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MANEUVER LEADER'S GUIDE to STINGER

Lessons and Best Practices

Maneuver Leader's Guide to Stinger

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Foreword

Today's operational environment presents threats the Army has not faced in nearly 20 years. Against peer competitors, the joint force may face air parity or even localized enemy air overmatch, challenging the assumption of air superiority the joint force has held since the Korean War. This will make maneuver forces vulnerable to air attack by fixed- and rotary-wing aircraft, unmanned aircraft systems, and cruise missiles. Maneuver forces lack capacity and capability to address these threats and the Army requires a speedy response.

The Chief of Staff of the Army directed the Army to execute a plan to increase short-range air defense (SHORAD) capability. The immediate solution is to train and arm teams of Soldiers organic to select brigade combat teams with Stinger missiles. This directive is one line of effort as the force structure for a dedicated maneuver SHORAD capability increases.

Stinger missiles provide a key capability for maneuver forces to defend themselves from aerial observation and attack. However, without direct involvement from senior brigade combat team leaders and effective leader training, these missiles will become dead weight at best or a fratricide in waiting at worst. Units must plan effectively to utilize this capability and ensure it ties directly to their scheme of maneuver as opposed to simply task-organizing one Stinger team per company.

This guide is designed as a single entry point for brigade combat team and maneuver battalion commanders and their staffs to effectively train and fight Stinger teams as part of an integrated combined arms team. These planning and employment techniques should prove invaluable to effectively maximize mission effectiveness, allow maneuver forces to retain the initiative, and provide freedom of maneuver from the air.

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Maneuver Leader's Guide to Stinger

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Introduction

This guide serves as a concise and consolidated tool for leaders to integrate short-range air defense (SHORAD) into battalion and brigade plans.

The principal audience for this guide is brigade and battalion staffs who have maneuver Soldiers equipped with Stinger man-portable air defense systems (MANPADS).

Commanders, staffs, and subordinates must ensure their decisions and actions comply with applicable U.S., international, and, in some cases, host-nation laws and regulations. Commanders at all levels must ensure their Soldiers operate in accordance with the Law of War and the rules of engagement. (See Field Manual 27-10, *The Law of Land Warfare*.)

The chapters of this guide first outline general air defense principles and planning and then focus on air defense within the maneuver brigade combat team. The appendices focus on training and employment of Stinger teams.

Chapter 1

Air Defense Planning Principles and Guidelines

This chapter provides a general overview of Army air defense planning principles and guidelines. It addresses the role of air defense, the Army's air defense operational elements, air defense employment principles and guidelines, alert statuses and warnings, and weapon control statuses (WCSs).

Air and Missile Defense Overview

Air and missile defense (AMD) is the direct defensive actions taken to protect friendly forces by destroying or reducing the effectiveness of hostile air and ballistic missile threats against friendly forces and assets in support of the joint force commander's objectives (Army Doctrine Reference Publication [ADRP] 3-09, *Fires*). Strategic, operational, and tactical levels all execute AMD.

Air defense artillery (ADA) is the Army element whose primary mission is conducting AMD operations. The role of ADA is to provide fires to protect the force and selected geopolitical assets from aerial attack, missile attack, and surveillance (ADRP 3-09).

Short-range air defense (SHORAD) are those dedicated ADA and non-dedicated air defense capabilities which enable movement and maneuver by destroying, neutralizing, or deterring low-altitude air threats by defending critical fixed- and semi-fixed assets and maneuvering forces. Units use these SHORAD elements to counter unmanned aircraft systems, rotary-wing threats, and other low-altitude aerial threats.

Operational Elements of Air Defense

Active Air Defense

Active air defense is direct defensive actions taken to destroy, nullify, or reduce the effectiveness of hostile air and missile threats against friendly forces and assets (Joint Publication [JP] 3-01, *Countering Air and Missile Threats*). Active air defense includes the use of aircraft, air defense weapons, electronic warfare, and other available weapons. Early detection of missiles in flight to permit cueing, acquisition, tracking, classification, identification, and destruction as soon as possible after launch enables active missile defense. Commanders must prepare their units to actively engage air threats if attacked. Active air defense techniques are measures taken in support of a commander's intent using rules of engagement (ROE), defended asset priorities, and airspace coordinating measures to protect the force.

The decision to engage air threats should include consideration of the unit's mission and tactical situation. If the enemy aerial platforms are outside the engagement range of the unit's weapons, a unit's most attractive option may be to seek cover.

Coordinating sensor plans with air defense elements prior to and during operations can increase a unit's survivability, especially when located separate from the main effort.

Although sensors cannot actively engage threats, they do provide weapon systems cueing and early warning functions needed by combined arms commanders to make an informed decision. These systems are normally tied into an established early warning network where tactical commanders can integrate their units through the deployment of air defense airspace management cells or AMD elements at the brigade combat team (BCT) or division levels. Based on the information given on a potential threat, a commander can make a decision on active defense or employ passive defense measures. The commander may also have time available to take force protection measures against a threat such as an inbound ballistic missile if there are no available air defense systems that can defend against it. Coordinating sensor plans with air defense elements prior to and during operations can increase a unit's survivability, especially when located separate from the main effort. Implementing sensor plans using varying routines will also reduce an adversary's targeting and counter-target effectiveness.

Passive Air Defense

Passive air defense is all measures, other than active air defense, taken to minimize the effectiveness of hostile air and missile threats against friendly forces and assets (JP 3-01). Passive air defense measures include camouflage, concealment, deception, dispersion, reconstitution, redundancy, detection and warning systems, and the use of protective construction. There are two types of passive defense measures: attack avoidance and damage limiting.

Commanders employ passive AMD measures to improve their units' survivability by increasing the likelihood of not being detected and targeted (attack avoidance) from the air and by mitigating the potential effects (damage limiting) of an air attack. Air defense units perform passive air defense techniques, which include the tasks of detecting air and missile launches, predicting impact points, providing threat identification, and alerting forces of possible chemical, biological, radiological, and nuclear (CBRN) events through disseminating early warning.

Attack Operations

Attack operations are offensive actions that destroy and disrupt enemy air and missile capabilities before, during, and after launch. Attack operations consist of the destruction, disruption, or neutralization of enemy airfields; aerial airframes; tactical ballistic missile (TBM) launch platforms; logistical support trains; electronic warfare platforms; reconnaissance, surveillance, and target acquisition platforms; and any other potential targets that can be destroyed before having the opportunity to be utilized against friendly forces. Sensors may be able to identify launch points for attack operations.

Mission Command

Mission command is the exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander's intent to empower agile and adaptive leaders in the conduct of unified land operations (Army Doctrine Publication [ADP] 6-0, *Mission Command*).

Mission command is the baseline that links active air and missile defense, passive defense, and attack operations to provide timely assessment of the threat, and rapid dissemination of tactical warning, mission assignment, targeting data, and post-strike assessment.

Components of SHORAD

The Stinger missile system is a man-portable air defense system (MANPADS). It is a shoulder-fired, infrared radiation-homing, heat-seeking, negative ultraviolet-guided missile system which requires no control from the gunner after firing. Stinger has an identification, friend-or-foe (IFF) subsystem that aids the gunner and team chief in identifying friendly aircraft. Stinger provides SHORAD for units and select critical assets. The Stinger weapon system is designed to counter low-level, fixed- and rotary-wing aircraft, and unmanned aircraft (unmanned aircraft system groups 3-4). (See Army Techniques Publication [ATP] 3-01.18, *Stinger Team Techniques* [CAC login required for access.])

The Avenger weapon system is a lightweight, day or night, limited adverse-weather fire unit employed to counter enemy reconnaissance, surveillance, and target-acquisition efforts and low-level, fixed- and rotary-wing threats. The Avenger fire unit has eight ready-to-fire Stinger missiles in two turret-mounted standard vehicle missile launchers, an M3P .50-caliber machine gun, a sensor package with forward-looking infrared receiver, laser range finder, and IFF capability. It has the capability to shoot on the move or emplace with the crew operating a remote control unit outward 50 meters from the fire unit. Avenger units are currently organized as battalions and separate batteries, deployed generally as a battalion or battery, and employed as batteries or platoons. (See ATP 3-01.64, *Avenger Battalion and Battery Techniques.*)

Sentinel is an X-band, medium-range, pulse-Doppler radar that provides accurate three-dimensional cueing and near real-time target identification information to a range of 40 kilometers (threat dependent). It can acquire, track, and classify cruise missiles, unmanned aircraft systems, and fixed- and rotary-wing aircraft. The Sentinel provides track data to the air defense airspace management (ADAM) element via the Air and Missile Defense Workstation to provide early warning. The Sentinel system is normally deployed as a platoon with the Indirect Fire Protection Capability/Avenger battalion and Avenger battalion. Sentinel sections can also be found in the counter rocket, artillery, and mortar battery; division artillery; and target acquisition platoon in fires battalions. (See ATP 3-01.48, *Sentinel Techniques* [CAC required for access].)

Combined arms for air defense (CAFAD) are small arms techniques used in air defense that incorporate the use of volume fire and proper aiming points according to the targets direction. Small arms are limited to the range and destructive capability of the weapon and should only be used on low-flying aircraft. (See ATP 3-01.8, *Techniques for Combined Arms for Air Defense.*)

The ADAM/brigade aviation element (BAE) cell is an organic element of the corps, divisions, BCTs, and select support brigades. The ADAM/BAE cell plans, coordinates, and establishes connectivity for unified actions with communications systems, command and control, intelligence/controller networks, and airspace users. It also provides situational awareness and early warning. The ADAM/BAE cell conducts continuous planning and execution of airspace management requirements for the supported unit/echelon and conducts AMD and aviation planning and coordination to determine AMD and aviation requirements across the spectrum of conflict. (See ATP 3-01.50, *Air Defense and Airspace Management (ADAM) Cell Operation*.)

Air Defense Employment Principles

AMD employment principles enable ADA forces to successfully perform combat missions and support overall force objectives. The following are the four air defense employment principles:

Mass

Mass is the concentration of air defense combat power. It is achieved by assigning enough firepower to successfully defend the force or the asset against aerial attack or surveillance. To mass air defense combat power in one area, commanders may have to accept risks in other areas of the battlefield. Mass may also be interpreted to include the launching of more than one interceptor against a target.

Mix

Mix is the employment of a combination of weapon and sensor systems to protect the force and assets from the threat. Mix offsets the limitations of one system with the capabilities of another and complicates the situation for the attacker. Consider joint, interagency, intergovernmental, and multinational ADA capabilities when applying this principle. Proper mix causes enemies to adjust their tactics. Enemy tactics designed to defeat one system may make the enemy vulnerable to another friendly system.

Mobility

Mobility is the quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary role. Some ADA units will have mobility that matches that of their supported unit. Others will be less mobile. However, they retain sufficient mobility to move from position to position to continuously protect the supported force on the move.

Integration

Integration is the addition and fitting together of the forces, systems, functions, processes, and information acquisition and distribution required to efficiently and effectively perform or support Army AMD tasks. Integration combines separate systems, capabilities, or functions in such a way that they can operate singly or in concert without adversely affecting other elements.

Employment Guidelines

Planning during defense design and positioning ADA units involves applying six employment guidelines. Defense planners apply these guidelines vertically and horizontally to account for the variety of altitudes and ingress routes from which the enemy can attack or conduct intelligence, surveillance, and reconnaissance operations.

Mutual Support

Position weapons so the fires of one weapon can engage targets within the dead zone of the adjacent weapon systems. For gun systems, this dead zone is usually small. For missile systems, the dead zone may be large and mutual support is a critical element. Mutual support can also cover non-operational units or units at lower states of readiness.

Overlapping Fires

Position weapons so their engagement envelopes overlap. Because of the many altitudes from which the enemy can attack or conduct surveillance operations, defense planners must apply mutual, supporting, and overlapping fires vertically and horizontally. Overlapping fires should be achieved at a minimum during defense design.

Balanced Fires

Position weapons to deliver an equal volume of fires in all directions. This is necessary for AMD in an area where the terrain does not canalize the threat or when the avenues of approach are unpredictable. It is a desired characteristic of defense design.

Weighted Coverage

Concentrate weapons coverage toward the most likely threat air avenues of approach or direction of attack. Based on the tactical situation, a commander may risk leaving one direction of attack unprotected or lightly protected to weight coverage toward another direction.

Early Engagement

Sensors and weapons are positioned so they can engage the threat before ordnance release or friendly target acquisition. Early engagements enable destruction of enemy platforms over enemy forces and unoccupied areas, thereby reducing the possibility of friendly collateral damage and fratricide.

Defense-In-Depth

Position the sensors and weapons in depth to expose the threat to a continuously increasing volume of fire as it approaches the friendly protected asset or force. Defense-in-depth decreases the probability that attacking missiles, aircraft, rockets, artillery, and mortars will reach the defended asset or force.

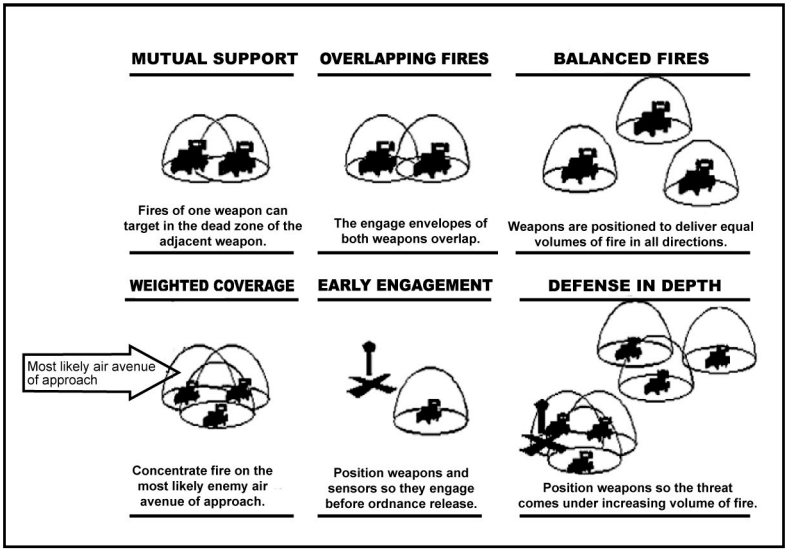

Figure 1-1. Air defense employment guidelines (Avenger systems are depicted; however, the same concept and terminology apply for Stinger systems.)

Air and Missile Defense Engagement Operations Control

An air defense engagement is an attack either by guns or by launch of an air defense missile by ADA or maneuver units equipped with Stinger MANPADS and the missile's subsequent travel to intercept (*DOD Dictionary of Military and Associated Terms*). Engagement operations within the joint counter air mission represent the collective and integrated effort by all services to physically defeat enemy air threats. Army ADA commanders, through the application of mission command, direct the force operations of their units. However, the decision to conduct AMD engagements are done under the tactical control directives established by the designated joint area air defense commander.

Positive Control

AMD fires are controlled through positive or procedural ROE. Positive control is a method that relies on positive identification and tracking of airborne objects and control of fires within an airspace conducted by an agency having the authority and responsibility therein. A common operational picture that synthesizes data from multi-Service intelligence and air defense sensors can correlate air tracks and identify them based on an integrated airspace control plan and established identification criteria that enables positive control. Positive control is exercised through fire control orders.

Procedural Control

Procedural control is a method that relies on a combination of previously agreed upon and promulgated orders and procedures. Procedural controls include air defense warnings (ADWs), ROE, airspace control orders, published identification criteria, and WCS.

Air Defense Warnings

ADWs state the probability of an air raid based on the threat assessment and current intelligence preparation of the battlefield. The area air defense commander (AADC) establishes the baseline ADW during the planning phase for the joint force. The ADW may be different for an air breathing threat and a missile threat. Subordinate air defense commanders may issue higher, but not lower, ADW for their region or sector. ADWs are disseminated though mission command channels to air and missile defense elements and fire units.

Air Defense Warnings

Red: An attack by hostile aircraft or missile is imminent or in progress.

Yellow: An attack by hostile aircraft or missile is probable.

White: An attack by hostile aircraft or missile is improbable.

Local air defense warnings (LADWs) are designated as dynamite, lookout, and snowman:

> **Dynamite**. Aircraft or missiles are inbound or attacking now. Response is immediate. As a general rule, a dynamite status should be assumed when an air threat is within 15 kilometers of the division or BCT area of operations.

Lookout. Aircraft or missiles are in the area of interest but are not yet threatening or are inbound but there is time to react. As a general rule, a lookout status should be assumed when an air threat is within 30 kilometers of the division or BCT area of operations.

Snowman. No aircraft or missiles pose a threat at this time. Aircraft and missiles are monitored but not broadcast over the early warning net.

LADWs are used to alert the force to impending attack at the local level. They should be incorporated into the local tactical standard operating procedure (TSOP), explaining what response the supported force desires when a LADW is broadcast. For example, in the TSOP, when dynamite precedes an early warning message, the forces stop to increase passive air defense measures and predesignated elements prepare to engage with a combined arms response. The response desired by the supported force is unique to the mission; dependent on mission, enemy, terrain and weather, troops and support available-time available and civil considerations (METT-TC); and should be included in the supported force's TSOP. LADW dissemination must be rehearsed with the supported force.

Rules of Engagement

ROE are positive and procedural management directives that specify the circumstances and limitations under which forces will initiate or continue combat engagement with enemy forces. (See *Unified Command Policy 2011*, Executive Office of the President [04/08/2011].) The joint force commander approves the theater ROE. These established rules enable the AADC to retain control of the air battle by prescribing the exact conditions under which engagements may take place. ROE apply to all warfare participants in theater and are disseminated to all echelons of air, land, and sea forces. There are seven ROE categories:

- Right of self-defense
- Identification criteria
- Fire control orders
- WCS
- Levels of control
- Modes of control
- Autonomous operations

Right of Self-Defense

Commanders at all echelons must take the action necessary to protect their forces and equipment against air or missile attack. When under attack, the right of self-defense is inherent to all ROE and weapon control procedures (JP 3-01). When applied to air defense, the right of self-defense includes the defense of the defended assets.

Identification Criteria

The employment of Army AMD weapon systems requires early identification of friendly, neutral, or hostile aircraft and missiles to maximize beyond-visual-range engagement and avoid fratricide. This requires a clear understanding of the ROE. The problem of distinguishing friendly, neutral, and enemy aerial objects, while employing various weapon systems against the enemy, is a highly complex task for some threats. The AADC and the airspace control authority establish procedures within the airspace control system to positively identify all airborne assets and permit AMD. AMD measures reduce delays in operations and prevent fratricide. Positive identification of tracks is normally the preferred method of operation. In the absence of positive identification, procedural identification is used. Procedural identification employs previously established and promulgated airspace coordinating measures and rules. Procedural identification separates airspace users by geography, altitude, heading, time, and/or maneuver. Generally, a combination of positive and procedural identification is used.

