Rescind/Chg 1, FM 25-30 Jan 1997

FM 1-116

TACTICS, TECHNIQUES, AND PROCEDURES FOR THE

AIR CAVALRY/ RECONNAISSANCE TROOP

FEBRUARY 1991

HEADQUARTERS, DEPARTMENT OF THE ARMY

FIELD MANUAL
NO 1-116

*FM 1-116

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 20 February 1991

TACTICS, TECHNIQUES, AND PROCEDURES FOR THE

AIR CAVALRY/ RECONNAISSANCE TROOP

CONTENTS

*This publication supersedes FM 1-116, 14 August 1986.

PREFACE

The air cavalry/reconnaissance troop is an organic element of the regimental aviation squadron, cavalry squadron, reconnaissance squadron, or air reconnaissance squadron. It is organized and equipped to perform reconnaissance and screening operations in support of the overall scheme of maneuver. Successful employment of this organization on the modern battlefield depends heavily on the synergistic efforts of combined arms forces.

This publication describes the organizational structure of the air troop and its doctrinal and tactical employment on the modern battlefield. Appendixes A through H provide supplemental material on risk management, the threat, NBC operations, orders and reports, aeroscout observer responsibilities, target handover procedures, aerial observation, and Kiowa Warrior employment. The L-series TOE serves as the basis for the unit discussed. This field manual is based on the doctrinal and tactical employment principles outlined in FMs 1-100, 1-111, 1-114, 1-117, 17-95, and 100-5. It is intended for air troop commanders as well as squadron commanders. It is also a practical tool for ground commanders, because ground and air troops will likely be employed in tandem.

This publication applies to commanders and staffs who will lead, employ, or fight with an air troop and to soldiers assigned to this type of organization. It also serves as a reference for flight crews learning to understand and conduct reconnaissance and screening operations in the air troop.

The proponent of this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 directly to—

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	277		Procedures for the Employment of Helicopters in the Antiarmor Role—ATP-49

This publication has been reviewed for operations security considerations.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

CHAPTER 1

MISSION AND ROLES

This chapter describes the mission and roles of the air cavalry/reconnaissance troops in AirLand Battle doctrine. It provides the organizational structure of air troops within the various squadrons assigned to divisions and armored cavalry regiments. It also describes the air troops' capabilities and limitations. Subsequent chapters refer to the actual employment of air troops. The air troops serve as the squadron's aviation scout-attack assets. They are one of the commander's most critical HUMINT-gathering assets. They collect and disseminate vital information that aids commanders in "seeing" the battlefield.

AIRLAND BATTLE DOCTRINE

AirLand Battle doctrine is based on seizing and retaining the initiative and employing aggressive offensive actions to impose our will on the enemy. This doctrine stresses the multidimensional nature of modern warfare. Air troop commanders must understand all dimensions of the battlefield. This understanding is vital for their decision on how to fight within a combined arms context. In previous conflicts, commanders employed forces on the battlefield in only two tiers of ground mobility: dismounted and mechanized. The evolution of aviation has added a third tier, air mobility, which has become increasingly essential to successful combat operations. Army aviation's rapid, terrain-independent air mobility helps create tactical opportunities for commanders at all echelons. Therefore, commanders can operate inside the enemy's decision cycle and cause the enemy to make decisions that will disrupt its initial plan. The air troops play a vital role in AirLand Battle doctrine by performing reconnaissance and security operations and gathering intelligence. By effectively using air troops, the ground maneuver commander can take the initiative away from the enemy; he can conduct combat operations on his own terms with the ultimate goal of destroying the enemy.

By knowing and effectively using the tenets of AirLand Battle, air troops can enhance the squadron, division, and corps commander's ability to capitalize on opportunities against the enemy force. These tenets are agility, initiative, depth, and synchronization.

Agility. Air troops greatly enhance the squadron's agility because of the capabilities of Army aviation on the battlefield. Agility is the ability of friendly forces to act faster than the enemy. It is the first prerequisite for seizing and holding the initiative. Agility requires flexible organizations and quick-minded, flexible leaders. They must know of critical actions as they occur and act to avoid enemy strengths and attack enemy vulnerabilities. They must do this repeatedly so that every time the enemy begins to counter one action another immediately upsets its plan. This leads to ineffective, uncoordinated, and piecemeal enemy responses and to the

enemy's eventual defeat. To be effectively agile, leaders must continuously "read the battlefield." They must use the information provided by the air troops as well as other intelligence-gathering efforts, decide on a course of action quickly, and act without hesitation.

Initiative. Through the effective use of fire support and organic attack helicopters, the air troops assist the squadron in taking the initiative. Initiative implies an offensive spirit in conducting operations. The underlying purpose of every encounter with the enemy is to seize or to retain independence of action. To do this, the commander must reach decisions and execute actions faster than the enemy. The aggressive actions of the air troops allow the armored cavalry regiment, division, or corps commander to select the time and place of his attack. These actions include accurate and timely reporting and possibly delivering the initial shock to the enemy.

Depth. Depth refers to time, distance, and resources. Air troops are highly mobile and flexible and possess the capability to report timely enemy intelligence. Therefore, commanders can employ friendly forces to counter any enemy combat operation. Momentum in the attack and elasticity in the defense derive from depth. Knowing the time required to move forces, enemy and friendly, is essential to knowing how to employ maneuver to destroy, disrupt, or delay the enemy. Commanders also need adequate space for force disposition, maneuver, and dispersion. Additionally, the commanders must see the whole battlefield. The air troops provide the reconnaissance and security capabilities to achieve these requirements.

Synchronization. Air troops assist in synchronizing friendly combat power by providing command and control to the ground maneuver commander. Synchronized operations achieve maximum combat power. These coordinated actions are the result of an all-prevailing unity of effort. Synchronized, violent execution is the essence of decisive combat. Synchronization is maximized when the commander has explicit knowledge of friendly and enemy forces—their disposition, strengths, weaknesses, and intentions. The air troops provide the commander with invaluable information to visualize the battlefield and to synchronize his forces successfully. However, synchronization means more than coordinated action. Synchronized combined arms complement and reinforce each other, greatly magnifying their individual effects. The air troops must not only synchronize with the squadron, division, or corps commander's scheme of maneuver but also with each other within the squadron. This synchronization facilitates forceful and rapid operations to achieve, at least, local surprise and shock effect. The air troop commanders, like their superiors, must make specific provisions in advance to exploit the opportunities that tactical success creates.

MISSION

The primary mission of the air troops is to conduct reconnaissance and screening operations. The air troops extend the reconnaissance and screening capabilities of their squadron and participate in limited offensive, defensive, and retrograde operations. They also perform command, control, communications, and intelligence enhancement; reconnaissance; security; and surveillance. Through these missions, they provide timely intelligence concerning the enemy, terrain, and weather throughout the area of operations and early warning against enemy observation or attack. The air troops conduct guard operations and covering force operations as part of a larger force for a limited period; however, both must be augmented to perform these missions in continuous operations. Other missions and roles that air troops normally perform are counterreconnaissance, raids, deception, and air assault security; they also assist in passage of lines. To achieve the full combat

effectiveness of the combined arms effort, however, air troops should be employed with ground cavalry troops or other friendly ground maneuver forces.

ORGANIZATION

The air troops are organic to all division- and corps-level cavalry organizations. These include the cavalry squadron of the heavy division, the reconnaissance squadron of the light division, and the air reconnaissance squadrons of the air assault and airborne divisions. They also include those corps without an assigned ACR and the regimental aviation squadron of an ACR. Figures 1-1 through 1-5 show these cavalry organizations.

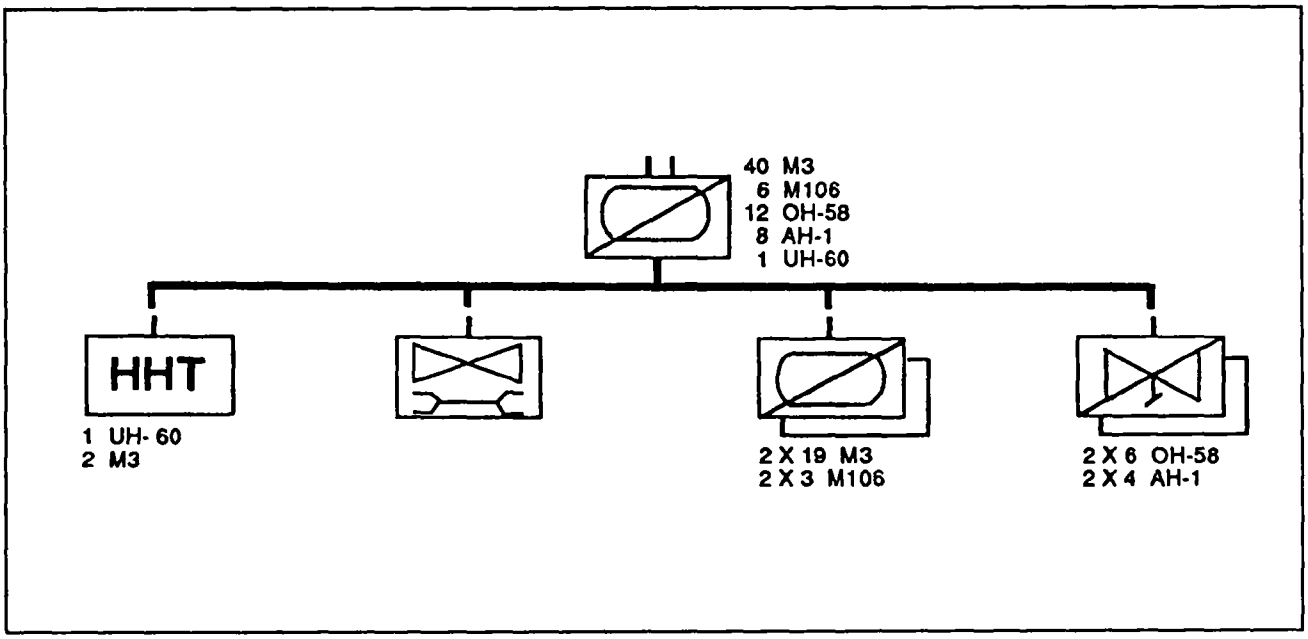


Figure 1-1. Heavy division cavalry squadron

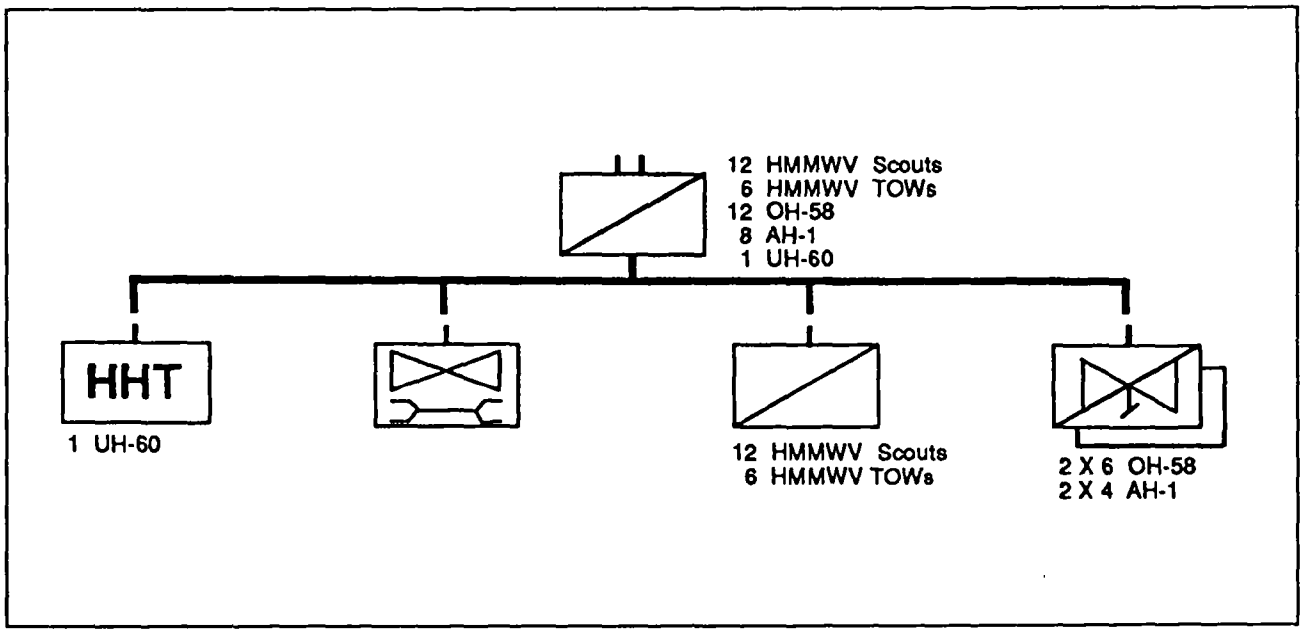


Figure 1-2. Light division reconnaissance squadron

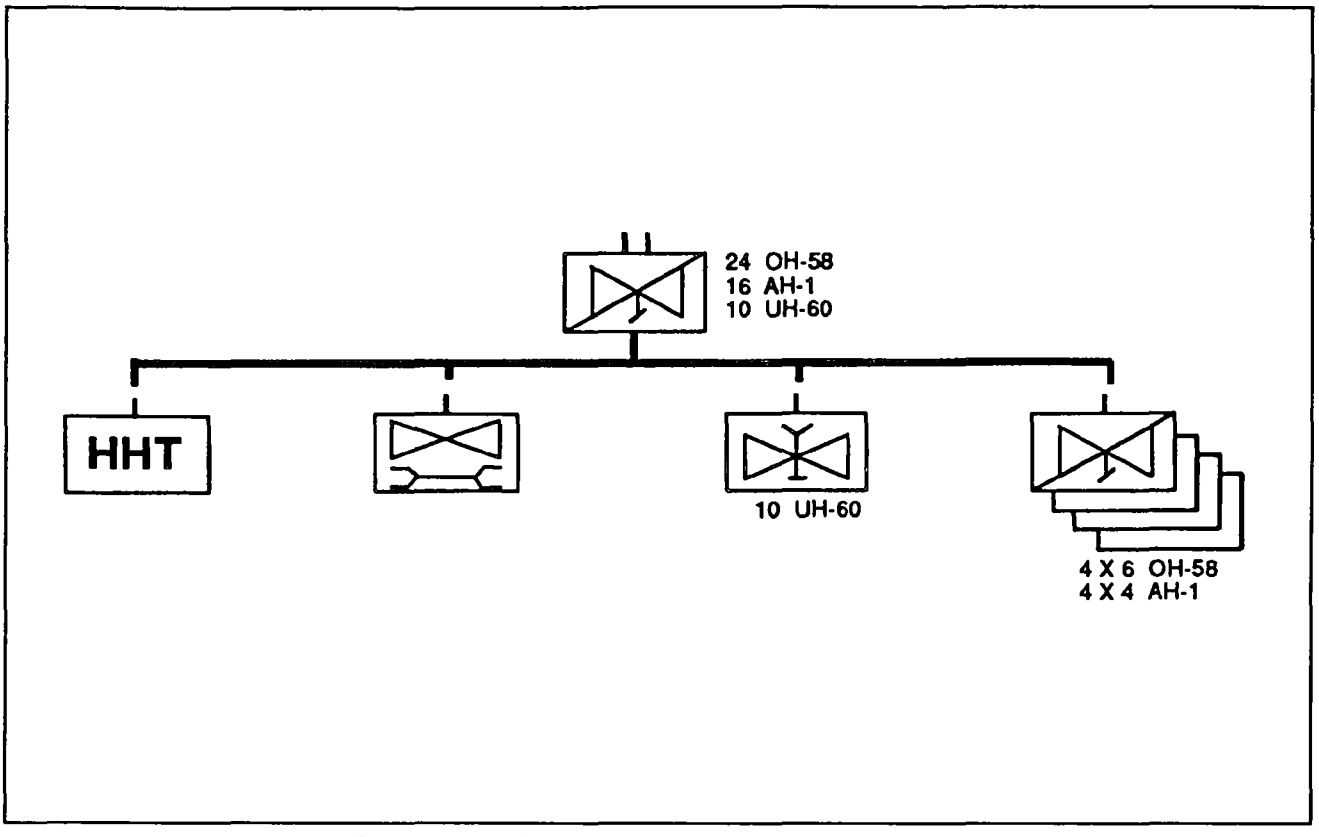


Figure 1-3. Air assault division or corps air reconnaissance squadron

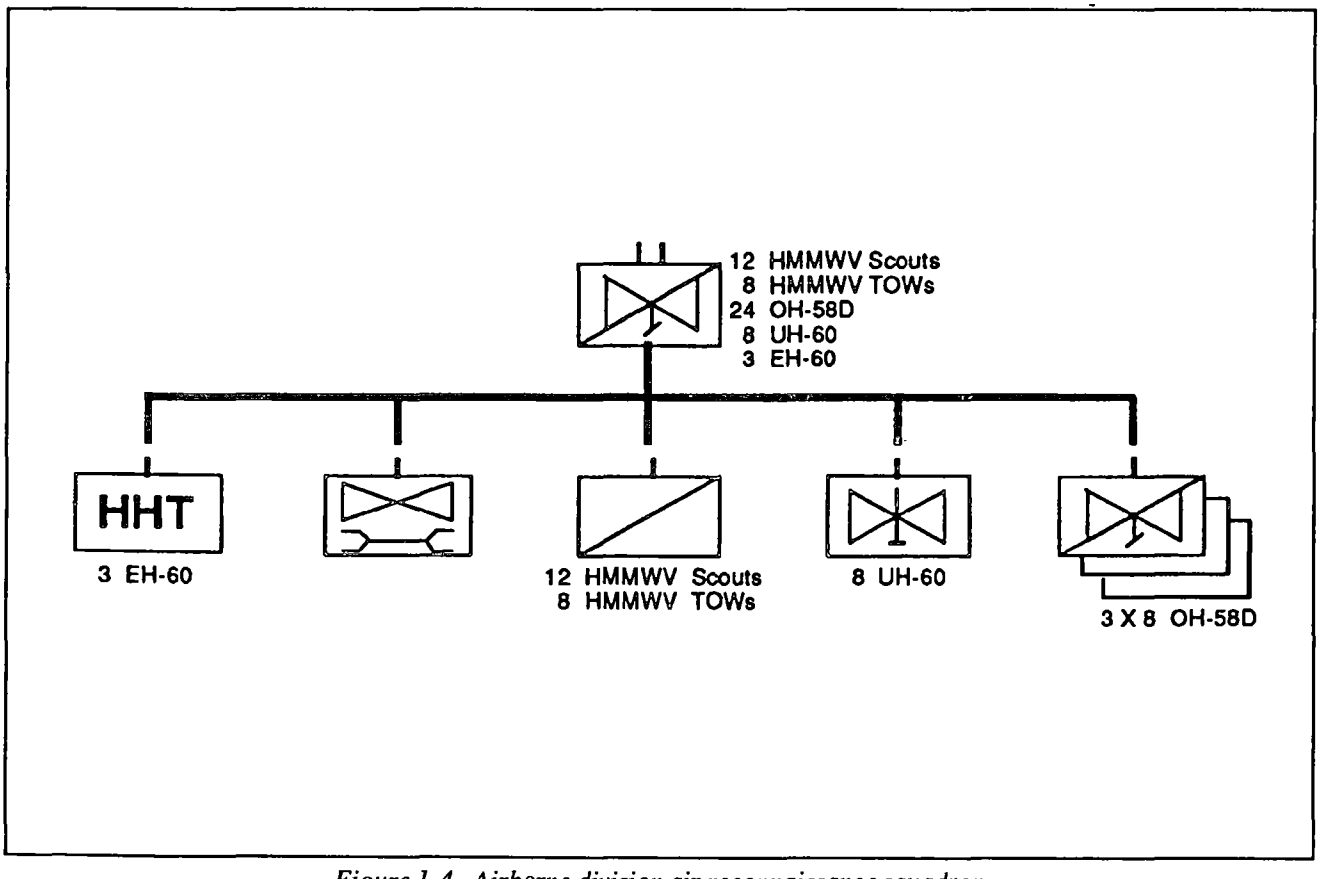


Figure 1-4. Airborne division air reconnaissance squadron

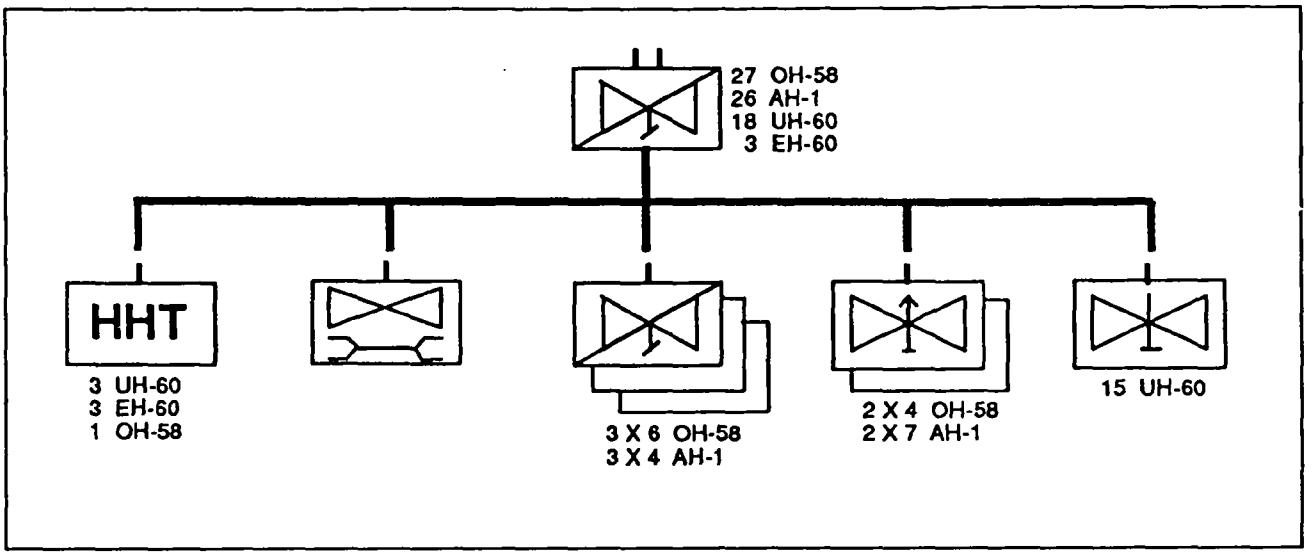


Figure 1-5. Regimental aviation squadron

The air cavalry/reconnaissance troop has a troop headquarters, an aeroscout platoon, and an attack helicopter platoon. Figure 1-6 shows the organization of an air troop.

