	Table VI, B	Day: 184 rounds	Night: 92 rounds
Third firer – M110	Table VI, B	Day: 184 rounds	Night: 92 rounds

QUALIFICATION OVERVIEW

J-17. To qualify, snipers must use their weapon system's capabilities to defeat single and multiple target presentations (stationary and moving) in varying sequences, between 100 and to the range at which the bullet is traveling at Mach 1.2 (DAY) and 600 meters (NIGHT). Sniper must also demonstrate their ability to perform their duties as a spotter within their team.

J-18. Qualification for the sniper is a four-step process in Table VI, Qualification. The individual sniper will be evaluated on the following:

J-19. **Table VI A, Group, Zero, and True**. The sniper conducts a group, zero, and true for their assigned sniper weapon system. To receive a GO on their assigned weapon system, the sniper must achieve the following:

- Light Sniper Weapon Systems: 2 minutes of angle 5-round grouping at 100 meters.
- Heavy Sniper Weapon Systems: 3 minutes of angle 5-round grouping at 500 meters.

J-20. A NO-GO will not prevent the sniper from progressing to Table VI B, Alternate Weapon Fire.

J-21. Firers receive 100 points for a GO or zero (0) points for a NO-GO. Annotate the points earned.

J-22. **Table VI B, Alternate Weapon Fire**. The sniper conducts this event once with their assigned weapon and once using each of their team's other light or heavy sniper weapon system.

J-23. Table VI B consists of 10 rounds and 10 targets fired using known or unknown distances as follows:

- Light Sniper Weapon Systems: E-type or F-type silhouettes at distances no greater than 600 meters.
- Heavy Sniper Weapon Systems: Light-skinned vehicle that is stationary or moving targets and not to exceed distances of 1660 meters.

J-24. To receive a GO (100 points), the sniper must successfully hit 7 of 10 (70%) of the targets presented. Firers that fail to hit a minimum of 7 targets or fail to complete table VI B receive a NO-GO and zero points.

J-25. **Table VI C, Tactical Engagement**. Light Sniper Weapon System tactical engagements. The sniper conducts tactical engagements with their assigned sniper weapon system as listed on the unit's master authorization list. The sniper is given 20 rounds to engage and defeat 10 targets in 8 minutes, DAY and NIGHT (40 rounds, 20 targets total).

J-26. The tactical engagement requires each sniper to integrate a spotter, ballistic solver (ballistic computer), weather stations (where available), and basic issue items or additional authorized equipment that is a part of their sniper weapon system.

J-27. E-type and F-type stationary and moving targets. Range to target may not exceed the distance where the primary ammunition type drops below Mach 1.2 (DAY) or the firing optic's capabilities (NIGHT).

J-28. **Table VI C, Tactical Engagement**. Heavy Sniper Weapon System tactical engagements.

J-29. Light-skinned vehicle, stationary, or moving targets. Range to target may not exceed the distance where the primary ammunition type drops below Mach 1.2 (DAY) or the firing optic's capabilities (NIGHT).

J-30. Scoring for Table VI, C and tactical engagement is—

- 1st round hit = 10 points.
- 2nd round hit = 5 points.
- Failure to hit within two rounds or failure to engage target = 0 points.

J-31. **Table VI D, Spotting**. The sniper is graded on their ability to effectively spot rounds for another shooter within the team. The spotting event is evaluated while another team member is conducting their Table VI C, Tactical Engagement.

As the spotter, the sniper uses the assigned spotting scope to include all basic issue items and associated additional authorized equipment used by the sniper team.

J-32. The Table VI D, Spotting score is the same score the designated shooter receives on their table VI C:

- 1st round hit = 10 points.
- 2nd round hit = 5 points.

J-33. Failure to hit within two rounds or failure to engage target = 0 points.

INDIVIDUAL	*M110*	*M2010*	*M107*	*SPOTTING*
Sniper 1 assigned M110	Grouping Assessment Qualification	Alternate Weapon Fire	Alternate Weapon Fire	Spot for M2010
Sniper 2 assigned M2010	Alternate Weapon Fire	Grouping Assessment Qualification	Alternate Weapon Fire	Spot for M107
Sniper 3 assigned M107	Alternate Weapon Fire	Alternate Weapon Fire	Grouping Assessment Qualification	Spot for M110
Note. Snipers only need to complete one familiarization fire for their qualifiaction grade.				

J-34. Grading for the individual sniper is a weighted average grade for all four events as shown in the chart below.

EVENT	*GROUP*	*ALTERNATE WEAPON FIRE*	*PRIMARY WEAPON*	*SPOTTING*
% of qualification grade	25%	25%	25%	25%
Table of execution	VI	VI	VI	VI

J-35. Snipers must receive an overall qualification grade of 70% or better to achieve a qualified status as illustrated in the following chart:

GRADE	*RANK*
540 - 600	1st Class sniper
480 - 539	2nd Class sniper
420 - 479	3rd Class sniper
419 and below	Not qualified

Note. Sniper cannot change qualification rating within 45 days of last qualification.

TABLES

J-36. Each track contains up to six training tables. The tables are designed to train snipers in a crawl, walk, run manner using defined training events. The standard tables for the sniper weapon system are—

- Table I. Preliminary Marksmanship Instruction and Evaluation (known as PMI&E).
- Table II. Simulations, Call for Fire Trainer (CFFT).
- Table III. Drills.
- Table IV. Basic (Zero).
- Table V. Practice.
- Table VI. Qualification.

J-37. The six tables are separated into two phases, prerequisites and live-fire as discussed below:

J-38. Prerequisites. Phase one consists of the prerequisites to live-fire training, and include tables I, II, and III. The prerequisite tables can be completed in any order. The prerequisite tables from track A and B can be combined when appropriate. To participate in any live-fire event in the second phase of training, snipers must successfully complete all prerequisites within six weeks for the active component, or six months for the reserve component of the live-fire events.

J-39. Live fire. Phase two encompasses the live-fire training events to include qualification. Phase two includes tables IV, V, and VI and must be completed for all assigned aiming devices.

J-40. The sniper weapon system strategy includes the minimum number of resourced events required to meet the desired minimum proficiency. The commander may integrate multiple iterations and additional training events into the unit training plan when resources are available.

TABLE I, PRELIMINARY MARKSMANSHIP INSTRUCTION AND EVALUATION

J-41. Table I, Preliminary Marksmanship Instruction and Evaluation (PMI&E) (table J-5, page J-10) is designed to train and evaluate tasks that are critical to the safety of the firer, essential to the operation of the weapon assigned, or key to the effective employment of the weapon or system. Table I, Preliminary Marksmanship Instruction and Evaluation must be completed prior to executing any live-fire event, including zeroing procedures. Figure J-1 shows the training event template used for Table I, Special Purpose Weapons, PMI&E.

TIER 4, TABLE I, SPECIAL PURPOSE WEAPONS PMI&E

EVENT NAME:	PMI&E	ENVIRONMENT		LIVE	0.5
WEAPON:	M110 / M2010 / M107	CONDITIONS		HANDS ON	
TIER CATEGORY:	FOUNDATION	PRIMARY FACILITY		STT	DAYS REQUIRED
TNG PUBLICATION:	TC 3-22.10	ALTERNATE FACILITY		CLASS	
REQUIRED:	YES	COMPONENT:	AC	RC	10 SOLDIERS
EXTERNAL EVAL:	OPTIONAL	FREQUENCY:	2x	1x	
VALID FOR:	T+6	FY / TY DAYS TOTAL	1	0.5	THROUGHPUT

TIER	TABLE I PMI&E	II PLFS	III DRILLS	IV BASIC	V PRAC	VI QUAL
4	REQUIRED					3.0
WHEN EXECUTED:	T-6 through T-X					TNG DAYS TO QUAL
CONDEMNATION CRITERIA (CC)	CC RULE 1	CC RULE 2	CC RULE 3	CC RULE 4	CC RULE 5	CC RULE 6
	TIME	KEY LEADER TURNOVER	COMMANDER ASSESSMENT	SUBORDINATE ELEMENT PROFICIENCY	SPECIALTY UNIT PROFICIENCY	STAFF SECTION PROFICIENCY

Remarks: Each Soldier assigned as a shooter, spotter, and team leader must successfully complete Table I, PMI&E, between T-6 and T-X, ***prior to any live-fire event with any of the team's sniper weapon system(s).***

Note: Table I ***should*** be completed prior to any other table to ensure the Soldier understands the proper functioning and immediate action for the weapon and associated skills needed to be successful as a sniper.

Legend

AC	active component	STT	sergeant's time training
EVAL	evaluation	T-6	training event minus 6 weeks or months
FY	fiscal year	T+6	training event plus 6 weeks or months
QUAL	qualification	TNG	training
PLFS	preliminary live-fire simulation	TNG Days to QUAL	number of training days remaining on the critical path to weapons qualification
PMI&E	preliminary marksmanship instruction and evaluation	T-X	training event exercise
PRAC	practice	TY	training year
RC	reserve component		

Figure J-1. Special purpose weapons, PMI&E

J-42. PMI&E ensures snipers are prepared to operate the weapon, aiming devices, and apply the shot process. Commanders use results as a tool in the development of future training needs and areas of required focus. All tasks should be conducted in garrison prior to the weapons training density. Snipers must successfully complete Table I, PMI&E (table J-5), within the training window T-6 though T- week for both active component (weeks prior to live fire) and reserve component (months prior to live fire).

Table J-5. Table I, PMI&E

Table I, Preliminary Marksmanship Instruction and Evaluation (PMI&E)	
Task:	Demonstrate proficiency with sniper weapon system and assigned equipment.
Conditions:	In a garrison environment, given a sniper weapon system, optic, thermals, pointers, and illuminators as assigned on the MAL for the unit.
Standard:	Demonstrate Table I, PMI&E, tasks in proper sequence and complete all PMI&E tasks between T-6 and T- week prior to conducting any live-fire event with the sniper weapon system.
Legend	
MAL	master authorization list
PMI&E	preliminary marksmanship instruction and evaluation
T-6	training event minus 6 weeks or months
T-	training event minus

J-43. Units tailor the PMI&E such that it trains the sniper on the sniper weapon system and all assigned equipment the sniper employs. Each sniper is evaluated based on their assigned weapon, attachments, and equipment only. Commanders may add topics to their table I requirements as necessary. The list below shows the minimum topics that must be trained:

- Safety.
- Ammunition.
- Ballistics.
- Field craft.
- Principle operations of—
  - Sniper rifle.
  - Optics (day and universal night sight).
  - Thermals.
  - Pointers, illuminators, LRFs.
  - Ballistic programs.
- Zeroing and calibrating procedures of—
  - Optics.
  - Thermals.
  - Pointers, illuminators, LRFs.
  - Ballistic programs.

- Engagement procedures.
- Shot process (stability, aim, control, movement).
- Firing positions listed below:
  - Artificial.
  - Natural.
- Engagement process.
- Complex engagements as follows:
  - Moving targets.
  - Wind.
  - Angle fire.
  - Rapid target engagement.
- Indirect fire support as follows:
  - Target acquisition.
  - Recognition of combat vehicles (known as ROC-V).
  - Recognition of combatants (known as ROC-RSTA).