Hostile criteria are basic rules that assist in the identification of friendly or hostile air platforms, fixed- and rotary-wing aircraft, cruise missiles, and unmanned aircraft systems. These rules are disseminated by the commanders of unified commands and by other appropriate commanders when authorized.

Echelons having identification authority use hostile criteria to determine the identification of detected air targets. The highest echelon capable of managing engagement operations normally retains identification authority. Upon target detection, fire units with near real-time data transmission capability assist the controlling authority by forwarding target information. The controlling authority makes final targeting decisions based on identification (e.g., classification and kinematic evaluation) and delegates engagement authority. Delegation of controlling and identifying authority to lower echelons is normal for ADA units and as such, units have both identification and engagement authority.

Maneuver units with Stinger teams should have identification and engagement authority at the Stinger team-chief level due to the lack of near real-time data transmission capability. Short reaction times due to the speed of threat airframes make authority at a higher level impractical.

Fire Control Orders

Fire control orders are commands used to control engagements on a case-by-case basis and can be transmitted electronically or verbally. However, not all the following fire control orders can or will be used by every type of ADA unit:

Engage is an order issued by the engagement authority to fire on a specified target with the intent to destroy it.

Hold fire is an emergency fire control order to stop engagement of a specific target. Missiles already in flight must be prevented from intercepting by diversion or destruction, if technically possible.

Cease fire is a fire control order instructing ADA units to refrain from firing on, but to continue to track an airborne object. Missiles in flight are allowed to continue to intercept. This fire control order is normally issued to preclude engagement of the same track by two or more weapon systems.

Cease engagement is a fire control order used to direct units to stop the firing sequence against a designated target. Missiles already in flight will continue to intercept.

Engage hold is an order applicable to Patriot and Terminal High Altitude Area Defense (THAAD) only. When operating in the automatic mode, engage hold prevents automatic engagement of the specified target by the system. Missiles in flight are allowed to continue to intercept.

Cover is used to order a fire unit to assume a posture that will allow engagement of a target if directed. This order can be used for targets that are presently being engaged by another fire unit or for targets that have yet to become a significant threat. When receiving this command, report tracking and ready to fire to higher echelons.

Weapon Control Status

A WCS prescribes the relative degree of control of AMD fires. WCSs — weapons free, weapons tight, weapons hold — may be applied to weapon systems, volumes of airspace, or types of air platforms. The degree or extent of control varies depending on the tactical situation.

Weapons hold. Do not fire except in self-defense or in response to a formal order. This is the most restrictive status. If a time limit is placed on the weapons hold restriction, the team maintains weapons hold for this time limit only and then reverts to weapons tight after the time limit has passed. If communication is lost and no time limit was established, the team maintains weapons hold for 30 minutes and then reverts to weapons tight.

Weapons tight. Fire only at aircraft positively identified as hostile according to prevailing hostile criteria. If communication is lost, the team remains in weapons tight condition.

Weapons free. Fire at any aircraft not positively identified as friendly. If a time limit is established, the same rule applies as in weapons hold. If communication is lost and no time limit is established, the team will immediately revert to weapons tight.

ADA units will normally be governed by a mix of positive and procedural controls that will vary by weapon system. For example, Patriot aircraft engagements are typically positively controlled by engagement orders passed through voice and data links from the controlling authority, while Stinger or Avenger aircraft engagements may be positively controlled or, more commonly, initiated at the fire unit based on established identification criteria (visual identification), and WCS.

Level of Control

Level of control describes the ADA echelon at which positive management of the air battle is conducted. This can be the AADC, regional air defense commanders, sector air defense commanders, ADA battalion, or individual fire unit. This level has engagement authority. Different levels of control may be established for fixed- and rotary-wing aircraft, unmanned aircraft systems, and ballistic missiles. The AADC will specify the level of control in the area air defense plan The level of control may likely change over the course of an operation.

Modes of Control

There are three modes of control: centralized, decentralized, and autonomous. The mode of control selected depends on the capabilities of the communications system, the weapon systems employed, and the friendly and enemy air situations. The AADC's area air defense plan specifies the modes of control, trigger events, when they should be changed, and who has the authority to change them.

Centralized control mode. In this mode, a higher echelon authority assigns target engagements to fire units. In some circumstances, fire units seek permission to engage targets by requesting authorization from that higher air defense echelon. Centralized control is used to minimize the likelihood of engaging friendly aircraft while permitting engagements of hostile aircraft and missiles only when specific orders are issued to initiate the engagement. This mode would not be appropriate for a Stinger in maneuver units due to lack of digital communications down to the Stinger team level and the likelihood the ADAM will not know the exact location of the Stinger teams to direct which team to shoot which target.

Decentralized control mode. In this mode, the higher echelon monitors unit actions to make direct target assignments on a management-by-exception basis to prevent engagement of friendly air platforms and to prevent simultaneous engagements of hostile air targets. Decentralized control is used to increase the likelihood that a hostile aircraft or missile will be engaged as soon as it comes within range of an ADA weapon system. During operations that are more static, it may be possible for the ADAM to execute some level of decentralized control over Stinger teams if their locations are known and direct communication is possible.

Autonomous operations. Autonomous operations occur when a firing unit has lost all communications (i.e., voice, data link, and tactical chat) to their higher headquarters. The firing unit commander assumes full responsibility for control of weapons and engagement of hostile targets in accordance with existing ROE, WCS, and previously received directives. The team must take immediate action to reestablish communications. Specific actions taken will be listed in the unit TSOP or the operation order for the operation. Normally, the ROE and supplemental fire control measures in effect at the time of communications loss remain in effect until communications are regained. Most Stinger teams will operate this way during more dynamic phases of the battle, as communications with the ADAM and BCT tactical operations center are likely to be interrupted during this time. The ADAM cell will not have real-time updates to the positions of the Stinger teams and therefore would be unable to select a team to conduct an engagement or decide which team would have line of sight of the threat within the time frame to engage a fast-moving target.

Vignette 1

An aircraft approached my company position fast and low. The battalion staff announced a WCS of weapons tight. My gunner acquired the aircraft, but cannot visually identify it at this time. I direct the gunner to interrogate. The gunner challenges and receives an unknown IFF response: beep, beep, beep, beep ...

Action taken: I cannot tell the gunner to engage the aircraft because I cannot positively identify it as hostile. I do not ignore it, but direct my gunner to continue tracking the aircraft.

Reason: Weapons tight requires that we make positive hostile identification before engaging. As the aircraft comes closer, we positively identify it as an SU-25. It bears enemy national insignia.

Action taken: I order my gunner to engage.

Reason: By visually identifying the aircraft as hostile, I have met the criteria for engagement under weapons tight.

Vignette 2

At 1230, I received a message from my battalion commander. He stated, "weapons hold on all jet aircraft flying westbound between 1300 and 1330, weapons tight for all other aircraft." At 1315, a jet aircraft I recognize as hostile approaches westbound. It is coming within range of my gunner's weapon.

Action taken: I do not direct my gunner to engage but continue to observe. My gunner tracks the aircraft and waits for my command to engage. I report the incident to the battalion tactical operations center. If the aircraft changes its heading so that it is no longer westbound, I will order my gunner to engage.

Reason: Under weapons hold, I cannot engage except in self-defense. If the aircraft changes headings, I am then under weapons tight. Since I have already visually identified the aircraft as hostile, I can then engage. The aircraft continues on the same heading and fires air-to-surface missiles at my unit.

Action taken: I order my gunner to engage.

Reason: I have the right to engage any aircraft in self-defense. This rule applies not only to an attack on my position, but to the unit I am supporting as well.

Vignette 3

I receive a message from my battalion commander changing the WCS to weapons free. A jet aircraft approaches my position at a low altitude and high speed. I direct the gunner to challenge the aircraft on detection. He receives an unknown audible signal from the IFF.

Action taken: I continue my attempts to visually identify the aircraft while the gunner goes through the engagement sequence. I cannot identify the aircraft as friendly, so I order him to engage and then shoulder my own Stinger.

Reason: I was authorized to order the engagement because weapons free means I should engage aircraft not positively identified as friendly. This, coupled with the fact that an unknown audible signal to an IFF challenge was received and I was unable positively identify the aircraft as friendly, provided sufficient grounds to launch under weapons free. (Stinger gunners may not be allowed to engage an unknown target in weapons free based solely on an IFF decision if constrained by headquarters, commands directives, or standard operating procedures.)

Had there been other aircraft in the area, the engagement sequence on the first aircraft would have continued while I directed my attention at another aircraft. If I had identified the aircraft as friendly after the order to engage was given but prior to launch, I would have called hold fire.

Chapter 2

Air and Missile Defense Intelligence Preparation of the Battlefield

Air and missile defense (AMD) intelligence preparation of the battlefield (IPB) is a four-step systematic continuous process of analyzing the adversary's aerial forces and environment in a specific geographic area and the battlefield around it. By determining the likely adversary courses of action (COAs) and their associated branches and sequels, and by describing the environment where AMD forces are operating, the AMD IPB process helps the commander and staff selectively apply and maximize available AMD forces at critical points in time and space on the battlefield (Army Techniques Publication [ATP] 3-01.16, *Air and Missile Defense Intelligence Preparation of the Battlefield*). The air defense airspace management (ADAM) cell in the brigade combat team (BCT) and the AMD cell at division should work closely with the G-2 or S-2 to develop the AMD IPB.

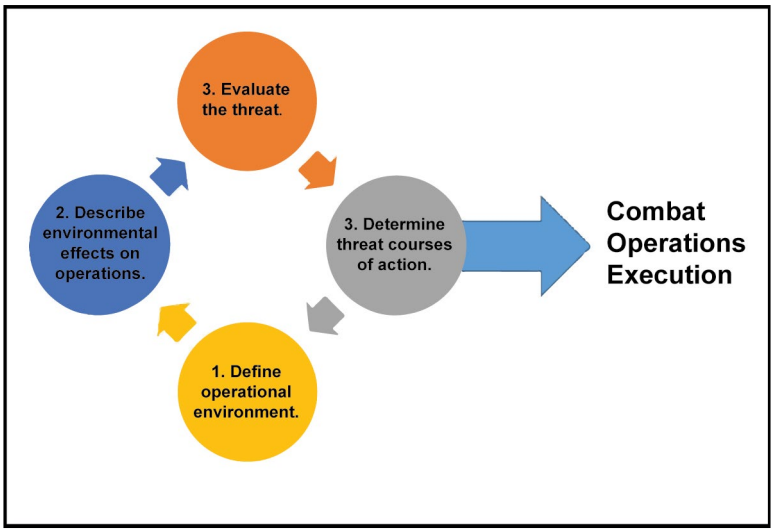

Figure 2-1. Continuous four-step AMD IPB process

Step 1. Define the Operational Environment (Focus)

This step focuses the initial intelligence collection efforts and the remaining steps of the AMD IPB process. It analyzes the command's mission and utilizes this analysis to define the limits of the AMD area of operations (AO) and area of interest (AOI). The AMD AO focuses on the effect that adversary aerial threats and AMD assets have on the battlespace well beyond a commander's traditional AO. The AMD AO is a composite of the geographic areas where adversary aerial forces will be conducting operations, where friendly AMD forces will be conducting operations, and where these forces can affect the battlespace with their assigned sensors and weapon systems. The AOI is that area of concern to the commander, including the area of influence, areas adjacent thereto, and extending into enemy territory. This area also includes the areas occupied by enemy forces and any areas outside enemy territory that provide enemy capability, which could jeopardize the accomplishment of the mission. Defining the significant characteristics of the operational environment aids in providing awareness of the entire AMD battlespace and in identifying and filling current intelligence information gaps. ATP 3-01.16 contains more detailed information on this process.

IPB Step 1 Substeps

- Analyze the commander's mission and intent in relation to AMD.
- Identify the AMD AO.
- Identify the AMD area of interest.
- Evaluate existing databases and identify intelligence gaps.
- Initiate collection of information required to complete IPB.

Step 2. Describe the Environmental Effects on Operations (Influence)

This step evaluates the environment's effect on adversary aerial and friendly AMD force operations. This assessment examines terrain (to include observations and fields of fire, air avenues of approach, key terrain, obstacles, and cover and concealment), weather, and other battlefield characteristics with a focus on how these characteristics affect the employment of adversary aerial threats and friendly AMD assets. The objective is to integrate the environmental effects with the operational environment to create a holistic understanding of the battlefield, which will be crucial to the development of enemy threat COAs and the employment of friendly AMD assets.

Observation and Fields of Fire

These aspects relate to the influence of terrain on reconnaissance and target acquisition. In the IPB context, observation relates to optical and electronic line of sight. Many battlefield systems require line of sight to effectively operate or acquire and engage targets. These systems include radios, radar, jamming systems, direct-fire weapons, airborne and ground sensors, and friendly ADA systems. Fields of fire relate to the terrain effects on weapon systems. Airspace must be analyzed with regard to routes that provide the best protection for air threats entering the target area and those routes that provide the best fields of fire once they reach the target area.

Air Avenues of Approach

Evaluate air avenues of approach using the same criteria as for ground. An effective air avenue of approach will permit maneuver while providing terrain masking from surface-to-air weapon systems and early warning radars. Some common air avenues of approach are valleys, direct lines from the threat point of origin, and riverbeds.

Determine entry and exit air avenues of approach using the following factors:

- Type of air threat, attack profile, and ordnance
- Air threat point of origin and ground control radar positions
- Probable threat objective
- Potential to support maneuver forces
- Freedom to maneuver within the air avenue
- Protection afforded to the air system and pilot
- Air threat and pilot capabilities

Type of air threat. Unmanned aircraft systems (UASs) are elusive. Although they usually fly at low altitudes, their altitude can vary. Once in the target area, they may fly an orbit attempting to stay out of engagement range of ADA. Most surfaced-launched cruise missiles are terrain following and use terrain masking. Due to their range, they may take indirect approach routes. Ballistic missiles are not terrain dependent (not a target for short-range air defense [SHORAD]). They fly a straight ground track from the launch point to the objective. Their flight is not restricted by terrain. Air-to-surface missiles usually fly direct routes from launch platform to the target. Rotary-wing aircraft primarily conduct terrain-following flights. They follow ridge lines and military crests using the terrain to mask their approach to the target area. Fixed-wing aircraft usually follow major terrain or manmade features. Depending on range, fixed-wing aircraft may fly a straight line to the target. Ordnance or payload may affect range and altitude of the air system and thus influence the selection of avenues of approach.

Point of origin. The staff looks at the commander's entire area of interest when determining air avenues. Analysis begins at the enemy airfield, UAS, or missile launch site and works toward the probable enemy objective. This method allows a look at the big picture in which the staff considers the range of the air systems, location of navigation aids, and ground control sites.

Probable threat objective. Each avenue of approach must end at a target; drop zone; landing zone; or within reconnaissance, intelligence, surveillance; or target acquisition range. War gaming is used to identify enemy COAs, which may be used to determine critical maneuver force assets that require AMD protection.

Obstacles. Obstacles are broken down into the following three primary types:

- Those that prevent the effective employment of ADA systems
- Those that restrict terrain-following flights
- Those that force air threats to employ a particular surveillance or attack profile, route, or to gain excessive altitude

Obstacles and terrain, which restrict lateral movement within an avenue of approach, are of particular interest. This will canalize movement or restrict evasive action. Additionally, terrain may stop the employment of certain air threat systems if the terrain exceeds the system's maximum operating ceiling. Obstacles should be plotted on a modified combined obstacles overlay.

Key terrain. Key terrain is any locality or area in which the seizure, retention, or control of it will afford a marked advantage to either combatant. In the aerial dimension, these consist of terrain features that canalize or constrain air threat systems and terrain with an elevation higher than the maximum ceiling of air threat systems. Additionally, areas that can be used for airfields, landing and drop zones, or forward arming and refueling points also need to be considered as key terrain.

Cover and concealment. Fixed- and rotary-wing aircraft, cruise missiles, and possibly even UASs will use terrain flying, masking, and ground clutter to avoid detection and to provide cover from direct fires. Aircraft will also use the terrain by loitering on reverse slopes, using pop-up tactics, and by using ground clutter and vegetation as a backdrop to enhance concealment.

Weather analysis. Air operations are especially susceptible to the effects of weather. Weather analysis for air and missile defense operations is designed to predict the most likely time over target and other considerations based on weather effects and light data.

The G-2 or S-2 consider many of the following factors for ground operations:

- Visibility has the same effects on visually directed ADA systems and sensors.
- High winds adversely affect performance and accuracy of missiles and UASs.
- Precipitation affects aircraft, missile, and UAS performance and reduces the effectiveness of sensors. Cloud cover and ceilings may restrict operations by setting low operational ceilings, affecting early warning and restricting visibility and target engagement.
- Low ceilings, overcast, and cloudy conditions may restrict visually directed ADA weapons' detection and acquisition ranges.
- Extreme temperature and humidity have a severe effect on aircraft and UASs by decreasing combat range, altitude (particularly rotary-wing aircraft), and ordnance loads.

Step 3. Evaluate the Threat (Operational Model)

This step examines in detail the capabilities and limitations of every threat aerial platform the enemy is assessed to possess and how the adversary will organize for combat and conduct operations with these platforms under normal conditions. The results of the threat evaluation are portrayed in appropriate threat models and graphic representations of the adversary's aerial force capabilities and limitations. They include doctrinal templates depicting how the adversary operates under normal conditions. (See the *Worldwide Equipment Guide (WEG) Volume 2: Airspace and Air Defense Systems* for specific enemy weapon systems and platforms for planners.)

Opposing forces' equipment is broken into four tiers in order to portray systems for adversaries with different levels of capabilities and modernity:

Tier 1: New or upgraded state-of-the-art systems with at least limited fielding

Tier 2: Modern competitive systems fielded in significant numbers for the last 10 to 20 years

Tier 3: Generally date back 30 to 40 years and have limitations in mobility, survivability, and lethality

Tier 4: 40- to 50-year-old systems which have been upgraded numerous times, usually found in Third World or less-developed countries

Collect and Analyze Doctrinal Threat Data

The following are typical questions to answer when collecting and analyzing threat data:

- What are the major strategic, operational, and tactical objectives of the enemy's air operations?
- Which objectives may be targeted for destruction or suppression?
- Where are previously reported missile launch positions? What are the likely targets? What are the range, endurance, and profile of these systems?
- What is the size of the ballistic missile brigade, battalion, and battery? Does it fire as a unit? Does the enemy have mobile, fixed, or both types of launchers?