NOTE: All troop vehicles are assigned to the troop headquarters but are tasked out as shown in Figure 1-6.

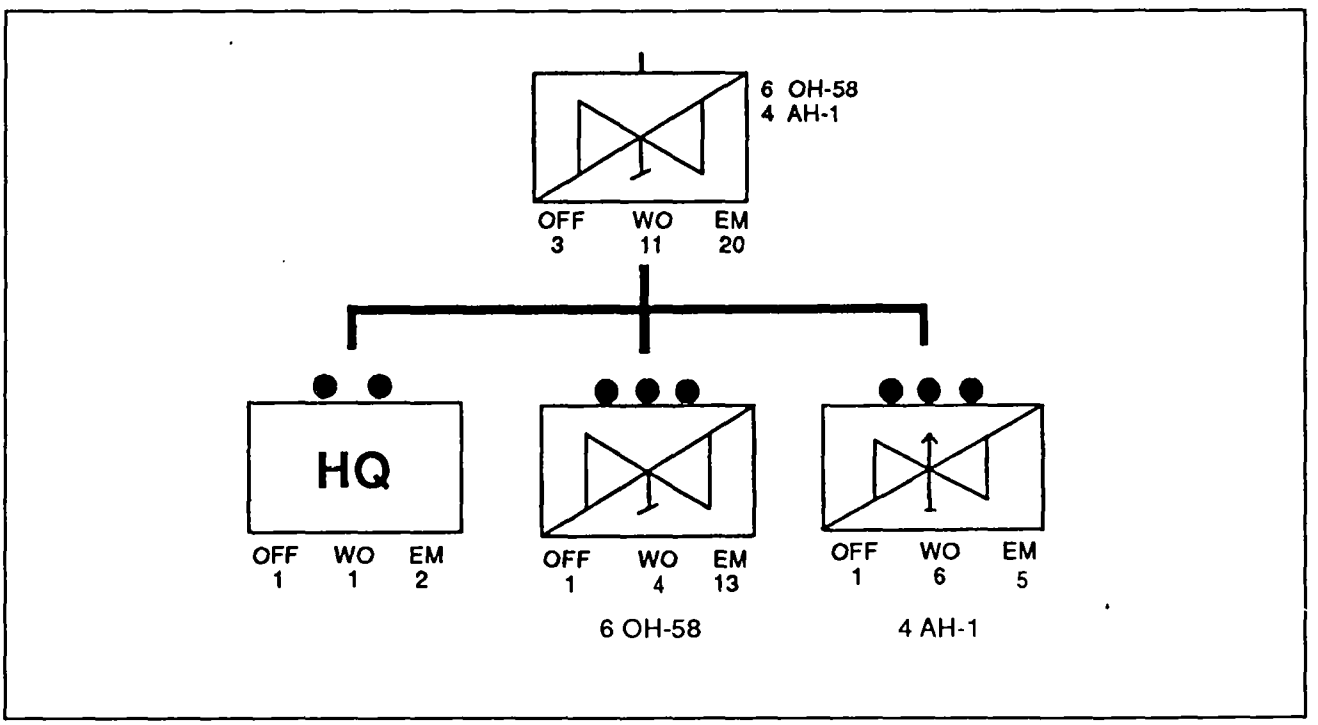


Figure 1-6. Air cavalry/reconnaissance troop

Troop headquarters. The troop's only ground transportation assets, three vehicles, are assigned to the headquarters section. The headquarters section consists of the commander, the aviation safety officer, the first sergeant, and a vehicle driver.

Troop commander. The commander commands and controls the troop. He plans operations and has overall responsibility for the troop. He is assigned an aircraft from the aeroscout platoon.

First sergeant. The first sergeant coordinates external support such as supply, mess, personnel, medical, aviation unit maintenance, and vehicle maintenance. The first sergeant also monitors combat operations. He supervises virtually all operations in the assembly area.

Aeroscout platoon. The aeroscout platoon consists of six OH-58s. It is led by a lieutenant and includes a flight examiner, an instructor pilot, and two OH-58 scout pilots. Only one pilot, to include the troop commander, is authorized per aircraft in the aeroscout platoon. The primary mission of this platoon is to conduct reconnaissance and surveillance operations.

An aeroscout observer, who is trained in aerial observation techniques, occupies the observer's station. The AO assists the pilot in reconnaissance and screening operations. He also assists him in such tasks as call for fire, target handover, joint air attack team operations, and navigation. (Appendix E describes AO responsibilities.)

Each aircraft may be equipped with two or more secure FM radios. Additionally, the AO has an AN/PRC-77 FM radio that allows the crew to dismount from the aircraft and maintain radio communications.

Attack helicopter platoon. The attack helicopter platoon consists of four AH-1s. It is led by a lieutenant and includes an instructor pilot, an aircraft maintenance technician, and four attack helicopter pilots. Also included as one of the pilots is the safety officer from the troop headquarters. The primary mission of the attack helicopter platoon in the air troops is to provide security for aeroscouts from both ground and air threats. Its secondary missions include conducting antiarmor and antipersonnel operations and providing suppressive fires for air and ground cavalry assets. This platoon also assists the aeroscout platoon with reconnaissance, surveillance, and development of the situation.

CAPABILITIES AND LIMITATIONS

Capabilities. The air troops possess many strengths which must be clearly understood for their effects to be maximized. The capabilities of air troops include—

- Providing reconnaissance (route, zone, area) during daylight hours.
- Enhancing the C^3I process.
- Providing maneuverability which adds enormously to the combat flexibility of the squadron commander or supported ground maneuver commander.
- Providing security (observation, surveillance) during daylight hours.
- Reacting quickly across a wide front to provide additional firepower to a ground force, if required.
- Conducting surveillance of lines of communication.
- Providing target acquisition for field artillery, attack helicopters, and tactical air support assets.

- Demonstrating agility and flexibility in responding to changing situations throughout the spectrum of close and rear operations.
- Adding depth to reconnaissance, security, and counterreconnaissance operations.

Limitations. It is equally important not to exceed the limitations of the troop. The weaknesses of air troops must be clearly understood to prevent an offset of their strengths. The limitations of the air troops include—

- Limited capability to operate in adverse weather or reduced visibility conditions.
- Extremely limited reconnaissance and screening capability at night unless equipped with the OH-58D.
- Limited capability to operate in a nuclear, biological, and chemical environment.
- Limited capability to adequately secure unit assembly areas against a Level I threat and little to no capability to secure against a Level II or III threat.
- Consumption of large volumes of Class III supplies.
- Inability to conduct continuous 24-hour-a-day operations with the present TOE.
- Limited capability to conduct air combat operations.
- Limited capability to perform unit-level aircraft maintenance.

CHAPTER 2

COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE

The C^3I process in air troops is performed in the same manner as in other maneuver units. The responsibility for C^3I begins with the troop commander. The C^3I process ensures that orders are clear and concise and that soldiers understand the commander's intent and their duties. Basing their plans on the best information available, leaders allow their subordinates to use initiative to accomplish the mission. This chapter describes the C^3I process and facilities and operations security as they apply to the air troops.

COMMANDER'S AND SUBORDINATE LEADERS' ROLES

Personnel primarily involved in C^3I include the air troop commander, platoon leaders, team leaders, and the first sergeant. Their decisions, however, affect all air troop personnel.

Air Troop Commander.

The air troop commander has the immediate responsibility of commanding and controlling his air and ground assets. Additionally, he is responsible for accomplishing all assigned missions and preserving the combat potential of the force.

The air troop commander's supervision must be direct and continuous while the air troop operates on the battlefield. Because the commander plans, coordinates, and controls all direct and indirect fires in his area, he is the primary coordinator of JAAT operations. When an air troop is employed with ground cavalry assets, the commander works closely with the ground cavalry commander. To accomplish all tasks within the role of a commander, the air troop commander must delegate authority to each crew member to make independent decisions. He must not attempt to accomplish all tasks personally. Instead, he must use the abilities of his subordinate scout and attack helicopter crews as much as possible.

The air troop commander and the first sergeant plan the combat service support requirements of the troop. The first sergeant coordinates, executes, and supervises that plan. The commander also advises the first sergeant of any unexpected changes that affect activities in the assembly area. Troop moves, night operations, and changes to Class III and V aviation demands are likely to require immediate coordination.

During tactical operations, the air troop commander normally commands his troop from an observation helicopter and controls and directs troop assets during the mission. The air troop commander will—

- Receive missions from the squadron commander or the ground maneuver commander.

- Provide detailed planning guidance to his reconnaissance crews.
- Coordinate with ground cavalry troops or other maneuver units operating in the area of operations.
- Coordinate indirect fires and tactical air support such as close air support.
- Coordinate with attack helicopter units for target handover.
- Update commanders on the current situation.
- Direct rearming and refueling operations.
- Ensure that detailed debriefings are conducted.

Platoon Leaders.

When the air troop conducts tactical operations, platoon leaders usually serve as scout-weapons team leaders. SWT leaders' responsibilities are described below. Because an air troop does not have an executive officer, the next senior platoon leader may assist in logistical and operational duties.

When the air troop is in the assembly area, the role of platoon leaders is primarily one of supervision. Specifically, the platoon leaders will—

- Prepare the platoon and supervise unit movements.
- Monitor operator maintenance and aircraft status.
- Monitor the crew endurance status of platoon members.
- Ensure that each platoon member is prepared for the mission.
- Advise the air troop commander about platoon matters such as aircraft maintenance, personnel status, and CSS requirements.

Team Leaders.

Like platoon leaders, the air troop team leaders must be continuously ready to assume the responsibilities of the air troop or air mission commander. This would become necessary if either commander were to become a casualty or be recalled from the area of operations.

When the air troop commander or AMC is on station, the team leaders have three basic responsibilities. The team leaders will—

- Accomplish any assigned missions.
- Employ direct and indirect fires to support the mission.
- Direct subordinate elements to accomplish the assigned missions.

First Sergeant. First sergeant duties in the air troop exceed those normally associated with regular duties of the position. The first sergeant will—

- Monitor the operation.
- Supervise CSS activities.
- Execute the commander's plan for CSS.
- Ensure the continuous operation of the command post.

- Supervise activities that occur in the assembly area.
- Manage the unit-level maintenance of aircraft and wheeled vehicles.
- Coordinate medical, mess, and personnel support with the platoon sergeants.

COMMAND AND CONTROL PROCESS

The Army Tactical Command and Control System provides the commander with the structure for command and control. The ATCCS is divided into the following five battlefield functional areas:

- Maneuver.
- Air defense.
- Fire support.
- Combat service support.
- Intelligence and electronic warfare.

Each battlefield functional area is a discrete area of responsibility that is readily identifiable by the function performed and contributes directly to battle management. The air troop commander, with his own command and control system, oversees each functional area. To effectively accomplish the mission, the air troop commander and his subordinates follow the eight-step, troop-leading process explained below. The process is an intuitive—almost automatic—way of thinking.

Step 1: Receive the Mission. The air troop commander receives the mission from the squadron commander orally or in writing in the form of a FRAGO or an OPORD. When he understands the issuing commander's intent, the air troop commander begins planning for the mission. The air troop commander should use no more than one-third of the available planning time, thus giving the aircrews two-thirds to complete their planning and preparations.

Step 2: Issue a Warning Order. After analyzing the mission, the air troop commander lists those specified and implied tasks that the unit must do to accomplish the mission. When the air troop commander identifies the essential tasks, he issues a warning order. The essential tasks in the warning order should be used to restate the mission. A warning order is issued to forewarn subordinates of the mission and to allow aircrews the maximum time for planning. (Appendix D gives a sample of a warning order.)

Step 3: Develop a Tentative Plan. The air troop commander develops a tentative plan to accomplish the assigned mission. He formulates the plan based on METT-T.

Step 4: Start Necessary Movement. If the plan requires the movement of ground assets, the order to prepare for movement should be issued as soon as possible. Movement may require additional coordination with air defense, field artillery, and USAF assets. Also, incoming air troops need time to coordinate with the new ground commanders.

Step 5: Reconnoiter. Aerial and/or ground reconnaissance is ideal; however, time may only permit a map reconnaissance. The commander must make every effort, within time constraints, to use all possible sources of information.

Step 6: Complete the Plan. The air troop commander completes his plan based on all information and time available. Because of a particular situation, he may have to decide on a new plan quickly. Regardless of the available planning time, the commander must make a sound plan that will result in the accomplishment of the mission.

Step 7: Issue Orders. The air troop commander will issue most orders, in the form of FRAGOs, from his observation aircraft. When time permits, however, he will issue orders to his troop at the command post. Everyone in the troop must understand the mission and the commander's intent.

Step 8: Supervise. The air troop commander controls troop operations. The first sergeant closely monitors those actions that support troop operations. Together, these individuals ensure that the issuing commander's intent in the order is carried out.

COMMAND AND CONTROL FACILITIES

Command Post. The troop CP and/or flight operations center serves as a coordination center and communications contact point between the troop and the squadron. The equipment used includes the commander's or first sergeant's wheeled vehicle, wire communications to the squadron, and a current situation map. An alternative is to use the flight operations officer from the S3 section. The section is equipped with wire, a 40- by 40-inch map board, and radio equipment. The flight operations officer may serve as the flight operations center for the air troops. The air troops may then be positioned away from the trains area (rear assembly area) to keep from compromising the squadron's position because of the aircraft signature. The flight operations center may monitor the squadron operation, coordinate and monitor FARP assets, and perform flight-following. The flight operations officer may also relieve the troop commander of some tasks required during continuous operations. By allowing the flight operations officer to assist him, the troop commander remains as part of the tactical operation without extending his crew endurance during continuous operations.

Alternate Command Post. At times, the air troop commander will have to meet with his crew members for a mission change or update away from the troop CP. The air troop commander's observation helicopter may be an ideal alternate troop CP in the forward assembly area. However, an alternate troop CP can be any location that the commander designates.

Assembly Areas. An air troop will likely be employed to perform reconnaissance of the squadron field trains area or the troop assembly area before occupation. The following items must be considered when a site is being selected:

- Overall suitability of terrain.
- Site security and natural camouflage.
- Space for adequate dispersion of aircraft.
- Openings in the area to position aircraft and vehicles.
- Terrain that facilitates communications and water drainage.
- Access to ground routes to facilitate CSS operations for the squadron.
- Protection from indirect fires by reverse slope positioning and adequate distancing from enemy artillery.

The air troop may position aircraft in the troop trains area, the tactical assembly area, or the forward assembly area. The troop trains area is in the squadron field trains area, the TAA is away from the field trains within the brigade support area, and the FAA is near the area of operations.

Troop trains area.

The troop trains area for the air troop is as static as the squadron field trains area. The air troop trains area contains all troop assets. These assets include the troop rest and sleep areas, wheeled vehicles, operational CP, and aircraft not currently engaged in active missions. Activities in the troop trains area include organizational maintenance of aircraft and wheeled vehicles and coordination for CSS.

Air troops are incorporated into the base cluster defense plan of the squadron field trains area. The HHT commander or his designated representative incorporates the air troops into the defense plan. The air troops may have to dedicate some of their personnel to the defense plan. The number of personnel required and their assigned tasks are specified in the defense plan. The defense plan is oriented toward a rear threat invasion from heliborne, airborne, or mechanized forces and tactical aircraft. This is the most likely form of enemy attack because of the location of the squadron field trains area.

Small stay-behind units, guerrillas, and saboteurs are the principal ground threats and the primary concern during darkness. Because of this, the air troops may be tasked for personnel during the hours of darkness. Rest and sleep plans must be developed to enable the troop to perform continuous operations.

Tactical assembly area. This area is much the same as the squadron trains area except that only the air troops' assets are located within it. This area may be used if the squadron commander thinks the threat has the capability of identifying where his squadron field trains might be. Because of threat radar, the area where aircraft land and depart can be identified. Based on threat capabilities, the squadron commander determines if the air troops will be positioned with the squadron field trains or in the TAA. Since the TAA will have limited personnel for defense, the air troops will have to use a reactive defense plan. The concentration of the troop's defense efforts will have to move toward the main attack instead of a 360-degree static defense. The attack aircraft in the TAA should be positioned so that they may be used in the defense.

Forward assembly area.

The FAA for an air troop is small and is usually occupied for short periods. It is an area where troop elements can shut down before relieving another team or troop on station. This allows the air troop to remain close to the battle so that it can react rapidly to changing tactical situations. It also allows the troop to perform limited maintenance without returning to the squadron field trains or TAA.

The FAA is usually located near a FARP to hasten maintenance efforts conducted by crew chiefs or contact teams that are collocated within FARPs. The FAA may be collocated with the squadron or a brigade tactical CP. This facilitates the coordination and exchange of information between air and ground elements. However, it increases the signature of the CP and the probability of attack. Therefore, those selecting an FAA close to a CP must ensure that the aircraft signature will be minimized. Otherwise, FAAs should be located away from CPs. Aircrews occupying the FAA will monitor radio traffic to keep abreast of the tactical situation. They can then respond quickly if needed by the air troop commander.

Activities in the FAA are limited. Aircrews check their aircraft for possible battle damage and take care of personal needs.

The FAA is positioned to support the air troop based on METT-T. Primary consideration is given to the vulnerability of the FAA to enemy indirect fires.

The FAA may also be located in an urban area where aircraft can be hidden behind or in the shadows of large structures. The air troop commander considers air avenues of approach into the FAA. Visual and radar detection by the enemy must be prevented. Varying covered and concealed routes into the FAA will help to ensure that the enemy does not locate the FAA. Generally, the locations of the assembly area, CPs, and trains area are as depicted in Figure 2-1.