Notes.

Engagement process encompasses target detection, range estimation, and sniper team communication instruction and evaluation.

Field craft encompasses land navigation (day and night), hide site construction (urban and rural), and stalking instruction and evaluation.

J-44. The commander and sniper employment officer determine the method of evaluation.. The method of evaluation should consist of hands-on, written, and demonstrated performance. Units are encouraged to incorporate their tactical standard operating procedures information into table I (figure J-2, page J-12) as appropriate to provide realistic use of the information and its application during combat operations.

Note. The sniper’s test results are recorded at the company level and are maintained for a minimum of 12 months. PMI&E results should be documented on a locally produced memorandum for record signed by the unit commander.

TABLE I, PMI&E TASK EVALUATION LIST			
TASK TO BE EVALUATED	PROFICIENCY OR UNDERSTANDING		DATE TRAINED AND LEADERS INITIALS
	TRAINED	UNTRAINED	
Safety:			
Safe weapons handling			
Rules of firearms safety			
Weapon safety status			
Weapon control status			
Principle of operations:			
Sniper rifle			
Optics			
Thermals			
Pointers, illuminators, LRF			
Ballistic programs			
Zeroing and calibrating procedures:			
Optics			
Thermals			
Pointers, illuminators, LRF			
Ballistic programs			
Engagement procedures:			
Shot process—stability, aim, control, movement			
Firing positions with and without support			
Engagement process			
Field craft			
Indirect fire support			
Target acquisition			
ROC-V			
ROC-RSTA			

Legend

LRF laser range finder
ROC-V recognition of combat vehicles
ROC-RSTA recognition of combatants

Figure J-2. Table I, PMI&E evaluation task checklist

Table II, Simulations

J-45. Table II (figure J-3), simulations, is designed to evaluate the sniper's ability to observe, report, and conduct indirect fires on a target in a simulated environment. Snipers are encouraged to have successfully completed table II training prior to executing any live-fire event or exercise. See table J-6, page J-14, for the task, conditions, and standards.

TIER 4, TABLE II, SPECIAL PURPOSE WEAPONS CFFT						
EVENT NAME:	CFFT	ENVIRONMENT		VIRTUAL		1.0
WEAPON:	M110 / M2010 / M107	CONDITIONS		TADDS		
TIER CATEGORY:	FOUNDATION	PRIMARY FACILITY		CFFT		DAYS REQUIRED
TNG PUBLICATION:	STP 7-11C14-SM-TG	ALTERNATE FACILITY				
REQUIRED:	YES	COMPONENT:	AC	RC		10 SOLDIERS
EXTERNAL EVAL:	OPTIONAL	FREQUENCY:	2X	1X		
VALID FOR:	T+6	FY / TY DAYS TOTAL	2	1		THROUGHPUT
TIER	TABLE					
	I PMI&E	II PLFS	III DRILLS	IV BASIC	V PRACTICE	VI QUAL
4		OPTIONAL				3.5
WHEN EXECUTED:	T-6 through T-X					TNG DAYS TO QUAL
CONDEMNATION CRITERIA (CC)	CC RULE 1	CC RULE 2	CC RULE 3	CC RULE 4	CC RULE 5	CC RULE 6
	TIME	KEY LEADER TURNOVER	COMMANDER ASSESSMENT	SUBORDINATE ELEMENT PROFICIENCY	SPECIALTY UNIT PROFICIENCY	STAFF SECTION PROFICIENCY

Remarks: Each Soldier assigned to a sniper team can complete Table II, CFFT, between T-6 and T-X.

Legend

AC	active component	RC	reserve component
CFFT	call for fire trainer	T-6	training event minus 6 weeks or months
EVAL	evaluation	T+6	training event plus 6 weeks or months
FY	fiscal year	TADDS	training aids, devices, simulators and simulations
PLFS	preliminary live-fire simulation	TNG	training
PMI&E	preliminary marksmanship instruction and evaluation	TNG Days to QUAL	number of training days remaining on the critical path to weapons qualification
QUAL	qualification	T-X	training event exercise
		TY	training year

Figure J-3. Special purpose weapons, table II, simulations

Table J-6. Table II, simulations

Table II, Simulations	
Task:	Demonstrate proficiency in target acquisition, calling for, and adjusting indirect fires in a simulated environment.
Conditions:	In a simulated environment, given an authorized simulations device with standard training model.
Standard:	Demonstrate proficiency in target acquisition, calling for, and adjusting indirect fires in a simulated environment. Successfully complete the GTLF event between T-6 and T- week prior to firing any live ammunition.
Legend: GTLF gate to live fire T-6 training event minus 6 weeks or months T- training event minus	

Preliminary Live-fire Simulations Training

J-46. The authorized hours of training are cumulative semi-annually to support completing all required training prior to the execution of the culminating simulations event for table II. The following hours (table J-7) are authorized per sniper:

Table J-7. Simulation authorizations table

Simulation Time Authorizations (hours)			
Capability	Focus	Active Component (AC)	Reserve Component (RC)
Indirect Fire	CFFT (Call for Fire Trainer)	1.0	0.5

Primary Training Method

J-47. The Call for Fire Trainer Immersive System is designed to provide realistic fire training in support of all indirect fire and close air support mission tasks.

J-48. The Call for Fire Trainer Immersive System provides a realistic virtual environment with simulated military equipment to enhance the existing institutional training capability. Immersive systems train base fire support and close air support mission tasks, as well as advanced mission scenarios. The Call for Fire Trainer supports ground combat readiness with simulated battlefield training for snipers. The Call for Fire Trainer ensures all fire support and close air mission tasks are discussed and provides a realistic training environment.

J-49. Leaders ensure that snipers are tested on—

- Radio operation and communication procedures.
- Map reading and grid plotting.
- Engagement process.
- Target acquisition and reporting procedures.
- Observation and adjustment of mortar and artillery indirect fires and close air support.

Note. For any other device or system not listed, the unit should contact the MCOE or the U.S. Army Sniper School for possible system evaluation or if an approved training plan is available. Units are not authorized to develop training plans on systems not specifically authorized when authorized systems are available for training.

TABLE III, DRILLS

J-50. Table III (figure J-4) is a series of physical actions (drills) that a sniper completes in a repetitious manner to demonstrate proficiency. Table III must be successfully completed prior to any live-fire event, including zeroing procedures. Table J-8 shows the task, conditions, and standard.

TIER 4, TABLE III, SPECIAL PURPOSE WEAPONS DRILLS					
EVENT NAME:	DRILLS	ENVIRONMENT		LIVE	1.0
WEAPON:	M110 / M2010 / M107	CONDITIONS		HANDS ON	
TIER CATEGORY:	FOUNDATION	PRIMARY FACILITY		STT	DAYS REQUIRED
TNG PUBLICATION:	TC 3-22.10	ALTERNATE FACILITY		TA	
REQUIRED:	YES	COMPONENT:	AC	RC	10 SOLDIERS
EXTERNAL EVAL:	FIRST LINE LEADER	FREQUENCY:	2X	1X	
VALID FOR:	T+6	FY / TY DAYS TOTAL	2	1	THROUGHPUT

TIER	TABLE I PMI&E	TABLE II PLFS	TABLE III DRILLS	TABLE IV BASIC	TABLE V PRACTICE	TABLE VI QUAL
4			REQUIRED			2
WHEN EXECUTED:	T-6 through T-X or T-X					TNG DAYS TO QUAL
CONDEMNATION CRITERIA (CC)	CC RULE 1	CC RULE 2	CC RULE 3	CC RULE 4	CC RULE 5	CC RULE 6
	TIME	KEY LEADER TURNOVER	COMMANDER ASSESSMENT	SUBORDINATE ELEMENT PROFICIENCY	SPECIALTY UNIT PROFICIENCY	STAFF SECTION PROFICIENCY

Remarks: Each Soldier assigned as a shooter, spotter, and team leader to a sniper team must successfully complete Table III, SPW Drills, between T-6 and T-X, ***prior to any live-fire event with any of the sniper team's sniper weapon system(s).***

Note: Table III should be used as concurrent training on Table IV, V, and VI while Soldiers are awaiting training within a firing order or between day and night phase.

Legend

AC	active component	STT	sergeant's time training
FY	fiscal year	T-6	training event minus 6 weeks or months
QUAL	qualification	T+6	training event plus 6 weeks or months
PLFS	preliminary live-fire simulation	TA	designated training area or location
PMI&E	preliminary marksmanship instruction and evaluation	TNG	training
PRAC	practice	TNG Days to QUAL	number of training days remaining on the critical path to weapons qualification
PRQ	prerequisite	T-X	training event exercise
RC	reserve component	TY	training year

Figure J-4. Special purpose weapons, table III, drills

Table J-8. Table III, task, conditions, and standards

Table III, Drills	
Task:	Demonstrate proficiency on drills.
Conditions:	In a training environment, given a weapon, optic, pointers and illuminators, and the checklist of required actions.
Standard:	Demonstrate proficiency on drills in sequence between T-6 and T-week prior to firing any live ammunition.
Legend: T-6 training event minus 6 weeks or months T- training event minus	

J-51. Table J-9 provides the list of drills and their description. These drills are specific to a sniper employing a sniper weapon system (7.62 mm, .300 Win Mag and .50 caliber).

Table J-9. Drills

Drill	*Name*	*Description*
A	Weapon Check	First check when picking up the weapon.
B	Equipment Check	Verify fit and function of equipment, uniform, and personal protective equipment.
C	Load and Conduct Status Check	Admin load of the weapon and proper check of the fire controls.
D	Fight Down	Transition from standing to kneeling to prone. (Include tripod support.)
E	Fight Up	Transition from prone to kneeling to standing. (Include tripod support.)
F	Prone Ready	Actions taken prior to the first shot.
G	Reload	Demonstrate proficiency of reload and reload with retention within the designated time standard.
H	Transition to Secondary	Demonstrate proficiency in transitioning between primary and secondary weapon, and back to primary.
I	Clear Malfunction	Demonstrate proficiency on the immediate and remedial methods of clearing a malfunction.
J	Unload/Show Clear	Demonstrate unloading the weapon and presenting the weapon as clear to a leader or instructor.

J-52. The sniper conducts the drills in sequence a minimum of five times. This corrects deficiencies and shortcomings when appropriate. Following the drills performance checklist, once the trainer is confident in the sniper's ability and demonstrated performance of a drill, the next drill can be executed.

J-53. Units may add to the drills listed in table J-9 above, but may not remove any from table III. Units developing additional drills are encouraged to provide the details of the drill, evaluation process, and timing considerations to the proponent of this manual for possible inclusion into future updates. Leaders use the checklist in table J-10.

Table J-10. Table III, drills, evaluated tasks checklist

TABLE III, DRILLS EVALUATION CHECKLIST				
DRILLS TO BE EVALUATED		*PROFICIENCY*		*DATE TRAINED/LEADERS INITIALS*
		TRAINED	*UNTRAINED*	
A	Weapons Check			
B	Equipment Check			
C	Load			
D	Fight Down			
E	Fight Up			
F	Prone Ready			
G	Reload			
H	Transition to Secondary			
I	Clear Malfunction			
J	Unload and Show Clear			

TABLE IV, BASIC (ZERO)

J-54. Table IV, basic (zero), is conducted with live ammunition on an approved range facility that meets distance requirements or an open field in a combat environment. Table IV (figure J-5) is designed for all sniper weapon system firers to conduct grouping, zeroing, and truing with their assigned aiming devices; to zero and align all master of authorization list assigned equipment to include thermals, pointers, illuminators, and LRFs; and to calibrate their ballistic programs.