- Where do friendly air and missile defense assets fit into the enemy's objectives? Do they need to be destroyed or suppressed for the enemy plan to work? (Answers to these two questions may result in modification to air avenues of approach.)
- What are the enemy's threat characteristics? How are the assets organized? (Knowledge of enemy organization and who has operational control will indicate the importance of the AO. For example, if the enemy's bombers are at theater level and in the AO, then that area is probably receiving the theater's main attack.)
- Who has tactical control of aircraft at the point of attack?
- How will UASs be used: attack, reconnaissance, or surveillance? What are the associated profiles?
- How does the enemy doctrinally attack? Will the enemy use airborne, air assault, or special operations forces in conjunction with an air or ground attack? What sizes are these forces and to what depth are they used? Will the enemy synchronize the air attack? Does the enemy have the capability to coordinate an air attack (possibly with varied air threat platforms that can overmatch friendly air and missile defense capability)?
- What are air system combat ingress and egress speeds?
- What are the doctrinal distances for forward arming and refueling points? If the enemy's maximum range falls short of the area of operations, where is the enemy likely to stop and refuel or be aerial refueled?
- How and where will the enemy attack ground targets for interdiction?
- At what altitude will the enemy approach the target, deliver munitions, and exit the target area?
- What is the release authority of certain types of ordnance? (This is particularly important when dealing with chemical, biological, radiological, and nuclear [CBRN] threats.)
- How does the enemy employ reconnaissance assets?
- How has the enemy historically fought?
- Was asymmetrical threat operations considered?

Analyze Enemy Air Capabilities

ADA units evaluate a broad range of order-of-battle data and enemy capabilities to include the ground force and electronic warfare threat to ADA units. They evaluate and answer the following concerning threat systems:

- **Ballistic missiles**. The following should be considered concerning the capabilities of threat ballistic missile systems:
    - Performances (missile flight time, speed, trajectory, and launch restrictions)
    - Location of surveyed launch sites
    - Maximum and minimum ranges
    - Circular error probable
    - How is a particular ballistic missile targeted? This may indicate sector of fire or aerial reconnaissance in the area.
    - Reload and fire time? What is the number of ballistic missiles available per transporter erector launcher?
    - Warhead type and size
    - Guidance modes. Precision-guided munition may indicate enemy spotters.
- **Cruise missiles**. The following should be considered concerning the capabilities of threat cruise missiles:
    - Performances (duration of flight, speed, altitude, and launch restrictions)
    - Maximum and minimum ranges
    - Circular error probable
    - Targeting capabilities and type
    - Contour flying capability
    - Vulnerability to countermeasures
    - Guidance modes
    - Warhead type and size
    - Radar cross section

- **Aircraft**. The following should be considered concerning the capabilities of air systems:
  - Coordination of air-to-ground attacks
  - Coordination of air and artillery operations. Are ground forward air controllers used?
  - Suppression of friendly air and missile defense
  - Performance (speed, altitude, airfield restrictions, troop and weapon load capacity)
  - Endurance and range (ingress and egress altitudes and speeds)
  - Levels of combat readiness and sortie generation rate
  - Ability to conduct pop-up maneuvers. What is the standoff range?
  - Target acquisition capability, night and adverse-weather capability, and identification ranges
  - The standoff ranges for cruise and tactical air-to-surface missiles
  - Ordnance load (maximum weight, type, load mixture, and level of sophistication)
  - Navigational capability. Type of radar: Can it fly at night or in adverse conditions?
  - Combat radius (with or without external tanks, ordnance, and location of staging bases)
  - Loiter time. How long will it have on station over the target area?
  - Countermeasures environment. For example, will standoff jammers, ground-based jammers, reconnaissance or chaff-laying UASs, or aircraft degrade friendly ADA systems?
  - How much do they conform to doctrine?
  - If the nation is known to vary from prescriptive flight routes or have restrictive command and control of sorties
  - Ability of pilots to fly at night or perform contour flying

  - Types and capabilities of threat ordnance. Each type of ordnance should be evaluated for the following:
    - Range to determine the ordnance release line (assume engagement at maximum range and two-thirds maximum range)
    - Accuracy
    - Release altitude. How high or low must the aircraft fly?
    - Reload and fire time. What is the number of missiles available?
    - Warhead type (for example, mass casualty, conventional, and sub-munitions)
    - Guidance modes. How does the pilot acquire and engage?

- **UAS**. The following should be considered concerning the capabilities of threat UASs:
  - Performances (speed, altitude, and launch restrictions)
  - Endurance and range
  - Terrain flying or terrain limiting factors
  - Target acquisition and standoff range
  - Sensor package and payload (maximum weight, type, and load mixture)
  - Loiter time. How long can the UAS stay on station?
  - Visibility effects on acquisition
  - Modes of recovery and turnaround time
  - Real-time, data-link capability
  - Guidance modes (ground controlled and preprogrammed)

Table 2-1. UAS group categories

UAS Group 1-5		
Group 1: Micro/Mini	Weigh 20 pounds or less and normally operate below 1,200 feet above ground level at speeds less than 100 knots	These systems are generally hand launched (including the hobby-type UASs), offer real-time video and control, and have small payload capabilities. They are operated within the line of sight of the user.
Group 2: Small Tactical	Weigh 25-55 pounds and normally operate below 3,500 feet above ground level at speeds less than 25 knots	These systems have a small airframe, low radar cross-sections, and provide medium range and endurance. They require operation within line of sight to the ground control station.
Group 3: Tactical	Weigh more than 55 pounds, but less than 1,320 pounds, and normally operate below 18,000 feet mean sea level at speeds less than 250 knots	These systems' range and endurance varies significantly among platforms. They require a larger logistics footprint than Groups 1 and 2.
Group 4: Persistence	Weigh more than 1,320 pounds and normally operate below 18,000 feet mean sea level at any speed	These relatively large systems operate at medium to high altitudes. This group has extended range and endurance capabilities (may require runway for launch and recovery).
Group 5: Penetrating	Weigh more than 1,320 pounds and normally operate below 18,000 feet mean sea level at any speed	These systems operate at medium to high altitudes having the greatest range, endurance, and airspeed. They require large logistical footprint similar to that of manned aircraft.

- **Threat anti-radiation missiles**. The following should be considered concerning the capabilities of threat anti-radiation missiles:
    - Performances (speed, altitude, and launch restrictions)
    - Lock on before launch (LOBL)-capable systems
    - Airframe capable of launching anti-radiation missiles
    - Frequencies targeted by anti-radiation missiles
    - Circular error probability (CEP)

Step 4. Determine Threat Courses of Action (Integrate)

This step integrates the results of the previous steps into meaningful conclusions. At a minimum, this step will conclude with one enemy most dangerous course of action (MDCOA) and one enemy most likely course of action (MLCOA). The MDCOA is derived from the threat evaluation in the previous step and how the enemy could conduct operations if unrestrained by the operational environment, the environmental effects, or even enemy intent and national policy. The MLCOA is derived from the threat evaluation in the previous step and how the enemy will most likely conduct operations when restrained by the operational environment, environmental effects, enemy intent, and national policy. These COAs are developed by creating event templates and matrices focused on intelligence collection aimed at identifying the COA the enemy forces could execute and the COA the enemy forces will most likely execute.

Situation Template

A situation template is a graphic depiction of expected enemy dispositions should they adopt a particular COA. They usually depict the most critical point in the operation as agreed on by the S-2 and S-3. However, the S-2 might prepare several templates representing different snapshots in time starting with the initial threat array. The situation template integrates air attack and surveillance profiles with terrain. It focuses on specific air avenues of approach and mobility corridors to determine which avenues are the most capable of supporting specific attack techniques, profiles, and the most direct routes to landing and drop zones.

Event Template

An event template is a guide for collection and reconnaissance and surveillance planning. It depicts named areas of interest (NAIs) where the commander expects to see certain activities of tactical significance and is used to confirm or deny an enemy COA. These NAIs are based on the terrain constraints on air approach routes to potential targets and analysis of the enemy's attack. The G-2 or S-2 develops an event matrix to support the event template by providing details on the type of activity expected in each NAI, the times the NAI is expected to be active, and its relationship to other events on the battlefield.

Decision Support Template

A decision support template is based on the situation and event templates, event matrix, and the wargaming of friendly COA results to include the following:

- Air avenues of approach
- Airborne and air assault objectives
- Landing and drop zones and the largest-sized enemy element that could be employed at the zone
- Range of threat systems
- Range of friendly air and missile defense systems
- Target areas of interest
- Decision points

Air target area of interest and decision points are determined in the same manner as for ground operations. However, due to the high speeds of air systems, decision points must be placed significantly farther in advance of the target area of interest.

Chapter 3

Airspace Management

Joint military operations require effective airspace control. The proliferation of unmanned aircraft systems and fielding of indirect fire platforms capable of higher altitudes and greater ranges than legacy systems create new demands on and complicate the airspace control process. Integration and synchronization of all airspace users are required to establish unity of effort for effective combat operations.

Airspace Management

Airspace management is the coordination, integration, and regulation of the use of airspace of defined dimensions (Joint Publication [JP] 3-52, *Joint Airspace Control*). Airspace management supports airspace control through the coordination, integration, and regulation of airspace users by airspace control elements within an airspace of defined dimensions. (See JP 3-52 for more discussion on airspace management.)

Airspace Control Principles

Effective airspace control enables commanders to respond effectively to changing operational environments with appropriate, flexible, and timely actions. Army forces use the principles of airspace control, which complement joint airspace control principles, to integrate all airspace users. The following are the five principles of Army airspace control:

- Airspace control is action executed through combined arms formations.
- Airspace control is a commander's responsibility based on the commander's intent, priorities, and risk guidance.
- Airspace control is continually planned for and coordinated throughout the operations process.
- Airspace control is an integral part of risk management.
- Near real-time airspace control requires continuous assessment.

Fundamental Considerations of Airspace Control

- The need for each component within the joint force to operate a variety of aircraft and weapon systems, both high and low speed, rotary- and fixed-wing (manned and unmanned)
- The need for each component to use the airspace with maximum freedom consistent with the degree of risk operationally acceptable to the joint force commander
- The need to discriminate quickly and effectively between friendly, neutral, and enemy air operations, vehicles, and personnel
- The need for the airspace control system to be responsive to the requirements of the joint force. The airspace control system needs to be capable of supporting high-density traffic and surge operations as required by the joint force commander.
- The need for close coordination and integration of surface force operations, supporting fires, air operations, air defense operations, special operations, and airspace control activities
- The need to accommodate U.S., host-nation, and multinational airspace control activities.

Airspace Control Documents

Airspace Control Plan

The airspace control authority develops this plan to provide general overall guidance on airspace control. Key elements of the airspace control plan (ACP) include:

- Description of the area of responsibility/joint operations area to which the airspace applies
- Appointment and location of the airspace control authority headquarters
- List of current existing capabilities within the area of responsibility/ joint operations area to provide airspace control.
- Description and duties of the airspace control authority to include each airspace user and liaisons, and coordination with airspace control authority and elements used in the airspace control system
- Description of the interface between the tactical air ground station and air traffic control

- Description of the interface between airspace control authority, area air defense commander (AADC), fire support coordination elements, and the procedures to deconflict air defense and operational requirements
- Description of interface with the Federal Aviation Administration (FAA), host-nation Air Traffic Control System and/or International Civil Aviation Organization (ICAO)
- Description of the interface between U.S. and multinational forces to coordinate and deconflict airspace requirements
- Plans to provide continuity of airspace control operations under degraded conditions
- Description of the positive airspace control procedures for the joint force
- Description of the procedural airspace control procedures available including requesting, approving, modifying, and promulgating procedures
- Description of identification, friend or foe/selective identification feature procedures
- Description of orbit procedures
- Description of special procedures
- Description of procedures and systems to compile and promulgate the airspace control order (ACO)

Air Tasking Order

The air tasking order (ATO) is the operation order or mission assignment for all joint aircraft missions flown in theater. The daily ATO document shows all missions operating in theatre. Aircrews must ensure they are on this daily mission tasking prior to flight.

Airspace Control Order

The ACO is developed after component commanders consolidate, deconflict, and forward their airspace requests to the airspace control authority for further consolidation with other theater-wide inputs. The airspace control authority then integrates all input, resolves any conflicts among the components, and prepares the ACO for distribution. The ACO implements specific airspace coordinating measures (ACMs) for specific time periods. The ACO activates and deactivates procedural control measures, and updates positive control procedures. The ACO can be printed as a stand-alone document or it can be incorporated into the ATO.

Special Instructions

In some theaters, numerous airspace procedures and airspace usages are published in the special instructions (SPINS). One section may contain all the airspace procedures units can expect in an ACP. Other SPINS, such as tanker procedures or cruise missile procedures, address airspace procedures within those particular sections. This may include rules of engagement and combat identification criteria for air defense along with any additional guidance, directives, or information that weapons system operators and/or aircrews will be held accountable for (i.e., host-nation restrictions, base defense zone procedures, and special weapons systems control procedures (Army Tactical Missile System [ATACMS], unmanned aircraft, Tomahawk air-launched cruise missile (TALCM)/air-launched cruise missile (ALCM), etc.). SPINS are published as baseline, weekly, and daily SPINS.

Combined/Joint Area Air Defense Plan

A prioritized list of friendly critical vulnerabilities is developed into a critical asset list and incorporated into the area air defense plan (AADP). The defended asset list is the basis of the AADP. Active air defense operations are designated to protect these selected assets. The AADP should:

- Arrange a layered and/or overlapping defense to allow multiple engagement opportunities.
- Include information operations strategies for counterair.
- Contain detailed weapon control and engagement procedures integral to a joint counterair operation.
- Specify ACMs.
- Include all surface-to-air capabilities assigned, attached, and supporting.
- Provide for high-value airborne asset protection.
- Employ electronic warfare to disrupt or destroy guidance systems.
- Integrate air and space (aircraft), ground (Patriot, short-range air defense [SHORAD]), and sea-based (AEGIS) capabilities.

The integration of air defense in the ACP is critical. The location of specific types of air defense operations and procedures for the identification of aircraft are critical to a viable ACP. The AADP needs to be written with detailed engagement procedures that are consistent with the ACP and operations in the combat zone. Drafters of the AADP must be cognizant of fielded equipment (and its possible limitations) employed by the joint/combined forces involved. Airspace control and area air defense operations need to be capable of functioning in a degraded mission command environment. Detailed engagement procedures and the roles of subordinate commanders in decentralized execution of air defense operations are keys to success in a degraded environment.

Operational Tasking Data Link

The operational tasking data link (OPTASK LINK) lays down specifics of the data link architecture. The interface control officer (ICO) monitors the data link nets to ensure transfer and display of critical air defense information. When directed, the ICO will transmit, via data link, engagement commands and air defense warning changes to linked agencies. The ICO coordinates the development of the OPTASK LINK message and manages all tactical digital information link (TADIL) interfaces to create a consolidated air picture.

Airspace Control Methods

Positive Control

Positive control is a method of airspace control that relies on positive identification, tracking, and direction of aircraft within an airspace, conducted with electronic means by an agency having the authority and responsibility therein (JP 3-52). Army air traffic service units train, man, and equip to perform positive control of established airfields and tactical landing sites.

Procedural Control

Procedural control is a method of airspace control that relies on a combination of previously agreed and promulgated orders and procedures (JP 3-52). Procedural control should be uncomplicated and understood by all aircrew members, air traffic control personnel, air defense and fires weapon system operators, and airspace element personnel. In addition to air traffic service personnel, the airspace elements in the Army Air Ground System are organized, trained, and equipped to ensure Army forces can provide near real-time procedural control and balance airspace control system requirements with mission command. Near real-time procedural control pertains to the timeliness of data or information, which has been delayed by the time required for electronic communication and automatic data processing. Furthermore, the use of near real-time implies that there are no significant delays to the process.

Fire Support Control Measures

Fire support control measures (FSCMs) are designated restrictive or permissive based on their purpose to either protect friendly forces or facilitate fires as described in JP 3-09, *Joint Fire Support*. Restrictive FSCMs safeguard friendly forces by imposing specific coordination requirements between the measure's controlling authority and other users. Permissive FSCMs facilitate target engagement with conventional means.

The fires cell is responsible for targeting coordination and synchronizing fires delivered on surface targets by fire support means under the control or in support of the corps or division. This cell coordinates and deconflicts FSCMs with ACMs through close interface with air defense and airspace management (ADAM)/brigade aviation element (BAE) and airspace elements, the air support operations center, and the tactical air control party. The airspace element works with the fires cell to integrate FSCMs with the unit airspace plan. (See Appendix D for a list of FSCMs and when to use them.)

Airspace Coordinating Measures

ACMs facilitate efficient use of airspace to accomplish missions and simultaneously provide safeguards for friendly forces. ACMs are not designated as restrictive or permissive. They protect friendly forces by establishing specific coordination requirements between the measure's controlling authority and other users, as defined in the ACP. Transit of an ACM requires coordination with the owning airspace control element.

An airspace measures request (ACMREQ) reserves airspace for a specific use. An originator requests airspace for an operation within their assigned area of operations. An ACMREQ can consist of single or multiple ACMs. (See Appendix D for a list of ACMs and when to use them.)

Air Defense Measures

Air defense measures are planned, coordinated, and employed to facilitate responsibilities for identification, detection, and tracking to engage enemy air and missile threats as directed by the AADC. (See Annex D for a list of air defense measures and when to use them.)

Collective Tasks for Airspace Control

The airspace control collective tasks apply across echelons from brigade through theater army. At the brigade level, the ADAM/BAE or ADAM elements execute all the collective tasks. Above the brigade level (division, corps, and theater army), the airspace element and the air and missile defense element collaborate to execute the tasks contained in Army Doctrine Reference Publication (ADRP) 1-03, *The Army Universal Task List*.

In ADRP 1-03, Army tactical task 5.4, Control Tactical Airspace, consists of 14 collective tasks that provide the basis for performance measures. These collective tasks are separated into two groups: tasks that focus on planning future airspace use and tasks that focus on the execution of airspace use. The first group of collective tasks integrate airspace requirements generated by all airspace user communities — movement and maneuver, intelligence, fires, sustainment, mission command, and protection — both joint and Army, while meeting commander's guidance for mission accomplishment and risk. The remaining collective tasks integrate airspace use during execution of current operations using staff procedures and near real-time procedural control. These latter tasks occur to resolve airspace use conflicts according to the commander's guidance for mission accomplishment and risk.