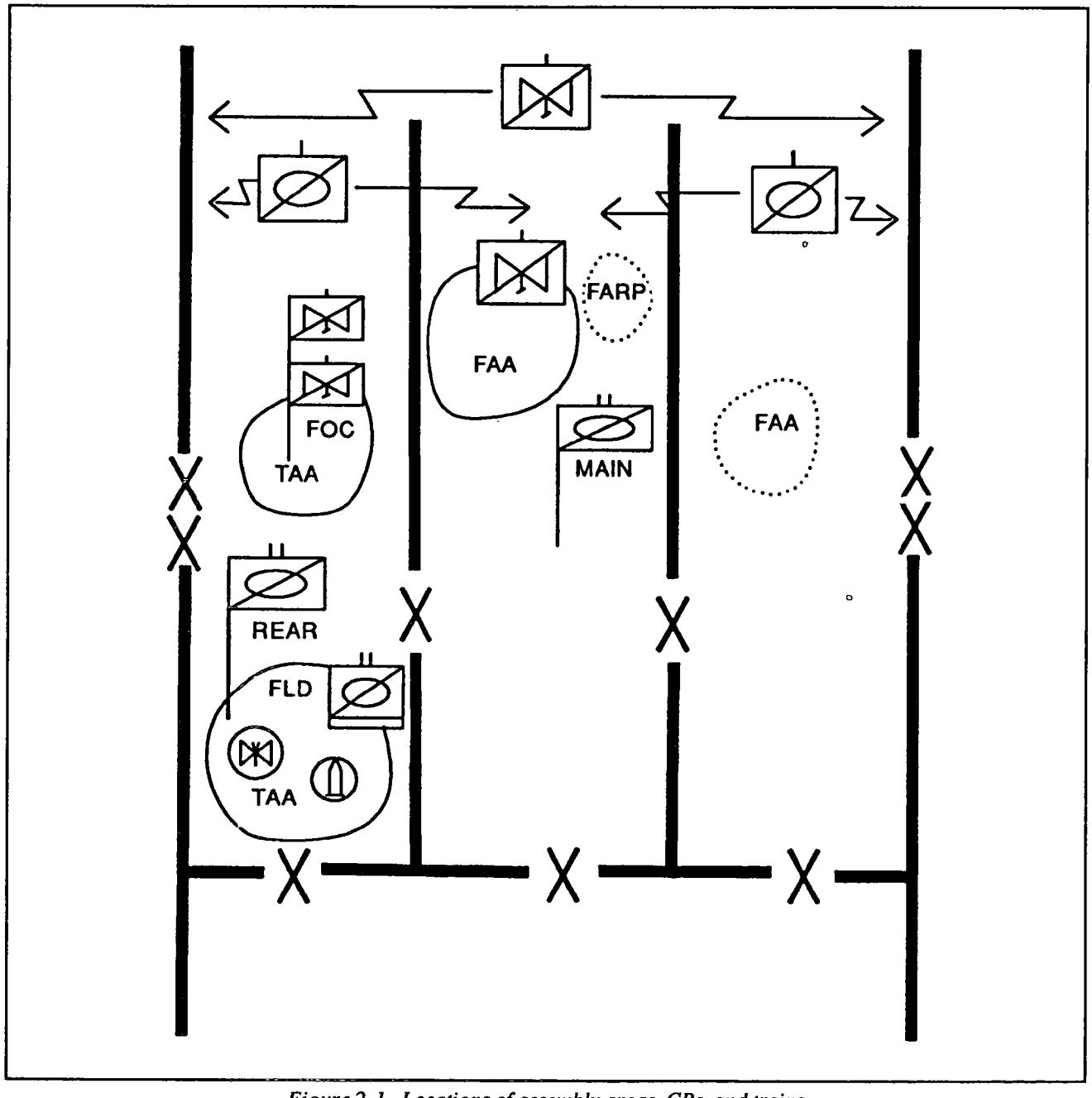


Figure 2-1. Locations of assembly areas, CPs, and trains

COMMUNICATIONS

Communications are essential to the accomplishment of the air troop's mission. The primary means of communication within the squadron and the air troops is FM(S). UHF and VHF radios in the aircraft help reduce the load on FM radios. The air troop commander normally communicates from his OH-58 aircraft. He may also communicate with an FM radio from the troop's wheeled vehicles or, if established, from the troop tactical operations center. Figure 2-2 shows a typical air troop communications net.

TROOP COMMANDER	FM 1	SQUADRON COMMAND
	FM 2	FSE
	VHF	TROOP AIRCRAFT
	UHF	USAF, FLIGHT-FOLLOWING, INTERNAL COMMUNICATIONS, OR RESERVE
FIRST SERGEANT	FM 1	SQUADRON COMMAND
	FM 2	SQUADRON A&L
	WIRE	SQUADRON REAR CP
SCOUT AND ATTACK AIRCREWS	FM 1	TROOP COMMAND
	FM 2	SQUADRON FSE
	UHF	INTERNAL TEAM OPERATIONS
	VHF	INTERNAL TEAM OPERATIONS

Figure 2-2. Typical air troop communications net

To ensure that squadron command directives are met and the air troop is supported by CS and CSS assets, the air troop first sergeant monitors both the squadron command net and the administrative and logistics net. Logistical and supply operations that demand squadron support are coordinated on the A&L net.

The air troop has neither the wire nor the field telephone assets to link its platoons with a troop net. When the troop is dispersed as in Figure 2-3 (page 2-8), lack of wire communications can lead to slow reaction times. To overcome this, a runner can be designated to alert the platoons. In Figure 2-4 (page 2-8), air troop personnel are closely assembled rather than dispersed. This method should only be used in the squadron field trains area or in a BSA because of the inherent risk of losing those personnel all at once in an unexpected attack.

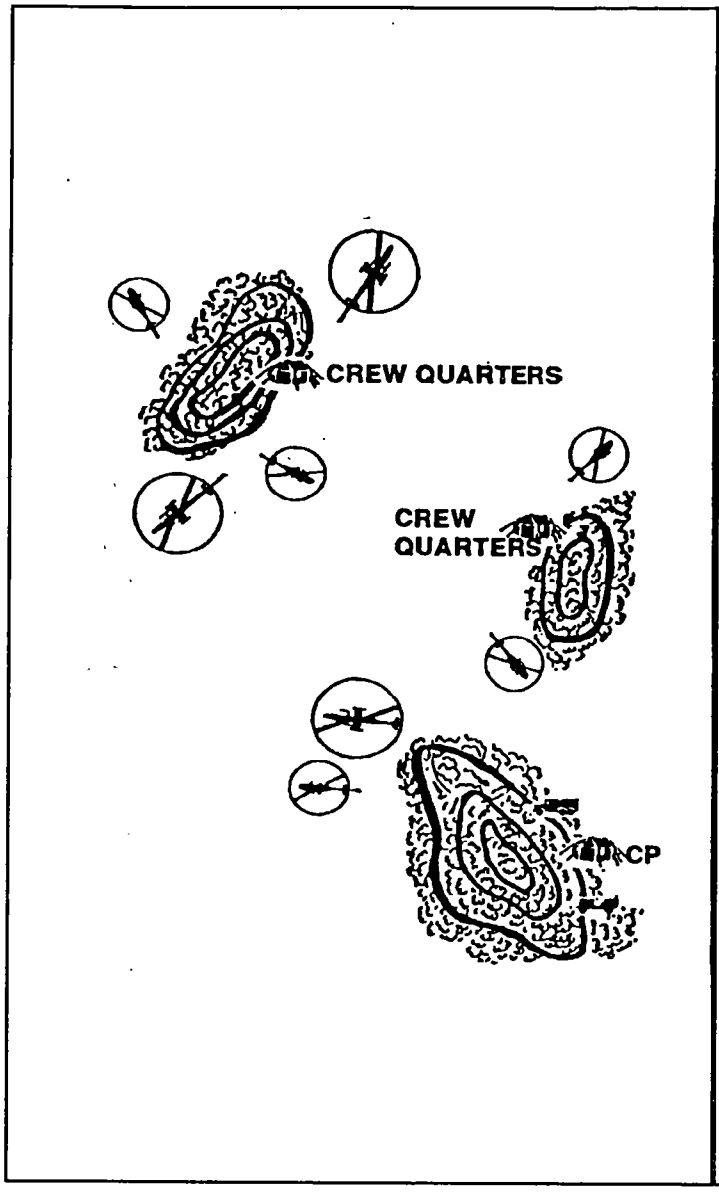


Figure 2-3. Air troop dispersed

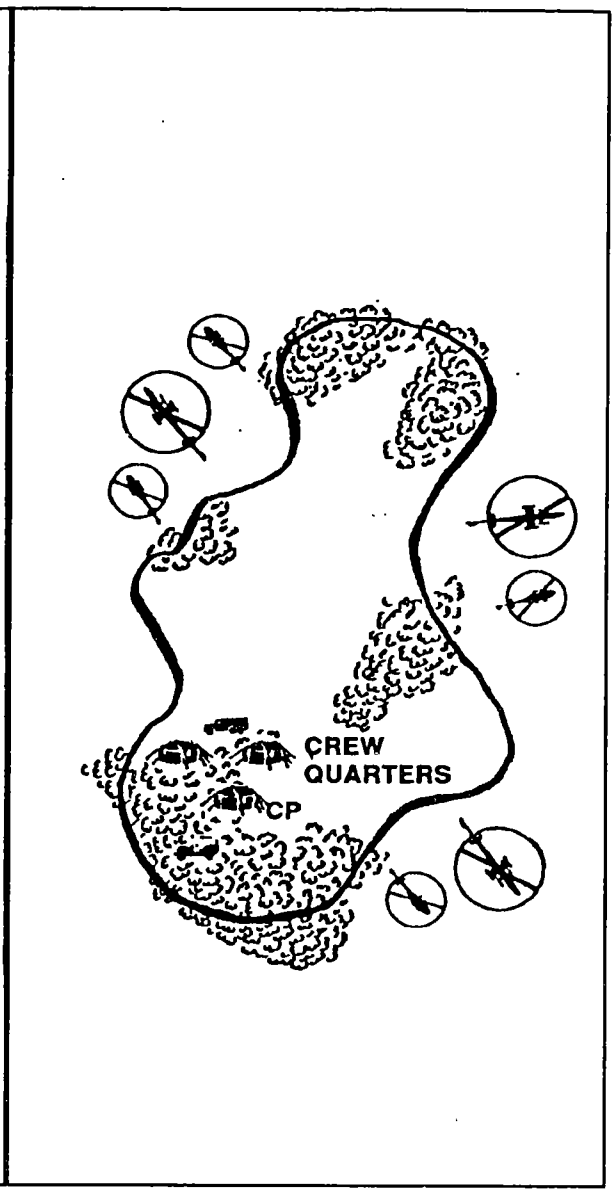


Figure 2-4. Air troop consolidated

Should a flight operations center be used as the troop TOC, the TAA may appear as depicted in Figure 2-5. In essence, the air troop commander would run wire to the troop TOC. The flight operations center would maintain 24-hour FM(S) contact with the squadron. It would also maintain contact either by wire or radio with the FARP and the AVUM troop to keep the troop commanders informed. If the squadron main CP is destroyed, the flight operations center can become the new squadron main CP.

OPERATIONS SECURITY

All measures taken to deny the enemy information about friendly forces and operations are called operations security. The OPSEC concept includes all security measures that allow units to achieve and maintain surprise. OPSEC consists of

physical security, information security, signal security, deception, and counter-surveillance. Since these categories are interrelated, the air troop commander normally chooses to employ multiple techniques to counter a threat. He analyzes hostile intelligence efforts and vulnerabilities, executes OPSEC countermeasures, and surveys the effectiveness of countermeasures. The air troop commander can then counter specific hostile intelligence efforts. Aviation operations security is described in more detail in FMs 1-100 and 1-111.

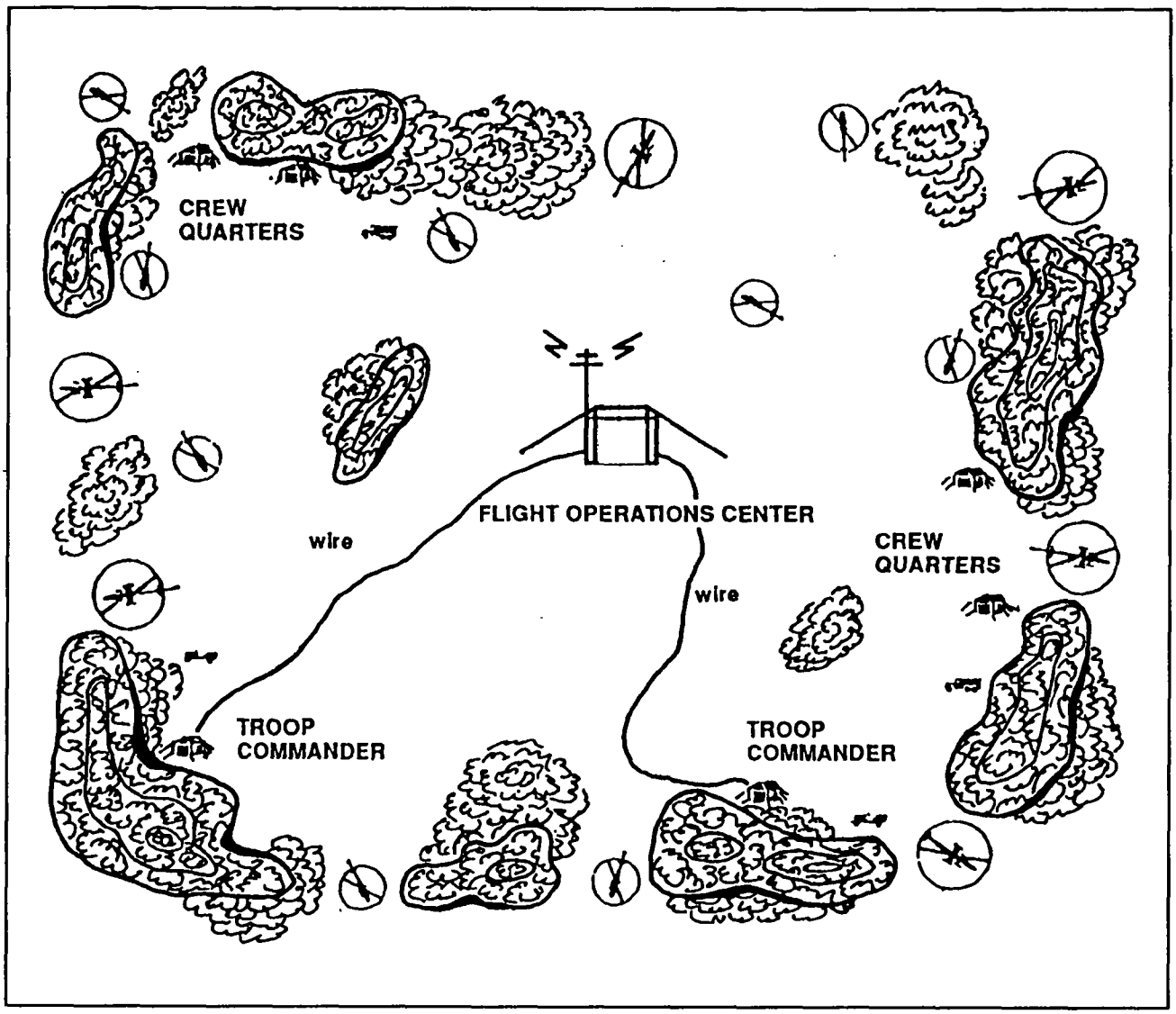


Figure 2-5. Air troops in a typical TAA

CHAPTER 3

EMPLOYMENT

This chapter implements portions of STANAGs 2112, 2253, 2904, and 2999 and QSTAG 277.

Air troops are normally employed to perform reconnaissance and security missions. However, they are capable of performing other operations such as assisting units in passage of lines, air combat operations, and raids. This chapter describes how an air cavalry/reconnaissance troop performs reconnaissance, security, special, offensive, defensive, and retrograde operations and other air troop missions.

Section I
TASK ORGANIZATION

EMPLOYMENT CONSIDERATIONS

The squadron commander directs the employment of his air troops. He may elect to assign all air troops the same mission in the same operational area. The air troops provide direct fires and control CAS assets to support the squadron's mission. The squadron advances to provide reconnaissance, conducts target handovers to maneuver forces, and provides security to the forces through screening operations. The attack aircraft can destroy or fix bypassed enemy forces and deny the enemy key terrain, when necessary. The attack aircraft of air troops primarily provide security to the observation aircraft. They act as a tool for the observation aircraft to use in developing situations.

The air troop commander may task-organize his aviation assets for employment after considering METT-T. His principal considerations are the—

- Intent of the squadron commander.
- Likelihood of enemy contact.
- Environmental factors.
- Assets available to accomplish the mission.
- Duration of the operation and the resulting requirement for relief on station.

SCOUT-WEAPONS TEAM COMPOSITION

When contact is expected, air troops are normally organized into scout-weapons teams. Each SWT consists of scout and attack aircraft. The mix is usually 1:1 (one scout and one attack), but if the commander so desires, the mix can be attack heavy or scout heavy based on METT-T. When the enemy situation is vague or unknown, this team of one scout and one attack aircraft allows the commander to field the largest number of teams. Depending on aircraft availability, the commander can field as many as four SWTs but normally fields only two or three.

To retain flexibility, the air troop commander normally operates independent of any particular SWT. The commander should not become so involved in an individual SWT that he loses sight of the troop's overall mission. Instead, he must focus on employing the troop as a unit.

When enemy contact is not expected, air troops may preserve their attack assets and deploy observation teams. The observation teams will consist only of observation aircraft.

As a rule, two SWTs are employed when enemy contact is possible or expected. This composition ensures mutual support and mission continuation should one element become engaged or ineffective. Figures 3-1 through 3-6 depict an air troop deploying. These illustrations are examples of typical air troop deployment; in actuality, the commander deploys the air troops after considering the factors on page 3-1.

> **NOTE:** In all instances where the troop commander has to return to refuel the aircraft or to meet face-to-face with someone, he appoints an air mission commander (normally a platoon leader) to command and control the troop in his absence.