J-55. Table IV is conducted only after successful completion of the prerequisite tables (I and III).

TIER 4, TABLE III, SPECIAL PURPOSE WEAPONS DRILLS

EVENT NAME:	DRILLS	ENVIRONMENT	LIVE		1.0
WEAPON:	M110 / M2010 / M107	CONDITIONS	HANDS ON		
TIER CATEGORY:	FOUNDATION	PRIMARY FACILITY	STT		DAYS REQUIRED
TNG PUBLICATION:	TC 3-22.10	ALTERNATE FACILITY	TA		
REQUIRED:	YES	COMPONENT:	AC	RC	10 SOLDIERS
EXTERNAL EVAL:	FIRST LINE LEADER	FREQUENCY:	2X	1X	
VALID FOR:	T+6	FY / TY DAYS TOTAL	2	1	THROUGHPUT

TIER	TABLE					
4	I PMI&E	II PLFS	III DRILLS	IV BASIC	V PRACTICE	VI QUAL
			REQUIRED			2
WHEN EXECUTED:	T-6 through T-X or T-X					TNG DAYS TO QUAL
CONDEMNATION CRITERIA (CC)	CC RULE 1	CC RULE 2	CC RULE 3	CC RULE 4	CC RULE 5	CC RULE 6
	TIME	KEY LEADER TURNOVER	COMMANDER ASSESSMENT	SUBORDINATE ELEMENT PROFICIENCY	SPECIALTY UNIT PROFICIENCY	STAFF SECTION PROFICIENCY

Remarks: Each Soldier assigned as a shooter, spotter, and team leader to a sniper team must successfully complete Table III, SPW Drills, between T-6 and T-X, ***prior to any live-fire event with any of the sniper team's sniper weapon system(s).***

Note: Table III should be used as concurrent training on Table IV, V, and VI while Soldiers are awaiting training within a firing order or between day and night phase.

Legend:

AC	active component	PRQ	prerequisite
EVAL	evaluation	QUAL	qualification
FY	fiscal year	RC	reserve component
HSR	heavy sniper range	SFF	sniper field fire range
KD	known distance range	TNG	training
MPTR	multipurpose training range	TNG Days to QUAL	number of training days remaining on the critical path to weapons qualification
PLFS	preliminary live-fire simulation	T-X	training event exercise
PMI&E	preliminary marksmanship instruction and evaluation	TY	training year

Figure J-5. Special purpose weapons, table IV, basic (zero)

J-56. Snipers execute zeroing procedures listed in the appropriate weapon technical manual and TC 3-22.10 for all assigned weapon's, optics, thermals, pointers, illuminators, and ballistic programs as listed on the unit's master of authorization list.

J-57. All Soldiers assigned a sniper weapon system on the unit's master of authorization list execute table IV, table J-11, for their assigned equipment (capabilities track) prior to conducting live-fire events with their equipment.

J-58. Table IV, basic (zero) (table J-11) is conducted to demonstrate the sniper's proficiency in grouping, zeroing, truing, and aligning their assigned weapon's pointer, illuminator, and LRF.

Table J-11. Table IV, basic (zero)

Table IV, Basic (Zero)	
Task:	Conduct grouping, zeroing and truing.
Conditions:	On an authorized range facility, given a weapon, optic, pointers, illuminators, and the checklist of required actions and shooting standards found in this TC.
Standard:	Conduct grouping, zeroing, and truing procedures with assigned sniper weapon system and equipment.

Authorized Facilities

J-59. Table J-12 shows the authorized range facilities for the conduct of table IV. See TC 25-8 for a description of the target types used, their ordering or construction and fabrication information, and any supporting equipment required. TC 25-8 also includes the correct targetry to perform the zero or alignment task on the range facility.

J-60. Units that do not have access to the primary range facilities must coordinate with their installation's supporting range operations for the identified alternate facilities. Units wishing to use a facility not listed must coordinate directly through the supporting installation's range operations safety office to develop a nonstandard range footprint.

Table J-12. Table IV, basic (zero), authorized range facilities

Range Facility	*Abbreviation*	*Zero*	*Practice*	*Qualification*
Automated Sniper Field Fire Range	SFF	X		
Heavy Sniper Range	HSR	X		
Known Distance Range	KD	X		
Multipurpose Machine Gun Range	MPMG	X		
Qualification Training Range	QTR	X		
Scout/Recce Gunnery Complex	SRGC	X		
The appropriate range must be selected to conduct truing procedures. See note below.				
***Note*.** To find the Mach 1.2 (beginning of transonic threshold) value of the sniper weapon system, the sniper conducts the following calculation: Mach 1.0 (1061 + Temp F°) x 1.2 = Mach 1.2 (in feet per second) The sniper trues their weapon system's muzzle velocity at Mach 1.2 range to 10% under.				

***Note*.** Any approved range that meets the distance requirement will work or an open field in a combat environment.

Execution

J-61. Snipers should complete the basic tasks sequentially. Snipers are required to successfully complete this table prior to advancing to Table V, Practice.

***Note*.** Snipers are at a distinct disadvantage without completing the appropriate levels prior to progressing to follow-on training events and tables. For any live-fire event, zeroing of all available iron, optics, thermals, and pointers is critical to the success of the sniper, and ultimately the unit. Units must provide sufficient time and resources to the zeroing procedures to ensure accuracy, consistency, and sniper confidence in the weapon and equipment.

J-62. If additional ammunition is required beyond the resourced amount listed above or found in DA Pam 350-38, the unit must coordinate for those additional assets.

Assessment

J-63. Units are encouraged to maintain zero targets and record adjustments for each aiming device to capture the results of Table IV, Basic (Zero). Soldier's should also maintain a record or mark aiming device positions that were used during the zero process. This serves as a reference point should the aiming device need to be removed and reinstalled at a later point.

> ***Note.*** Soldiers must confirm zero after reinstalling an aiming device.

Table V, Practice

J-64. Table V, is designed to challenge firers with single and multiple stationary targets and moving targets at ranges from 100 meters to the range at which the bullet of the sniper weapon system being used is traveling at Mach 1.0.

J-65. The unit decides which skills in table V they want to practice. Table V is used to train snipers on a varirty of skills to inlcude alternate fire, concealment shooting, and rifle to pistol transition live-fire drills. Figure J-6 shows the layout of the training event design template used for table V.

TIER 4, TABLE V, SPECIAL PURPOSE WEAPONS PRACTICE						
EVENT NAME:	PRACTICE	ENVIRONMENT		LIVE		1.0
WEAPON:	M110 / M2010 / M107	CONDITIONS		LIVE FIRE		
TIER CATEGORY:	FOUNDATION	PRIMARY FACILITY		SFF, HSR		DAYS REQUIRED
TNG PUBLICATION:	TC 3-22.10	ALTERNATE FACILITY		MPMG, MPRC-H KD		
REQUIRED:	NO	COMPONENT:	AC	RC		10 SOLDIERS
EXTERNAL EVAL:	FIRST LINE LEADER	FREQUENCY:	2X	1.X		
VALID FOR:	T-X	FY / TY DAYS TOTAL	2	1		THROUGHPUT

TIER	TABLE					
	I PMI&E	II PLFS	III DRILLS	IV BASIC	V PRACTICE	VI QUAL
4	PRQ		PRQ	PRQ	OPTIONAL	1.0
WHEN EXECUTED:					T-X	TNG DAYS TO QUAL
CONDEMNATION CRITERIA (CC)	CC RULE 1	CC RULE 2	CC RULE 3	CC RULE 4	CC RULE 5	CC RULE 6
	TIME	KEY LEADER TURNOVER	COMMANDER ASSESSMENT	SUBORDINATE ELEMENT PROFICIENCY	SPECIALTY UNIT PROFICIENCY	STAFF SECTION PROFICIENCY

Remarks: Each sniper within the team ***should*** successfully complete Table V, Practice, to gain experience with and confidence in their weapon, aiming devices, and skill.

Note: Table III should be used as concurrent training on Table IV, V, and VI while Soldiers are awaiting training within a firing order or between day and night phase.

Legend

AC	active component	PRQ	prerequisite
EVAL	evaluation	QUAL	qualification
FY	fiscal year	RC	reserve component
HSR	heavy sniper range	SFF	sniper field fire range
KD	known distance range	TNG	training
MPMG	multipurpose machine gun range	TNG Days to QUAL	number of training days remaining on the critical path to weapons qualification
MPRC-H	multipurpose range complex-heavy	T-X	training event exercise
PLFS	preliminary live-fire simulation	TY	training year
PMI&E	preliminary marksmanship instruction and evaluation		

Figure J-6. Special purpose weapons, table V, practice

J-66. Table V, Practice, is a live-fire training event that provides tactical engagement experience to the Soldier using their assigned weapon and equipment. This event prepares the firer for Table VI, Qualification, which requires demonstrated performance of the use of their weapon system's capabilities to defeat single and multiple target presentations in varying sequences.

Authorized Facilities

J-67. Table J-13 shows the authorized range facilities used to conduct Table V, Practice, for the light and heavy sniper weapon systems. Units that do not have access to the primary range facilities must coordinate with their installation's supporting range operations for the identified alternate facilities. Units wishing to use a facility not listed must coordinate directly through the supporting installation's range operations safety office to develop a nonstandard range footprint.

Table J-13. Table V, practice, authorized range facilities

Range Facility	*Abbreviation*	*Zero*	*Practice*	*Qualification*
Automated sniper field fire range	SFF		X	
Heavy sniper range	HSR		X	
Known distance range	KD		X	
Multipurpose machine gun range	MPMG		X	
Qualification training range	QTR		X	
Scout/recce gunnery complex	SRGC		X	

Note. Any approved range that meets the distance requirement will work or an open field in a combat environment.

TABLE VI, QUALIFICATION

J-68. Table VI is the culminating qualification table used to assess the proficiency of a sniper with the assigned weapon and associated equipment. Table VI is designed with single and multiple stationary targets and moving targets at various ranges.

J-69. Table VI is the commander's assessment of the sniper. Table VI, Qualification, incorporates a four-step process.

J-70. **Table VI A, Group, Zero, and True**. The sniper conducts a group, zero, and true for their assigned sniper weapon system. To receive a GO on their assigned weapon system, the sniper must achieve the following:

- Light Sniper Weapon Systems: 2 minutes of angel 5-round grouping at 100 meters.
- Heavy Sniper Weapon Systems: 3 minutes of angle 5-round grouping at 500 meters.

J-71. **Table VI B, Alternate Weapon Fire**. The sniper conducts this event once with their assigned weapon, and once using each of their team's other light or heavy sniper weapon systems.

J-72. Table VI B consist of 10 rounds and 10 targets fired using known or unknown distances as follows:

- Light Sniper Weapon Systems: E-type or F-type silhouettes at distances no greater than 600 meters.
- Heavy Sniper Weapon Systems: Light-skinned vehicle that is stationary or moving targets. Not to exceed distances of 1660 meters.