Chapter 4

Stinger Plan Development

This chapter describes the Stinger planning process. This chapter also discusses the requirements of the air defense estimate and air and missile defense (AMD) inputs for the fires annex. The estimate process assists the force commander in decision making. The planning process results in a description of the air defense artillery support for the concept of the operation.

Overview

AMD planning is a distributed process occurring at all echelons. The area air defense commander (AADC) at the theater level provides the area air defense plan. From this plan, the defense designers extract identification criteria, rules of engagement, airspace coordinating measures, weapon control statuses (WCSs), air defense warnings (ADWs), self-defense criteria, and, as applicable, direct the integration of multinational AMD. The area air defense plan provides a baseline document for planning and is modified routinely through the publication of air tasking orders, airspace control orders, and special instructions. The theater area air defense plan, with the AMD annexes from higher organizations, provides broad guidelines to develop a Stinger air defense plan at the maneuver brigade combat team (BCT) or battalion level.

Receive the Mission

The area air defense plan with the relevant air tasking orders, airspace control orders, and special instructions at the combatant command, joint task force, and/or corps level informs the division and BCT to the ADW, WCS, rules of engagement, and joint task force critical asset list/defended asset list. Higher headquarters orders should include relevant appendices in the fires and protection annexes that provide additional guidance. This information will allow divisions and brigades to begin their mission analysis.

Mission Analysis

The products developed by the staff during mission analysis help commanders understand the situation and develop the commander's visualization. Analyzing the contents of the higher headquarters products and AMD intelligence preparation of the battlefield (IPB) help with the following:

- Identify specified, implied, and essential tasks.
- Review available assets.
- Determine constraints and limitations.
- Identify facts and develop assumptions.
- Begin risk assessment.
- Develop commander's critical information requirements (CCIRs) and essential elements of friendly information (EEFIs).
- Develop the initial information collection plan.

Intelligence Preparation of the Battlefield Process

The commander uses IPB to understand the operational environment and the options it presents to friendly and enemy forces. IPB is a systematic, continuous process of analyzing the threat and environment in a specific area. By applying the IPB process, the commander gains the information necessary to selectively apply and maximize combat power at critical points in time and space on the battlefield. Airspace — or the aerial dimension — is the most dynamic and fast paced of the operational dimensions. The intelligence staff must consider the aspects of air operations and be aware of the capabilities of air threats to include unmanned aircraft systems (UASs), ballistic missiles, cruise missiles, air-to-surface missiles, and rotary- and fixed-wing aircraft. The S-2 has overall staff responsibility for IPB. Air defense artillery and aviation officers must provide input to the S-2 when integrating air aspects into the IPB process. As described in Chapter 2, the IPB process has the following four steps:

- Define the operational environment.
- Describe the operational environments' effects.
- Evaluate the threat.
- Determine threat courses of action.

By the end of the IPB process, the commander expects the staff to have formulated enemy air avenues of approach (AAA), enemy courses of action (COAs), and have begun determining the air defense priorities (criticality, vulnerability, threat [CVT] analysis). See Chapter 2 for a full discussion of AMD IPB.

Determine Specified, Implied, and Essential tasks

Examining higher headquarters plans and air defense annexes two levels higher allows the staff to identify specified, implied, and essential tasks. Understand the mission of the adjacent units conducting air defense.

Available Assets

Air defense requirements are likely to outstrip forces available, forcing commanders to make decisions about command and support relationships for air defense assets. For example, attaching Stinger teams to each maneuver company risks spreading these assets too thin and makes an inflexible plan. It is better to keep the teams as general support to a brigade so the air defense they provide can more easily change by phase of the operation.

Determine Limitations and Constraints

Constraints laid out in the form of the higher unit's WCS and rules of engagement determines the engagement authority of Stinger teams. Limitations for the Stinger system, especially range and capability at night, requires careful planning to ensure teams are where they need to be and when.

Facts and Assumptions

Monitor the tactical situation to develop facts and assumptions that support mission analysis and COA development. More assumptions mean more risk to the operation, unless they are confirmed and become facts.

Risk Assessment

During selection of a COA, the commander will face inherent risks (for example, combining and concentrating weapons' coverage [engagement area] toward the most likely enemy AAAs or direction of attack to achieve weighted coverage). Based on the tactical situation, a commander may risk leaving one direction of attack unprotected or lightly protected to weight coverage toward another direction. Conducting a risk assessment is recommended before this guideline is implemented.

Develop CCIRs and EEFIs

A CCIR directly influences decision making and facilitates successful execution of military operations. Two elements of CCIRs are friendly force information requirements (FFIRs) and priority intelligence requirements (PIRs). An FFIR could be a Stinger team expending all its missiles or the loss of a Sentinel radar. PIRs could consist of how and when the enemy utilizes its UAS capabilities.

EEFIs, the third element, is a critical aspect of a friendly operation that, if known by the enemy, would subsequently compromise, lead to failure, or limit success of the operation and therefore should be protected from enemy detection. EEFIs, if important enough, could warrant air defense protection in order to prevent aerial observation.

Intelligence, Surveillance, and Reconnaissance

Intelligence, surveillance, and reconnaissance (ISR) is an activity that synchronizes and integrates the planning and operation of sensors and assets, and the processing, exploitation, and dissemination of systems in direct support of current and future joint operations. Air defense radars such as the Sentinel can be used to perform aerial surveillance and to confirm or deny enemy AAAs and aerial COAs. Including enemy air capability in the initial collection plan is necessary. ISR should be considered to support offensive counterair targets such as striking UAS control stations, enemy forward arming and refuel points, or airfields before they launch UASs or aircraft. Developing and nominating these targets as operations unfold can help reduce the need for the active air defense provided by Stingers, or allow them to focus more narrowly on one element of the threat. An integrated fires cell with fire support and air defense and airspace management (ADAM)/brigade aviation element (BAE) personnel working together makes this process much smoother.

Air Defense Priorities

Establishing the air defense priorities for the maneuver commander is a critical step in creating the Stinger air defense plan. As part of mission analysis, the staff should assist the commander in outlining the air defense priorities for inclusion in the initial planning guidance at the end of mission analysis. The most common methodology employed to establish these priorities involves weighing the factors of criticality, vulnerability, and threat, otherwise known as the CVT method. The CVT method allows the BCT to avoid task-organizing a Stinger team to each maneuver company and instead do an analysis to determine what assets by phase Stinger teams executing short-range air defense (SHORAD) in a general support role should protect. This is an iterative process; as COAs are developed, air defense priorities will need to be revisited and adjusted.

Criticality is the degree to which an asset or force is essential to mission accomplishment. Determination of the criticality of an asset or force is made by assessing the impact on the conduct of the operation that would result from damage to the asset or force. The degree of criticality is based on whether damage to the asset or force prevents, seriously interferes with, or causes only limited interference with the execution of the plan.

Vulnerability consists of two parts: susceptibility to damage if attacked and recuperability. Susceptibility to damage is further subdivided into two parts: hardness and dispersion. Consideration should be given to the asset or force's hardness and its ability to disperse or displace to another position. Recuperability is the degree to which an asset or force can recover from inflicted damage in terms of time, equipment, and available manpower to continue the mission.

Threat is the assessed probability of an asset or force being targeted for surveillance or attack by enemy air and missile threats. The use of threat information to develop AMD priorities is a reverse IPB process that determines what enemy air to surveil and attack. Targeting information provided by intelligence estimates, past enemy surveillance and attack methods, and enemy doctrine are useful in evaluating AMD priorities. To determine the relative importance of assets and forces, the commander considers certain characteristics that make an asset or force a lucrative target for the enemy. In effect, this is reverse target value analysis.

The CVT method provides the commander and staff with a prioritized list of assets and matches them against the AMD resources available and the risks of not protecting them. This is used to create a list of assets that will receive AMD protection by phase.

Course of Action Development

During COA development, planners use the problem statement, mission statement, commander's intent, planning guidance, and various knowledge products developed during mission analysis. The COA development step generates options for subsequent analysis and comparison that satisfy the commander's intent and planning guidance.

Assess Relative Combat Power

Combat power is the total means of destructive, constructive, and information capabilities that a military unit or formation can apply at a given time (Army Doctrine Reference Publication [ADRP] 3-0, *Operations*). Comparing friendly, organic, combined arms for air defense systems (CAFADS) and Stinger numbers and capabilities against likely threat aircraft strength and capabilities will help inform the CVT analysis. For example, by analyzing the relative combat power, the BCT may determine that Stinger teams should be focused on enemy rotary-wing platforms while CAFADS is used for group one and two UASs due to limited numbers of missiles.

Generate Options

The staff generates options based on the commander's guidance and the initial results of the relative combat power assessment. Air defense planners assist the rest of the staff in determining decisive points/supporting efforts, elimination/modification of COAs, and consideration of the advantages and disadvantages of air defense for each possible COA.

The air defense planners also advise on the integration and synchronization of air defense with the rest of fires, maneuver, maneuver support, and other warfighting functions. Planners should consider the air defense employment guidelines — mutual support, overlapping fires, balanced fires, weighted coverage, early engagement, and defense in depth — before arraying forces for each COA and phase.

Array Forces

After determining the decisive and shaping operations, related tasks and purposes, and the air defense employment guidelines used, air defense planners determine the relative combat power required to accomplish each task. Planners should be cautioned against simply assigning a team or section direct support to each subordinate maneuver formation. This rarely results in adequate defense of the BCT commander's priority assets.

Assets considered critical will likely outnumber the availability of air defense systems available. At this time, the air defense planner works with the staff and commanders to ensure they are maximizing the planning of passive air defense measures. It is critical to actively plan and rehearse passive measures and CAFADS at the troop-leading level to decide on actions to take for the local air defense warning (LADW) of dynamite.

Develop a Broad Concept

In developing the broad concept of the operation, the commander describes how arrayed forces will accomplish the mission within the commander's intent. The broad concept provides the framework for the concept of operations and summarizes the contributions of the warfighting functions. If necessary, revisit and adjust the critical assets the commander wishes to defend by COA and phase during this portion of planning. Developing a draft synchronization matrix and AMD overlay two levels down will allow the planner to coordinate air defense coverage for these priority assets in space and time.

When selecting tentative weapon positions, planners must ensure that weapon positions provide balance and mutual support if there is no known direction or air attack. Planners should assign a tentative primary target line and sector of fire for each team oriented on the AAA they are defending against. Teams can be sited perpendicular, as well as head-on to hostile incoming aircraft. The ADAM cell can use the Air and Missile Defense Workstation (AMDWS) to develop detailed positioning of assets and assess capabilities.

While developing the broad concept, planners will also need to consider how the unit will receive and disseminate early warning notifications. Early warning of inbound aircraft and directional cueing are essential for the early engagement of threat aircraft of all types. Without early warning, the first indication a Stinger team has of enemy aircraft in the area is after aircraft release ordnance or enemy UASs call indirect fire on the defended asset thereby losing the initiative. Creating the early warning plan may include the placement of radars capable of detecting the enemy air threat and how the radars will support the broader early warning network.

A Stinger force that lacks a digital method to pass early warning will be relying purely on radio capabilities. In this case, the best practice is to have a dedicated early warning net. This net is used to pass early warnings in a language Soldiers can understand, such as LADWs. The early warning net also uses the directed early warning format to send early warning to maneuver battalions and Stinger teams. Incorporate scouts on this net to pass information on aircraft that have been visually identified. The ADAM cell at the BCT should be able to receive the digital air picture from its division and nearby air defense radars in order to pass early warning to the

force. The preferred method of passing information is to use the manual SHORAD control system (see Appendix C). Given the time-sensitive nature of this task, drawing the shortest route of voice communications from the BCT tactical operations center to the individual Stinger team is paramount. Figure 4-1 is a simplified illustration of this challenge.

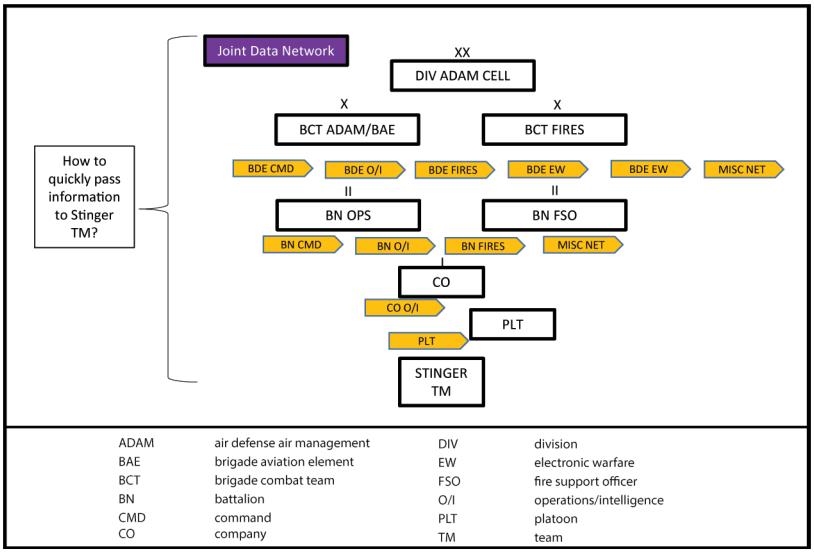

Figure 4-1. Stinger team communications challenges

Planners across the staff need a unit airspace plan. This plan promotes the permissive use of surface-to-surface, air-to-surface, and surface-to-air fires. Flight routes and SHORAD engagement zones in particular promote effective surface-to-air fires and minimize fratricide. Brief the unit airspace plan during the combined arms rehearsal. Contact and correct any airspace users who do not fly in compliance with the unit airspace plan. The BCT does not allow adjacent units to conduct uncontrolled movement across unit boundaries. The same rule applies to air boundaries.

Course of Action Analysis and War Gaming

COA analysis enables commanders and staffs to identify difficulties or coordination problems and probable consequences of planned actions for each COA. The COA analysis may uncover potential execution problems, decisions, and contingencies. At the conclusion of this step of the MDMP, the staff should have refined COAs, a completed synchronization matrix, and a decision support matrix.

Course of Action Comparison

COA comparison is an objective process for evaluating COAs independently and against set evaluation criteria approved by the commander and staff. The goal is to identify the strengths and weaknesses of COAs, enable selecting a COA with the highest probability of success, and developing it further in an operation plan or operation order (OPORD). The commander and staff perform certain actions and processes that lead to key outputs.

Course of Action Approval

After the decision briefing, the commander selects the COA that best accomplishes the mission. After approving a COA, the commander issues the final planning guidance, which includes a refined commander's intent (if necessary) and new CCIRs to support execution. It also includes any additional guidance on priorities for the warfighting functions, orders preparation, rehearsal, and preparation.

Orders Production, Dissemination, and Transition

The staff prepares the order or plan by turning the selected COA into a clear, concise concept of operations. The COA statement becomes the concept of operations for the plan. The COA sketch becomes the basis for the operation overlay.

Stinger and Sentinel Radar Employment Guidelines

- Balanced coverage: Coverage in all directions. Assets or areas such as brigade support areas or airfields.
- Weighted coverage: Dense coverage in areas of most likely AAAs. Commanders assume risk in other areas.
- Coverage in depth: Arraying Sentinels/Stingers through the depth of battlefield. Continuous coverage of egressing and ingressing air platforms.
- Early detection: Position Sentinels/Stingers as far forward as the tactical situation permits.
    - Radar coverage should extend beyond the Stinger positions at least 10 kilometers in the expected direction of air attack to provide early warning.
    - Position Sentinels as close as 10 kilometers from forward line of own troops, but not in artillery range of the enemy.
    - Most forward radar in a secured location is no closer than 2 kilometers to the forward edge of the battle area.

    - Position Stinger teams up to 3 kilometers forward of maneuver units (may co-locate with scout teams for additional security). Mission, enemy, terrain and weather, troops and support available-time available, and civil considerations (METT-TC) dependent.

- Overlapping coverage: Adjacent Sentinels should overlap by 20 kilometers. Allows an uninterrupted band of radar coverage throughout the area of operations.
- Actual position is based on ground clutter that affects coverage.
- Mutual Support: Effective search of two Sentinels extends to cover dead space of the other Sentinel. Enhances coverage in the area of operations, facilitates survivability.
- Appreciate the terrain: Need a line-of-site analysis (AMDWS can do this digitally).
- Arranging force protection for radars is critical.
- Provide primary target lines for Stinger teams oriented on AAAs as well as sectors of fire.

Communications Security and Identification, Friend or Foe Considerations

The Stinger is equipped with an identification, friend or foe (IFF) system that aids in identification of aircraft. The IFF has two modes of interrogation: Mode 3 and Mode 4. Mode 3 is the default mode, which is built into the IFF interrogator system and automatically challenges aircraft. Mode 4 requires crypto codes and requires a crew member to load the codes into the interrogator programmer. These codes last up to four days. The IFF programmer loads the encryption keys and the mode of operation into the interrogator. If Mode 4 codes expire, the interrogator reverts to challenging Mode 3. Positive Mode 4 response indicates friendly aircraft. Local tactical directives will specify whether to consider Mode 3 returns as a positive friend, possible friend, or unknown. Planning should incorporate the requirement for teams requiring new IFF codes at least every four days in order to maintain Mode 4 functionality.

Stinger Team Operations

Outlined below are the basics of Stinger team operations. Explaining them here gives the maneuver leader better understanding of how Stinger teams should fight and helps commanders provide better guidance and plan training. The team chief receives the mission orally or in writing. As part of an integrated air defense plan, the team should be provided with a primary target line (PTL), sector of fire oriented on the AAA it is defending against, and a list of expected aircraft types. Upon the team's arrival at the designated location, the team chief selects the best firing position, field of view, and primary target line. When selecting firing positions, pay particular attention to positions that provide unobstructed fields of fire, no masking of the missile launch, and adequate missile backblast area. Evaluate terrain features that present a masking problem for employment for height, distance, and direction from the firing position.

Reconnaissance, Selection, and Occupation of Position

The Stinger team performs a reconnaissance, selection, and occupation of position prior to occupying any position to ensure the survivability of the team. The priorities of the team are selecting the mission site or position and checking for local security. The team chief dismounts approximately 300 meters from the location and scouts the position, while the gunner provides overwatch. The team ensures the area is clear of any hostile forces or hazards and locates a firing position that meets operational and tactical requirements. The following describe considerations for selecting the primary, alternate, and supplementary positions:

Reconnaissance:

- Receive the mission.
- Conduct a map/aerial reconnaissance of the proposed position.
- Team chief coordinates face-to-face with the local ground commander prior to occupation.
- Select a route of march and an alternate route.
- Conduct precombat checks.
- Initiate movement.