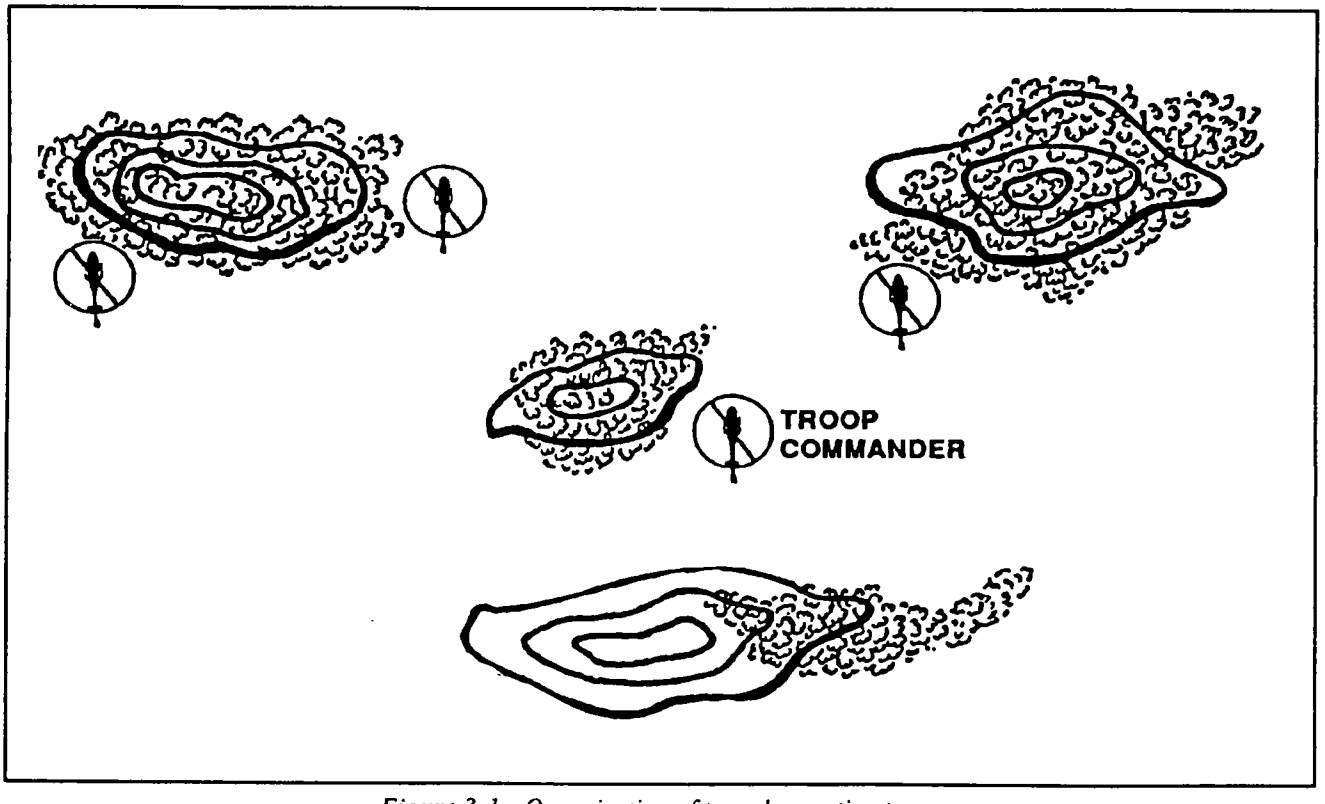


Figure 3-1. Organization of two observation teams

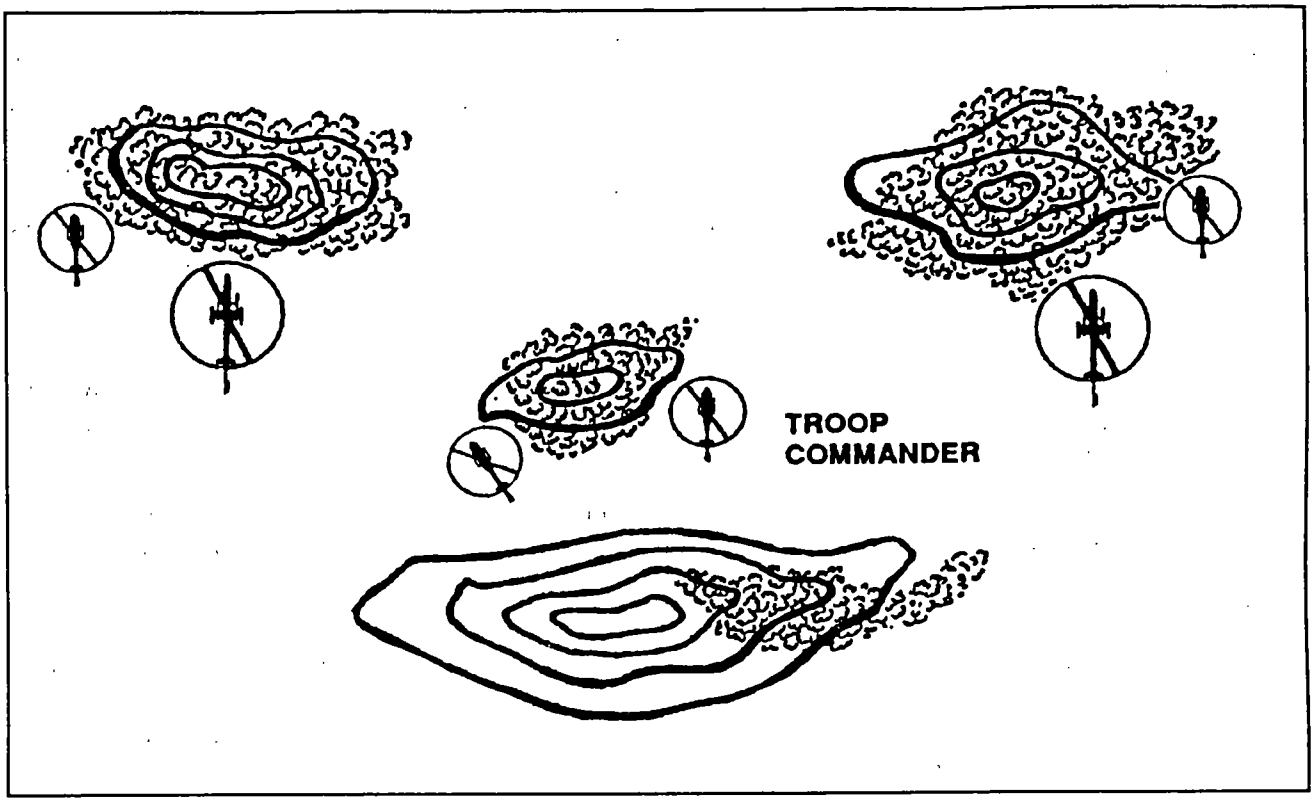


Figure 3-2. SWTs deployed when enemy contact is possible or expected

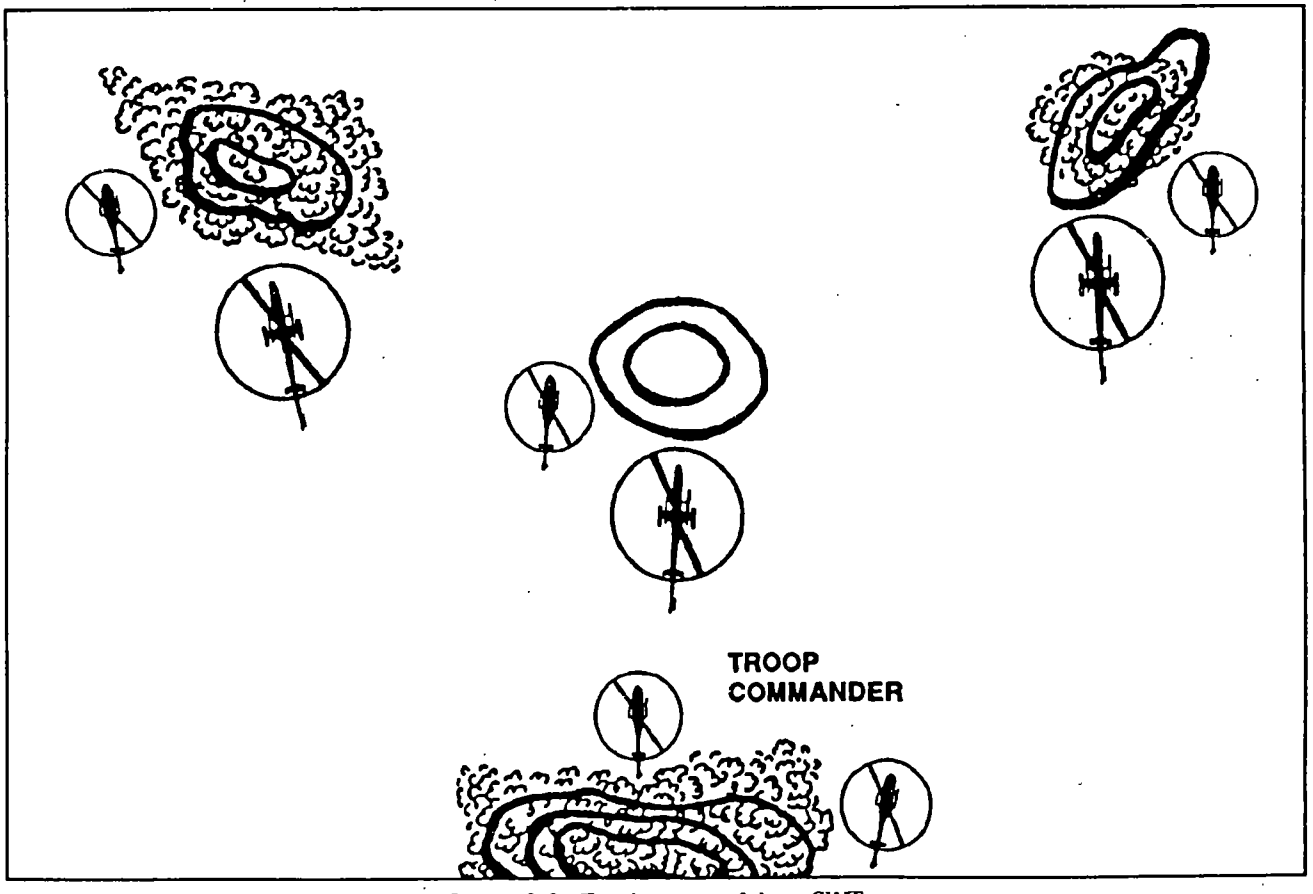


Figure 3-3. Employment of three SWTs

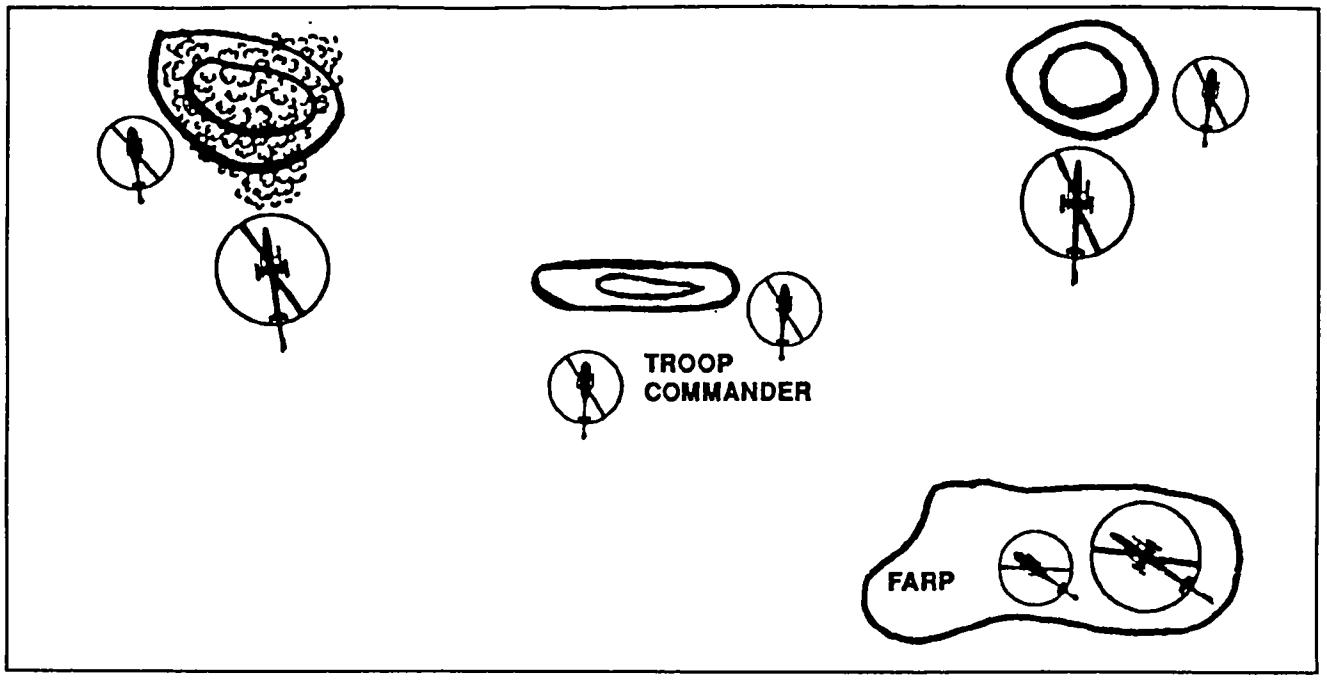


Figure 3-4. Two SWTs on station and one SWT in FARP for relief on station

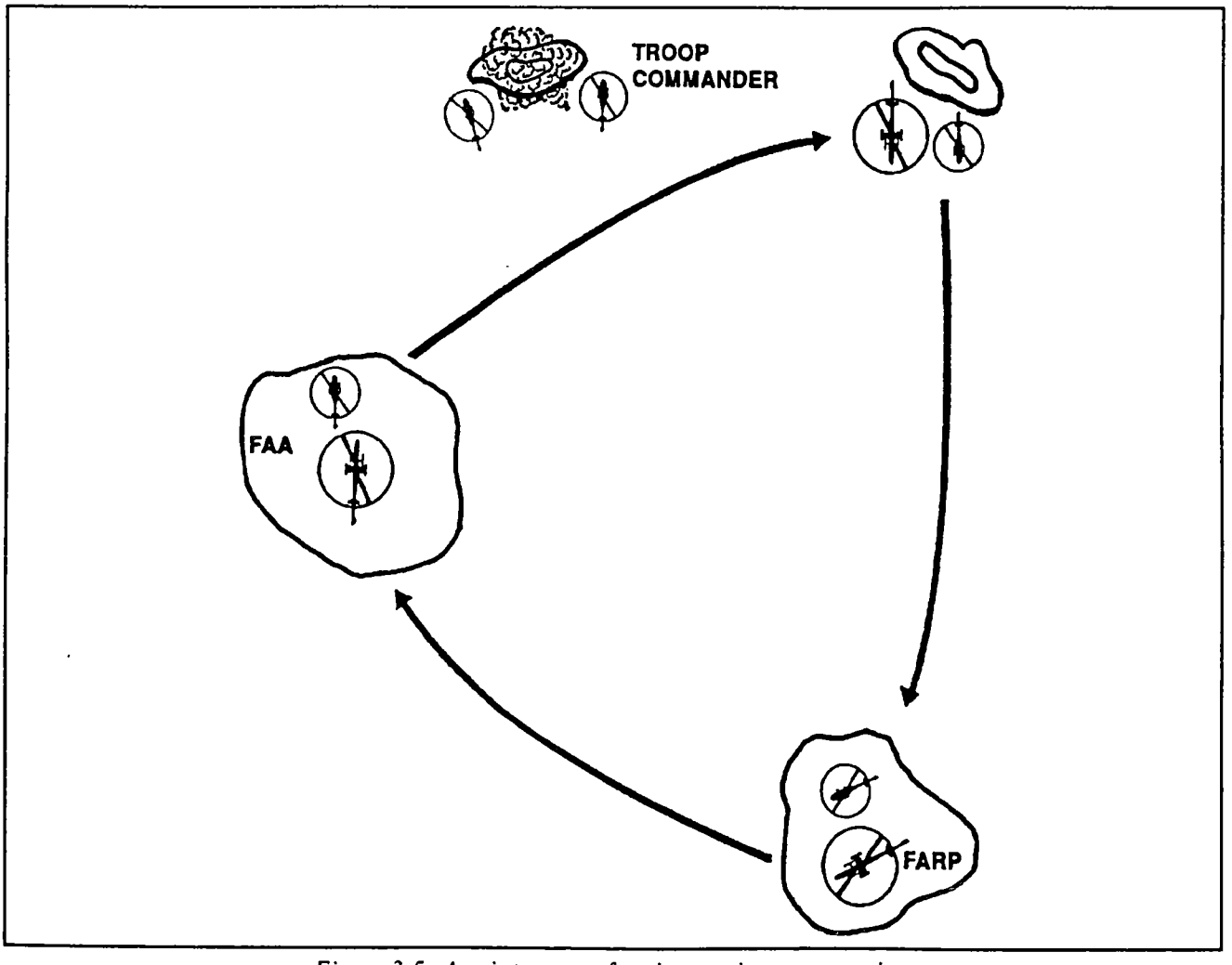


Figure 3-5. An air troop performing continuous operations

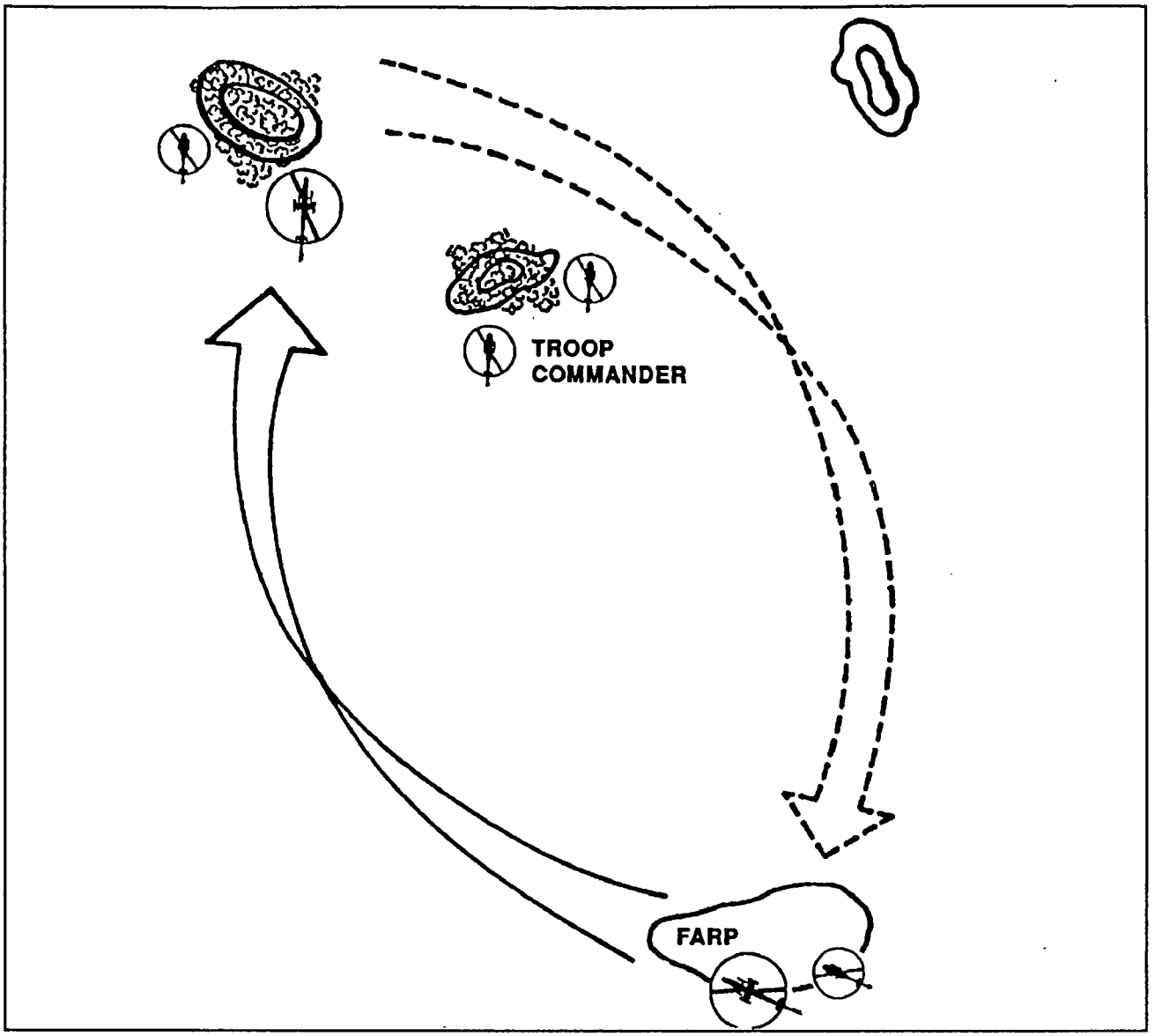


Figure 3-6. One SWT on station and one SWT in FARP for relief on station

Section II
RECONNAISSANCE OPERATIONS

MISSIONS

The primary mission of the air troops is to conduct reconnaissance. If reconnaissance is not stated in a mission order, it is always an implied mission. Air troops gather and report information on which the squadron commander bases his plans, decisions, and orders. The purpose of reconnaissance is to gain intelligence about two vital factors of METT-T: the enemy and the terrain. Reconnaissance missions are divided into three categories: route, zone, and area.

Air troops may be assigned a route, a zone, or an area reconnaissance mission. Ground and air cavalry may provide mutual reinforcement. For example, ground cavalry may reinforce air cavalry if the terrain offers concealment from aerial observation. The distance the air troops operate from the ground units is a function of METT-T.

A primary consideration is the ability of air troops to maintain communications with their ground counterpart. The flow of information between air troops and ground troops increases the efficiency of the reconnaissance and the survivability of each asset. When air troops operate with or without ground troops, they maintain communications with the squadron's TOC, the air troop's TOC, or the controlling maneuver commander's TOC.

The range of supporting fires also determines the distance at which air troops operate. Supporting fires include indirect fire and direct fire from attack helicopters, ground cavalry, and USAF TACAIR. These assets support the SWTs during reconnaissance and screening operations. Their availability is essential to the success of air troops.

The operations officer positions the FARP to support the mission of air troops. Refueling and rearming times and the requirement to maintain continuous operations dictate the location of the FARP. Close coordination with the squadron and possibly other aviation brigade elements in the area is required to ensure that the location of the FARP supports the reconnaissance mission.

FUNDAMENTALS

The cavalry conducts reconnaissance according to six fundamentals. These fundamentals are explained below.

Orient on the Location or Movement of the Reconnaissance Objective. The objective may be a terrain feature, a locality, or an enemy force. The air troop must orient on the objective and position itself to retain considerable freedom of maneuver.

Report All Information Rapidly and Accurately. Information that initially appears unimportant may become valuable when used with other information. Knowing that an enemy force is not in one location can be just as important as knowing it is in another. Reconnaissance reports must be relayed in a timely manner for the information to be useful to the squadron commander or the ground maneuver commander. Appendix D explains how to report information about the enemy.

Retain Freedom to Maneuver.

Cavalry must move to survive. It obtains information by stealth, when possible, but fights as necessary to accomplish the mission. Overwatch, suppressive fire, cunning, and constant awareness of the tactical situation to the flanks help retain freedom to maneuver.

The air troop commander maneuvers his elements to avoid decisive engagement. Once engaged, the air troop will lose some of its capability to continue the reconnaissance. Therefore, air troop engagements during reconnaissance operations consist only of those actions required to prevent decisive engagements and to continue the reconnaissance mission.