J-73. Table VI C, Tactical Engagement. Light Sniper Weapon System tactical engagements The sniper conducts tactical engagements with their assigned sniper weapon system as listed on the unit's master authorization list. The sniper is given 20 rounds to engage and defeat 10 targets in 8 minutes, DAY and NIGHT (40 rounds, 20 targets total).

J-74. The tactical engagement requires each sniper to integrate a spotter, ballistic solver (ballistic computer), weather stations (where available), and basic issue items or additional authorized equipment that is a part of their sniper weapon system..

J-75. Heavy Sniper Weapon System tactical engagements. Light-skinned vehicle, stationary, or moving targets. Range to target may not exceed the distance where the primary ammunition type drops below Mach 1.2 (DAY) or the firing optic's capabilities (NIGHT).

J-76. Table VI D, Spotting. The sniper is graded on their ability to effectively spot rounds for another shooter within the team. The spotting event is evaluated while another team member is conducting their Table VI C, Tactical Engagement.

J-77. As the spotter, the sniper uses the assigned spotting scope to include all basic issue items and associated additional authorized equipment used by the sniper team.

J-78. Table J-14 provides the action, conditions, and standards for Table VI, Qualification.

Table J-14. Table VI, qualification

<table>
<tr><th colspan="3">Table VI, Qualification</th></tr>
<tr><td>Action</td><td colspan="2">Conduct grouping assessment, conduct alternate weapon fire, engage as a team to defeat single and multiple stationary threats and movers in a tactical array at varying ranges during day and limited visibility conditions.</td></tr>
<tr><td>Condition</td><td colspan="2">Given the following:
Fully mission capable equipment, weapon, optic, thermals, pointers, and illuminators as assigned on the master authorization list for the unit.
Authorized training ammunition.
Authorized range facility and approved targetry.</td></tr>
<tr><td>Standard</td><td colspan="2">The sniper must demonstrate tactical engagement proficiency as a shooter. The sniper must effectively group, conduct alternate weapon fire, and defeat the minimum number of presented targets within the time allotted for their record field fire and spot for a team member’s record field fire.</td></tr>
<tr><td rowspan="6">Rating</td><td colspan="2">Qualification Score Total</td></tr>
<tr><td>Qualified Rating</td><td>Rating Score</td></tr>
<tr><td>1st Class</td><td>540 - 600</td></tr>
<tr><td>2nd Class</td><td>480 – 539</td></tr>
<tr><td>3rd Class</td><td>420- 479</td></tr>
<tr><td>Nonqualified</td><td>419 and below</td></tr>
</table>

J-79. Figure J-7 shows the layout of the training event design template used within table VI.

TIER 4, TABLE VI, SPECIAL PURPOSE WEAPONS QUALIFICATION LIVE-FIRE PROFICIENCY GATE					
EVENT NAME:	QUALIFICATION	ENVIRONMENT		LIVE	1.0
WEAPON:	M110 / M2010 / M107	CONDITIONS		LIVE FIRE	
TIER CATEGORY:	FOUNDATION	PRIMARY FACILITY		SFF, HSR, KD	DAYS REQUIRED
TNG PUBLICATION:	TC 3-22.10	ALTERNATE FACILITY		ARF	
REQUIRED:	YES	COMPONENT:	AC	RC	10 SOLDIERS
EXTERNAL EVAL:	COMMAND	FREQUENCY:	2X	1X	
VALID FOR:	12 MONTHS	FY / TY DAYS TOTAL	2	1	THROUGHPUT

TIER	TABLE I PMI&E	II PLFS	III DRILLS	IV BASIC	V PRACTICE	IV QUAL
4	PRQ		PRQ	PRQ	CDR OPTION	REQUIRED
WHEN EXECUTED:						T-X
CONDEMNATION CRITERIA (CC)	CC RULE 1	CC RULE 2	CC RULE 3	CC RULE 4	CC RULE 5	CC RULE 6
	TIME	KEY LEADER TURNOVER	COMMANDER ASSESSMENT	SUBORDINATE ELEMENT PROFICIENCY	SPECIALTY UNIT PROFICIENCY	STAFF SECTION PROFICIENCY

Remarks: Each Soldier assigned to a sniper team ***must*** successfully complete Table VI, Qualification, to meet their live-fire proficiency gate (LFPG). The LFPG is required for any Solider to participate in any Tier 3, Tier 2, or Tier 1 live-fire event.

Note: Table III should be used as concurrent training on Table IV, V, and VI while Soldiers are awaiting training within a firing order or between day and night phase.

Legend

AC	active component	MPRC-H	multipurpose range complex-heavy
ARF	automated record-fire range	PLFS	preliminary live-fire simulation
CDR	commander	PMI&E	preliminary marksmanship instruction and evaluation
EVAL	evaluation	PRQ	prerequisite
FY	fiscal year	RC	reserve component
HSR	heavy sniper range	SFF	sniper field fire range
KD	known distance range	TNG	training
LFPG	live-fire proficiency gate	T-X	training event exercise
MPMG	multipurpose machine gun range	TY	training year

Figure J-7. Special purpose weapons, table VI, qualifications

Authorized Facilities

J-80. Table J-15 shows the authorized range facilities used to conduct table VI, for the light and heavy sniper weapon systems. Units that do not have access to the primary range facilities must coordinate with their installation's supporting range operations for the identified alternate facilities. Units wishing to use a facility not listed must coordinate directly through the supporting installation's range operations safety office to develop a nonstandard range footprint.

Table J-15. Table VI, qualification, authorized range facilities

Range Facility	*Abbreviation*	*Zero*	*Practice*	*Qualification*
Automated sniper field fire range	SFF			X
Heavy sniper range	HSR			X
Known distance range	KD			X
Multipurpose machine gun range	MPMG			X
Qualification training range	QTR			X
Multipurpose range complex-heavy	MPRC-H			X
The appropriate range must be selected to conduct record table. See note below.				
Note. To find the Mach 1.2 (beginning of transonic threshold) value of the sniper weapon system, the sniper conducts the following calculation: Mach 1.0 (1061 + Temp F°) x 1. = Mach 1.2 (in feet per second).				

Note. Any approved range that meets the distance requirement will work or an open field in a combat environment.

Execution

J-81. Soldiers should complete tracks A and B sequentially based on the unit's master of authorization list describing the assigned equipment. Table VI, Qualification, is executed for stationary known and unknown distance and moving targets during day and night.

J-82. Units should complete all firers in track A before conducting any subsequent tracks. Units should ensure enough firing time is available to execute track A during the day and night.

Malfunctions

J-83. When malfunctions occur on the range, the Soldier must perform the appropriate corrective action and continue to engage the threats presented.

NO ALIBI FIRING IS AUTHORIZED FOR ANY REASON

J-84. It is critical the Soldier understands the importance of maintaining their weapon, optics, sensors, magazines, and other equipment to the highest standard.

> ***Note***. If a malfunction occurs during the event, the weapon must be cleared (if possible) and turned in to the unit armorer for verification and potentially a new weapon or equipment.

J-85. In the event the Soldier requires a new weapon or optic, the Soldier must return to table IV and execute the appropriate capability track prior to continuing. For example, if the Soldier has an optic failure (scope turrets do not track correctly), the Soldier receives a new optic, executes track A, table IV, and returns to table VI to execute only track A, table VI. If successful, the Soldier continues to the next firing event.

J-86. The qualification requires demonstrated performance of the snipers use of their weapon system's capabilities to defeat single and multiple target presentations (stationary and moving) in varying sequences, between 100 and to the range at which the bullet is traveling at Mach 1.2 (DAY) and 600 meters (NIGHT). The qualification also requires demonstrated performance of their ability to perform their duties as a spotter within their team.

J-87. Qualification for the sniper is a four-step process in Table VI, Qualification. The individual sniper is tested on the following:

Table VI A, Group, Zero, and True. The sniper conducts a group, zero, and true for their assigned sniper weapon system. To receive a GO on their assigned weapon system, the sniper must achieve the following:

- Light Sniper Weapon Systems: 2 minutes of angle 5-round grouping at 100 meters.
- Heavy Sniper Weapon Systems: 3 minutes of angle 5-round grouping at 500 meters.

J-88. A NO-GO will not prevent the sniper from progressing to Table VI B, Alternate Weapon Fire.

J-89. Firers receive 100 points for a GO or zero points for a NO-GO. Annotate the points earned.

J-90. **Table VI B, Alternate Weapon Fire**. The sniper conducts this event once with their assigned weapon and once using each of their team's other light or heavy sniper weapon system.

J-91. Table VI B consists of 10 rounds and 10 targets fired using known or unknown distances as follows:

- Light Sniper Weapon Systems: E-type or F-type silhouettes at distances no greater than 600 meters.

- Heavy Sniper Weapon Systems: Light-skinned vehicle stationary or moving targets and not to exceed distances of 1660 meters.

J-92. To receive a GO (100 points), the sniper must successfully hit 7 of 10 (70%) of the targets presented. Firers that fail to hit a minimum of 7 targets or fail to complete table VI B receive a NO-GO and zero points.

J-93. **Table VI C, Tactical Engagement**. Light Sniper Weapon System tactical engagements. The sniper conducts tactical engagements with their assigned sniper weapon system as listed on the unit's master authorization list. The sniper is given 20 rounds to engage and defeat 10 targets in 8 minutes, DAY and NIGHT (40 rounds, 20 targets total).

J-94. The tactical engagement requires each sniper to integrate a spotter, ballistic solver (ballistic computer), weather stations (where available), and basic issue items or additional authorized equipment that is a part of their sniper weapon system.

J-95. E-type and F-type stationary and moving targets. Range to target may not exceed the distance where the primary ammunition type drops below Mach 1.2 (DAY) or the firing optic's capabilities (NIGHT).

Table VI C, Tactical Engagement. Heavy Sniper Weapon System tactical engagements.

J-96. Light-skinned vehicle, stationary, or moving targets. Range to target may not exceed the distance where the primary ammunition type drops below Mach 1.2 (DAY) or the firing optic's capabilities (NIGHT).

J-97. Scoring for Table VI, C, and tactical engagement is—

- 1st round hit = 10 points.
- 2nd round hit = 5 points.

J-98. Failure to hit within two rounds or failure to engage target = 0 points.

J-99. **Table VI D, Spotting**. The sniper is graded on their ability to effectively spot rounds for another shooter within the team. The spotting event is evaluated while another team member is conducting their Table VI C, Tactical Engagement.

J-100. As the spotter, the sniper uses the assigned spotting scope to include all basic issue items and associated additional authorized equipment used by the sniper team.

J-101. Table VI D, Spotting. The score is the same score the designated shooter receives on their Table VI C:

- 1st round hit = 10 points.
- 2nd round hit = 5 points.

J-102. Failure to hit within two rounds or failure to engage target = 0 points.