Selection:

- The team stops 300 meters from the proposed primary position.
- The team chief issues the gunner a five-point contingency plan (known as GOTWA):

1. Where you are **Going**?
2. **Others** you are taking?
3. **Time** you will return?
4. **What** to do if you do not return?
5. What **Action** to take if hit by the enemy?

- The gunner dismounts the vehicle and:
  - Provides local security
  - Monitors radio
  - Awaits for team chief to return
- The team chief moves toward the primary position and looks for:
  - Firing position
  - Booby traps and mines
  - Sufficient area for dispersion
  - Alternate exit and entrance routes
  - Optimal observation and fields of fire
  - Survivability and defendability
  - Cover and concealment
  - A position away from natural lines of drift
  - A position not on key terrain, if possible
  - Proximity to friendly troops
  - Alternate fighting positions

Note: Call in if you have moved more than 100 meters from your initial grid.

Note: You have 200-400 meters of your initial grid to position yourself. If an optimal position does not exist, find one and call higher command before you dig in.

Occupation of Position Priorities of Work

H-Hour:

1. The team chief coordinates face-to-face with the nearest ground unit. Let them know you are there.

2. Establish security and clear the area of chemical, biological, radiological, and nuclear (CBRN) hazards.

3. Ready Stinger for firing.

4. Verify location, primary target line, and sectors of fire.

5. Establish communication with higher command, report location and "ready for action."

6. Emplace CBRN alarm.

7. Select an alternate position (300 meters away).

8. Begin the range card.

H+1:

9. Camouflage the vehicle.

10. Dig a hasty fighting position.

11. Dig in an ammo cache point (split between the primary and alternate position).

12. Complete the range card.

H+2:

13. Remote communications equipment from the vehicle to the fighting position.

14. Emplace special equipment as necessary (claymore, concertina, etc.).

15. Clear fields of fire.

H+3 to H+9:

16. Dig in the fighting position.

17. Emplace overhead cover.

H+10 to H+24

18. Rehearse movement to an alternate position.

19. Check night vision goggles.

20. Establish sleep, security, and preventive maintenance checks and services plan.

21. Check position camouflage.

D+1 and beyond

22. Constantly improve primary and alternate positions and construct range cards.

Types of Positions

Primary. A position from which the fire unit intends to accomplish its tactical mission. This is the best location available in the designated area for the Stinger/Avenger team to accomplish the mission.

Alternate. A position to which the fire unit moves when the primary position becomes compromised or unsuitable for carrying out the assigned mission. The alternate position must be far enough away to prevent it being rendered compromised by the same action that affected the primary position. The alternate position must meet all the requirements of the primary position.

Supplementary. A place to fight which provides the best means to accomplish a task or cover an AAA that cannot be accomplished from the primary or alternate positions.

Hasty. A position selected with no prior reconnaissance.

Exercise care to avoid placing positions near terrain features easily recognized from the air. Positions are more vulnerable to enemy fires once spotted near an identifiable object.

Stinger Position Checklist

Location:

- Within 100 meters of the grid given in the OPORD.
- Received permission to adjust location.
- Within 100 meters of the grid reported to higher command.
- Position away from terrain features that are easily recognized from the air.

Security:

- Approaching vehicle halted away from position.
- Challenge and password used correctly.
- Local security maintained.
- Soldiers in the proper uniform.
- Maintain light, noise, and litter discipline.
- Supplementary positions created.
- Dummy positions created.

Threat:

- Show air avenues of approach on the map.
- Show direction of the highest air threat in relation to the position on the ground.
- Show on the map where the last enemy aircraft was encountered.
- Position away from terrain features easily recognized from the air.
- Show forward line of own troops on the map.

Sector of fire:

- Is the primary target line the same given in the OPORD?
- Has permission been received to adjust the primary target line?
- Are limits designated as in the OPORD?
- Are there major obstructions in the sector of fire?
- Is sector of fire limited or is there 360 degrees of coverage?

Cover and concealment:

- Is the vehicle camouflaged?
- Is the vehicle concealed?
- Are the vehicle tracks into position concealed?
- Is all the equipment camouflaged and concealed?

Access:

- Are there adequate routes in and out of position?
- Is there more than one route?
- Is the vehicle combat parked?

Alternate position:

- Is it 200-300 meters away from the primary?
- Does it have a quick concealed access route?
- Does it cover the same sector of fire?
- Does it have a hasty command post position?
- Does it have a deliberate command post position?

Deliberate fighting position:

- Are there hasty fighting positions?
- Is there a deliberate fighting position?
- Are there 18 inches of overhead cover?
- Is the range card complete?
- Magnetic north.
- Sector of fire limits.
- Eight-digit grid coordinate.
- Range rings to maximize range of Stinger nearby positions.
- Any defensive measures or obstacles.
- ADW/WCS.
- Enemy threat information.
- Is there a position:
    - In the defense plan?
    - For evacuation by vehicle?
    - For evacuation by foot?
- Has an ammunition storage area been designated?

Vehicle:

- Is the dispatch complete and correct?
- Is the daily preventive maintenance checks and services on vehicle, communications, and other items complete?

Soldiers:

- Know the task force and platoon mission.
- What air defense fire units are adjacent to your position?
- What other friendly units are adjacent to your position?
- What is the ADW/WCS and at what effective time?
- What are the rules of engagement for ground and air?

Readiness Conditions

Readiness conditions (REDCONs) describe the degree of readiness of teams. The decision to select a REDCON is based on intelligence, early warning, and ADW. Normally, the BCT will designate the readiness condition used by subordinate Stinger teams. Additionally, readiness conditions are used to ready the force in a logical way for action against the enemy while retaining the ability to stand down teams for rest or maintenance. This is critical with two-man crews and 24-hour capable systems.

REDCON Levels Associated With Weapon Control Status

Red: REDCON 1 and 2

Yellow: REDCON 1 and 2

White: REDCON 1, 2, and 3

REDCON 1: A team is capable of completing its target engagement drill within the drill standard.

REDCON 2: A team is capable of completing its target engagement drill within 5 minutes.

REDCON 3: A team is capable of completing its target engagement drill within 30 minutes.

REDCON 4: A team is moving or released from its mission.

REDCON 5: A team is non-mission capable.

Appendix A

Stinger Characteristics

The Stinger Weapon System

The Stinger weapon system is a man-portable, shoulder-fired, infrared homing-guided/negative ultraviolet (UV) heat-seeking missile with modified proportional navigation. It requires no control from the gunner after firing. The system is equipped with an identification, friend or foe (IFF) subsystem, which aids the team in identifying friendly aircraft.

Missile Round

The missile round is composed of two major components: the fiberglass launch tube and the missile.

Launch tube. The launch tube, which houses the missile, provides the main support for all other parts of the weapon round. Both ends of the launch tube are sealed with a breakable disk. The front infrared (IR) window is transparent to IR and UV radiation. Both the front and rear disks break when the missile is launched. The hinged sight assembly attached to the launch tube allows the gunner to sight the weapon, determine target range, super elevate, and hear the audible tones through the acquisition indicators.

Missile. The Stinger missile consists of three sections: guidance, warhead, and propulsion sections.

- The guidance assembly processes target IR and UV radiation. It provides guidance commands for the missile during flight. The seeker tracks the IR/negative UV source automatically after the gyro is uncaged and during missile flight. The control assembly converts the guidance commands into movement of control surfaces that direct the flight of the missile.
- The warhead section consists of a fuse assembly and a quantity of explosives, housed within a cylindrical case. The fuse can detonate the warhead in three ways: by means of a low-impact switch, a hard target sensor, or by self-destructing. Should a target intercept not occur, a self-destruct circuit detonates the warhead.
- A separable launch motor and a dual thrust flight motor provide propulsion for the missile. The launch motor provides initial thrust that ejects the missile from the launch tube allowing the missile to coast to a safe distance from the gunner. The flight motor ignites and propels the missile to the target.

Weapon Round

A weapon round consists of a missile round fitted with a separable gripstock. The separable, reusable gripstock consists of operational controls, connectors, latch mechanism, and the IFF antenna assembly. Located on the gripstock assembly are the safety and actuator device, uncaging switch, firing trigger, IFF challenge switch, IFF interrogator connector, and battery/coolant unit (BCU) receptacle. When the IFF antenna assembly is unfolded and the IFF interrogator is connected to the weapon, it is capable of interrogating aircraft and receiving coded replies. After a missile launch, the gripstock is removed from the launch tube.

Ready Round

A ready round consists of the weapon round and a battery coolant unit. When the battery coolant unit is inserted into the weapon round, it becomes a ready round. The battery coolant unit is a thermal battery that provides prelaunch power for the system and argon gas that cools the missile seeker for a maximum of 45 seconds (ready round). Once activated, the battery coolant unit must be removed within three minutes of activation to avoid damage to the gripstock due to excessive overheating. Once activated, the battery coolant unit is expended and removed from the gripstock.

Identification Friend or Foe Subsystem

The Stinger weapon system is equipped with an IFF subsystem to aid in the identification of aircraft. The IFF system is an electronic system that provides an automated means to identify aircraft as friend, possible friend, or unknown. It does not identify hostile aircraft.

Weapon and Missile Rounds

The Stinger missile is packaged as weapon round complete, weapon round partial, or missile round. A weapon round complete includes the missile round, gripstock, and varying numbers of BCUs packaged in a reusable aluminum container. A weapon round partial contains the missile round and varying numbers of BCUs packaged in a reusable aluminum container. The missile round contains the missile round and varying numbers of BCUs packaged in a fiberboard box within a wire-bound wooden container.

Basic Stinger missile. The basic Stinger is no longer active in the U.S. inventory.

FIM-92D – Stinger-Reprogrammable Microprocessor (RMP). The RMP Stinger missile has additional improvements to the guidance system. These improvements enable the weapon to reject complex infrared countermeasures (IRCM), provide greater background discrimination than the basic Stinger, and have made the missile more responsive to steering commands. The addition of a reprogrammable module allows weapon updates to meet future threats without the need to modify missile hardware.

FIM-92E – Block I. The Block I Stinger missile has improved guidance system electronics, including a roll frequency sensor (ring laser gyro). This upgrade provides the missile with the capability of determining the up position before and during launch, allowing the missile guidance system to bias its flight to counteract gravitational forces. The Block I upgrade enhances missile performance when launched against targets in non-ideal scenarios, such as minimum target elevation angles and low target aspect angles in a clutter environment. FIM-92E Block I Stinger missiles only fly in the Block I mode and have full continental U.S. (CONUS) IRCM performance if they are launched with a Block I gripstock or platform launcher.

Table A-1. Weapon round complete configurations

NSN	Model No.	DODIC	BCU Quantity	Unit Pack Weight	Boxed Dimensions
1425-01-356-6995	FIM-92D	PJ12	5	95	66 x 13 x 13.25 inches
1425-01-325-0696	FIM-92D	PJ09	3	92	66 x 13 x 13.25 inches
1425-01-325-0695	FIM-92D	PJ12	2	91	66 x 13 x 13.25 inches
1425-01-440-8040	FIM-92E	PJ15	3	92	66 x 13 x 13.25 inches

BCU battery/coolant unit
DODIC Department of Defense Identification Number
NSN National Stock Number

Table A-2. Weapon round partial configurations

NSN	Model No.	DODIC	BCU Quantity	Unit Pack Weight	Boxed Dimensions
1427-01-356-7048	FIM-92D	PL87	5	90	66 x 13 x 13.25 inches
1427-01-325-3160	FIM-92D	PL87	3	87	66 x 13 x 13.25 inches
1427-01-325-3161	FIM-92D	PL88	2	85	66 x 13 x 13.25 inches
1427-01-416-3184	FIM-92E	PL41	3	87	66 x 13 x 13.25 inches

BCU battery/coolant unit
DODIC Department of Defense Identification Number
NSN National Stock Number

Table A-3. Missile round configurations

NSN	Model No.	DODIC	BCU Quantity	Unit Pack Weight	Boxed Dimensions
1427-01-325-3158	FIM-92D	PL89	2	79	67.25 x 13.8 x 11.2 inches
1427-01-325-3159	FIM-92D	PL86	1	77	67.25 x 13.8 x 11.2 inches
1427-01-356-7047	FIM-92D	PL86	0	76	67.25 x 13.8 x 11.2 inches
1427-01-416-3186	FIM-92E	PL42	1	77	67.25 x 13.8 x 11.2 inches
1427-01-416-3183	FIM-92E	PL39	0	76	67.25 x 13.8 x 11.2 inches

BCU battery/coolant unit
DODIC Department of Defense Identification Number
NSN National Stock Number

Table A-4. Equipment data

Weapon Item	Length	Width	Height	Weight
Missile Round	59.5 inches (151.1 cm)	7.25 inches (18.4 cm)	7.25 inches (18.4 cm)	*36.1 lbs (16.4 kg)
FHT	59.5 inches (151.1 cm)	7.25 inches (18.4 cm)	7.25 inches (18.4 cm)	*36.1 lbs (16.4 kg)
BCU	3.4 inches (8.6 cm)	3.75 inches (9.5 cm)	3.75 inches (9.5 cm)	2 lbs (.9 kg)
IFF Programmer/ Battery Charger	23.6 inches (59.9 cm)	13.3 inches (33.8 cm)	10.7 inches (27.2 cm)	41.0 lbs (18.6 cm)
Shipping and Storage Container	66.0 inches (167.6 cm)	13.5 inches (34.3 cm)	18.0 inches (45.7cm)	54.1 lbs (empty) (24.5 kg) 100.0 lbs (full)

BCU battery/coolant unit
FHT field handling trainer
IFF identification, friend or foe
***Note:** Weight includes gripstock and BCU

Capabilities

- Supersonic, surface-to-air missile
- Range: unclassified planning range of four kilometers
- 2.75 inch diameter
- 59.5 inch length
- 36.1 pounds weight
- Passive guidance with IR/negative UV homing and modified proportional navigation
- Warhead: high explosives
- Rocket motor: solid propellant, two-stage separable launch motor and dual-thrust flight motor
- Extreme mobility: Goes everywhere the Soldier can go

- High effectiveness: High-hit probability on high speed targets
- Head-on capability: Engage(s) target at any aspect
- IFF capability: Aids in target identification
- Short reaction time: Ready to fire in seconds
- Low vulnerability: Easy to camouflage
- High reliability: Requires little maintenance
- Logistic simplicity: Certified round concept
- Climatic insensitivity: Used from Arctic to tropical regions
- Removable gripstock assembly
- Disposable launch tube assembly

System Components

Weapon Round RMP: FIM-92D

- (NSN 1425-01-325-0695) (End Item Code [EIC]: N/A)
- (NSN 1425-01-356-6995) (EIC: N/A)
- (NSN 1425-01-325-0696) (EIC: N/A)

Weapon Round Block I: FIM-92E

- (NSN 1425-01-440-8040) (EIC: N/A)

Trainer Handling-Guided Missile Launcher M60

- (NSN 6920-01-024-9969) (EIC: NRH)

Guided Missile Subsystem Intercept-Aerial, Training M148

- (NSN 6920-01-246-0699) (EIC: NSC)

Interrogator Set AN/PPX-3A, AN/PPX-3B

- (NSN 5895-01-032-4263) (EIC: IZH)
- (NSN 5895-01-126-9263) (EIC: IZF)

Interrogator Set Programmer AN/GSX-1, AN/GSX-1A

- (NSN 5895-01-032-4266) (EIC: IZJ)
- (NSN 5895-01-119-1273) (EIC: IZK)

Figure A-1. Weapon round metal container

Figure A-2. Weapon round wooden container

Appendix B

Stinger Team Certification and Training

Managing Stinger Gunnery and Training in the Brigade Combat Team

Brigade combat teams (BCTs) will provide Soldiers organic to their formation to form Stinger teams, with no additional dedicated air defense Soldiers from the Army at large. Soldiers attending the five-week Stinger course are awarded an Additional Skill Identifier (ASI) and will have the basic tools they need to put the Stinger missile into operation. However, they will have limited capability to conduct sustainment training or certification on the system without centralized help from the BCT and outside organizations. Stinger teams should be treated as low-density, military occupational specialty holders and conduct centralized training. The following are recommended responsibilities for a gunnery and training program for these Soldiers:

Brigade

- Directs consolidated Stinger team sustainment training weekly.
- Designates the field artillery battalion commander (fire support coordinator [FSCOORD]) as the commander in charge of the Stinger gunnery program.
- The BCT air defense and airspace management (ADAM) cell plans monthly, quarterly, and semi-annual evaluations and certifications as per Training Circular (TC) 3-01.18, *Stinger Gunnery* (CAC login required for access).
- Designates a Stinger standardization officer (recommend the ADAM officer in charge as the air defense artillery [ADA] subject matter expert). The following are the Stinger standardization officer responsibilities:
    - ○ Reviews and approves written tests for Tables I, III, VII, and VIII.
    - ○ Works with the S-2 to create the visual aircraft recognition (VACR) hot list for study and certification.
    - ○ Establishes a centralized training program for the Stinger teams in the BCT and manages training aids, devices, simulators, and simulations (TADSS) for the BCT.
    - ○ Maintains a list of certified trainers and evaluators.
    - ○ Coordinates for outside training and evaluations as necessary.

  - Serves as custodian of any commander's gunnery waiver memos such as for early warning equipment not fielded to BCT Stinger teams (Pony or Crew Chief Air Situation Display [CCASD]).
  - Provides short-range air defense (SHORAD) leader training to BCT and battalion leadership to facilitate proper planning and utilization of capability.
  - Captures Stinger training in the BCT quarterly training guidance.
  - Submits Class V requirements to the brigade S-3 in accordance with Department of the Army Pamphlet 350-38, *Standards in Weapons Training*, Chapter 4, (CAC login required for access).
- Includes Stinger crew and equipment reporting in the Unit Status Report/Objective-T.
- Consolidates TADSS (field handling trainer, tracking head trainer [THT], and Stinger troop proficiency trainer [STPT]) at the BCT level.

Fires Battalion

- Has training and readiness authority for the brigade's Stinger teams.
- Has the only authority to certify and break crew integrity.
- Approves the brigade Stinger training and certification program.