Gain and Maintain Enemy Contact. Contact reduces the enemy's ability to achieve surprise. Once contact is made, it is not voluntarily broken; orders must be

received to break contact. The air troop may be the first friendly element that establishes contact with the enemy. Once the air troop establishes contact, it reports the information to the squadron's TOC or to the supported ground unit's TOC. The air troop commander keeps the squadron commander continually updated on the tactical situation. The air troop may maintain visual contact from a great distance, or it may engage with organic attack helicopter fire. The degree of contact desired is determined before the mission begins.

Ensure Maximum Reconnaissance Forces Forward. The air troop is most valuable when it is providing essential battlefield information. To do this, it must be positioned as far forward as METT-T factors allow. It operates at a distance supported by CS and CSS assets. The air troop or squadron commander determines the mix and how the SWTs are to be rotated to ensure a constant presence on station.

Develop the Situation Rapidly.

When the enemy situation is vague or unknown, the air troop deploys to gather information for the supported commander. Immediately on gaining enemy contact, it deploys to cover, maintains observation, and reports and develops the situation. It develops the situation based on the tactical order, unit SOP, or the directions of the commander. The air troop—

- Reconnoiters gaps, flanks, weapon sites, and obstacles for follow-on friendly forces.
- Uses fires (direct, indirect, CAS) to force the enemy to react, thereby disclosing its size, type of unit, location, equipment, and intentions.
- Maneuvers friendly elements to force the enemy to react, thereby disclosing its size, type of unit, location, equipment, and intentions.

The air troop continues to observe the enemy and prepares for a chosen course of action. The troop may conduct a hasty attack, bypass the enemy force, or observe the enemy until it is relieved by another unit or until the mission is accomplished.

If contact results in an exchange of fire, overwatch elements provide a heavy volume of direct suppressive fire. If indirect fire is necessary, it is requested when available. The bounding element seeks cover. It reports the situation, to include ground obstacles encountered, to the squadron commander and develops the situation by maneuver. The air troop continues to report the situation as it is developed. This ensures that the supported commander has the essential information to develop his course of action.

TECHNIQUES

An air troop uses four basic techniques to conduct a reconnaissance mission. These techniques are observation, movement, overwatch, and reporting.

Observation. Observation is continuous and is performed by all aircrews. Aircrews constantly apply the three basic visual search techniques: stationary, motive, and side-scan. These techniques are described in Appendix G. Aerial observation is used to detect, identify, locate, and report matters of military significance. The aircrews use terrain flight techniques and safe airspeeds to observe larger areas that cannot be observed from the ground. They should seek to find and observe the enemy without being seen.

Movement. Aircrew movement is governed by the likelihood of enemy contact and available terrain. Aircrews use the terrain flight modes: low-level, contour, and nap-of-the-earth. However, the troop moves by using three movement techniques: traveling, traveling overwatch, and bounding overwatch. Figure 3-7 shows these movement techniques.

> **NOTE:** When moving as part of an SWT, the attack helicopter should not follow the same route as the observation helicopter. The attack helicopter, if possible, moves along a different route while providing overwatch protection to the scout. The threat knows that when it sees an observation helicopter there is also an attack helicopter somewhere. The threat may allow the observation helicopter to bypass in order to kill the attack helicopter that is following. In instances where the unit is equipped with OH-58Ds, these aircraft may become the high-value target.

Traveling. This technique requires that the elements move at a constant speed in relatively secure areas. An example would be movement in the rear areas. Enemy contact is not likely.

Traveling overwatch. This technique requires that the lead elements move at a constant rate while trailing elements move to provide overwatch. The lead element moves constantly, and the trail element moves as necessary to maintain an overwatch position. Enemy contact is possible.

Bounding overwatch. This technique requires overwatching elements to occupy positions that offer observation and fields of fire. The bounding element selects the next overwatch position and moves to it using available concealment. Then the overwatch element moves forward to overwatch the bounding element as it moves forward again. The length of each bound depends on the terrain and visibility and the effective range of the overwatching attack helicopters. Both scout and attack helicopters use NOE movement techniques. Enemy contact is expected.

Overwatch. Overwatch includes both observation and suppression. The overwatching element, in its stationary concealed position, continues to observe the area as well as the moving or bounding element. In reality, the attack helicopters with their superior optics can see the area better than observation helicopters that are bounding. Primarily, the overwatching element enhances the survivability of the bounding element. The overwatching element alerts or warns the bounding element of an enemy sighting or a suspicious terrain feature. If the enemy is contacted, the overwatching element assists the bounding element's deployment to cover by providing suppressive fire if needed. If enemy contact is accomplished by stealth, suppressive fire is unnecessary and would only alert the enemy. Actions on contact, as per the aircrew training manual, should be completed. They include deploying to cover, maintaining contact, and reporting information about the enemy's strength, composition, and disposition in a timely manner.

Reporting.

Reports of direct visual observation are the most important and timely intelligence the commander can have. Therefore, reports must be accurate, concise, and timely. Reports of no enemy sightings are just as important as actual enemy sightings. Standard reporting procedures save time, ensure completeness, and reduce confusion. Since radio is usually the primary communication means, leaders must stress proper radio discipline. Appendix D contains an example of report format.

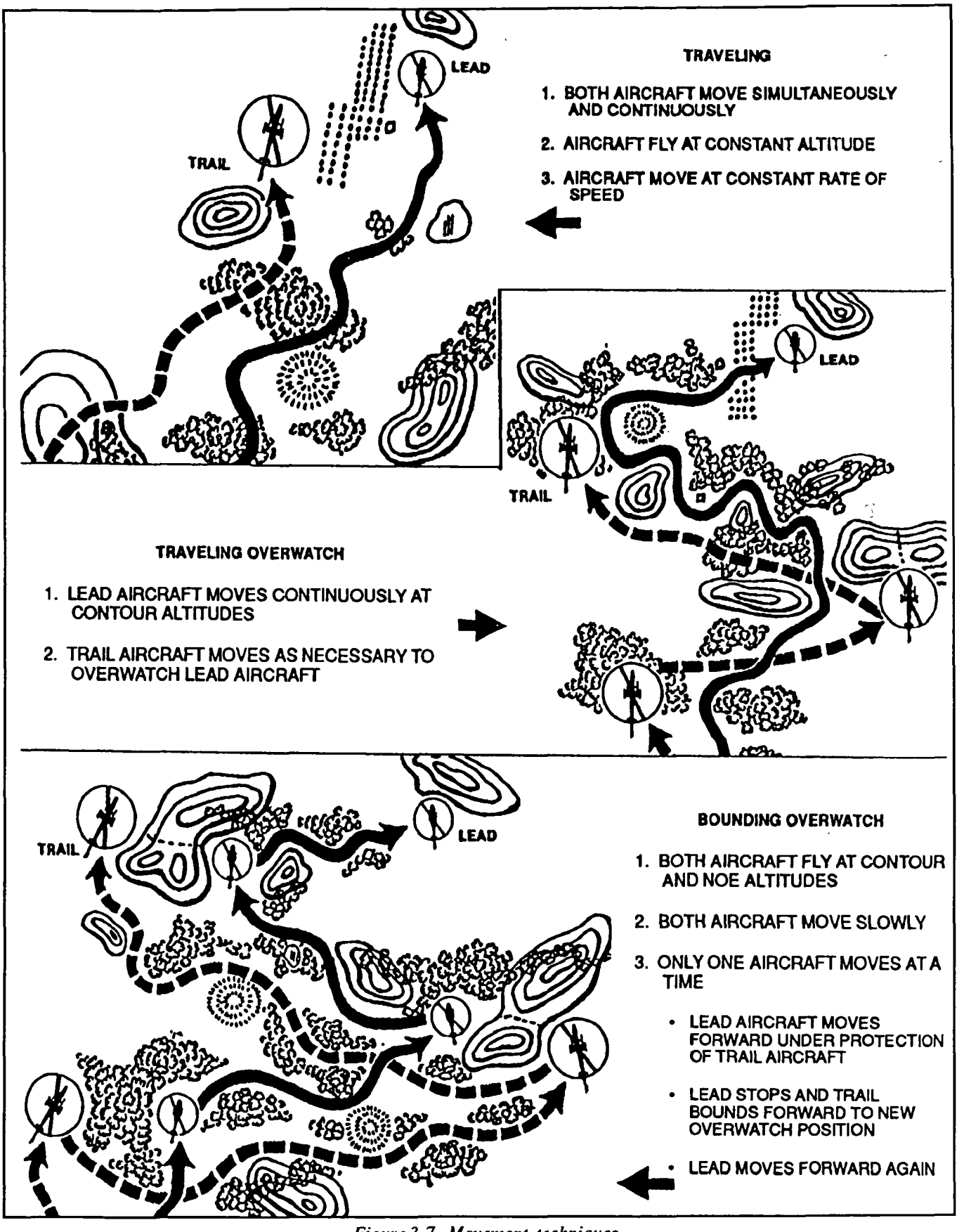


Figure 3-7. Movement techniques

The air troop commander and the aircrews must know the frequencies and call signs of the SWTs involved in the mission. They must also know the frequencies and call signs of available fire support. Planned targets along the route or throughout the area or zone facilitate the responsiveness of fire support assets. Targets are normally planned on easily identifiable terrain features from which rapid shifts can be made onto targets of opportunity.

ROUTE RECONNAISSANCE

Purpose. A route reconnaissance is conducted to obtain detailed information about a specific route and all adjacent terrain where the enemy could influence movement along the route. An air troop may be assigned a route reconnaissance as a primary mission. However, information about the route can be gathered during a zone reconnaissance. The mission may be better accomplished by employing air troops with ground cavalry troops. The ground cavalry troops can perform a detailed route reconnaissance, while the air troops can reconnoiter difficult terrain and provide security for the ground troops. Air troop elements can then provide security to the front and flanks of ground cavalry troops. This allows ground cavalry troops to perform a faster and more efficient detailed route reconnaissance. A route reconnaissance may be oriented on a road, an axis, an air route, or a general direction of advance. A route reconnaissance mission may also be conducted to—

- Support movement of supply or other units.
- Develop the enemy situation ahead of a friendly force.
- Obtain information about an enemy force moving along a specific route.
- Locate sites for constructing hasty obstacles to impede enemy movement.

Figure 3-8 depicts an air troop with a ground cavalry troop performing a route reconnaissance. Enemy contact is possible.

When time is not critical, aeroscout observers can be dismounted to—

- Obtain more detail on specific points of interest such as bridges, fords, or other terrain features.
- Observe terrain that, if reconnoitered by an SWT, would compromise the team's location, strength, and intentions.

They can also be dismounted in preplanned observation posts during the day or at night to give the squadron more capability to observe continuously at greater ranges. OPs should be planned and coordinated through the squadron headquarters.

All actions taken during a route reconnaissance ensure that specific critical tasks are accomplished. These critical tasks constitute the minimum essential information a commander must have. A route reconnaissance will include but is not limited to—

- Determining the trafficability of the route.
- Reconnoitering defiles for possible enemy forces and identifying bypasses.
- Identifying and determining the trafficability of lateral routes or approaches.

- Inspecting and classifying bridges and identifying fording or crossing sites near each bridge.
- Identifying existing and reinforcing obstacles and possible bypasses.
- Reconnoitering dominant terrain features and the perimeter of built-up areas on either side of the route. The distance will be based on METT-T.

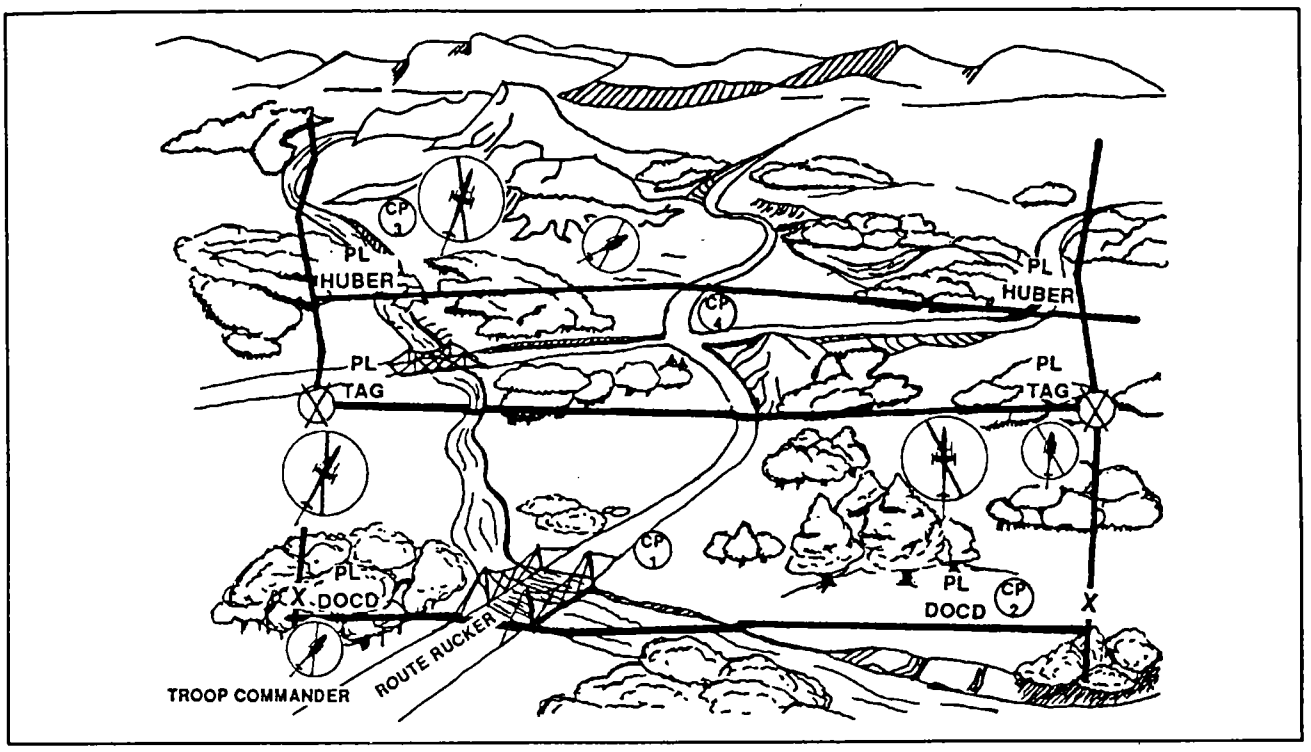


Figure 3-8. Route reconnaissance

To perform a route reconnaissance, air troops must know certain information about the route. This information includes—

- Designation of the route; for example, Highway 85 or Route Blue.
- Start point and release point of the route.
- Time of day the route will be used.
- Weather forecast for the time of movement.
- Type and number of units or vehicles to use the route.
- Departure time or completion time or both.
- Fire support available.
- Applicable control measures.
- Intelligence report on enemy forces close to the area.
- Any other specific information desired by the commander requesting the reconnaissance.
- When, where, and how to report the information.
- Critical points along the route.
- Actions after completion of the mission.

Planning and Execution.

Mission planning. The way the mission is flown will probably be determined by the enemy. If enemy contact is not likely, one SWT may be sufficient to conduct the reconnaissance. If enemy contact is possible or expected, a minimum of two SWTs may be employed along the route or the mix changed to one scout to two attack helicopters (1:2 mix). If time is critical, additional SWTs may be used to speed up the reconnaissance. The composition of SWTs is always the commander's choice based on METT-T.

The pilot and the aeroscout observer should conduct a detailed map study when performing premission planning. This will help them in determining the—

- Width.
- Surface type.
- Grades and curves.
- Surface condition.
- Drive-off capability.
- Possible ambush positions.
- Locations of choke points.
- Long-range OPs for the aeroscouts.
- Long-range fields of fire on the route.
- Locations of bridges, tunnels, and underpasses.

After studying this information, the pilot and the AO select a tentative route between the various points. They plan to use covered and concealed routes if available. The aircrew members complete their premission planning to include the fire support, checkpoints, and type of movement. They then brief the rest of the team on the plan to complete the mission. If time is available, the pilot and the AO should make a hasty drawing of the route or obtain a map to record important mission information. This information may then be submitted to squadron operations or the supported unit commander.

Mission execution. After the briefing, the SWT flies the mission and confirms the information determined from the map and intelligence reports. Additionally, the SWT performs all critical reconnaissance tasks included in the route reconnaissance checklist.

The air troop commander task-organizes his assets after evaluating the mission and the enemy. The route should be the boundary between the SWTs if more than one team is employed simultaneously. Each SWT reconnoiters the terrain from its side of the boundary to the point from which the enemy could employ direct fire on the route. This distance will vary, depending on the terrain and vegetation.

If masking terrain, thick wood, or underbrush prevent observation of more than a few meters, the SWTs should reconnoiter each side of the route to a minimum depth of 3,000 meters. They should also reconnoiter interconnecting roads a distance of 3,000 to 5,000 meters or to the team boundary, whichever is less.

The SWTs should not fly down a straight route or cross it until they have reconnoitered a distance of at least 3,000 to 5,000 meters on either side. This is particularly important in close terrain, because the enemy will often use the road as a fire lane for dedicated AD weapons. Flying through a straight cut in a heavily forested area is also hazardous.

After the SWTs reconnoiter both sides of the route, one SWT remains near the forward limits to maintain surveillance while the other SWT backtracks for a more detailed reconnaissance of the route. The SWT backtracks by using terrain flight techniques and caution in case it comes upon an enemy target that was missed earlier during the reconnaissance.

If the route is long, the SWTs may have to refuel. This is accomplished by one SWT relieving another. However, before this can take place, the team leader of the SWT on station debriefs the new team leader. This way the new team taking over is kept informed on the current situation.

The initial order should specify what the air elements are to do. If the mission is to check for mine locations, bridge strength, ford depth, and so on, a ground element may have to be in support; for example, a ground cavalry troop or an engineer company. Reconnaissance elements must use caution when they approach enemy obstacles, because the enemy may have forces there. They must report their findings to the squadron TOC immediately.

Records.

Several methods are acceptable for recording reconnaissance information about a route. Whatever method is used, it should be relatively simple and contain all pertinent information about a route. An acceptable method is to number all important features along the route as they are drawn on the map. Pertinent information corresponding to the same terrain features on the map can then be written on a self-made work sheet. A good work sheet will be invaluable during a route reconnaissance. A suggested format for a work sheet, depicted in Figure 3-9 on page 3-14, is divided into two sections—one for bridges and one for roads.

The work sheet gives a legible account of the route and does not clutter the map, which may have to be used again for another mission. Each individual can work out a simple, abbreviated shorthand.

Checklist. The use of a checklist is recommended to ensure that critical terrain data are not overlooked and to aid in the preparation of reconnaissance reports. The checklist is based on the characteristics of the area of operations and includes general information about the route. More complete information on route reconnaissance and classification can be found in Chapter 2 of FM 5-36. Items on the checklist should include the—

- Identification and location of the reconnoitered route.
- Distances between easily recognized points both on the ground and on the map.
- Percent of slope and length of grades that are 7 percent or greater.
- Sharp curves that have a radius of curvature of 25 meters (82.5 feet) and less (per STANAG 2253).
- Bridge military load classifications and limiting dimensions to include suitable bypasses.

- Locations and limiting data of fords and ferries.
- Route constrictions, such as underpasses, which are below minimum standards and, if appropriate, the distances to which such restrictions extend.
- Locations and limiting dimensions of tunnels and suitable bypasses.
- Suitable areas that offer drive-off facilities, adequate dispersion space, and cover and concealment during short halts and bivouacs.
- Areas of rock falls and slides that may present a traffic hazard.
- Enemy or friendly obstacles that may impede movement.

BRIDGE NUMBER	CONSTRUCTION	LENGTH	WIDTH	BYPASS	OTHER

ROAD SECTION NUMBER	CONSTRUCTION SURFACE	WIDTH	DRAINAGE	DRIVE-OFF CAPABILITY	GRADE	OTHER

Figure 3-9. Suggested format for a work sheet

AIR ROUTE RECONNAISSANCE

The principles of an air route reconnaissance are the same as for a route reconnaissance except that the areas of interest are different. Aviation forces moving along an air route are primarily concerned with the location of enemy forces, ease of navigation, suitability of landing sites and zones, and hazards to flight. Hazards to flight include enemy air defense areas, mountainous areas, wires, and other natural and man-made features.

ZONE RECONNAISSANCE

A zone reconnaissance is a directed effort to obtain detailed information concerning all routes, obstacles (to include chemical or radiological contamination), terrain, and enemy forces within a zone defined by boundaries. It is normally assigned when the enemy situation is vague or when information concerning cross-country trafficability is desired. Figure 3-10 depicts an air troop performing a zone reconnaissance.