INDIVIDUAL	*M110*	*M2010*	*M107*	*SPOTTING*
Sniper 1 assigned M110	Grouping Assessment Qualification	Alternate Weapon Fire	Alternate Weapon Fire	Spot for M2010
Sniper 2 assigned M2010	Alternate Weapon Fire	Grouping Assessment Qualification	Alternate Weapon Fire	Spot for M107
Sniper 3 assigned M107	Alternate Weapon Fire	Alternate Weapon Fire	Grouping Assessment Qualification	Spot for M110
Note. Snipers only need to complete one familiarization fire for their qualifiaction grade.				

J-103. Grading for the individual sniper is a weighted average grade for all four events as shown in the chart below:

EVENT	*GROUP*	*ALTERNATE WEAPON FIRE*	*PRIMARY WEAPON*	*SPOTTING*
% of qualification grade	25 %	25 %	25 %	25 %
Table of execution	VI	VI	VI	VI

J-104. Snipers must receive an overall qualification grade of 70% or better to achieve a qualified status as illustrated in the following chart:

GRADE	*RANK*
540 - 600	1st Class sniper
480 - 539	2nd Class sniper
420 - 479	3rd Class sniper
419 and below	Not qualified

Note. Sniper cannot change qualification rating within 45 days of last qualification.

J-105. Snipers must receive an overall qualification grade of 70% or better to achieve a qualified status. The unit uses DA Form 7785, *Sniper Qualification Scorecard*, figure J-8.

SNIPER QUALIFICATION SCORECARD
For use of this form see TC 3-22.10; the proponent agency is TRADOC.

1. LAST NAME	2. FIRST NAME	3. RANK	4. DATE (YYYYMMDD)
Doe	John	SSG	20170901
5. DODID*	6.UIC**	7. INSTALLATION	8. FACILITY TYPE***
123456790	W6NFE1	Fort Benning, GA	
9. SPOTTER NAME	10. WEAPON TYPE	11. EQUIPMENT	
Sgt. Smith	M2010	Spotting scope, Ballistic Calculator	

TABLE VI A: Group and Zero	TABLE B: Alternate Weapon
GO [X]	GO [X]
NO-GO [ ]	NO-GO [ ]

ZERO DATA

Zero Range: 100 meters

Bore Height: 2.5 inches

ZERO HEIGHT/ZERO OFFSET

	ELEVATION	WINDAGE
Suppressor:	+.1 mil	.2 mil R
Universal Night Sight:		
Thermal Weapon Sight:		

TABLE VI C: Tactical Engagement										TABLE VI D: Spotting									
Day					Night					Day					Night				
Target	Range	1st Hit	2nd Hit	Miss	Target	Range	1st Hit	2nd Hit	Miss	Target	Range	1st Hit	2nd Hit	Miss	Target	Range	1st Hit	2nd Hit	Miss
1	100	10			1	200	10			1	300	10			1	100	10		
2	250	10			2	150	10			2	100	10			2	400		5	
3	800		5		3	300	10			3	450	10			3	350	10		
4	425	10			4	500		5		4	600		5		4	200	10		
5	300	10			5	400	10			5	250	10			5	100	10		
6	600		5		6	300	10			6	900			0	6	500			0
7	750			0	7	150	10			7	500	10			7	350	10		
8	400	10			8	250	10			8	350	10			8	150	10		
9	900		5		9	300	10			9	750		5		9	400		5	
10	650	10			10	500		5		10	400	10			10	500		5	
Total		60	15	0	Total		80	10		Total		70	10	0	Total		60	15	0

NOTES:

*	DEPARTMENT OF DEFENSE IDENTIFICATION NUMBER FOUND ON REVERSE SIDE OF CAC.
**	UNIT IDENTIFICATION CODE, 6 ALPHA-NUMERIC CHARACTERS.
***	RANGE FACILITY CODE FOR THE TYPE USED FOR THE QUALIFICATION EVENT, 3-5 CHARACTERS.

REMARKS:
Wind was 5-8 mph from the NW. During the night, light fog was present and it made it difficult to see some of the more distant targets.

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Figure J-8. Completed DA Form 7785, front, example

CONDUCT OF QUALIFICATION

TABLE VI A, Group, Zero, and True. The sniper conducts a group, zero, and true for their assigned sniper weapon system. To receive a GO on their assigned weapon system, the sniper must achieve the following:

Light sniper weapon systems: 2 minutes of angle (MOA), 5-round grouping at 100 meters.
Heavy sniper weapon systems: 3 MOA, 5-round grouping at 500 meters.

A NO-GO will not prevent the sniper from progressing to Table VI B, Alternate Weapon Fire.

Annotate the grouping assessment in the SCORE block, lower right, by circling GO or NO-GO, as appropriate. Firers receive 100 points for a GO or zero (0) points for a NO-GO. Annotate the points earned in the SCORE block, lower right.

TABLE VI B, Alternate Weapon Fire. The sniper conducts this event once with their assigned weapon and once using each of their team's other light or heavy sniper weapon system. Table VI B consist of 10 rounds and 10 targets, fired using known or unknown distances:
Light sniper weapon systems: E-type or F-type silhouettes at distances no greater than 600 meters.
Heavy sniper weapon systems: Light-skinned vehicle stationary or moving targets and not to exceed distances of 1660 meters.

To receive a GO (100 points), the sniper must successfully hit 7 of 10 (70%) of the targets presented. Firers who fail to hit a minimum of 7 targets or fail to complete Table VI B receive a NO-GO and zero points. Annotate points earned in the SCORE block, lower right.

TABLE VI C, Tactical Engagement. The sniper will conduct tactical engagements with their assigned sniper weapon system as listed on the unit's master authorization list. The sniper is given 20 rounds to engage and defeat 10 targets in 8 minutes, DAY and NIGHT (40 rounds, 20 targets total).

The tactical engagement requires each sniper to integrate a spotter, ballistic solver (ballistic computer), weather stations (where available), and basic issue items or additional authorized equipment that is part of their sniper weapon system. Light sniper weapon system tactical engagements are—

E-type and F-type stationary and moving targets. Range to target may not exceed the distance where the primary ammunition type drops below Mach 1.2 (DAY) or the firing optic's capabilities (NIGHT).

TABLE VI C, Tactical Engagement, continued. Heavy sniper weapon system tactical engagements:

Light-skinned vehicle, stationary or moving targets. Range to target may not exceed the distance where the primary ammunition type drops below Mach 1.2 (DAY) or the firing optic's capabilities (NIGHT).

Scoring:

1st round hit = 10 points
2nd round hit = 5 points
Failure to hit within two rounds or failure to engage target = 0 points.
Annotate the total number of points for Table VI C for DAY, NIGHT, and overall TOTAL in the SCORE block below.

Table VI D, Spotting. The sniper is graded on their ability to effectively spot rounds for another shooter within the team. The spotting event is evaluated while another team member is conducting their Table VI C, Tactical Engagement.

As the spotter, the sniper uses the assigned spotting scope to include all basic issue items and associated additional authorized equipment used by the sniper team.

The Table VI D, Spotting score is the same score the designated shooters receive on their Table VI C:

1st round hit = 10 points
2nd round hit = 5 points
Failure to hit within two rounds or failure to engage target = 0 points.
Annotate the total number of points for Table VI D for DAY, NIGHT, and overall TOTAL in the SCORE block below.

Zero data:
ZR – zero range. This is the distance to the target at which the rifle was zeroed.
BH – bore height. The distance from the center axis of the scope to the center axis of the barrel.
ZH/ZO – zero height (elevation) and Zero Offset (windage). Used when the addition of a suppressor or the addition of night vision optics changes the point of impact of their zero.

SCORE			
TABLE VI A, GROUP ZERO	GO	NO-GO	100
TABLE VI B, ALTERNATE WEAPON FIRE	GO	NO-GO	100
	DAY	NIGHT	TOTAL
TABLE VI C, TACTICAL ENGAGEMENT	75	90	165
TABLE VI D, SPOTTING	80	75	155
FINAL SCORE:			520

QUALIFICATION RATING (Check One):

1st CLASS 540-600	☐	2nd CLASS 480-539	☒
3rd CLASS 420-479	☐	UNQUALIFIED 419 and Below	☐

NAME AND RANK OF RANGE OIC	RANGE OIC SIGNATURE
NAME AND RANK OF RANGE RSO	RANGE RSO SIGNATURE

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Figure J-8. Completed DA Form 7785, back, example, continued

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Appendix K
Hard Target Interdiction

Appendix K covers the weapon and employment considerations for engaging materiel type targets that cannot be neutralized by standard small arm calibers. Three sections comprise this appendix—mission planning, shot placement, and the M107 rifle.

HEAVY SNIPER TEAM

K-1. The destructive, anti-materiel capability of the M107 rifle allows the commander to assign tasks to the heavy sniper team that would be beyond the capability of the M110 Semiautomatic Sniper System or the M2010 Enhanced Sniper Rifle. The increased range and penetration of the round allows the commander to accurately engage and destroy high-value materiel targets at long range.

K-2. The principles that a heavy sniper team should employ when planning an attack on materiel targets are—

- Attack special target components.
- Do permanent damage to the selected target.
- Do damage to selected components that prevents cannibalization.
- Attack cast metals where possible.

MISSION PLANNING

K-3. The commander must base their decision to employ a heavy sniper team on the current threat and on whether suitable targets can be identified within the target area. The plan must address the following considerations:

- The heavy sniper team is larger than the M110 Semiautomatic Sniper System or the M2010 Enhanced Sniper Rifle team and requires additional support equipment. They must plan their transportation and infiltration into the target area accordingly.
- The increased size and weight of the M107 rifle and its accessories slows down the team and reduces the distance the team can travel dismounted. The plan must allow the team the time and means to insert at a reasonable distance from the objective and to conduct a thorough target area reconnaissance.
- For some anti-materiel and special missions, the commander might need to employ both heavy sniper teams (M107) and light sniper teams (M110 Semiautomatic Sniper System or M2010 Enhanced Sniper Rifle) at the same time. This depends on the depth of the target area, the threat, and whether suitable targets fall within the range of the M110 Semiautomatic Sniper System or the M2010 Enhanced Sniper Rifle.

K-4. The commander can exploit an enemy's ignorance by deploying a heavy sniper team. When the heavy sniper team is given the **REQUIRED** ammunition, MK 211 MOD 0 (DODIC A606), the heavy sniper team can penetrate and neutralize a variety of threats with relative ease and at great distances, which are well outside the effective fire of the enemy. Vehicles and dismounted machine gun and mortar teams are most probably hit and defeated during the initial contact before they can react. Rapid target acquisition, engagement, and short time of flight are critical to hit probability. The M107 system can provide this combination. Probability of kill is then enhanced by the blast and fragmentation from the MK 211 MOD 0 ammunition.

K-5. A heavy sniper team is best suited when allowed to occupy a position in advance to allow the sniper team to successfully setup and employ the M107. The heavy sniper team can also be used in a support role for maneuver forces.

> Canadian Army Scouts, attached to 1-187 Infantry from the 101st Airborne Division, were deployed with a scout platoon in Afghanistan. Armed with .50 caliber sniper rifles, the Canadian snipers were able to engage at long range an insurgent artillery piece and the mules that were logistically supporting it. Later in the same fight, the Canadian snipers engaged a pickup truck. These are two excellent examples of the use of a heavy sniper team in the anti-materiel role.