Maneuver Battalion

- Provides two-man teams to attend the five-week Stinger ASI-producing course as per the BCT plan.
- Maintains team integrity to minimize retraining and recertification.
- Provides trained Stinger teams to BCT-consolidated Stinger training in accordance with brigade policy.
- Provides Stinger teams to participate in BCT-consolidated gunnery events as required.
- Battalion leadership participates in BCT-led SHORAD leader development (recommend one topic per quarter).
- Integrates Stinger training in general and Table VI training specifically into existing field training exercises.
- The battalion S-3 submits crew rosters and certifications to the BCT Stinger standardization officer and BCT FSCOORD.

Trainers and Evaluators

- The senior evaluator should be a certified Avenger master gunner.
- The senior evaluator selects all other evaluators to train the Stinger teams.
- The evaluator has the authority/responsibility to halt evaluations for catastrophic system failures or safety violations.

Stinger Team

- Participates in weekly brigade-consolidated Stinger sustainment training.
- Crew-rostered crewmembers will certify as individuals (Tables I-III) within 30 days of assignment to a Stinger team.
- Stinger teams will certify within 60 days of assignment and every 180 days thereafter.
- Crew-rostered crewmembers will be Table IV certified during a section training exercise within 90 days of being assigned as a crewmember.
- Crew-rostered crews will be Table VI certified during a field training exercise within 180 days of being assigned to a platoon and semi-annually thereafter.

Weekly Stinger Sustainment Training

Stinger crew skills are perishable if not trained on a regular basis. When employed, Stinger teams have a narrow window to positively identify and engage targets. Table B-1 outlines the recommended eight-hour weekly sustainment training.

Table B-1. Eight-hour weekly sustainment training

Training Time	Task	Supported Table
1 hour	Stinger weapon system components/subcomponents and button functions	I
2 hours	VACR	II
1 hour	Identification, friend or foe programming	II
1 hour	Tracking practice against live aircraft, Stinger troop proficiency trainer, or remote aircraft	IV
1 hour	Engagement practice	V
1 hour	Battle drill/crew drill	V
1 hour	Stinger team operations	VI

Stinger teams will provide the Man-Portable Air Defense System (MANPADS) force for maneuver units. The certification requirements and recommended training are listed in Table B-2. See TC 3-01.18 for the full description (CAC login required for access). Tables IX and X are designed for ADA units at the platoon level.

Table B-2. Certification requirements and recommended training

Gunnery Phase	Event		Where	How	Frequency
Crewmember	I	Stinger Weapon System Components/Function/ PMCS Platoon/Section/ Team Operations	UTA	(C)(D)(PE) (4)(8)(12)	Monthly
	II	VACR/FACT/DAGR/ SKL/IFF Operations	UTA	(C)(D)(PE) (4)(8)(9)(12)	Monthly
	III	Crewmember Certification Tables I and II	UTA	(E) (4)(8)(9)(12)	Monthly
Team	IV	Tracking Practice	UTA	(D)(PE) (1)(2)(3)(4)(5) (10)(12)	Quarterly
	V	Battle Drill Certification	UTA	(D)(PE) (1)(2)(3)(4)(5) (10)	Quarterly
	VI	Team/Section Operations Evaluation	UTA	(PE)(E) (4)(5)(7)(8)(10) (11)(12)(13) (14)	Quarterly
	VII	Team Pre-Certification	UTA LTA	(D)(PE) (1)(2)(3)(4) (5)(8)(9)(10) (12)	Semi-Annually
	VIII	Team Certification	UTA LTA	(E) (1)(2)(3)(4)(5) (8)(9)(10)(12)	Semi-Annually
Collective	IX	Rehearsal LFX (Annual Service Practice)	MTA UTA LTA	(D)(E) (3)(6)(9)(10) (11) (12)(13)(14)	Annually
	X	LFX (Annual Service Practice)	MTA UTA LTA	(D)(E) (3)(6)(8)(10) (11) (12)(13)(14)	Annually

DAGR Defense Advance GPS Receiver
FACT forward area control terminal
IFF identification, friend or foe
LFX live-fire exercise
LTA local training area
MTA maneuver training area
PMCS preventive maintenance checks and services
SKL simple key loader
UTA unit training area
VACR visual aircraft recognition
(C) conference
(D) demonstration
(E) evaluation
(PE) practical exercise (hands-on)
(1) Stinger troop proficiency trainer
(2) Improved Movement Target Simulator (IMTS)
(3) tracking head trainer
(4) field handling trainer
(5) tactical aircraft when available
(6) targets one-fifth scale or its equivalent
(7) Multiple Integrated Laser Engagement System (MILES)
(8) Technical Manual 9-1425-429-12, *Operator's and Organizational Maintenance Manual for Stinger Guided Missile System* (CAC login required for access)
(9) Training Circular (TC) 3-01.80, *Visual Aircraft Recognition*
(10) TC 44-117-11, *Stinger Team Crew Training* (CAC login required for access)
(11) Unit mission essential task list (METL)
(12) Anti-Tank Weapons Effect Signature SimulatorATWESS cartridge will be used in battery level and higher level supported field training exercises.
(13) Training readiness condition (TRC) B/C units will perform during training year.
(14) One team will fire while all other available section members track with tracking head trainer (TRC A, one missile per platoon per year, TRC B/C, one missile per platoon per training).

Crewmember Gunnery Tables

Table I (Stinger weapon system components/preventative maintenance checks and services/functions, and platoon/section/team operations)

This table helps the individual develop a working understanding of the Stinger weapon system and trains the individual to identify the components of the Stinger weapon system and the Stinger 13 critical checks. This table helps the individual understand the function of Stinger components and preventative maintenance checks and services performed at the operator level. This table also trains the individual on platoon, section, and team operations.

- Crewmembers will correctly identify and state the function of the Stinger weapon system, the Stinger 13 critical checks, and perform preventative maintenance checks and services per Technical Manual 9-1425-429-12, *Operator's and Organizational Maintenance Manual for Stinger Guided Missile System*. The crewmember must achieve a minimum score of 80 percent on the platoon, section, and team operations.

Table II (Visual aircraft recognition (VACR)/forward area computer terminal (FACT)/Defense Advanced GPS Receiver (DAGR)/simple key loader (SKL)/identification, friend or foe (IFF) operations)

This table trains the crewmember on aircraft recognition. The crewmember also receives instruction on FACT/DAGR/SKL operations, charging the IFF programmer batteries and IFF code loading procedures.

- The individual must receive "Go" scores in FACT linkup, DAGR/SKL operations, successfully program the IFF to accept a code, and receive "Go" scores in other IFF procedures and battery charging per Soldier Training Publication 44-14S14-SM-TG, *Soldier's Manual and Trainer's Guide* (CAC login required for access).
- (VACR) Each crewmember must identify 45 out of 50 aircraft by correct nomenclature or aircraft name within five seconds, per aircraft.

Table III (Crewmember Certification Tables I and II)

This table is a critical gate used to provide an evaluation for the Stinger crewmembers.

- Each crewmember must receive a minimum score of 90 percent in each evaluated task in Tables I and II. If an individual fails to certify on Table III, retrain the Soldier until he satisfactorily completes Table III prior to advancing to the next phase.

Stinger Team Gunnery Tables

Tables IV through VIII train Stinger teams to engage aerial targets in a static position using THT or STPT.

Table IV (Tracking Practice)

This table measures the Stinger teams tracking procedures of aerial targets using the THT or the STPT. The team leader controls the tracking practice.

- Each Stinger team will successfully track four out of five aerial targets with the THT or STPT.
- Each individual must achieve a score of "Go" on all drills.

Table V (Battle drill certification)

This table measures the Stinger team proficiency in engagement procedures using STPT or THT. The Stinger team leader controls the engagement. The Stinger team deploys to a unit training area and operates the STPT, or, when available, the THT against live aircraft. The STPT will be used to maintain Stinger proficiency and for Table VIII certification. The individual will perform drill tasks required for his position as specified in Training Circular 44-117-11, *Stinger Team Crew Training* (CAC login required for access).

- To successfully complete Table V, each Stinger team (team leader and gunner) must correctly engage two out of five hostile target presentations using the STPT and must score a "Go" on all drills.
- Each Stinger team must achieve a score of "Go" on all drills. It is the responsibility of the leader to ensure that the teams follow the correct engagement procedures.

Table VI

Team operations evaluation tests the Stinger teams' ability to employ under day and night conditions. The platoon leader and platoon sergeant will maintain command and control. Teams deploy to the local training area, which may be in conjunction with a unit field training exercise and emplace and engage aerial targets. The senior evaluator will train the team on how to conduct a site selection and how to select firing positions.

- Activities will be evaluated based on principles of air defense employment contained in TC 44-117-11; Army Techniques Publication (ATP) 3-01.18, *Stinger Team Techniques* (CAC login required for access); and appropriate operation plans (OPLANs), operation orders (OPORDs), and standard operating procedures (SOPs).

Table VII (Team pre-certification)

This table prepares the Stinger team for certification in Table VIII. The senior evaluator will administer a practice and/or diagnostic test on all Table VIII elements. Stinger teams that are not proficient will receive additional training to prepare them for certification.

- Each crewmember must have achieved 90 percent on VACR and range ring test; 80 percent on the platoon, section, and team test; and a "Go" score on all crew drills, IFF programming, FACT linkup, and DAGR/SKL operations.
- Each Stinger team (team leader and gunner) must correctly engage four out of five hostile target presentations using the STPT or THT.

Table VIII (Team certification)

Table VIII is a critical gate. A battalion evaluation team will evaluate drills. The failure of any task results in an uncertified team. Teams must successfully complete Table VIII prior to advancing to the next phase of training.

- Each crewmember must achieve 90 percent on VACR and range ring test; 80 percent on the platoon, section, and team test; and a "Go" score on all crew drills, IFF programming, FACT linkup, and DAGR/SKL operations.
- Each Stinger team (team leader and gunner) must correctly engage four out of five hostile target presentations using the STPT or THT.

Platoon Gunnery Tables

Platoon gunnery tables train the team to engage targets in various modes under various conditions. Advanced gunnery skills include Tables IX and X. Satisfactory performance on Table VIII indicates the Stinger team is certified to perform a live engagement of an aerial target.

Table IX (Rehearsal live-fire exercise [annual service practice])

To be satisfactorily completed, this training event may encompass more than one training day.

- Activities will be evaluated based on principles of air defense employment contained in TC 44-117-11, ATP 3-01.18 (CAC login required for access), and appropriate OPLANs, OPORDs, and SOPs.
- Selected Stinger teams will engage an aerial target with a Stinger missile and successfully perform drills per TC 44-117-11.

Table X (Annual service practice)

To be satisfactorily completed, this training event may encompass more than one training day.

- Activities will be evaluated based on principles of air defense employment contained in TC 44-117-11, ATP 3-01.18 (CAC login required for access), and appropriate OPLANs, OPORDs, and SOPs.
- Selected Stinger teams will engage an aerial target with a Stinger missile and successfully perform drills per TC 44-117-11.

Training and Evaluation Outlines Collective Task

The collective tasks recommended to support the Stinger gunnery program are listed in TC 44-117-11. Commanders have the option of selecting the collective tasks they feel are required to support the gunnery program.

Appendix C

Manual Short-Range Air Defense Control System

Accurate, timely, and reliable early warnings enable air defense artillery (ADA) fire units to be more effective. Early warning serves two purposes: alerting and cueing. Alerting information tells the Soldier that an aircraft is approaching his position or defended asset. Cueing information tells the Soldier which direction the aircraft is travelling, its positional location, and its tentative identification in a timely manner. This enables the user to focus attention in the right direction and detect the aircraft at a greater range. To obtain this information, short-range air defense (SHORAD) units use a manual control system that provides alerting, but very limited cueing. The following are objectives of the Manual SHORAD Control System (MSCS):

- Provide near real-time transmission of early warning information to SHORAD and other divisional units.
- Provide weapon control information to the SHORAD units organic to the division.
- Integrate ADA data into the division airspace management effort.

Early warning data is available to any unit that is capable of receiving it. This includes ADA units, the divisional maneuver units, and combat support units.

Manual SHORAD Control System Communications

MSCS uses various communications nets and components to provide timely, accurate, and reliable early warning information. The early warning broadcast net is a one-way frequency modulation (FM) net originating at the brigade combat team (BCT) tactical operations center. The air defense and airspace management cell in the BCT should be able to see the integrated air picture across the area of operations. Any unit with an FM receiver and within line of sight and operating range restrictions can obtain early warning information simply by monitoring this net.

SHORAD Grid Matrix

MSCS uses a unique grid system (see Figure C-1). A standard grid matrix is used with a specified reference point. The division operation order will normally designate the map coordinates to this reference point in the air defense annex, as well as the map sheet series number. The location of the reference point is standard on each sheet; however, it may change for security reasons. This can be accomplished by designating another intersection as the reference point (for example, intersection of HEMLOCK, INSECT, HAZEL, and INDIAN) and applying the specific map coordinates.

AUSTIN	BUTTON	COPPER	DUNGEON	EYEBROW	FURNACE	GUTTER	HUSBAND	IVY	JUPITER
AUGUST	BUTLER	CHOWDER	DUNCAN	EXPORT	FRONTIER	GUITAR	HUNTER	ISRAEL	JUNGLE
ATLANTA	BUTCHER	CHIPMUNK	DUCHESS	EXHAUST	FOUNTAIN	GREMLIN	HOWARD	ISAAC	JULY
ASIA	BUSHEL	CHINA	DUBLIN	EVEREST	FORREST	GREGORY	HONDA	IRON	JOSEPH
ARKANSAS	BURBANK	CHIMNEY	DONKEY	ESTATE	FOREHEAD	GRANITE	HUMMER	IRIS	JORDAN
APRICOT	BUCKET	CHILI	DONALD	ENTRANCE	FOOTBALL	GOSPEL	HOLLAND	IRENE	JOHNSON
ANTHONY	BUBBLE	CHILDREN	DOMINO	ENGLAND	FLORIDA	GORILLA	HIGHWAY	IRELAND	JOCKEY
ANGEL	BRONCO	CHICKEN	DOLPHIN	ENGINEER	FLORENCE	GOODYEAR	HICKORY	IOWA	JEWEL
ANCHOR	BOULDER	CHICAGO	DOLLAR	EMMA	FLIPPER	GODDESS	HENRY	IODINE	JESSICA
AMBER	BOTTLE	CHEVY	DOCTOR	ELSIE	FLETCHER	GOBLIN	HEMLOCK	INSECT	JERSEY
ALMOND	BINGO	CHESTNUT	DINOSAUR	ELLEN	FIBER	GLACIER	HAZEL	INDIAN	JELLO
ALCOHL	BEDROOM	CHERRY	DIAMOND	ELEPHANT	FEATHER	GIBSON	HAWAII	INDEX	JEFFREY
ALCATRAZ	BASEBALL	CHARCOAL	DEVIL	ELBOW	FAUCET	GAZELLE	HATCHET	INCENSE	JASPER
ALBERT	BARREL	CHAPTER	DETROIT	ELAINE	FARMER	GATEWAY	HAROLD	IMPERIAL	JASON
ALASKA	BARBER	CHAPEL	DESIGN	EGYPT	FARGO	GARMENT	HARNESS	ILLINOIS	JAPAN
ALAMO	BANQIT	CHAMPION	DENVER	EDWARD	FALSTAFF	GARLIC	HAMMER	IDOL	JAMAICA
AFRICA	BAMBOO	CHAIRMAN	DAYLIGHT	EDITH	FALCON	GARAGE	HAMLET	IDAHO	JAGUAR
ADAM	BAKER	CARBON	DAVID	EDISON	FAIRMONT	GANGPLANK	HAMILTON	ICICLE	JACOB
ACORN	BADGER	CAMPBELL	DANIEL	EDGAR	FAIRFAX	GAMMA	HALLMARK	ICELAND	JACKSON
ABILENE	BACON	CADILLAC	DAKOTA	EARTHWORM	FABRIC	GABLE	HALIFAX	ICEBURG	JACKET

Figure C-1. SHORAD grid system

KRYPTON	LOWELL	MUSIC	NYLON	OXEN	PYRAMID	ROYAL	SURGEON	TURTLE	VULTURE
KOREA	LONDON	MUSCLE	NUTSHELL	OUTPOST	PUMPKIN	ROWBOAT	SUMMER	TURKEY	VOLCANO
KORAN	LIZARD	MOVIE	NUTMEG	OUTLAW	POWER	ROMAN	SUGAR	TUNNEL	VODKA
KODAK	LIQUOR	MOUSETRAP	NOVEL	OSCAR	PONTIAC	ROBIN	SPIDER	TROPIC	VITAMIN
KLONDIKE	LION	MORGAN	NOTEBOOK	ORPHAN	PIRATE	ROBERTS	SOIL	TOMBSTONE	VRONIA
KITCHEN	LINEN	MONSTER	NORMAN	ORLANDO	PIONEER	RICHMOND	SILVER	TIMBER	VIOLET
KINGDOM	LINCOLN	MONKEY	NOMAD	OREGON	PILLOW	REVERE	SIDEWALK	TIGER	VINEGAR
KIDNEY	LIMESTONE	MILLER	NITRO	ORCHARD	PILGRAM	REPTILE	SEASHORE	TICKET	VILLAGE
KEYBOARD	LILY	MIDAS	NILE	OPAL	PIGEON	RENO	SCORPIN	THUNDER	VIKING
KETTLE	LICORICE	MIAMI	NICHOLAS	ONTARIO	PETER	REINDEER	SCARLET	TEXAS	VIENNA
KENTUCKY	LETTUCE	MEXICO	NIAGARA	O'NEAL	PERSIA	REDHEAD	SATURN	TERMITE	VIDEO
KENNEL	LESLIE	MEDIC	NEWPORT	OMAHA	PERFUME	REBEL	SARAH	TEQUILA	VICKSBURG
KENNEDY	LEOPARD	MASTER	NEVADA	OLYMPIC	PEPPER	REACTOR	SAPPHIRE	TENNIS	VICEROY
KELLOGG	LEMON	MARTIN	NEPTUNE	OLIVE	PEANUT	RAYMOND	SALOON	TEACHER	VESSEL
KATIE	LEGION	MARSHALL	NELSON	OHIO	PARIS	RANDOLPH	SALAMI	TAXI	VERMONT
KAREN	LAVA	MARBLE	NEEDLE	OFFICE	PARCEL	RAINBOW	SAILBOAT	TAHITI	VENUS
KARATE	LAWYER	MANGO	NECKTIE	OCTOPUS	PANTHER	RAMBLER	SAHARA	TADPOLE	VELVET
KANSAS	LADDER	MAGIC	NECKLACE	OCEAN	PANCAKE	RACOON	SAGEBRUSH	TACOMA	VEGA
KANGAROO	LACROSSE	MADRID	NEBRASKA	OATMEAL	PACKAGE	RACKET	SADDLE	TABLET	VAMPIRE
KAISER	LABRADOR	MADISON	NATHAN	OASIS	PACIFIC	RABBIT	SABER	TABASCO	VALLEY

Figure C-1. SHORAD grid system (continued)

The SHORAD grid matrix is a standardized matrix consisting of 400 grid squares with a code name assigned to each square. Users need only use that portion of the matrix applicable to their areas of operation. The matrix reference point should be set to extend the matrix coverage at least 20 kilometers beyond the division boundaries.