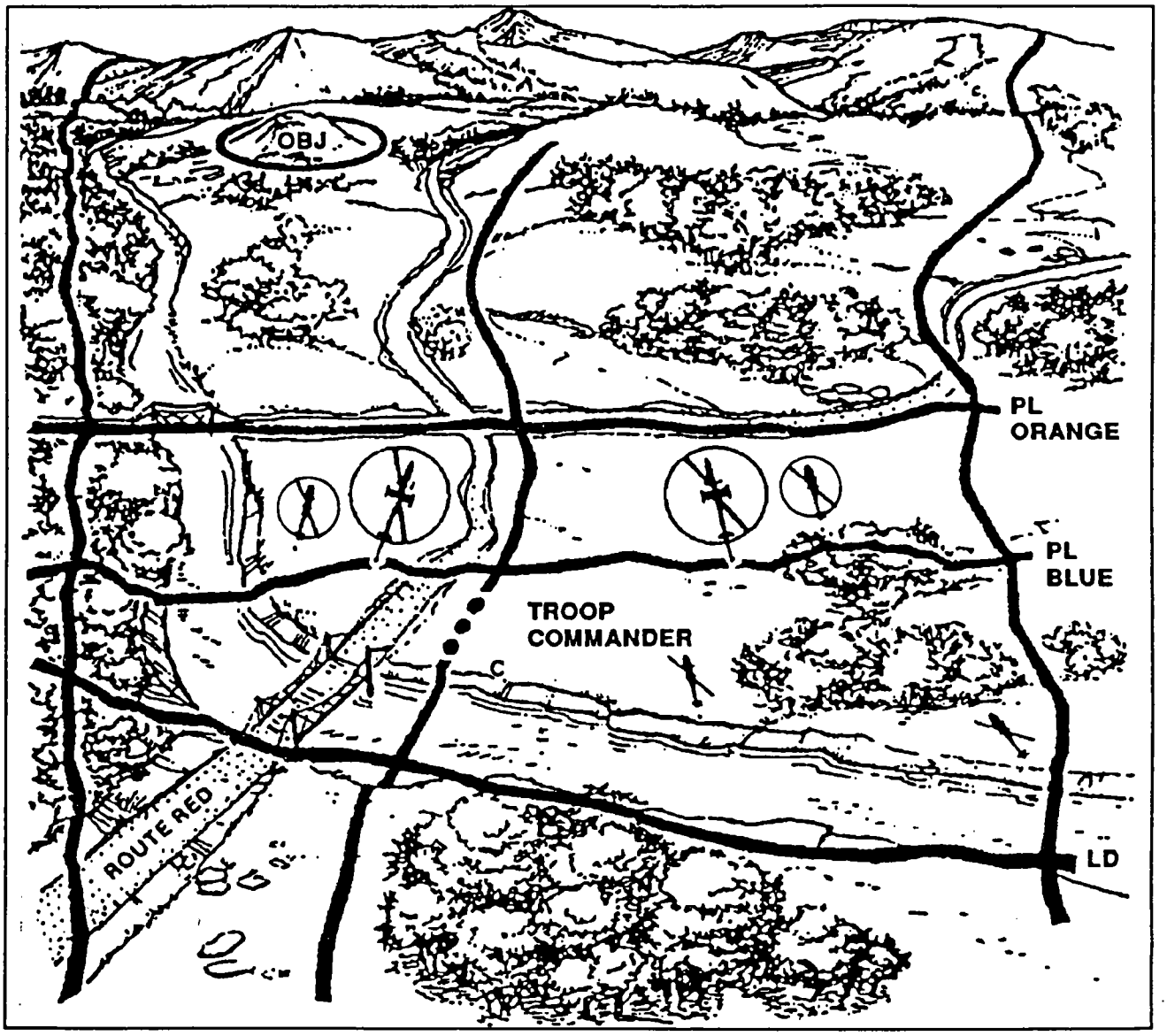


Figure 3-10. Zone reconnaissance

The zone to be reconnoitered is defined by lateral boundaries, an LD, and an objective or a phase line. The objective or established phase line is the termination point for the mission. It may or may not be occupied by the enemy. The air troop conducts a zone reconnaissance on a broad front about the same as a movement to contact. It performs the zone reconnaissance with or without the support from ground cavalry units. However, depending on time and the commander's intent, the air troop should perform a zone reconnaissance in concert with a ground cavalry troop. The ground cavalry troop can see more detailed information than the air troop. Ideally when working with a ground cavalry troop, the air troop provides a forward screen in front of the ground troop and reconnoiters difficult terrain as it performs a detailed zone reconnaissance. If time is critical, the air troop may perform the zone reconnaissance alone.

Critical tasks associated with the zone reconnaissance are more extensive than those associated with any other type of reconnaissance. Therefore, a zone reconnaissance will be the most time- and resource-consuming reconnaissance operation that the air troop conducts. Critical tasks include—

- Accomplishing all route reconnaissance tasks.
- Finding all enemy units in the zone and determining their composition, disposition, and activity.
- Locating suitable routes that bypass enemy positions for follow-on forces.
- Finding suitable covered and concealed approaches into the flanks of enemy positions.
- Reconnoitering and determining cross-country movement through open areas within the zone.
- Identifying enemy obstacles.

When an air troop commander uses SWTs under his direct control, he assigns team responsibilities. Starting with the LD, the teams reconnoiter each zone in a systematic manner. The SWTs will conduct the reconnaissance based on the terrain and the width of the zone.

Zones are divided vertically or horizontally or both. Dividing the zone vertically is appropriate when more than one SWT is deployed abreast and the zone is relatively narrow. It is also appropriate when a route in close terrain must be reconnoitered. The zone may be divided horizontally into subzones using phase lines. This helps to ensure that an enemy force is not inadvertently bypassed. Figure 3-10 depicts vertical and horizontal zone boundaries.

After receiving the mission assignment, the team leader or individual aeroscout pilot and AO should conduct a detailed map reconnaissance to become familiar with the assigned zone. During the map reconnaissance, the team leader or individual aeroscout pilot tentatively decides what features dominate the area or are likely to conceal enemy units. The zone reconnaissance is a detailed reconnaissance. It includes checking all—

- Fording sites.
- Trails for recent use.
- Hilltops and dominating man-made features for OPs.
- Densely wooded areas for stay-behind or ambush units.
- Bridges for condition, location, demolition, and classification.

Before departing on the mission, the SWT selects significant checkpoints for examination. The aeroscout selects a tentative route between the checkpoints, using terrain and vegetation to conceal aircraft movement. The air troop commander or the aeroscout team leader—

- Designates checkpoints to aid in moving attack helicopters and in controlling SWT movement. The air troop commander may also assign intermediate phase lines to help control team movement.

- Analyzes the known enemy situation. The air troop commander or the aeroscout team leader then selects the mode of terrain flight and the type of movement technique.

- Confirms radio frequencies and call signs with all team members. Additionally, the air troop commander should ensure that each team member understands the mission and how it is to be accomplished.

The air troop commander and aircrews must know the frequencies and call signs of the SWTs working on either side and the fire support element. Each aircrew member must be prepared to call for fire support. Quick response from the fire support element requires that several targets be prearranged throughout the zone. Normally, these are registered on easily identifiable terrain features from which rapid shifts can be made onto targets of opportunity. Known or suspected enemy positions are coordinated with artillery in advance. The availability of TACAIR support should also be predetermined.

Each SWT flies the planned terrain flight mode to the LD. It crosses at the designated time and at the correct air passage point. The SWT flies the mission on the predetermined route unless a situation requires that another route be taken. Such a situation may be the presence of the enemy or the lack of cover and concealment.

Each SWT reports the evidence or absence of enemy forces. The reports must be specific about route conditions. The SWTs report checkpoint times as well as any information requested.

The speed and accuracy of the report are equally important. The language of a report should be specific; for example, "three T-80 tanks," not "one tank platoon." Normally, SWTs report this information immediately by radio. If time and the situation permit, they can use more secure nonelectronic or visual signal devices or face-to-face debriefings.

If an SWT needs to refuel or rearm, it should go through relief on station. If enemy contact is made, the SWT should use standard actions. These actions are given on page 3-7.

Depending on the unit SOP, the situation, and the ability to communicate with squadron operations, the SWT may report enemy contact before engagement. The decision to engage depends on the situation and is influenced by the unit SOP and the mission. In some situations, the SWT may have to bypass the target. Normally, the order to bypass comes from squadron or higher headquarters. The SWT maintains contact until attack helicopter units or ground units arrive and the handover is coordinated. If the visual sighting or contact is a good target, artillery or CAS can be employed while friendly attack or ground elements are en route.

After returning from the mission, the aircrew members are debriefed. The squadron consolidates all information.

AREA RECONNAISSANCE

An area reconnaissance is conducted to obtain detailed information about a specific area. It is conducted when the commander desires information about a town, ridgeline, wooded area, or other specific feature that may be critical to the operation. The specific area to be reconnoitered is designated by a boundary line that completely encloses the area. Figure 3-11 depicts an SWT performing an area reconnaissance.

An area reconnaissance is conducted in the same manner as a zone reconnaissance except in the manner of movement to and from the area. The town, road junction, or other area, as well as the controlling terrain, must be thoroughly reconnoitered.

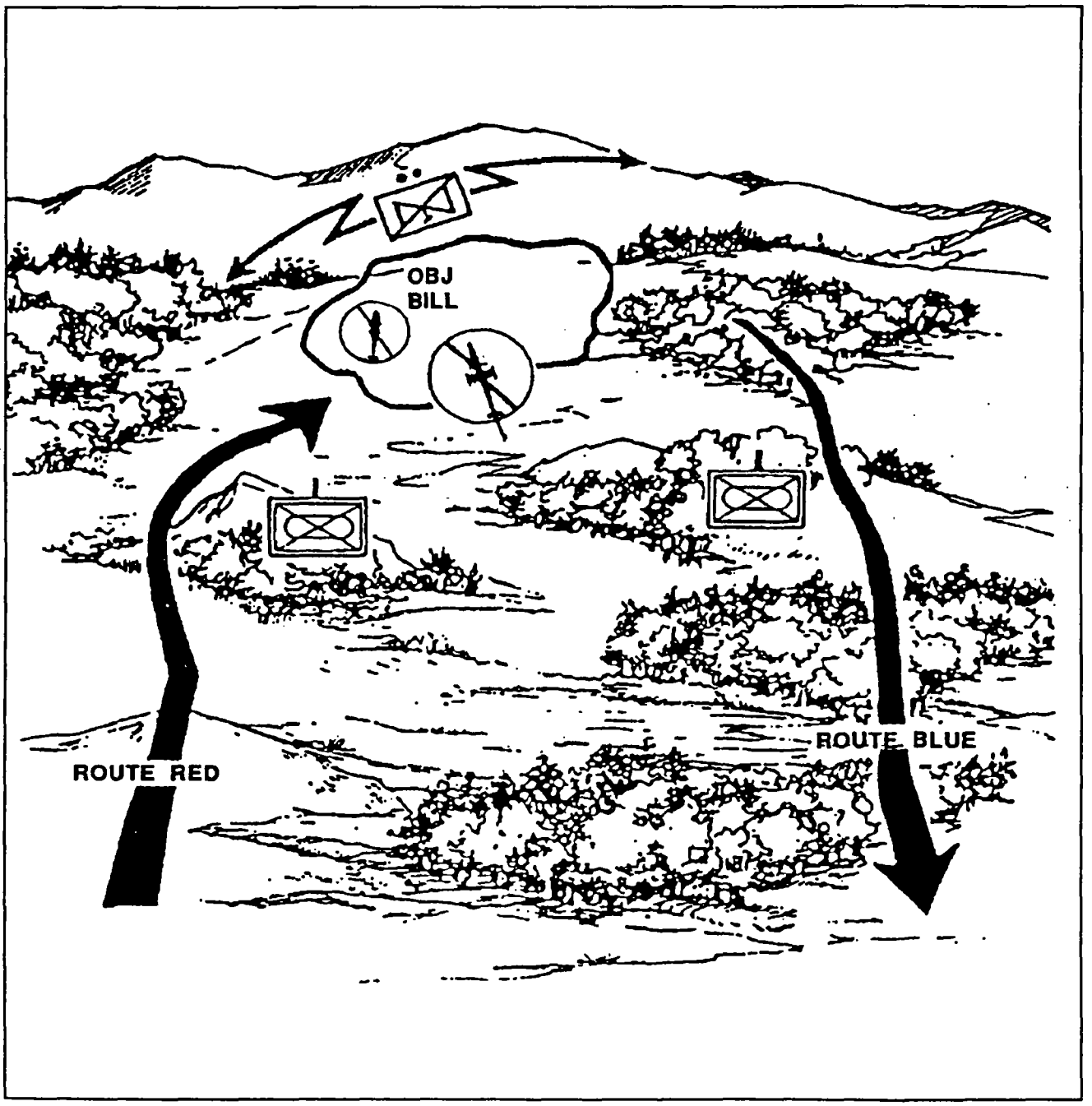


Figure 3-11. Area reconnaissance

When the situation is vague or unknown, the air troop may perform an area reconnaissance forward of friendly lines. It may also perform an area reconnaissance when an open or a lightly defended friendly flank exists, when terrain is difficult, when time is limited, or when speed is essential.

An air troop commander who is assigned an area reconnaissance mission studies the METT-T. Emphasis is normally placed on reaching the area quickly. Enemy situations encountered en route are developed only enough to ensure that reconnoitering elements can bypass and continue to the reconnaissance objective.

Flight corridors to and from the area are selected after the enemy situation and terrain are analyzed. Corridors are selected to reach the area quickly, to use available cover and concealment, and to avoid known or suspected enemy locations. Different corridors are used for return flights to make it more difficult for the enemy to ambush returning aircraft.

Flight to the area is accomplished using terrain flight and movement techniques. Enemy forces encountered en route are reported and, if possible, bypassed. Area reconnaissance missions must be completed rapidly, and passage in and out of friendly lines must be carefully coordinated.

A common area reconnaissance mission is one that reconnoiters landing zones, pickup zones, and objectives. Typical area reconnaissance objectives include—

- Key terrain.
- Choke points.
- Assembly areas.
- FARP locations.
- Field trains sites.
- Specific areas of NBC activity. (Appendix C discusses NBC operations.)
- Danger areas such as bridges, tunnels, and fords.
- Enemy obstacles and activity.

Because of the tactical situation or the need for security, time may be a factor. Therefore, crews must be able to collect the desired information rapidly while flying over the area only once or twice. Procedures are the same for selecting sites and zones to be used as pickup zones, landing zones, and tactical heliports or airfields. Tactical, technical, and meteorological conditions must be considered.

Tactical considerations.

Mission. The most important consideration in selecting a landing zone is the unit's ability to accomplish the mission from or at that location.

Location. To reduce troop fatigue, the landing zone should be close to the unit or objective and provide good cover and concealment.

Security. Security requirements vary depending on the general location and purpose. Aviation units must depend to a great extent on the supported unit for their active security. Landing zones are usually unsecured.

Technical considerations.

Landing point characteristics. A helicopter requires a relatively level, cleared, circular area at least 20 to 75 meters in diameter for landing, depending on the type of helicopter. The area around the landing point must be cleared of all hazards, trees, brush, stumps, communications wire, or other obstacles that could damage the aircraft. Generally, a helicopter requires a more usable landing area at night than during the day. However, if troops are going to rappel from the aircraft, the landing zone may be overgrown because the aircraft will not be landing.

Number of helicopters landing. An important factor is the number of aircraft required to land at one time at one location. An additional landing site should be provided nearby, or aircraft can be landed in successive flights at the same site if necessary.

Landing formation. Usually, it is preferable to land air assault helicopters in flight formation. Formations may have to be modified if the LZ is small.

Vulnerability. The site must provide good cover and concealment from enemy observation. Successive use of an LZ should be avoided to prevent the enemy from plotting artillery while aircraft are in the LZ.

Surface conditions. Surface conditions must be firm enough to prevent aircraft from bogging down. Sites should be clear of debris so as to prevent aircraft rotor wash signature.

Ground slope. If helicopters will be landing, the slope must be appropriate for them. The maximum slope for the safe landing of helicopters will be according to the operator's manual for the appropriate aircraft.

Approach and departure directions. The approach direction should be over the lowest obstacles and generally into the wind, especially at night.

Loads. Fully loaded aircraft require a larger landing area and better approach and departure routes than empty or lightly loaded ones.

Obstacles. Approach or departure ends should be clear of obstacles. Obstacles that cannot be removed from within the LZ should be clearly marked on the LZ work sheet.

Meteorological considerations.

Ceiling. The cloud base in relation to the field elevation of the PZ and the LZ should be considered.

Visibility. The effects of the sun and the possibility of ground fog are factors to be evaluated.

Density altitude. If density altitude increases, the size of the LZ or PZ should also increase.

Winds. Pilots need to know the wind direction and velocity to ensure that the aircraft can safely land or hover out-of-ground effect at the LZ or PZ.

The LZ or PZ reconnaissance data should be recorded on a work sheet. In addition to the information on the work sheet, an illustration may be furnished to the commander. Figure 3-12 depicts a landing zone work sheet.

Any task required for a zone reconnaissance may also be required for an area reconnaissance. The squadron commander may assign additional critical tasks and provide specific guidance concerning the intended use of the area. The air troop commander then orients his reconnaissance efforts to the area to obtain the needed information.

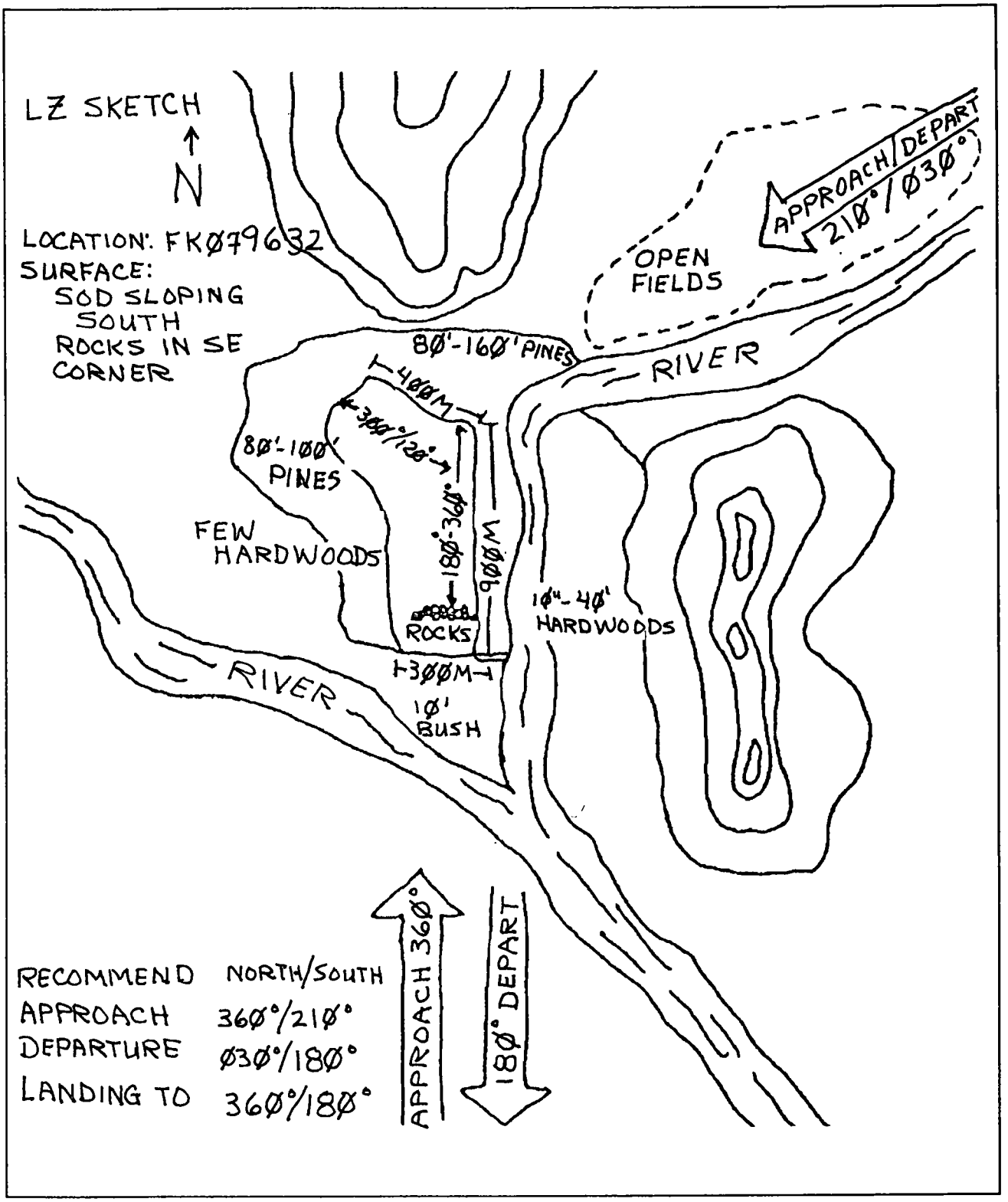


Figure 3-12. Landing zone work sheet

The air troop may be required to perform NBC reconnaissance tasks. Tasks may include chemical agent detection, radiological monitoring and reconnaissance, and surveys. NBC reconnaissance may be an implied task during reconnaissance operations. The purpose of NBC reconnaissance is to locate the boundaries of contamination and routes around or through a contaminated area. This information is vital to the success of friendly operations. Air troops are normally assigned the mission of conducting NBC reconnaissance. Reconnaissance operations are resource-intensive and require extensive planning, to include the decontamination of aircrews and aircraft.