M107 EFFECTIVNESS CHART WITH MK-211 MOD 0

K-6. Table K-1 shows the hit capability in minute of angle arcs to simulate the effectiveness that this system would have on materiel targets. The table also shows the maximum performance envelope. The heavy sniper team must stay within the supersonic flight of the projectile to deliver a more accurate and devastating hit.

K-7. The modeling for the following table has the following constants:

- Range uncertainty is modeled at +/– 5 meters to represent instrumented ranging at a greater distance.
- Wind uncertainty is modeled at +/– 1 miles per hour and +/– 5 miles per hour to represent easy and difficult wind conditions.
- Environment modeled in is: wind from 9 o'clock at 5.0/10 miles per hour. Temperature is 59 degrees, pressure at 29.53 inches ghectogram. Humidity is 70 percent.
- Azimuth is 90 degrees and inclination is 0 degree.

K-8. The parameters for the M107 are—

- The M107 is modeled (table K-1) with the inherent precision of 1.5 minutes of angle.
- The standard deviation of muzzle velocity is modeled at 15 feet per seconds to represent the consistency of the loaded ammunition.
- Twist rate is 1:15 right.
- Zero range is 100 meters.

K-9. The ballistic coefficient is .6001 G1 scale and the muzzle velocity is 2910 feet per seconds.

Table K-1. M107 performance model

M107 with MK211 MOD 0 @ 2910 fps							
Wind estimation error	+/- 1 mph			+/- 5 mph			
Range estimation error	+/- 5 meters (m)						MPE (Mach)
Target size	1 MOA	2 MOA	3 MOA	1 MOA	2 MOA	3 MOA	
1000 m	44%	89%	99%	10%	30%	47%	1.286
1100 m	38%	84%	98%	8%	26%	41%	1.196
1200 m	32%	78%	96%	7%	22%	37%	1.117
1300 m	27%	71%	93%	6%	19%	32%	1.048
1400 m	23%	65%	90%	5%	16%	29%	0.991
1500 m	19%	58%	85%	4%	14%	25%	0.944
1600 m	17%	52%	80%	3%	12%	23%	0.906
1700 m	14%	47%	75%	3%	11%	20%	0.874
1800 m	12%	42%	70%	3%	9%	18%	0.845
1900 m	11%	38%	65%	2%	8%	16%	0.820
2000 m	10%	34%	61%	2%	7%	15%	0.797
	Best Case			Worst Case			

Legend

fps	feet per second	MOD	modification
m	meters	MPE	maximum performance envelope
MOA	minute of angle	mph	miles per hour

K-10. In recent conflicts, the enemy has used vehicle-borne improvised explosive devices. The heavy sniper team can disrupt and cause detonation at a safe standoff with minimal collateral damage. This also includes water and aircraft vehicles. Figure K-1, is the explosive stand-off chart. The figure shows that the M107 and MK 211, MOD 0 ammunition can disable the enemy's engine and other compartments outside the lethal range to neutralize their threat.

	Threat Description		Explosives Mass[1] (TNT equivalent)	Building Evacuation Distance[2]	Outdoor Evacuation Distance[3]
High Explosives (TNT Equivalent)		Pipe Bomb	5 lbs 2.3 kg	70 ft 21 m	850 ft 259 m
		Suicide Belt	10 lbs 4.5 kg	90 ft 27 m	1,080 ft 330 m
		Suicide Vest	20 lbs 9 kg	110 ft 34 m	1,360 ft 415 m
		Briefcase/Suitcase Bomb	50 lbs 23 kg	150 ft 46 m	1,850 ft 564 m
		Compact Sedan	500 lbs 227 kg	320 ft 98 m	1,500 ft 457 m
		Sedan	1,000 lbs 454 kg	400 ft 122 m	1,750 ft 534 m
		Passenger/Cargo Van	4,000 lbs 1,814 kg	640 ft 195 m	2,750 ft 838 m
		Small Moving Van/ Delivery Truck	10,000 lbs 4,536 kg	860 ft 263 m	3,750 ft 1,143 m
		Moving Van/Water Truck	30,000 lbs 13,608 kg	1,240 ft 375 m	6,500 ft 1,982 m
		Semitrailer	60,000 lbs 27,216 kg	1,570 ft 475 m	7,000 ft 2,134 m
	Threat Description		LPG Mass/Volume[1]	Fireball Diameter[4]	Safe Distance[5]
Liquefied Petroleum Gas (LPG - Butane or Propane)		Small LPG Tank	20 lbs/5 gal 9 kg/19 l	40 ft 12 m	160 ft 48 m
		Large LPG Tank	100 lbs/25 gal 45 kg/95 l	69 ft 21 m	276 ft 84 m
		Commercial/Residential LPG Tank	2,000 lbs/500 gal 907 kg/1,893 l	184 ft 56 m	736 ft 224 m
		Small LPG Truck	8,000 lbs/2,000 gal 3,630 kg/7,570 l	292 ft 89 m	1,168 ft 356 m
		Semitanker LPG	40,000 lbs/10,000 gal 18,144 kg/37,850 l	499 ft 152 m	1,996 ft 608 m

Legend

lbs	pounds	kg	kilograms
ft	feet	l	liter
gal	gallon	m	meter
		TNT	2,4,6-Trinitrotoluene (CAS Number 118-96-7; explosive)

Figure K-1. Explosive stand-off chart

SHOT PLACEMENT

K-11. One aspect that is of importance to the heavy sniper team is shot placement. The wide array of targeting that a heavy sniper team can interdict can include radar equipment, crew-served weapons, military-type aircraft, and communication systems. When conducting planning for a heavy sniper team mission, the commander, sniper employment officer, and sniper team leader need to gather the appropriate data on where the sniper team can place a shot for the maximum effect to destroy or disable that target.

K-12. Cell-by-cell target vulnerability representations are available by request. These would essentially show a target made up of colored blocks with green being no vulnerability (or munition performance) and red being high vulnerability or performance. The commander would need a secure internet protocol router (known as SIPR) access to view these files. The command must contact the U.S. Army Materiel Systems Analysis Activity (known as AMSAA) to gain access.

LAND FORCE TARGETS

K-13. Tanks have an array of optical and thermal camera systems that the heavy sniper team can disable with the M107. The majority of these systems rely upon optical lenses that are on the outside of the armor. Modern tanks have an array of antenna and sensors required for the tanks' fire control system. The sniper team needs to pay particular attention to what type of land force targets are operating in the area and know the characteristics of those targets.

AIRFIELD TARGETS

K-14. Airfields can present an array of targets for the heavy sniper team to interdict and disable. The wide expanse of the average airfield, be it military or civilian, lends itself to an adequate range standoff that the heavy sniper team can use to their advantage. An aircraft is a complex machine that is vulnerable to a direct fire attack. The heavy sniper team can target the sensors and cameras that are abundant on today's modern aircraft (airplanes and helicopters). Airfield support equipment also presents itself as a vulnerable target. The heavy sniper team can cause havoc to the infrastructure and operational capabilities of an airfield. From hangers to control towers, the heavy sniper team can inflict great damage at relatively safe standoff distances by employing the M107.

NAVAL TARGETS

K-15. Harbors of the enemy can be targeted by a heavy sniper team which can engage an abundance of naval targets and support equipment at long range as long as they have a strong understanding of what can be defeated from .50 caliber fire. From sensors to fire control systems, these targets are usually exposed to the sniper team as they are usually found on the deck of the naval targets.

Urban Considerations

K-16. The barrier penetration capability of the M107 and MK 211 MOD 0 ammunition makes it well suited for urban dominance, where a barrier of some kind is everywhere and often impervious to small arms fire. The M107 and MK 211, MOD 0 ammunition can penetrate cinder blocks, bullet proof glass, and other urban barriers with relative ease.

M107 ANTIMATERIAL SNIPER RIFLE

K-17. The M107 rifle (figure K-2) is a man-portable, direct line of sight weapon system that can provide precision fire at a distance of up to 1830 meters or 2000 yards. The M107 has a bipod, muzzle brake, carrying handle, telescope (day optic sight), sling, and six, 10 round removable magazines.

Note. Refer to TM 9-1005-239-23&P for detailed information.

Figure K-2. M107 rifle

Recoil

K-18. The stronger recoil of the M107 rifle is physically wearing to the sniper. To reduce these effects, the rifle must be properly fitted to the sniper. The recoil, noise, and muzzle blast of the M107 requires special consideration. If the observer is not directly behind the sniper, the effects are worse on them.

Muzzle Blast

K-19. The air before and after a fired .50-caliber round disperses outward through the muzzle brake. Exposure to this blast of gasses, combined with the heavy recoil of the weapon, can intimidate an inexperienced sniper. Placing sandbags on either side of the weapon helps reduce the blast. The sandbags can be removed once the sniper gains confidence in their marksmanship with the M107.

POSITION AND HOLD

K-20. The sniper must lay behind the rifle where the weapon will recoil straight back. The sniper aligns the length of their body with the axis of the bore. A right-handed shooter aligns the axis of the barrel through their right shoulder, buttocks, and leg.

Note. Lying at an angle so only the shoulder receives the recoil can misalign the weapon. The sniper must avoid disturbing the lay of the rifle while firing.

NATURAL ALIGNMENT

K-21. As air and gas disperse through the muzzle brake during the firing of a round, the muzzle blast causes some force to be pulled in the opposite direction of the recoil. The sniper must ensure the weapon naturally aligns on the target. If not, these forces will pull the weapon off target.

AUTHORIZED CARTRIDGES

K-22. Table K-2 shows the only ammunition authorized for use in the M107.

Table K-2. Authorized cartridges

NOMENCLATURE	TYPE	MARKINGS ON TIP
MK211 Mod 0	High-explosive (HE), armor-piercing incendiary (API)	Green tip and gray
M33	Ball	None
M17	Tracer	Maroon or brown
M8	API	Gray
M20	Armor-piercing incendiary, tracer (API-T)	Red tip and gray
M1A1	Blank	Not applicable (N/A)

Note. Never fire sabot light armor penetrator (known as SLAP) or sabot light armor penetrator tracer (known as SLAP T) ammunition through the M107. Forcing it to chamber and fire may cause serious injury to personnel and damage to the rifle. Ammunition predating 1965 should not be fired through this weapon.

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Appendix L

Targetry

Sniper training programs require specific targets, lifting mechanisms, and capabilities, which must be available on the training facility to meet the training requirements. All targets must be provided in accordance with TC 25-8, *Training Ranges*. This includes the physical dimensions of the target, its capabilities and performance parameters, as well as the thermal signatures of those targets, for both day and night engagements.

TARGET MECHANISMS

L-1. There are seven types of target mechanisms or frames (or target lifting mechanisms) used within the sniper training events. Each of these target mechanisms or frames provides a specific capability to the range facility to meet the training and qualification requirements, respectively. These target mechanism types are:

IRON AND STEEL TARGETS

L-2. Steel targets provide visual and audio cues when hit. Typically, targets do not require power and target protection is minimal or not required. Steel targets are ideal for unknown distance engagements.