Each grid square represents a map area of 10 by 10 kilometers. Use only the portion of the matrix needed for the operation. SHORAD grid overlays are locally produced in a scale compatible with standard tactical maps. Using a larger-scale map such as 1:250,000 will allow teams to track a larger area and provide earlier warning

Track Reporting

The track position is reported to 1 kilometer using the coded grid square in which the aircraft is located and by further subdividing each grid square into 1 kilometer increments (see the aircraft in Figure C-2). It is located at SHORAD grid LEMON Three-Three.

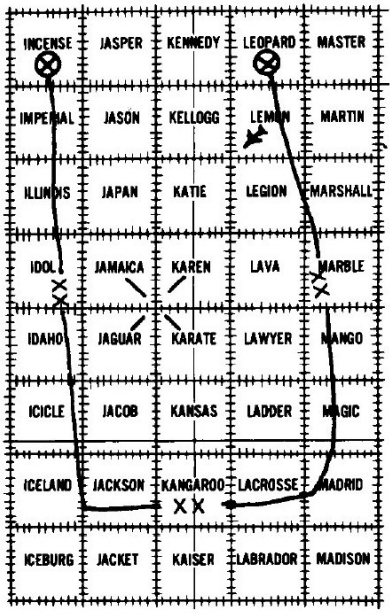

Figure C-2

Standard Track Report Format	
Preface:	Initial track (repeat twice), track update, scrub track, or mass track
ID:	Friend, unknown, or hostile (friendly not normally transmitted)
Location:	Lemon 3-3 (10-kilometer grid designator [LEMON] plus 1-kilometer grid increments for easting and northing, read to the right and up)
Heading:	Southwest
Raid Size:	One
Aircraft Type:	Fixed wing
Track Designator:	A-01 (Assigned by detecting unit)

Track Report Examples

1. Initial Track. When transmitting an initial track, transmit all known information as time or the tactical situation permits:

INITIAL TRACK, INITIAL TRACK

UNKNOWN

AT LEMON—THREE—THREE

HEADING SOUTHWEST

ONE

FIXED WING

TRACK DESIGNATOR: ALPHA-ZERO-ONE

2. Track Update. To transmit a track update, send only the preface, the track designator, the new location, and the new heading. Using the example shown, if the aircraft moves to grid KATIE and is located at KATIE-7-8:

TRACK UPDATE

ALPHA-ZERO-ONE

NOW AT KATIE-SEVEN-EIGHT

HEADING SOUTHWEST

3. Track Update Identified

Track update reports must also include any changes to the information previously reported, for instance, if, in the example below, the aircraft is now identified as hostile and its new location is KATIE-4-3:

TRACK UPDATE

ALPHA-ZERO-ONE

NOW AT KATIE-FOUR-THREE

NOW HOSTILE

HEADING SOUTHWEST

Note: Track updates should be applied about twice a minute.

4. Scrub Track

A scrub track is reported when a track exits the area of interest, a track no longer appears on the radar, or is identified as friendly. To report a scrub track, only the preface and track designator must be transmitted:

SCRUB TRACK

ALPHA-ZERO-ONE

5. Mass Track

The last type of track report is a mass track. A mass track is transmitted instead of an initial track when the raid size is "many." When reporting a mass track, location will normally be one or more 10-kilometer grid designations. Track updates for a mass track are the same as any other track:

MASS TRACK, MASS TRACK

HOSTILE

AT LEMON AND MARTIN

HEADING SOUTHWEST

MANY

ROTARY WING

TRACK DESIGNATOR: ALPHA-ZERO-TWO

Appendix D

Airspace Control and Coordinating Measures

Coordination measures are used to facilitate planning and efficient execution of operations while providing safeguards for friendly forces and noncombatants. See Army Techniques Publication (ATP) 3-52.1, *Multi-Service Tactics, Techniques, and Procedures for Airspace Control*, for the complete list.

Airspace Coordinating Measures

Users employ airspace coordinating measures (ACMs) to facilitate efficient airspace use to accomplish missions and simultaneously provide safeguards for friendly forces. The appropriate airspace control authority approves ACMs and disseminates them via the airspace control order (ACO).

Low-level transit route (LLTR). A LLTR is a temporary corridor of defined dimensions, established in the forward area to minimize the risk to friendly aircraft from friendly air defenses or surface forces.

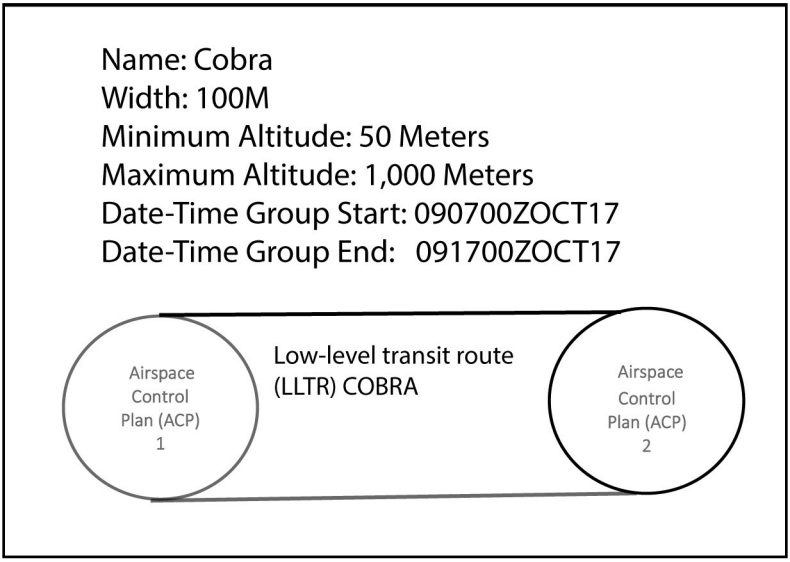

Figure D-1. Low-level transit route

Minimum risk route (MRR). An MRR is a temporary corridor of defined dimensions recommended for use by high-speed, fixed-wing aircraft that presents the minimum known hazards to low-flying aircraft transiting the combat zone. The MRR graphic looks the same and has the same data as the LLTR.

Temporary minimum risk route (TMRR). A TMRR is a temporary route established to route air traffic between transit routes or the rear boundary of the forward area and the operations area in direct support of ground operations.

Transit corridor (TC). A TC is a bidirectional corridor in the rear area and normally is not provided air traffic services.

Transit route (TR). A TR is a temporary air corridor of defined dimensions, established in the forward area to minimize the risk to friendly aircraft from friendly air defenses or surface forces.

Special corridor (SC). An SC is a corridor used to accommodate the special routing requirements of specific missions.

Standard use Army aircraft flight route (SAAFR). SAAFRs are established below the coordination level to facilitate Army aircraft movement. Normally, it is located in the corps through brigade rear areas of operation and does not require approval by the airspace control authority.

Coordinating altitude (CA). A CA uses altitude to separate users and defines the transition between airspace control elements. A CA allows the airspace control authority or airspace control entity to assign a volume of airspace to another control organization.

Coordination level (CL). A CL is an ACM that uses procedural control methods to separate fixed- and rotary-wing aircraft by determining an altitude below which fixed-wing aircraft will normally not fly. Prior to transitioning through the CL, the aircraft should coordinate with the appropriate command and control (C2) agency listed in the airspace control plan or ACO. A CL allows airspace planners to deconflict low-level routes for rotary-wing aircraft and certain unmanned aircraft systems (UASs).

High-density airspace control zone (HIDACZ). A HIDACZ is a complex, designated airspace in which there is a concentrated employment of numerous and varied airspace users. A HIDACZ has defined dimensions, which usually coincide with geographical features or navigational aids. The maneuver commander normally controls HIDACZ access. The maneuver commander can also direct a more restrictive weapons status within the HIDACZ than the weapons status outside the HIDACZ.

No fly area (NOFLY). A NOFLY is airspace of specific dimensions set aside for a specific purpose in which no aircraft operations are permitted, except as authorized by the appropriate commander and controlling agency.

Restricted operations zone (ROZ). A ROZ is an ACM with 14 specific usages. ROZ usages are typically described by the stated mission of the airspace user with one exception: unmanned aircraft (UA) usage. Although a UA performs various missions, like manned aircraft, planners should use a UA ROZ for UA missions. The 14 specific usages are:

- **Air-to-air refueling area (AAR)**. An AAR ROZ is airspace of defined dimensions set aside for aerial refueling operations.
- **Airborne command and control area (ABC)**. An ABC ROZ is airspace of defined dimensions established specifically for aircraft conducting battlefield C2. A U.S. Marine Corps airborne C2 aircraft or a Joint Surveillance Target Attack Radar System (JSTARS) E-8 aircraft could use an ABC ROZ.
- **Airborne early warning (AEW) area**. An AEW ROZ is airspace of defined dimensions established for airborne platforms conducting airborne early warning missions. Generally, it is designed for aircraft such as the Airborne Warning and Control System (AWACS) and E-2C.
- **Close air support (CAS)**. A CAS ROZ is airspace designated for holding orbits and used by rotary- and fixed-wing aircraft in proximity to friendly forces.
- **Combat air patrol (CAP)**. A CAP ROZ is airspace for an aircraft patrol over an objective area, protected force, critical area, or in an air defense area for the purpose of intercepting and destroying hostile aircraft before they reach their targets.
- **Drop zone (DZ)**. A DZ ROZ is a specific area of defined dimensions upon which airborne troops, equipment, or supplies are airdropped.
- **Electronic combat (EC)**. An EC ROZ is airspace established specifically for aircraft engaging in EC.
- **Landing zone (LZ**.) An LZ ROZ is any specified zone of defined dimensions used for landing aircraft.
- **Pick-up zone**. A PZ ROZ is a specified zone used for landing aircraft to pick-up troops, equipment, or supplies.

- **Reconnaissance area (RECCE)**. A RECCE ROZ is airspace established specifically for aircraft conducting reconnaissance. Although UASs can perform reconnaissance, this ROZ usage is designed for manned aircraft performing airborne reconnaissance.
- **Sector of fire (SOF) area**. A SOF area ROZ is airspace of defined dimensions, potentially covering the entire area of a joint special operations area and created specifically for SOF missions. It can be of any shape.
- **Surface-to-surface missile system (SSMS)**. An SSMS ROZ is airspace of defined dimensions designed specifically for Army Tactical Missile System (ATACMS), Guided Multiple Launch Rocket System (GMLRS), and Tomahawk land-attack missile (TLAM) launch point, route of flight, and impact points. Also, an SSMS ROZ is used for Patriot firing positions.
- **Surface-to-surface munitions (SSM)**. An SSM ROZ is airspace of defined dimensions established specifically for SSM route of flight and launch and impact points.
- **Unmanned aircraft (UA).** A UA ROZ is airspace of defined dimensions created specifically for UAS operations. Generally, this airspace defines where UAS missions are conducted and does not include en-route airspace.

Fire Support Coordination Measures

Commanders use fire support coordination measures (FSCMs) to facilitate engaging targets rapidly while providing safeguards for friendly forces. They ensure fire support will not jeopardize friendly forces, will interface with other fire support means, and will not disrupt adjacent units' operations. Permissive FSCMs facilitate the attack of targets, while restrictive FSCMs impose specific restrictions and provide safeguards for friendly forces, facilities, or terrain.

Airspace coordination area (ACA). An ACA is a formal or informal, three-dimensional block of airspace in a target area (established by the appropriate commander) in which friendly aircraft are reasonably safe from friendly, indirect, surface-to-surface fires. ACAs are often of short duration. Formal and informal ACAs are constructed with the assistance of the air liaison officer to ensure they meet the technical requirements of the using aircraft and weapon systems. In developing situations, and as increasing fire support and airspace control capability become available, an established ACA can be replaced by another control measure, such as a ROZ or kill box.

The joint force air component commander (JFACC) can establish an ACA within the JFACC's assigned airspace. The JFACC cannot establish an ACA within another component commander's assigned airspace without coordination because this measure could unduly restrict that commander's airspace users.

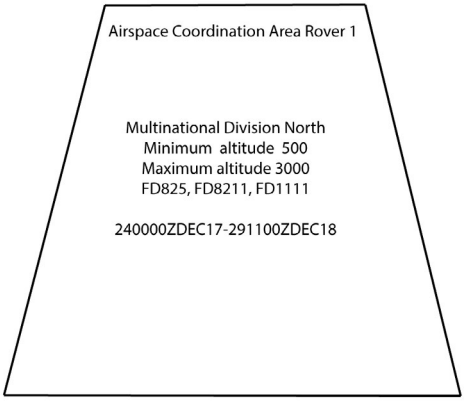

Figure D-2. Airspace coordination area (ACA)

Battle position (BP) and holding area (HA). BPs and HAs are not categorized as coordination measures, but have implied airspace components when helicopters use them.

- A BP is a defensive position from which a unit will fight; it is oriented on the most likely enemy avenue of approach. A unit assigned a BP is located within the general outline of the BP, but its maneuver is not confined to the BP.
- For attack helicopters, a BP is a maneuvering area containing lateral and in-depth firing points for the flight to maneuver while searching for and engaging targets. Because a BP is not a coordination measure, it does not appear on airspace and fires digital systems as protected airspace. Planners should use an ACA to establish helicopter BPs. This protects the aircraft from surface-to-surface fires and other airspace users. Planners should coordinate size and altitude requirements based on the mission. Alternatively, planners could use a CAS ROZ to achieve the same effects as an ACA.

- HAs are generically described as areas where ground and air units await movement instructions, targets, or missions. The area should be well forward, but it should provide cover and concealment from enemy observation and fires. Like the BP, HAs are two-dimensional areas with an implied airspace component, when used by helicopters.
- Attack helicopters occupy HAs prior to movement to BPs or individual firing points. While in the HA, the aircraft complete final coordination with the terminal controller, as required. Because the HA is not a coordination measure, it does not appear on airspace and fires digital systems as protected airspace. Planners should use an ACA to establish helicopter HAs as necessary. This protects the aircraft from surface-to-surface fires and other airspace users. Alternatively, planners could use a landing zone ROZ to achieve the same effects as an ACA.

Figure D-3. Battle position

Kill box. A kill box is a permissive measure with an associated ACM used to facilitate integrating joint fires and coordinating the airspace within. The kill box FSCM defines the surface area where friendly forces may employ surface-to-surface and air-to-surface effects without further coordination. To facilitate integrating air and surface fires, it is necessary to establish an ACM over the kill box to protect aircraft from other aircraft and surface-to-surface fires.

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Figure D-4. Kill box

Air Defense Measures

Air defense measures are employed to segregate and identify friendly aircraft from hostile aircraft to facilitate effective air defense.

Air defense identification zone (ADIZ). An ADIZ is airspace of defined dimensions within which the ready identification, location, and control of airborne vehicles are required. The ADIZ is normally the transition between procedural control areas (outside) and the positive control areas (inside). Typically, an ADIZ is used for sovereign national boundaries or, in the case of areas of operations, for identification in the rear areas. Review flight information publications for theater-specific ADIZ and associated procedures and limitations.

Base defense zone (BDZ). A BDZ is an air defense zone established around an air base and limited to the engagement envelope of short-range air defense weapons systems defending that base. BDZs have specific entry; exit; and identification, friend or foe procedures established. Key components required are radar, controlling agency, and weapon systems.

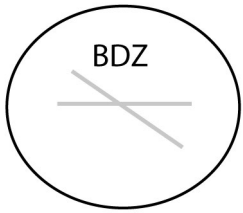

Figure D-5. Base defense zone

Control zone (CONTZN). A CONTZN is controlled airspace extending upwards from the surface of the Earth to a specified upper limit. The graphic for a control zone looks identical to the ACA and contains the same information, except for grid coordinates.

Coordinated air defense area (CADA). A CADA is a mutually defined block of airspace between a land-based air commander and a naval commander when their forces are operating in proximity to one another.

Fighter engagement zone (FEZ). A FEZ is airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with fighter aircraft. FEZs are designated airspace, usually above and beyond the engagement ranges of surface-based (land and sea), short-range air defense systems, but may extend from the surface, as required. Normally, a FEZ is used when fighter aircraft have the clear operational advantage over surface-based systems. These advantages could include range, density of fire, rules of engagement (ROE), or coordination requirements. Coordination and flexibility within the combat airspace control system may be limiting factors.

High-altitude missile engagement zone (HIMEZ). A HIMEZ is airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with high-altitude, surface-to-air missiles. Normally, HIMEZs are used when a high-altitude missile system has a clear operational advantage over aircraft in a particular zone. Advantages could include range, C2, ROE, or response time. Design of the HIMEZ is contingent on specific weapon system capabilities.

Joint engagement zone (JEZ). A JEZ is airspace of defined dimensions within which multiple air defense systems (e.g., surface-to-air missiles and aircraft) are simultaneously employed to engage air threats. JEZs depend on correct differentiation between friendly, neutral, and enemy aircraft.

Low-altitude missile engagement zone (LOMEZ). A LOMEZ is airspace of defined dimensions within which the responsibility for air threat engagement normally rests with low- to medium-altitude, surface-to-air missiles.

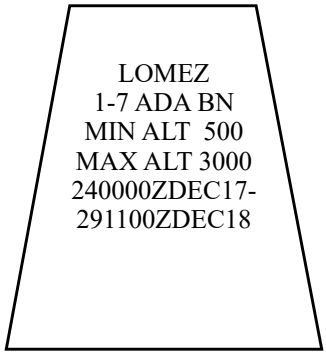

Figure D-6. LOMEZ

Short-range air defense engagement zone (SHORADEZ). A SHORADEZ is airspace of defined dimensions within which the responsibility for engaging air threats normally rests with short-range air defense weapons. It may be established within a low- or high-altitude missile engagement zone. A SHORADEZ is normally established for the local air defense of high-value assets. Commanders should plan to employ decentralized control of short-range air defense weapons within the SHORADEZ. A SHORADEZ is similar to the LOMEZ graphic.