Chemical Agent Detection.

Chemical agent detection will probably be the most frequent NBC reconnaissance task required of an air troop. Before moving into or occupying an area, unit commanders are always concerned with determining enemy activity and the presence of chemical hazards. The air troop is specifically tailored to do both tasks simultaneously. When determining the presence or absence of chemical agents, the air troop gathers information to answer these questions:

- Are chemical agents present?
- If an agent is present, what type is it?
- Where was the agent first detected?
- What are the boundaries of the contaminated area?
- Is there a clean route through the area?

Before conducting an NBC reconnaissance, the troop commander ensures the equipment is properly prepared. Equipment normally used by the reconnaissance element includes an automatic chemical agent alarm, an M256 detector kit, M8 and M9 paper, an M272 water test kit, and an M34 sampling kit. The commander also determines areas of priority. These include possible movement routes and unit locations. Finally, the commander designates an area to which the reconnaissance element can return for decontamination.

During NBC reconnaissance planning, the troop commander designates areas of responsibility and determines distances between checkpoints. (The distance between checkpoints depends on METT-T.) The reconnaissance team initially conducts checks at 500-meter intervals. It concentrates on locations where chemical agents collect such as low spots, valleys, and sheltered areas. The team uses the M256 kit to detect vapors and M8 paper to check liquids. When time is critical, it uses samplers or detectors only when necessary. Upon detecting a chemical agent, the reconnaissance team marks the area and then moves back to a clean area. It moves laterally a predetermined distance and direction, usually 500 meters, and then moves forward again. The team follows this procedure until it reaches the unit boundary or finds a clean route through the contaminated area.

The way in which the information is reported depends on how urgently the information is needed. If time is critical, the information is transmitted by radio using the NBC 4 report format. If time is not critical or if radio assets cannot be used, the information is recorded and carried back to the unit. DA Form 1971-2-R is used to record and transfer reconnaissance information. FM 3-3 describes reporting procedures in detail. Figure 3-13 shows a sample of a completed DA Form 1971-2-R for monitoring.

CHEMICAL DATA SHEET — MONITORING ~~OR SURVEY~~

For use of this form, see FM 3-3; proponent of this form is TRADOC.

DATE	PAGE NO.	NO. OF PAGES
14 Jul 90	1	1

UNIT: B Co 2/31 Inf.

MONITOR OR SURVEY TEAM NUMBER: #B2

MAP USED: Karlsbadt

MONITOR OR SURVEY TEAM MEMBER (Print Name): Sgt King

LOCATION/TIME OF TEST OR INDICATION	TYPE DETECTOR USED			AGENT DETECTED
	PAPER	ALARM	KIT	
NV521678/100600Z			✓	Nerve
NV521676/100625Z	✓			V.
NV521674/100636Z	✓			V.
NV521672/100647Z	✓			V.
NV521670/100715Z	✓			V.

SAMPLE

REMARKS

DA FORM 1971-2-R, SEP 86

Figure 3-13. Completed DA Form 1971-2-R

Radiological Monitoring. The air troop is responsible for conducting radiological monitoring in its area of operations to determine the presence and intensity of residual radiation hazards. The radiation may be from fallout or neutron-induced gamma

activity areas. The IM174/PD radiacmeter or AN/VDR-2 radiac set is used to monitor radiation. The procedure is outlined in FM 3-3. Figure 3-14 shows a sample of a completed DA Form 1971-R..

Radiological Reconnaissance. The air troop is also responsible for conducting aerial radiological reconnaissance and can conduct a limited ground radiological reconnaissance. A radiological reconnaissance involves detecting the presence of radiation and measuring it, while moving, with radiac instruments. The radiological reconnaissance is normally conducted before the main body encounters the hazard. It is also conducted to initially detect or determine the extent of contamination. All units conduct a ground radiological reconnaissance while moving. An aerial reconnaissance is conducted only when an area is known to be contaminated. Reconnaissance efforts concentrate on location rather than intensity or dose rate. Thus the reconnaissance provides only information about the size of a contaminated area. The collected data provide minimum essential information needed to evaluate the impact the contamination will have on current operations.

Aerial radiological reconnaissance. The air troop works closely with the squadron in conducting an aerial radiological reconnaissance. The air troop selects the checkpoints, routes, and course legs when it arrives over the area. The NBC center preplans only the general area over which the troop conducts the reconnaissance. Under hostile air defense conditions, route and course leg techniques are not recommended because of their unique signature. In this case, the air troop should use the point technique with NOE flight at the appropriate airspeed. The aerial radiological reconnaissance provides little detail, covering only those parts of the contaminated area that are of immediate operational concern. On arrival over the contaminated area, the air troop locates the edge of the area. Once the air troop does this, it determines checkpoints which can be located from the air and on the map. The reconnaissance team flies on a heading from a known point as a modification of the course leg technique. It determines the altitude and airspeed. Reporting procedures are like those described for the ground reconnaissance troop with the addition of airspeed and flight duration. FM 3-3 describes reporting procedures in detail. The point technique may be the only viable way to perform an aerial radiological reconnaissance at or beyond the FLOT.

Ground radiological reconnaissance. In a ground radiological reconnaissance, the most desirable information is the location of uncontaminated areas. Ground radiological reconnaissance is rarely concerned with the determination of the dose rates inside contaminated areas. This task is left to radiological survey. Of principal value and importance is the location of the perimeter or route around or through the contamination. This intelligence allows units to avoid the hazard completely. When contamination is discovered, the location is reported to warn the main body. In preparing an NBC 4 report, the ground elements of the air troop use the in-and-out technique to record the reading, time, and location and then withdraw to an uncontaminated area. The teams flank the contaminated area, repeating the in-and-out process within their assigned area, sector, or zone. Figure 3-15 (page 3-26) illustrates this process. Unless otherwise instructed, the ground elements mark the outer boundaries of the contaminated area. (The ground element of the air troop may be told not to mark the boundaries because marking may provide the enemy with information about troop movements.) NATO markers are erected only at logical points of entry facing away from the contamination.

Surveys. Nuclear surveys determine the extent and intensity of contamination. Commanders use the detailed information provided by surveys to plan future operations. Because of the resources and coordination involved, units conduct surveys only when the intensity of contamination must be known. Current techniques permit a reasonably safe survey of high-dose-rate areas. Often the survey will be delayed until

RADIOLOGICAL DATA SHEET – MONITORING ~~OR POINT TECHNIQUE~~

For use of this form, see FM 3-3; proponent of this form is TRADOC.

DATE: 10 Jan. 89 | PAGE NO: 1 | NO OF PAGES:

~~CLEARING/CONTAMINATION~~ MONITORING
UNIT DESIGNATION: Co. B/1-11 INF.

MONITOR (Print name): PFC I.M. Observer

MAP USED: SERIES V25-9 1:50,000

~~TYPE OF VEHICLE OR~~ OTHER SHIELDING: Foxhole

INSTRUMENT TYPE: IM-174B/PD

READING NO	LOCATION	TIME	DOSE RATE (cGyph)	DO NOT USE*	READING NO.	LOCATION	TIME	DOSE RATE (cGyph)	DO NOT USE*
1	AY123456	0600	0 (1)		16	AY123456	0945	9	
2		0615	0		17		1000	9	
3		0630	0		18		1005	10 (7)	
4		0645	1 (2)		19		1010	10	
5		0700	0 (3)		20		1015	10	
6		0715	0		21		1020	9	
7		0730	1		22		1025	10	
8		0745	1		23		1030	9	
9		0800	1 (4)		24		1035	9 (8)	
10		0815	1		25		1040	8	
11		0830	2 (5)		26		1055	7 (9)	
12		0845	2		27		1125	5	
13		0900	3 (6)		28		1155	6	
14		0915	5		29		1225	5	
15		0930	7		30		1255	5	

SAMPLE

REMARKS: TOB 0555

*DO NOT USE For control zone only

$CF = \frac{180}{9} = 20$

CORRELATION FACTOR DATA

LOCATION	READING NO.	DOSE RATE (cGyph) Inside	DOSE RATE (cGyph) Outside	CF*	LOCATION	READING NO.	DOSE RATE (cGyph) Inside	DOSE RATE (cGyph) Outside	CF*
AY123456	24	9	180	20					

DA FORM 1971-R, SEP 86

NOTES:

(1) A nuclear weapon was detonated. Continuous monitoring is initiated. Monitor awaits arrival of fallout in open areas.

(2) Fallout arrives. Monitor reads 1cGyph, notes it, and reports it to the unit NBC defense team.

(3) Monitor enters the shelter. No dose rate is noted inside because of the shielding. Dose rate must build to equal the CF before a dose rate of 1 cGyph is apparent.

(4) Dose rate on the outside now equals CF. (Of course, the monitor does not know the CF at this time.) Monitor reads 1 cGyph on the inside. The dose rate continues to build. OD must reach 40 before ID will reach 2 (as in this example).

(5) The dose rate builds. The OD now equals 40. (This can be seen once the CF is applied to all previous readings.)

(6) The dose rate continues to build and starts slowing the rate of increase.

(7) The dose rate is almost the same as the previous reading. This indicates peak or near peak. The dose rate is measured every five minutes now. The dose rate levels off. It appears that no more fallout will arrive. Decay now takes over. The peak reading is reported to the unit NBC defense team.

(8) The decrease is noted. At this point, a collection of CF data is possible. The monitor notes the continuing decrease in dose rates. An OD of 180 is taken. The monitor reports a peak of 10 (shielded) at 1005 hours and the data for the CF (OD=180 and ID=9). The unit NBC defense team calculates a CF of 20 and applies this data to the peak reading.

(9) The monitor continues to take readings at 30-minute intervals until dose rates decrease below 1 cGyph or he is told to stop.

Figure 3-14. Completed DA Form 1971-R

the area is under friendly control. Surveys in the covering force area or beyond the FLOT normally are not performed unless the information is critical and the loss of survey assets is acceptable. The squadron coordinates all survey missions. A group composed of a control team and one or more survey teams conducts the survey. The control team is normally formed at squadron level, and survey teams are formed at troop level. The control team controls and directs the survey or troops. In survey missions, only a minimum number of personnel are exposed to radiation. The control and survey teams may conduct aerial and ground surveys. Both types of surveys are briefly discussed below. FM 3-3 describes both in detail.

Aerial surveys. Aerial radiological survey information is obtained by the use of the IM174/PD radiacmeter or the AN/VDR-2 radiac set held in a vertical position (face up) in rotary-wing aircraft. Aerial surveys are conducted rapidly and at a distance from the radiation source. The advantages of aerial surveys over ground surveys are speed and flexibility of employment, lower radiation doses to survey teams, and fewer requirements for personnel and equipment. The disadvantages of aerial surveys are that dose-rate readings are not as accurate and dose rates for specific points on the ground are not provided. The techniques used to conduct detailed aerial surveys include the route technique, course leg technique, and point technique. In the route technique, aircrews fly between two checkpoints along some prominent terrain feature. Using the course leg technique, aircrews fly a straight line or course leg between two checkpoints. When the dose-rate information obtained from the use of either technique is processed, the result is a series of ground dose rates spaced at equal intervals along the path flown. The point technique is used to determine the ground dose rate at points of operational concern. It is normally used to get more precise dose-rate information at those points than can be gotten using other aerial survey techniques.

Ground surveys. Ground radiological surveys are normally conducted by personnel mounted in wheeled or tracked vehicles. The techniques used to conduct ground surveys include the route and point techniques (described in the preceding paragraph) and the preselected dose-rate technique. Because of exposure to troops, ground surveys lack the speed and flexibility of aerial surveys. For this reason, ground elements of the air troop normally will not conduct ground surveys. Recording and reporting are accomplished as described in FM 3-3 and as shown on Figure 3-13.

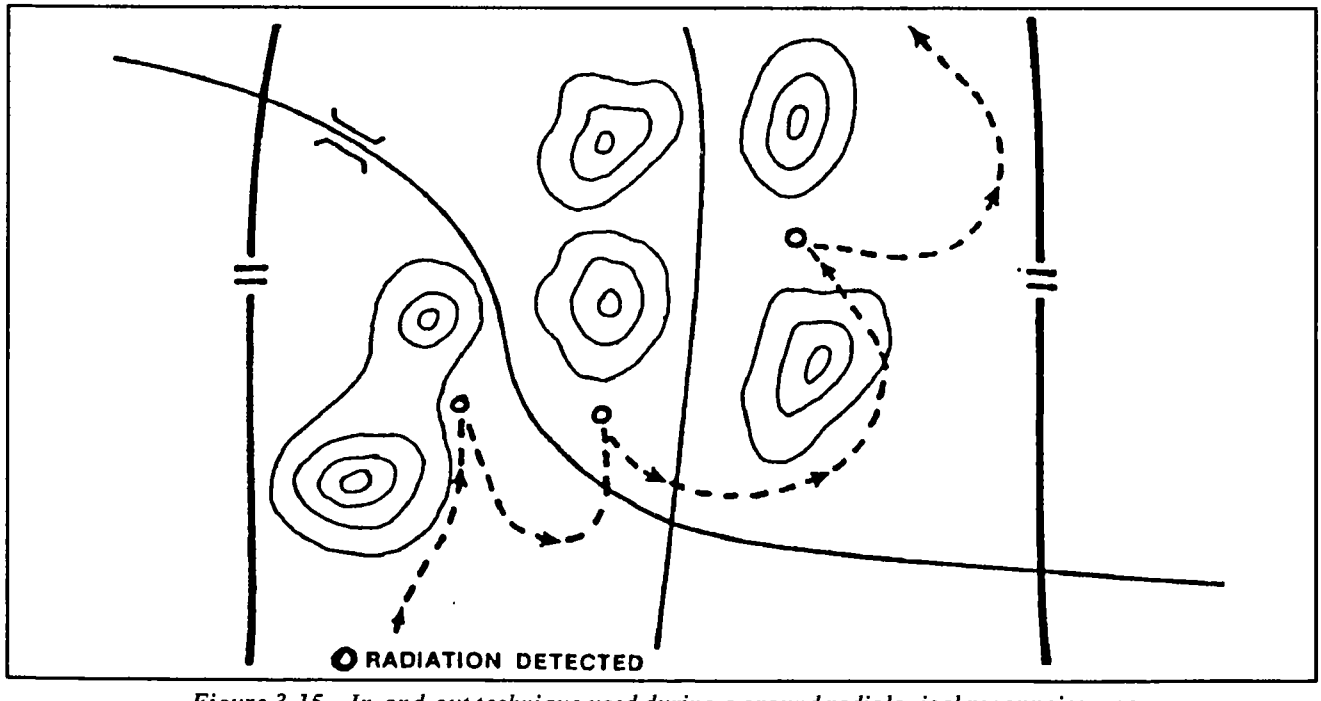


Figure 3-15. In-and-out technique used during a ground radiological reconnaissance

Section III
SECURITY OPERATIONS

PURPOSE AND MISSIONS

Security operations are conducted to gather information about the enemy and to provide reaction time, maneuver space, and protection for the main body. The main element is thus forewarned and has time to prepare and deploy forces and engage the enemy. Security includes all measures taken to prevent observation, harassment, surprise, and espionage or sabotage. Aggressive and bold reconnaissance to reduce the unknowns about the enemy and the terrain is an integral part of security. Security operations include screen, guard, and cover missions.

FUNDAMENTALS

Air troops conduct security operations independently or as an integral part of a larger unit's task organization. However, air troops cannot be used as independent guard or cover forces because of their inability to sustain continuous operations and hold terrain. Air troops participate in guard and cover operations in conjunction with ground forces as part of a larger force.

Air troops are ideally suited for screen missions, which are the type of security mission they most frequently perform. Usually, they reconnoiter and screen forward and to the flanks of ground cavalry forces. Air troops can also be used as rapid-reaction forces to engage enemy elements with long-range aerial fires and available indirect fire. This helps gain time so that ground cavalry and other maneuver elements can occupy defensive positions or maneuver to attack. The flexibility and mobility of air troops permit a rapid change in mission. Air troops conduct security according to the five fundamentals listed below.

Orient on the main body. A security force operates between the main body and known or suspected enemy units. The air troop commander ensures that his personnel are thoroughly familiar with the main body's scheme of maneuver. Graphics are exchanged between air and ground cavalry elements. The air troop commander maneuvers his elements to orient on the main body, remaining between it and the enemy force.

Perform continuous reconnaissance. A security force performs continuous and aggressive reconnaissance to gain all possible information about the enemy and the terrain. To perform continuous reconnaissance, the air troop commander task-organizes his assets according to METT-T. Continuous reconnaissance may be accomplished by primarily using air troops during the day and by relying on ground operations at night. However, in some situations, such as desert operations, the air troop may be a valuable asset at night. In fact, the squadron commander may designate both an air troop for day and an air troop for night. Whatever method is used, the squadron commander ensures that a reconnaissance force is continuously available.

Provide early and accurate warning. Early warning of enemy activity includes accurate reports about the enemy's size, composition, location, movement, and special equipment. This gives the main body commander the time and information needed to seize the initiative and choose the time and place to engage the enemy.

The air troop can relocate rapidly from one part of the battlefield to another. However, this may force it to operate independently at times because the ground cavalry relocates more slowly. In such situations, the air troop will be the only element available to provide early warning. It will report enemy activity as soon as it sees it. Equipment and material specifics are vital to the main body commander so that he can better organize his forces to meet the threat.

Provide reaction time and maneuver space. A security force operates as far from the main body as possible and according to METT-T. It fights to ensure that the main body has adequate time and space to respond to the threat. The air troop employs direct fire and long-range indirect fire to gain time and maneuver space for its main body. It works at a distance that is consistent with the factors discussed on page 3-1.

Maintain enemy contact. Once gained, contact is maintained to ensure a continuous flow of information about enemy activity. (The degree of contact to be maintained or actions to be taken should be stipulated in the OPORD.) If lost, contact must be regained unless the enemy is withdrawing from the area of operations and the security force is ordered not to follow. As in reconnaissance operations, maintaining enemy contact prevents the enemy from achieving the element of surprise. The air troop constantly reports changes about the enemy's location and direction of movement.

The air troop participates in screen, guard, and cover missions. However, the air troop's primary function in all of these missions is one of reconnaissance, which is addressed in Section II. Information about the enemy, terrain, and weather that reduces battlefield uncertainties allows the ground commander to formulate his battle plans more realistically.

SCREEN OPERATIONS

Purpose. A screening force maintains surveillance and provides early warning by maintaining contact with the enemy forces encountered. It impedes and harasses the enemy with organic and supporting fires and, within its capability, destroys or repels enemy patrols.

Specific Critical Tasks.

Apart from the fundamentals of security, the screening force accomplishes specific critical tasks that provide the commander with minimal, essential information. The air troop, as a screening force, must accomplish these tasks. They include—

- Maintaining continuous surveillance of all battalion-size avenues of approach into the troop sector. (The air troop can maintain surveillance on two battalion-size avenues of approach.)
- Destroying or repelling all enemy reconnaissance patrols observed.
- Determining the size and composition of follow-on enemy forces, their direction of movement, and their estimated rate of advance.

Though not a specific critical task, the air combat operation is an implied task during security operations. To be effective, security operations must prevent interdiction by enemy air and ground maneuver forces.

Screening Missions. The air troop may screen a stationary or moving force.

Stationary screen. A screen operation for a stationary force is accomplished by establishing successive screen lines. A screen line is a line of aerial OPs that overwatches avenues of approach into an area. If time is available, the initial occupation of the screen line should be conducted as a zone reconnaissance. If time is not available, the movement to the initial screen line should be conducted as a movement to an area reconnaissance forward of friendly lines.