STATIONARY INFANTRY TARGET

L-3. Also known as SIT, this frame is placed in a protective emplacement and must be reconfigurable or portable. The range operations center, also known as ROC or the tower facility controls the SIT using standard range operations software. The SIT targets are typically located in clusters of six with one moving Infantry target, known as MIT, described below. SIT targets can operate as a cluster or individually, based on the needs of the training scenario. The SIT device can be hardwired or battery-operated, and radio frequency or wireless internet access controlled. The device can lift any E-type or F-type silhouette, as well as extended E-type silhouettes that are approximately 60-inches tall.

MOVING INFANTRY TARGET

L-4. The MIT is placed in a protective emplacement that may or may not be portable or reconfigurable. The MIT can operate at varying speeds from 1 to 11 miles per hour and in two directions. They are typically positioned within a cluster with six SIT emplacements. These targets can be operated individually or as part of a larger threat cluster or squad. The MIT includes either a 15- or 40-meter track length, depending on the training facility. Targets can move in either direction on the track, and are controlled by the range operating software in the tower or ROC.

Stationary Armor Target

L-5. The SAT is placed in a protective emplacement that may or may not be reconfigurable or portable. The ROC or tower facility controls the SAT using standard range operations software. TC 25-8 defines the targets for the SAT lifting mechanisms, which are usually manufactured locally. SATs provide the training unit with a variety of unarmored, light armored, aerial, and armored threats, both in frontal and flank aspects to support the training scenario. The device can be hardwired or battery-operated, and radio frequency or wireless internet access controlled.

Moving Armor Target

L-6. The MAT is placed in a protective emplacement. The ROC or tower facility controls the standard range operations software. TC 25-8 defines the targets for the MAT lifting mechanisms, which are usually manufactured locally. MATs provide the training unit with a variety of unarmored, light armored, aerial, and armored threats in flank aspects to support the training scenario. The device is battery operated, and radio frequency or wireless internet access controlled. The MAT can operate at varying speeds from 1 to 18 miles per hour, in varying directions. The MAT may also perform as an evasive target where it may change speed and direction based on the scenario. The standard track length for the MAT is 350 meters to provide a full 50-second exposure during presentation and travel at maximum speed to the firer.

Trackless Moving Target–Infantry

L-7. The TMT-I is a trackless, scenario-based anti-personnel target system that the tower software controls. The TMT-I relies on Global Positioning System (GPS) mapping of the training facility to execute training tasks as an opposing force. The TMT-I can operate at varying speeds from 1 to 11 miles per hour and must be able to traverse up to a 5-degree slope. The TMT-I is independent of any emplacement and is designed with ballistic protection up to .300 Win Mag. The device supports standard Infantry mechanisms, human type targets, and known-distance lifting mechanisms. The TMT-I can support standard equipment, such as the Location of Miss and Hit System (known as LOMAH), battlefield effects simulators, hostile fire simulators, and sound effects simulators. Targets can move along a predetermined path, move to a series of GPS positions, and react to contact in a tactical and unpredictable manner. The targets are controlled by the range operating software in the tower or ROC individually, or as a series of targets to provide high-value target discrimination training based on the scenario. The system includes an anti-collision detection and avoidance capability that allows multiple systems to operate independently or collectively without striking stationary or moving objects, other targets, or leaving the range surface danger zone.

TRACKLESS MOVING TARGET–VEHICLE

L-8. The TMT-V is a portable, scenario-based vehicle target system that is controlled by the tower software. It relies on GPS mapping of the training facility to execute training tasks as an opposing force. The TMT-V can operate at varying speeds from 1 to 28 miles per hour and must be able to traverse a 7-degree slope and varying terrain conditions. The TMT-V is independent of any emplacement and is designed with ballistic protection up to .50 caliber (ball). The device supports 3-dimensional targets replicating full-size tank, Infantry fighting vehicles, and personnel carriers. The system can identify specific hit areas (engine, driver, gunner.) on the vehicle and simulate the power-train failure after sufficient ballistic strikes as well as nonlethal strikes. These mechanisms can also support a minimum of two SIT mechanisms to replicate the personnel within the vehicle. The mechanism can support up to four power and interface connections for standard target equipment, such as the Location of Miss and Hit System, battlefield effects simulators, hostile fire simulators, and sound effects simulators. The TMT-V can move along a predetermined path, a memorized path, and move to a series of GPS positions. The TMT-V has the ability to react to contact in a tactical and unpredictable manner. The targets are controlled by the range operating software in the tower or ROC individually, or as a series of targets to provide scenario-based high-value target discrimination training. The system includes an anti-collision detection and avoidance capability that allows multiple systems to operate independently or collectively without striking stationary or moving objects, other targets, or leaving the range surface danger zone.

OTHER CONSIDERATIONS

L-9. Most target mechanisms can support multiple instrumentation or accessories (termed instrumentation). The instrumentation provides training capabilities to the range facility to meet the specific training requirements for the sniper and sniper team. The standard Army emplacement for the SIT, SAT, MIT, and MAT listed above include integration for various accessories when the emplacement is constructed with the range. When the target is portable or autonomous, accessories must be provided either as a stand-alone portable device, or with the ability to piggyback off of the target equipment.

TARGETS, PANELS, BOARDS, AND RANGE MARKERS

L-10. All live-fire ranges require targets to support specific training requirements. This section provides detailed information concerning targetry types, classifications, dimensional information, primary uses, and ordering or manufacturing information. TC 25-8, Appendix E, details the standard naming conventions, thermal capabilities, and presentation requirements of all targets, panels, boards, and markers for range managers, operators, and users.

L-11. This section is designed to help users easily understand the proper type and category of targets required for the live-fire training event. Targets are defined in three categories, listed below, based on their capability and functionality:

- Targets. Targets are physical representations of silhouettes, outlines, bulls-eyes, or rings designed and produced to be engaged by an appropriate weapon system. Depending on the target's use, they may be locally manufactured or requisitioned through the unit supply ordering process or range operations using NSNs.

- Panels and boards. Panels and boards are locally manufactured or purchased for use during a training event, and are not designed to be engaged by a weapon. They typically serve as required items to support the training objective, represent friendly or neutral forces, provide a maintenance function, support the appropriate orientation of fires, or to identify no-fire areas. They ***are not to be engaged*** by any weapon system. Panels may be located on a range, a training area, or a non-live fire facility. Some panels and boards may be available at the installation training support center as a portable training aid.
- Range markers. Range markers are similar to panels in that they ***are not authorized for direct or indirect engagement***. They are used to direct, coordinate, and identify safe firing areas on a range. Range markers also identify individual lanes on a range, interior range limits, and exterior range limits.

L-12. Targets, panels, boards, and range markers are grouped by their function or type for simplicity. Units must be familiar with these types of range equipment to ensure they have the proper tools to support their training objectives. The groups are: small arms, medium and large caliber, and standard or special use. Only those targets, panels, boards, and markers specific to individual and crew-served weapons training through qualification are provided within this manual. TC 25-8 includes a comprehensive list of all range equipment, including targets, panels, boards, and markers

TARGETS

L-13. Targets are made of metal, plywood, composites, plastic, paper, or paperboard and are used for sniper training and marksmanship events, typically on live-fire ranges. Targets may be ordered through the installation's range control supply, training support center, or through the unit's supply functions. Users should verify with their range control supply to determine the method of ordering.

L-14. Table L-1 lists the most common target types used during sniper weapons training. TC 25-8, Appendix E, describes in detail the specific targets for the training plans in this TC.

Table L-1. Sniper target types

Target Type	Target Type Description	Remarks
A-Type	Small Arms Zero	Paper targets, typically ordered through GSA.
B-Type	Small Arms Bulls Eye or Ring	Paper targets, typically ordered through GSA.
D-Type	Dimensional	Plastic form, three-dimensional targets, typically referred to as Ivans.
E-Type	Silhouette, Kneeling	Standard machine gun, rifle, or pistol training target on automated ranges.
F-Type	Silhouette, Prone	Standard machine gun, rifle, or pistol training target on automated ranges.
G-Type	Silhouette, Flank	Standard machine gun, rifle, or pistol training target on automated ranges replicating a moving target.
I-Type	Iron, Steel, or Composite	Metal targets used for downrange feedback on nonautomated ranges. Portable and relocatable. Typically called Iron Maiden targets.
J-Type	Human Type, Reactive	Urban operations training instrumented target.
K-Type	Known Distance	Specifically designed for known distance ranges for rifle, carbine, and sniper weapon use.
L-Type	Light Armor Threat Silhouettes	Locally manufactured silhouettes that replicate threat light armor vehicles, either in frontal or flank postures.
ST-Type	Standard Target	The standard targets are typically used to facilitate the zeroing, harmonization, or screening events for weapons or weapon systems.
Legend		
GSA	General Services Administration	

Special Panels and Boards

L-15. The range support staff or using unit constructs the panels, or boards to use on ranges, training areas, and maintenance areas (table L-2). Special panels and boards are used for fire control manipulation drills, maintenance functions, or sight and optic alignment activities and ***are not to be engaged.***

Table L-2. Panels and boards

Panel Type	*Panel Description*	*Remarks*
SP-Type	Special Purpose Panels	Locally manufactured panels for alignment, accuracy checks, boresighting, or maintenance procedures.
SB-Type	Snake Boards	Locally manufactured boards used for fire control manipulation, aiming, sight picture, and other training drills.
Legend SB special board SP special panel		

Range Markers

L-16. The range support staff or using unit constructs the range markers for use on ranges or training areas (table L-3). They identify the firing limits, lanes, or areas of a given range facility. The range markers provide a method of controlling the fires of a Soldier, crew, or small unit for safety or instructional purposes. They ***are not to be engaged***.

Table L-3. Range markers

Marker Type	*Marker Description*	*Remarks*
RM-Type	Range Markers	Locally manufactured markers that identify the firing boundaries, limits, lanes, or reference points on a range facility.
Legend RM range marker		

Visibility and Exposure

L-17. Target visibility. All targets must be 90 percent visible from the firing position for the entire exposure time. For engagements that require the forward, lateral, or rearward movement of the firer, all targets must be 90 percent visible for 90 percent of the length of the movement. For example, if the target is presented for 50 seconds in the scenario, the target must be clearly 90 percent visible to the firer for a minimum of 45 seconds.

L-18. Target exposure. Target exposure is based on the firing task during the training event. Each type of event identifies the amount of time the target is exposed, as well as the time allowed for the shooter to engage and defeat the threat presented. The exposure requirements are programmed into the range operating software and are executed during the scenario automatically. Target exposure time begins when all targets for the engagement are fully presented and locked in the exposed position.

L-19. Using moving targets requires scenario developers to pay particular attention to how the moving target system is used during the engagement. The following is a list of actions developers must consider when using moving targets during scenario development:

- Determine length of track in meters. (Standard is 350 meters in length.)
- Establish a required speed of mover, direction, and evasive characteristics.
- Identify the distance to reach full speed and lock in meters. (This varies on different range facilities.)
- Determine maximum speed in kilometers per hour or miles per hour.
- Ensure the moving target exposure time is for 50 seconds after locking and reaching set speed conditions. Ensure there is sufficient remaining track at the end of the presentation to slow and stop the moving target carriage. Typically, planners should include 8 seconds for the moving target to accelerate and raise the panel for presentation. Depending on the range operating software, this may or may not be taken into account when the scenario is generated.
- Determine the start and end point of the presentation. The scenario may require specific start locations for each lane in the scenario which may require additional time between engagements to reset.
- MITs may require direction changes to maintain movement throughout the desired exposure time for the engagement.
- When using TMT-I or TMT-V mechanisms, the developer must map the desired actions of the moving target. This may include random or deliberate reactive tactical maneuver of the target based on a direct fire engagement from the firer. Sufficient space for the systems to function as desired after contact must be coordinated and programmed.