Weapons free zone (WFZ). A WFZ is an air defense zone established to protect key assets or facilities, other than air bases, where air defense weapon systems may fire at any target not positively recognized as friendly. Normally, a WFZ is used for high-value asset defense in areas with limited C2 authority. The area air defense commander declares weapons free with the airspace control authority establishing the zone.

Levels and Lanes

Missile arc (MISARC). A MISARC is an area of 10-degrees centered on the target bearing with a range extending to the maximum range of the surface-to-air missile or as large as ordered by the tactical commander.

Safe lane (SL). An SL is a bi-directional lane connecting an airbase, landing site, or BDZ to adjacent routes or corridors. Safe lanes may also be used to connect adjacent, activated routes, or corridors.

Traverse level (TL). A TL is the vertical displacement above low-level air defense systems, expressed as a height and an altitude, at which aircraft can cross the area. Normally, TLs will be used with transit corridors, as specified in the airspace control plan.

Appendix E

Topics for Fires and Combined Arms Rehearsals

Brigade combat team (BCT) fires personnel may be involved in several types of rehearsals. The most common types are combined arms rehearsals and fires rehearsals. Multiple rehearsals ensure that maximum integration and synchronization in supporting the scheme of maneuver with fires is achieved. However, when time is limited, the number and scope of rehearsals are reduced. In these cases, rehearsals may focus on fires tasks or particular aspects of the maneuver plan, and the associated fires plan and air and missile defense appendix. See Army Techniques Publication (ATP) 3-09.42, *Fire Support for the Brigade Combat Team*, for more information.

Combined Arms Rehearsals

The fires plan may be rehearsed as part of the BCT's combined arms rehearsal. In addition to the air defense and airspace management (ADAM)/ brigade aviation element, key fires players include the fire support coordinator; brigade fire support officer; main command post fires cell including the Air Force tactical air control party; BCT staff weather officer; subordinate and supporting unit fires cells; fire support officers; mortar platoon leaders; the Army aviation liaison officer; military intelligence company commander; chemical, biological, radiological, nuclear (CBRN) officer; and the engineer coordinator. Assigned and attached combined arms units that comprise or support the BCT will participate when possible. Normally, the BCT S-3 directs the rehearsal using a synchronization matrix or execution checklist. The brigade fire suppport officer should use the fire support execution matrix. The rehearsal is normally executed by reciting or performing the following:

- Actions to occur
- Possible friendly initiatives
- Possible reactions to enemy initiatives
- Coordinating measures
- Significant events relative to time or phases of the operation

At a minimum for each phase or time period of the operation, the brigade ADAM cell officer as the senior air defense representative should verify the following:

- Weapon control status and air defense warning
- Rules of engagement to include hostile criteria, friendly criteria, and unknown response
- Identification and engagement authority by type of target (fixed wing, rotary wing, unmanned aircraft system, etc.)
- Critical assets and defended assets
- Enemy air and missile threat and capabilities
- Sensor plan and early warning method
- Air defense measures
- The movement plan specifies when and where units will move.

Fires Rehearsals

The fires rehearsal should last no more than 90 minutes and should ensure the synchronization of the fires effort with the maneuver plan. Fires rehearsals focus on the execution of air defense tasks, fire support tasks, the fire support execution matrix, the effectiveness of fire support control measures, and the timing and synchronization of all fire support efforts with each other and with the maneuver operation. Fires rehearsals serve to refine fire support and air defense, ensure understanding by all fires personnel, and prove the feasibility of executing fires.

A fires rehearsal may be used to prepare for a combined arms rehearsal or it may be used after a combined arms rehearsal to refine and reinforce key fires tasks. If the fires rehearsal is held first, changes from the combined arms rehearsal may require a second fires rehearsal.

At a minimum for each phase or time period of the operation, the brigade ADAM cell officer as the senior air defense representative should verify the following:

- Weapon control status and air defense warning
- Rules of engagement to include hostile criteria, friendly criteria, and unknown response
- Identification and engagement authority by type of target (fixed wing, rotary wing, unmanned aircraft system, etc.)

- Critical assets and defended assets
- Enemy air and missile threat and capabilities
- Sensor plan and early warning method
- Air defense measures
- The movement plan specifies when and where units will move.
- Airspace clearance and integration including indirect fire trajectories
- Ammunition status by phase (given number of enemy sorties)

Appendix F

Sample Air and Missile Defense Appendix to Annex D (Fires)

Annex D (Fires) contains Appendix 7 (Air and Missile Defense [AMD]). Appendix 7 and associated tabs provide fundamental considerations, format, and instructions for developing Appendix 7 to Annex D to the base plan or order. This appendix follows the five-paragraph attachment format.

Sample Appendix 7

Place the classification at the top and bottom of every page of the attachments. Place the classification marking at the front of each paragraph and subparagraph in parentheses. Refer to Army Regulation (AR) 380-5 for classification and release marking instructions.

Copy ## of ## copies
Issuing headquarters
Place of issue
Date-time group of signature
Message reference number

APPENDIX 7 (AIR AND MISSILE DEFENSE) TO ANNEX D (FIRES) TO OPERATION PLAN/ORDER
[number] [(code name)]—[issuing headquarters] [(classification of title)]

References: List documents essential to understanding the attachment.

a. List maps and charts first. Map entries include series number, country, sheet names or numbers, edition, and scale.

b. List other references in subparagraphs labeled as shown.

c. Doctrinal references for this annex include Field Manual (FM) 3-01, *U.S. Army Air and Missile Defense Operations*; Army Techniques Publication (ATP) 3-01.18, *Avenger Battalion and Battery Techniques* (CAC login required for access); ATP 3-01.64, *Avenger Battalion and Battery Techniques*; ATP 3-01.81, *Counter-Unmanned Aircraft System Techniques*; ATP 3-01.16, *Air and Missile Defense Intelligence Preparation of the Battlefield*; ATP 3-01.8, *Techniques for Combined Arms for Air Defense*; and ATP 3-01.50, *Air Defense and Airspace Management Cell Operations*.

1. **Situation**. Include information affecting air and missile defense that paragraph 1 of the operation plan (OPLAN) or operation order (OPORD) does not cover or that needs expansion.

a. Area of Interest. Describe the area of interest as it relates to AMD. Keep in mind you may need to account for enemy airfields, anticipated forward arming and refuel points, and ballistic missile operating areas that extend far beyond the area of operations. Refer to Annex B (Intelligence) as required.

b. Area of Operations. Refer to Annex C (Operations) as required.

(1) Terrain. Describe the aspects of terrain that impact AMD. Refer to Annex B (Intelligence) as required. Terrain will canalize low-flying aircraft but also provide cover from early warning radars and the opportunity for pop-up attacks.

(2) Weather. Describe the aspects of weather that impact AMD. Refer to Annex B (Intelligence) as required. Low ceilings, precipitation, wind, and night conditions all have large impacts on how enemy air will operate.

c. Enemy Forces. List known and templated locations and activities of enemy air threat. List enemy maneuver, indirect fire, and electronic warfare threats that will impact friendly AMD operations. State expected enemy air threat courses of action and crosswalk with the map in Tab A (Air Avenues of Approach) by phase. Create Tab B (Enemy Air Order of Battle) and Tab C (Enemy Ballistic Missile Overlay). Refer to Annex B (Intelligence) as required.

(1) Enemy Ballistic Missiles. Discuss capabilities and courses of action of enemy ballistic missiles, refer to Tab B (Enemy Air Order of Battle) and Tab C (Enemy Ballistic Missile Overlay).

(2) Enemy Fixed Wing. Discuss capabilities and courses of action of enemy fixed wing, refer to Tab A (Air Avenues of Approach) by phase, and Tab B (Enemy Air Order of Battle).

(3) Enemy Rotary Wing. Discuss capabilities and courses of action of enemy rotary wing, refer to Tab A (Air Avenues of Approach) by phase, and Tab B (Enemy Air Order of Battle).

(4) Enemy Unmanned Aircraft System (UAS). List by group type, discuss capabilities, limitations, and expected courses of action.

(a) Group 1-2. Discuss capabilities and courses of action of group 1 and 2 UAS, refer to Tab A (Air Avenues of Approach) by phase, and Tab B (Enemy Air Order of Battle).

(b) Group 3. Discuss capabilities and courses of action of group 3 UAS, refer to Tab A (Air Avenues of Approach) by phase, and Tab B (Enemy Air Order of Battle).

(c) Group 4-5. Discuss capabilities and courses of action of group 4 and 5 UAS, refer to Tab A (Air Avenues of Approach) by phase, and Tab B (Enemy Air Order of Battle).

(5) Additional Air Threat Information. List air threat information pertinent to operations but not covered in Annex B (Intelligence). Highlight specific air threat considerations like sortie rates, subordination of air elements to ground units, ordinance peculiarities, target preferences, tactics, and recent significant activities.

d. Friendly Forces. See Annex A (Task Organization). Outline the higher headquarters' air defense plan. List critical asset list (CAL)/defended asset list (DAL) of higher headquarters in area of interest. Outline the plan, task, and purpose of higher, adjacent, and other short-range air defense (SHORAD) organizations and assets that support or impact the issuing headquarters or require coordination and additional support.

2. **Mission**. State the mission of AMD in support of the base plan or order.

3. **Execution**.

a. Scheme of AMD. Describe how AMD supports the commander's intent and concept of operations. Establish priorities of AMD to units for each phase of the operation. The scheme of AMD must be concise but specific enough to clearly state what AMD capable forces are to accomplish in the operation. Utilize the ADA employment guidelines. The scheme of AMD must answer the "who, what, when, where, and why" of the AMD to be provided, but provide enough flexibility to allow subordinate commanders to determine the "how" to the maximum extent possible by ensuring necessary procedural and positive control. The scheme of AMD may include a general narrative for the entire operation that should address allocation of assets, support relationships, task and purpose, positioning guidance and primary target lines for AMD assets. Add subparagraphs addressing AMD tasks for each phase of the operation use the following format: task, purpose, execution, and assessment in matrix form. Refer to the base plan or order and Annex C (Operations) as required.

b. Execution Matrix.

EVENTS	TM 1	TM 2	TM 3	TM 4	TM 5	TM 6
Effective 162100	DS HHB/3-29 (Q-53)					Attached TF 1-9
Linkup	DTG 162000					NLT 162000 begin movement NV 400120
Mission time	NLT 170400 NV 399096 PTL 280	NLT 170400 NV 430089 PTL 200	NLT 170400 NV 230400 PTL 180	NLT 170400 NV 444000 PTL 320	NLT 170400 NV 400100 PTL 210	
TF 3-8 lead crosses PL MAINE	NV 339080 PTL 285	NV 401079 PTL 195	NV 410125 PTL 182	NV 420161 PTL 330	NV 400100 PTL 210	
TF 3-8 begins breach	Near side NV 255080 PTL 285 NAI 1	Near side NV 250120 PTL 195 NAI 2			NV 321100 PTL 195	
TF passes through breach			Far side NV 231120 PTL 195 NAI 2	Far side NV 238071 PTL 280 NAI 1		
TF 3-8 OBJ FRANKLIN	O/O Begin reorg/ consolidation	O/O Begin reorg/ consolidation	O/O Begin reorg/ consolidation	O/O Begin reorg/ consolidation	O/O Begin reorg/ consolidation	

c. Early Warning. Review method and format for passing early warning to the entire force. Consider placement and integration of available early warning assets.

d. Airspace Planning. Coordinate with the remainder of the Fires staff, aviation, and other members of the airspace working group to develop the unit airspace plan to maximize permissive fires, support procedural control of airspace, and minimize fratricide. The full airspace control plan should be in Appendix 10 to Annex C, but relevant information can be included here such as coordinating level, SHORAD engagement zones, and standard Army aircraft flight routes (SAAFRs).

e. Tasks to Subordinate Units. Lists tasks assigned to specific subordinate units not contained in the base order

f. Coordinating Instructions. Instructions applicable to two or more subordinate units. Include references to other applicable annexes.

(1) Air Defense Warning. Include local air defense warning and the authorities for both.

(2) Rules of Engagement (ROE)

(a) Weapon Control Status (WCS). Set by area air defense commander (AADC), typically at joint level. A different WCS may be selected for different types of enemy airframes (e.g., fixed wing (FW)/rotary wing (RW)-TIGHT, UAS-FREE. Include any plans to change WCS.

(b) Hostile Criteria. The AADC will typically disseminate the ROE and hostile criteria to all ground-based AMD forces through ROE and special instruction (SPINS). Dropping of flares does not constitute a hostile act. Include preplanned changes.

(c) Right of Self Defense. The right of commanders to protect their own forces. When applied to air defense, the right of self-defense includes the defense of the defended assets.

(d) Identification Criteria. The employment of Army AMD weapon systems requires early identification of friendly, neutral, or hostile aircraft and missiles to maximize engagement and avoid fratricide.

(e) Level of Control. Level of control describes the ADA echelon at which positive management of the air battle is conducted. This can be the AADC, regional air defense commanders, sector air defense commanders, ADA battalion, or individual fire unit. This is the level that has engagement authority. Different levels of control may be established for fixed-wing aircraft, rotary-wing aircraft, UASs, and ballistic missiles. The AADC will specify the level of control in the area air defense plan; the level of control may likely change over the course of an operation.

(f) Modes of Control. There are two modes of control: centralized and decentralized. The mode of control selected will depend on the capabilities of the communications system, the weapons systems employed, and both the friendly and enemy air situations. The AADC's area air defense plan specifies the modes of control, trigger events and when they should be changed, and who has the authority to change them. Stinger will most likely operate under decentralized.

(g) Autonomous Operations. A unit assumes autonomous operations after it has lost all communications with the higher and adjacent echelons. The unit commander assumes full responsibility for control of weapons and engagement of hostile targets. Normally, ROE and supplemental fire control measures in effect at the time of communications loss remain in effect until communications are regained.

(3) Passive Air Defense. Specific passive air defense measures that all units should take to protect themselves from air and missile attack or surveillance during this operation. Should include instructions about camouflage, cover, concealment, dispersion, and hardening. Other examples are moving units at night, noise and light discipline, and employing obscuration techniques.

(4) Combined Arms for Air Defense. Briefly discuss specific techniques units should use to help in defending themselves against air or missile attack or surveillance.

4. **Sustainment**. Identify sustainment priorities for AMD key tasks and specify additional sustainment instructions as necessary. Describe critical or unusual sustainment actions that might occur before, during, and after the battle to support the commander's scheme of AMD. Refer to Annex F (Sustainment) as required.

a. Logistics. Use subparagraphs to identify priorities and specific instructions for AMD logistics support. Refer to Annex F (Sustainment) and Annex P (Host-Nation Support) as required.

(1) Supply. Identify the location of ammunition transfer holding points and ammunition supply points. Refer to Annex F (Sustainment) as required.

(2) Allocation of Ammunition. List the allocation of machine gun, and missile ammunition for each phase of the operation based on the amount of Class V available. Refer to Annex F (Sustainment) as required.

b. Personnel. Use subparagraphs to identify priorities and specific instructions for human resources support, financial management, legal support, and religious support. Refer to Annex F (Sustainment) as required.

c. Health Service Support. Identify ground and air medical evacuation requirements and the availability, priorities, and instructions for medical care. Refer to Annex F (Sustainment) as required.

5. **Command and Signal**.

a. Command.

(1) Location of the Commander and Key Leaders. State the location of the commander and key AMD leaders.

(2) Succession of Command. State the succession of command if not covered in the unit's standard operating procedurs (SOPs).

(3) Liaison Requirements. State the AMD liaison requirements not covered in the base order.

b. Control

(1) Command Posts. Describe the employment of maneuver units and AMD-specific command posts, including the location of each command post and its time of opening and closing.

(2) Reports. List AMD-specific reports not covered in standard operating instructions. Refer to Annex R (Reports) as required. Consider ADA engagement and early warning reports.

c. Signal. Address any AMD-specific communications requirements. Identify the current standard operating instructions edition. Refer to Annex H (Signal) as required.

[Commander's last name]
[Commander's rank]

ACKNOWLEDGE: Include only if attachment is distributed separately from the base order. The commander or authorized representative signs the original copy of the attachment. If the representative signs the original, add the phrase "For the Commander." The signed copy is the historical copy and remains in the headquarters' files.

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ATTACHMENTS: List lower-level attachment (appendixes, tabs, and exhibits).

Tab A — Air Avenues of Approach Overlay

Tab B — Enemy Air Order of Battle

Tab C — Enemy Ballistic Missile Overlay

Tab D — AMD Protection Overlay

DISTRIBUTION: Show only if distributed separately from the base order or higher-level attachments.

Appendix G
References

Army Doctrine Publication (ADP) 6-0, *Mission Command*, 17 May 2012.

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

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FM 27-10, *The Law of Land Warfare*, 18 July 1956.

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Combined Arms Doctrine Directorate (CADD)
CADD develops, writes, and updates Army doctrine at the corps and division level. Find the doctrinal publications at either the Army Publishing Directorate (APD) at http://www.apd.army.mil or the Central Army Registry (formerly known as the Reimer Digital Library) at http://www.adtdl.army.mil.

Foreign Military Studies Office (FMSO)
FMSO is a research and analysis center on Fort Leavenworth under the TRADOC G-2. FMSO manages and conducts analytical programs focused on emerging and asymmetric threats, regional military and security developments, and other issues that define evolving operational environments around the world. Find FMSO products at http://fmso.leavenworth.army.mil.

Military Review (MR)
MR is a revered journal that provides a forum for original thought and debate on the art and science of land warfare and other issues of current interest to the U.S. Army and the Department of Defense. Find MR at http://usacac.army.mil/cac2/militaryreview.

TRADOC Intelligence Support Activity (TRISA)
TRISA is a field agency of the TRADOC G-2 and a tenant organization on Fort Leavenworth. TRISA is responsible for the development of intelligence products to support the policy-making, training, combat development, models, and simulations arenas.

Capability Development Integration Directorate (CDID)

CDID conducts analysis, experimentation, and integration to identify future requirements and manage current capabilities that enable the Army, as part of the Joint Force, to exercise Mission Command and to operationalize the Human Dimension. Find CDID at http://usacac.army.mil/organizations/mccoe/cdid.

Joint Center for International Security Force Assistance (JCISFA)
JCISFA's mission is to capture and analyze security force assistance (SFA) lessons from contemporary operations to advise combatant commands and military departments on appropriate doctrine; practices; and proven tactics, techniques, and procedures (TTP) to prepare for and conduct SFA missions efficiently. JCISFA was created to institutionalize SFA across DOD and serve as the DOD SFA Center of Excellence. Find JCISFA at https://jcisfa.jcs.mil/Public/Index.aspx.

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