Friendly and Neutral Presentations

L-20. Friendly and neutral presentations may be included during select training events. These presentations provide the ability to execute target discrimination and classification as friend, foe, or neutral. There are three methods to enable the appropriate target discrimination and classification training, which are based on the training requirement and equipment capabilities below:

- High fidelity. Technology and instrumentation provide several means to provide high fidelity discrimination and classification cues on targets. High fidelity options include photo and thermal-realistic applications that accurately replicate a thermal (heat) signature of the threat. Other applications include polarized weapons on a dismounted threat that enables the gunfighter to select the most dangerous threat during multiple target presentations.

- Medium fidelity. Reverse-polarity paper, contrasting paint schemes, and thermal blankets provide a medium fidelity option for targets. They provide day and night target identification features that can be viewed through image intensifier (known as I2) and thermal optics.
- Low fidelity. This is where the target includes colors, shapes, numbers, or other methods to direct the gunfighter onto the proper target, or to select the appropriate threat to engage.

L-21. Target discrimination and classification training tasks are executed during the more complex and advanced exercises in dry and live-fire events. Presentations during live-fire events typically provide a thermal-realistic image to provide infrared and thermal signatures that replicate actual threats. Training developers must consider the day, infrared, and thermal characteristics that provide the ability to discriminate the threat from friendly, neutral, or noncombatants

INSTRUMENTATION AND ACCESSORIES

L-22. The following is a list of target instrumentation or accessories required for small arms training, qualification, and sustainment. These are the most common devices for small arms ranges, which provide combat realism, accuracy, downrange feedback, and target acquisition cues to the event.

- Battle Effects Simulator. Known as BES, these training devices provide the firer an indication that the threat is present and has fired an armor-defeating munition. The device can be programmed to execute independently or timed based on a target mechanism or other instrumentation.
- Sound Effects Simulator. Known as SES, these training devices provide prerecorded audio that supports the scenario. The sound effects simulator maintains a catalog of at least 50 on-demand audio recordings. These recordings can be played on demand from the range operating software, programmed situation instances, or timed scenario events.
- Hostile Fire Simulator. Known as HFS, these training devices provide simulated small arms fire cues to the shooter. The simulator can be controlled for execution from the range operating system at varying instances for single or multiple rates of fire as the scenario requires.
- Location of miss and hit. Known as LOMAH, this computerized scoring system can be applied to any target lifting mechanism to identify the relative location of direct fire impact, from 5.56 millimeter rounds up to .300 Win Mag rounds, on a target or the surrounding area. The system can identify small arms projectiles that pass through or within 72 inches of a target. The system is accurate to within + or - 5 millimeters of the actual location (tolerance) for projectiles travelling supersonic. The system cannot identify subsonic ballistic strikes. The x and y location of all projectiles passing the z axis of the target is provided to the range operating software and subsequently to a display for the specific shooter, trainer, or spotter. The ballistic strike information must transmit via wireless means as the primary

method and hardwire or fiber optic means for redundancy for fixed emplacements.

- Hit sensors. Each target must be able to register ballistic strikes by the appropriate caliber. These sensors must be placed on the target and tied to the target lifting mechanism for evaluation and scoring purposes. Each lifting mechanism must have the ability to select the number of ballistic strikes in the event the scenario requires multiple strikes to defeat the threat, or if the threat requires ballistic strikes in a lethal area. Hit sensors must provide hit detection that corresponds to the training scenario's target strike requirements to activate or initiate additional actions (target drop, bob, redirect, change of direction).
- Hit direction. For the TMT-series of targets, the system must register the direction of received direct fire for 5.56 millimeter rounds up to .300 Win Mag rounds, with an accuracy of + or -5 degrees. This enables advanced after action review capabilities for sniper and designated marksman training events.
- Thermalization. Targets must be thermal-capable to facilitate training using day, infrared, and thermal optics. Thermalization must follow the shapes and outlines described in TC 25-8 for the respective target silhouette.

Note. Battlefield Effects Simulators require additional pyrotechnics cartridges that training units must forecast within the Total Ammunition Management Information System, known as TAMIS. Units must order the proper pyrotechnics cartridges to ensure the training facility provides the required target indications to meet the Army standard.

Hostile Fire Simulators do not require any additional pyrotechnics to support the training event. These systems typically use a light source to replicate a muzzle flash for dismounted Infantry target presentations and arrays.

L-23. Table L-4 details the stationary types of targets typically found on small arms and sniper training ranges, their hostile fire indicator or battlefield effects simulator event, and the point of execution.

Table L-4. Stationary target requirements

Target Type	*Presentation*	*Hostile Fire Indicator*	*Execution*
Unarmored (SAT)	Stationary (frontal or flank) threat truck, sedan, technical truck, or similar silhouette. Standard thermal, daylight, or graphic application.	1 BES	5 seconds after target lock, programmable.
Unarmored (TMT-V)	Stationary threat truck, sedan, technical truck, or similar 3-dimensional silhouette. Direct fire identification (engine block, driver, mobility kill) accessory capable. Standard thermal, daylight, or graphic application. Engine block and driver hit sensor accessories required.	HFS Flash, semi-automatic or automatic fire simulated.	Per scenario, programmable.
Point Troop (SIT or MIT)	Stationary D-type, E-type, or H-type silhouette. Thermalized with or without garments. High-value target may be displayed as contrasting thermal or color garment.	HFS flash, semi-automatic or automatic fire simulated.	Per scenario, programmable.
Point Troop (TMT-I)	Stationary D-type, E-type, H-type silhouettes, or KD 72” frame. LOMAH and direct fire identification accessory capable. Thermalized with or without garments. High-value target may be displayed as contrasting thermal or color garment.	HFS flash, semi-automatic or automatic fire simulated.	Per scenario, programmable.
Iron Maiden	Portable, rotating E-type with lethality zone indicators. Provides instant downrange feedback through strike rotation or action.	N/A	N/A

Legend

BES	battlefield effects simulator	N/A	not applicable
HFS	hostile fire simulator	SAT	stationary Armor target
KD	known distance	SIT	stationary Infantry target
LOMAH	location of miss and hit	TMT-I	trackless moving target–Infantry
MAT	moving Armor target	TMT-V	trackless moving target–vehicle
MIT	moving Infantry target		

L-24. Ranges with scenarios that incorporate moving armor targets (MATs) add realism to the training event or exercise. Table L-5 illustrates the moving target presentation capabilities, the hostile fire indicator standards, and the point of execution for the indicator. The standard track length is 350 meters but may be less depending on range terrain constraints.

Table L-5. Moving and evasive target requirements

Target Type	*Presentation*	*Hostile Fire Indicator*	*Execution*
Unarmored (MAT)	Moving or evasive (flank) threat truck, sedan, technical truck, or similar silhouette. Standard thermal, daylight, or graphic application. Constant or altering (evasive) speeds between 1-20 mph, with programmable change of direction. Engine block and driver hit sensor accessories required.	1 BES	5 seconds after target lock and mechanism is moving at programmed speed, programmable.
Unarmored (TMT-V)	Moving threat truck, sedan, technical truck, or similar 3-dimensional silhouette. Direct fire identification (engine block, driver, mobility kill) accessory capable. Standard thermal, daylight, or graphic application. Moving pattern controlled by preset mapping, individual control, or preprogrammed logic. Constant or varying speeds between 1 and 20 mph, with programmed, random, or unpredictable reaction. Engine block and driver hit sensor accessories required.	HFS flash, semi-automatic or automatic fire simulated.	Per scenario, programmable.
Point Troop (MIT)	Moving D-type, E-type, or H-type silhouette. Thermalized with or without garments. High-value target may be displayed as contrasting thermal or color garment. Moving targets 1-8 mph, constant or varying speed, single or varying direction.	HFS flash, semi-automatic or automatic fire simulated.	Per scenario, programmable.
Point Troop (TMT-I)	Moving D-type, E-type, H-type silhouettes, or KD 72” frame. Precision hit zones and direct fire identification accessory capable. Thermalized with or without garments. High-value target may be displayed as contrasting thermal or color garment. Moving pattern controlled by preset mapping, individual control, or preprogrammed logic. Constant or varying speeds between 1 and 12 mph, with programmed, random, or artificial tactical intelligence reaction.	HFS flash, semi-automatic or automatic fire simulated.	Per scenario, programmable.

Legend

BES	battlefield effects simulator	MIT	moving Infantry target
HFS	hostile fire simulator	mph	miles per hour
KD	known distance	TMT-I	trackless moving target–Infantry
MAT	moving Armor target	TMT-V	trackless moving target–vehicle

L-25. Evasive targets should have the ability to change speed and direction as well as alter their appearance or thermal signature as the vehicles’ direction changes. If the scenario includes the moving target executing a short halt, an additional battlefield effect simulator or hostile fire simulator must be initiated within two seconds after coming to a halt.

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Glossary

The glossary lists acronyms and terms with Army or joint definitions. Where Army and joint definitions differ, (Army) precedes the definition. Terms for which TC 3-22.10 is the proponent are marked with an asterisk. The proponent manual for other terms is listed in parentheses after the definition.

SECTION I – ACRONYMS AND ABBREVIATIONS

B

BCT brigade combat team

G

GEOINT geospatial intelligence

GPS Global Positioning System

L

LRF laser range finder

M

METT-TC mission, enemy, terrain, troops available, time and civil considerations

N

NVD night vision device

NSN national stock number

O

OP observation post

R

ROE rules of engagement

RPG rocket propelled grenade

S

S-2 battalion or brigade intelligence staff officer

S-3 battalion or brigade operations staff officer

SIGINT signals intelligence

SOP standard operating procedure

T

TOC tactical operations center

U

UAS	unmanned aircraft system

SECTION II – TERMS

avenue of approach

An air or ground route of an attacking force of a given size leading to its objective or to key terrain in its path (JP 2-01.3).

exfiltrate

A tactical mission task where a commander removes Soldiers or units from areas under enemy control by stealth, deception, surprise, or clandestine means.

(FM 3-90-1)

forward observer

An observer operating with front line troops and trained to adjust ground or naval gunfire and pass back battlefield information. (Also called FO) (JP 3-09).

joint fires observer

A trained Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 close air support terminal attack control, and perform autonomous terminal guidance operations. Also called JFO (JP 3-09.3).

joint terminal attack controller

A qualified (certified) Servicemember who, from a forward position, directs the action of combat aircraft engaged in close air support and other offensive air operations. Also called JTAC (JP 3-09.3).

reconnaissance

A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or adversary, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area (JP 2-0).

rules of engagement

Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered (JP 1-04).

surveillance

The systematic observation of aerospace, cyberspace, surface, or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means (JP 3-0).

tactical air control party

A subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft. Also called TACP (JP 3-09.3).

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