The air troop conducts a screen for a stationary force when its main body commander is preparing for future tactical operations. During reconstitution activities or planning and preparing phases, the main body commander may remain stationary. The air troop may be assigned screen operations when ground forces are preparing for defensive or offensive operations before actual movement begins. Initial occupation of a unit battle position may also require screening activities.

The air troop is task-organized by the troop commander to accomplish its screen mission. Graphics depict where and when the screen lines are to be occupied. Figure 3-16 depicts screen lines.

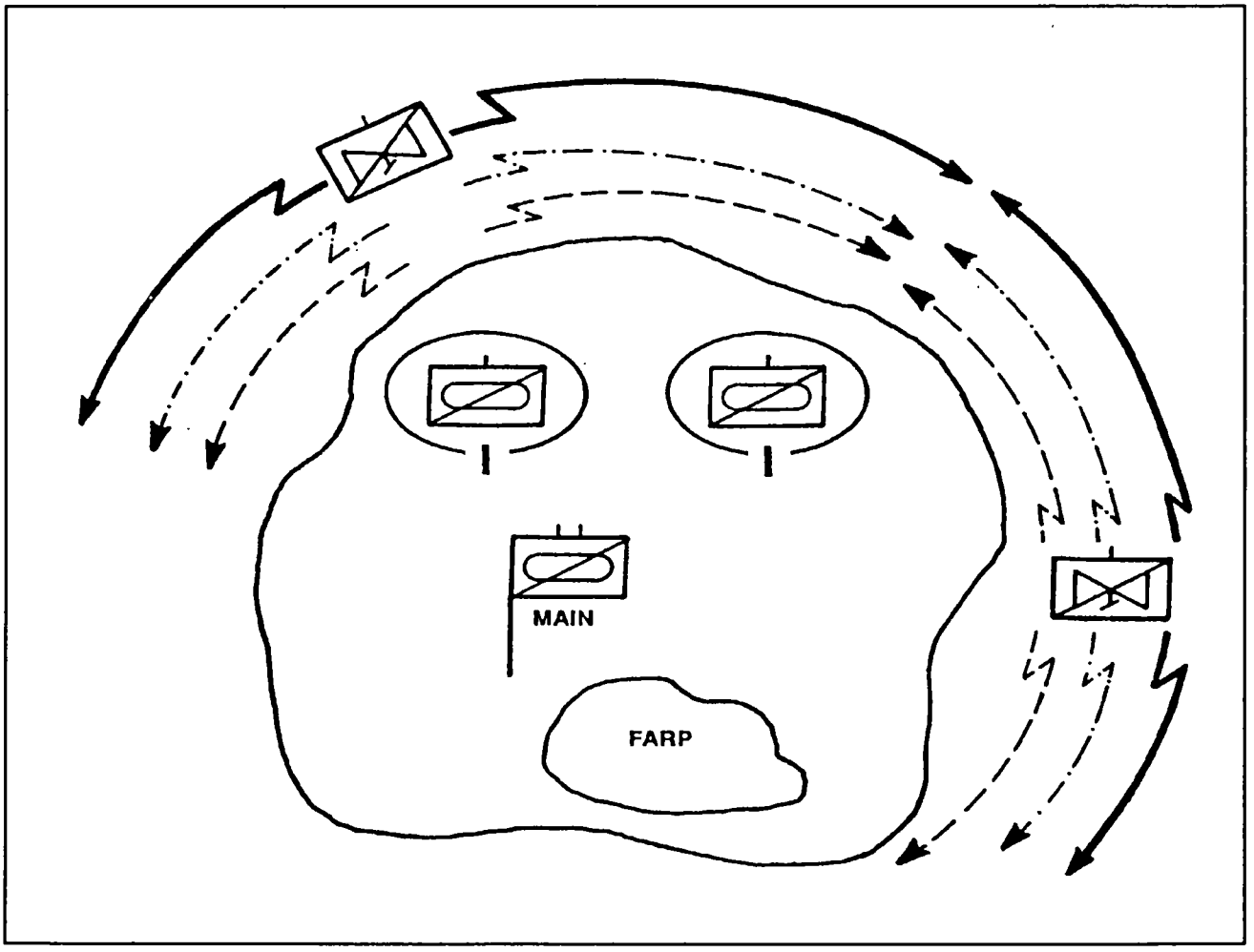


Figure 3-16. Screen lines

The air troop commander assigns his SWTs to occupy the screen and establishes a troop or team rotation to maintain continuous surveillance. On-station relief occurs when the SWTs require refueling or rearming. Either an air troop

relieves another or the SWTs from one air troop relieve each other. Whatever method is used, the SWTs exchange pertinent mission information. The key elements of exchanged information include updated friendly and enemy situations and changes in radio nets. The relief may be accomplished by using the techniques described in the unit SOP.

The AO may dismount if it will increase the surveillance capabilities of the SWT. The pilot and the AO must coordinate when and how the AO will be picked up. Enemy sighting alone may prompt extraction. The AO uses his AN/PRC-77 radio to maintain constant contact with the aeroscout. He normally does not remain on the ground when the scout aircraft leaves to refuel or rearm.

When contact is made, the air troop responds to secure the main body. Spot reports from the air troop update the squadron commander on the tactical situation. This gives the main body commander time to maneuver his ground units to engage the enemy. Using point weapon fires from organic attack aircraft or indirect fire support, the air troop destroys or repels the enemy's reconnaissance elements thereby increasing the enemy's vulnerability to surprise.

As the enemy continues to advance, the air troop moves to and occupies successive screen lines. It makes maximum use of cover and concealment and employs supporting fires to harass and impede enemy elements. Each screen is situated to provide the air troop commander with a good view of the battlefield. The air troop commander instructs his aircrews on the direction of observation. The fields of view for one SWT overlap another to ensure the enemy is not allowed to pass unnoticed. Routes to and from succeeding screen lines should provide good cover and concealment. Cover may be difficult to obtain along a route, but concealment is a must. During movement, the SWTs ensure that visual contact with the enemy is continuously maintained.

The air troop uses all supporting fires to develop the situation. The air troop commander coordinates with the FSE that supports him. This may be the FIST of a sister ground troop (when air and ground elements are paired), the fire support officer of the squadron, or the fire support coordinator of the supported maneuver unit. External coordination is necessary, because the air troops do not have an FSE.

The air troop commander is responsible for employing all fire support assets to accomplish the mission. These assets include TACAIR, field artillery, naval gunfire, and organic attack helicopters. Employment of the fire support assets is preplanned for quick response and maximum effect. The synergistic effects of direct and indirect fire support improve the lethality of the system and increase the survivability of assets. As the enemy force reacts to indirect fire, its attention is diverted from the attack helicopters. SWTs will not normally screen beyond the range of supporting artillery.

Moving screen. When the air troop conducts a security operation to the front of a moving force, it uses zone reconnaissance techniques to move forward of the main body. Emphasis is placed on making contact with the enemy and developing the situation. This operation is essentially a movement to contact. When the air troop makes contact with enemy elements, it establishes an initial screen and continues the observation to develop the situation.

An air troop screening to the flank of a moving unit plans a line of OPs and prepares to occupy each, in turn, as the main body advances. If possible, the air

troop reconnoiters out to the maximum range of supporting fires. Except for these procedures, the mission is planned and conducted the same as a stationary screen.

The most forward OP is generally abreast of the rear of the leading battalion task force on the near flank of the main body. The most secure technique is one in which OPs can leapfrog from rear to front if the main body is moving slowly. OPs may move forward simultaneously on command if the main body is moving more rapidly. This technique, however, is less secure. The entire force may move continuously, using a technique similar to a route reconnaissance, if the main body is moving swiftly. This, however, is the least secure technique. Figure 3-17 depicts techniques for screening a moving force.

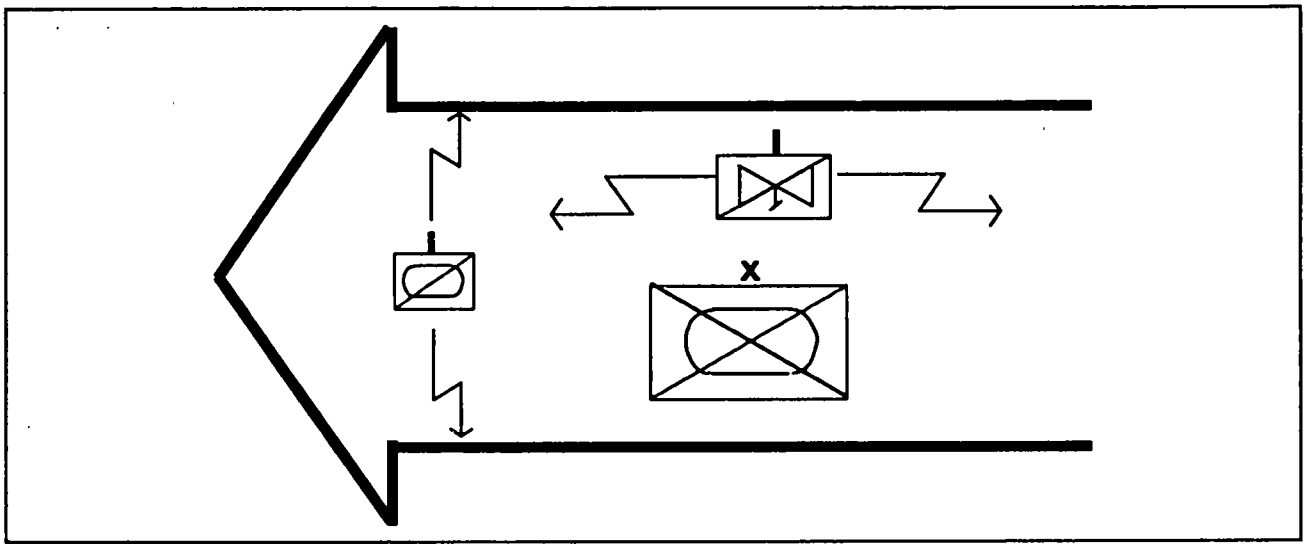


Figure 3-17. Screening a moving force

An air troop screening to the rear of a moving force uses the same techniques as when screening for a stationary force. It may occupy successive lines because of the movement of the main body rather than the action of the enemy. The main body commander is responsible for the area between the screening force and the main body.

Screening Against Enemy Aircraft.

The air troop may operate as a screening force with its primary mission being that of alerting the squadron to approaching enemy aircraft. It would be deployed to the flanks and forward of other aviation and ground units conducting operations. The air troop would be deployed to screen probable air avenues of approach and would maintain surveillance of these avenues similar to the way it maintains surveillance of ground avenues of approach. Reports of incoming aircraft would alert all assets in the area to take appropriate action.

To be successful in a screen against the enemy, the air troop should fight as a unit, using maneuver and making the most of available weapons. The troop should also observe the principles of air combat operations which include—

- Avoiding detection.
- Seeing the enemy first.
- Recognizing the enemy.
- Fighting unpredictably.

GUARD OPERATIONS

Purpose. The purpose of guard missions is to gain early warning, reaction time, and maneuver space to the front, flank, or rear of a moving or stationary force. A guard operation is usually conducted within range of the main body's artillery. A guard force reconnoiters, screens, attacks, and defends to accomplish the mission.

Guard Missions.

Advance guard. An air troop cannot independently conduct an advance guard mission. Normally, it is deployed forward of a moving force. The cavalry squadron, augmented by brigade or division, is given the overall advance guard mission. As part of the advance guard, the air troop is expected to plan its portion of the mission the same way it would a zone reconnaissance. Primary emphasis is on early development of the enemy situation in the area of the main body's route or axis of advance.

Flank guard. During a flank guard operation, the air troop can be used to screen between the guard force and the main body. It can also screen forward of the guard force during the move to battle positions. Either way, the air troop uses the techniques described for screening forward of a moving force. It can be integrated as part of the guard force by screening between and in front of battle positions after they are established. Normally, the air troop's mission is to reconnoiter and to maintain contact with the main body. This will free ground cavalry (the flank guard force) to concentrate on its battle position tasks. The mission is planned in the same manner as for a normal movement to a screen line, using techniques described for a zone reconnaissance. The guard force is responsible for the area between it and the main body. Figure 3-18 depicts an air troop as part of a flank guard.

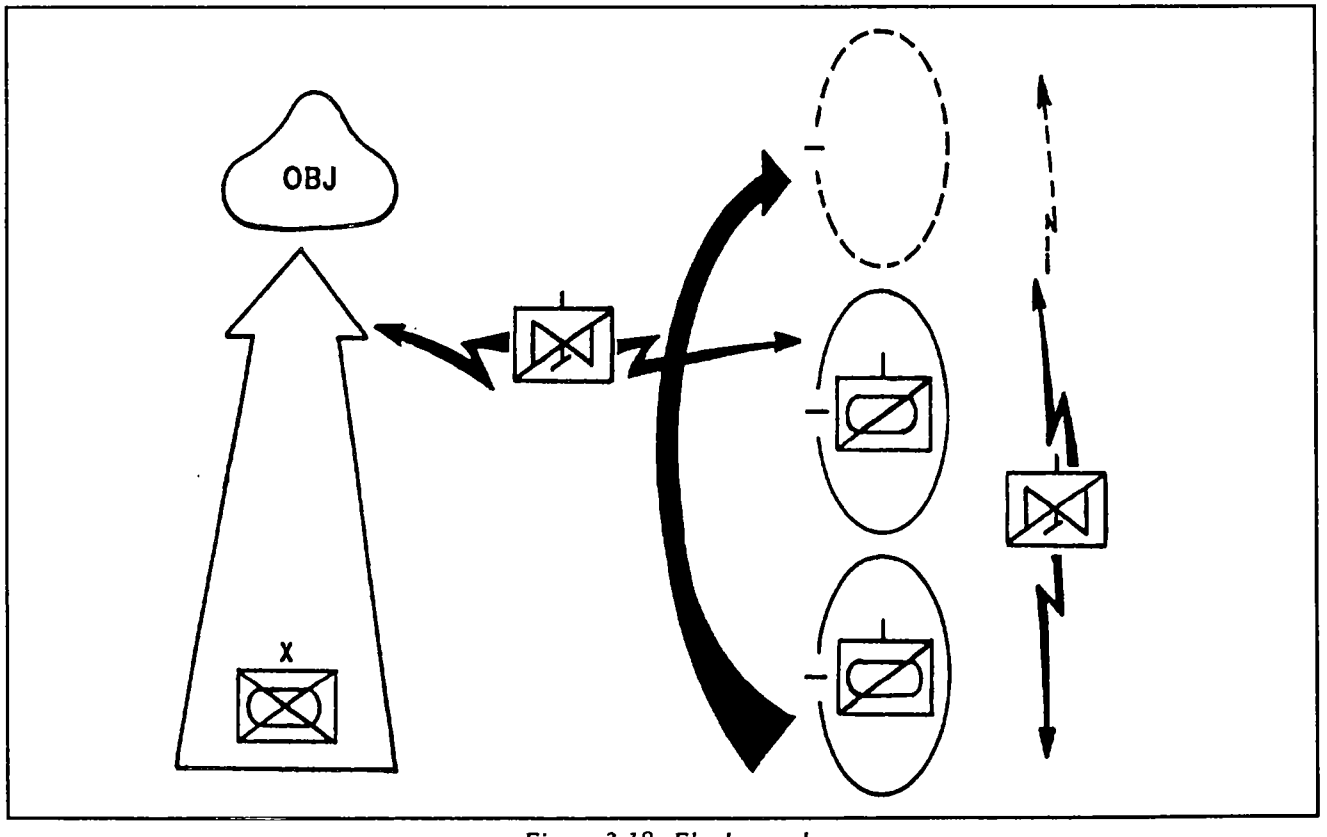


Figure 3-18. Flank guard

Rear guard. A rear guard for a stationary force deploys and defends. A rear guard for a moving force generally does the same. The difference between the two is the orientation of movement. A rear guard follows the main body, occupying successive battle positions and screening between flank battle positions and rear elements of the main body's flanks. The air troop is used to screen forward of or between battle positions. It may also screen the area between the guard force and the main body. Figure 3-19 depicts an air troop as part of a rear guard.

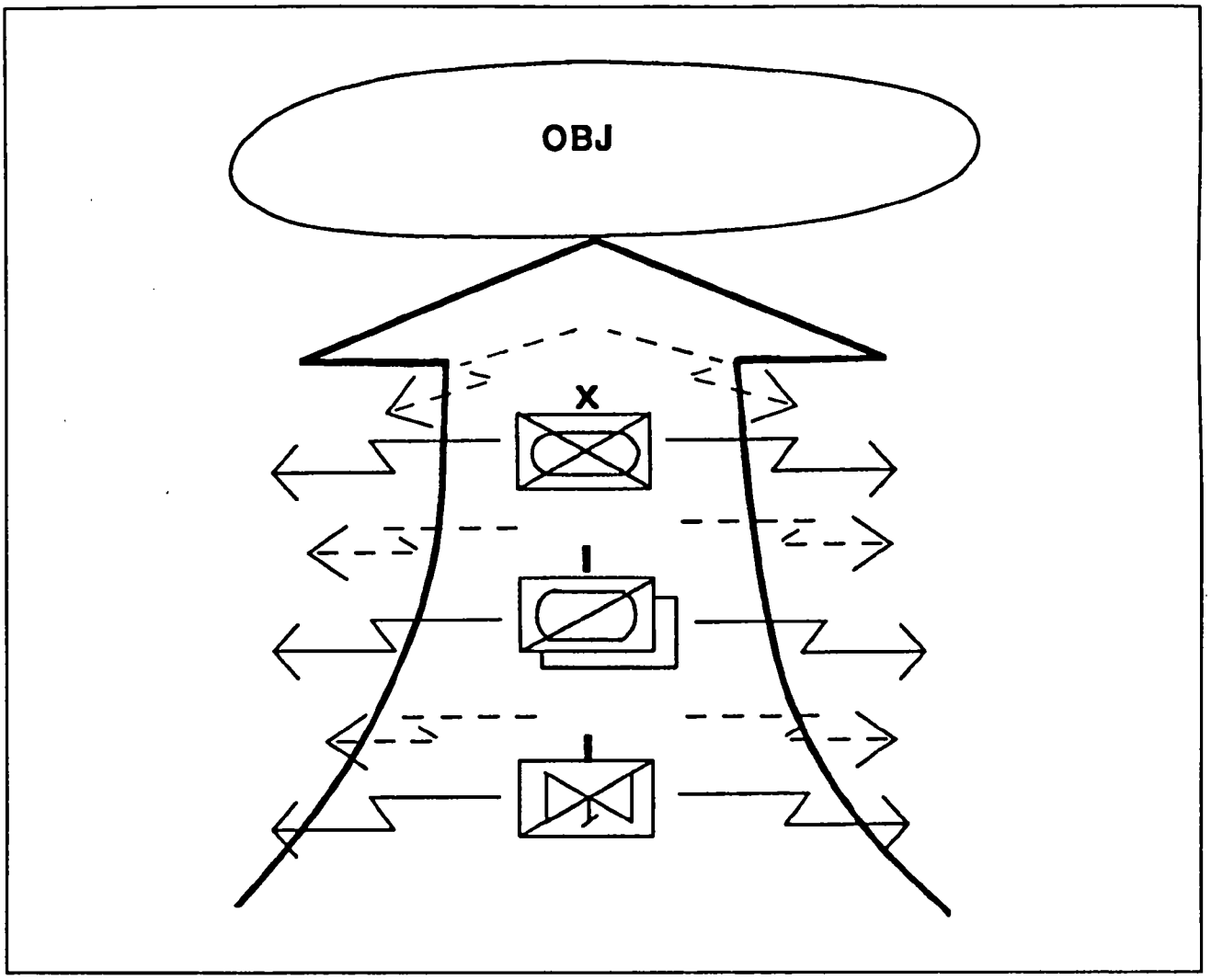


Figure 3-19. Rear guard

Guard Force Tasks. Briefly, the tasks of a guard force include—

- Providing reconnaissance and early warning of enemy attack for the main body.
- Providing reaction time and maneuver space for the main body.
- Destroying enemy reconnaissance units.
- Defeating, repelling, or fixing enemy forces before they can engage the main body with direct fires.
- Probing the enemy's guard force and defeating it within the friendly guard force's capability.

COVERING FORCE OPERATIONS

Covering force operations give the main body information about the enemy, early warning, reaction time, and maneuver space. A covering force is a tactically self-contained security force which operates at considerable distance from the front, flank, or rear of a moving or stationary force. The mission of a covering force is to develop the situation early and to defeat the enemy. If the covering force cannot defeat the enemy, it will deceive, delay, and disorganize the enemy until the main body can react. The tasks of a covering force include—

- Operating beyond the range of the main body's artillery. The distance is determined by METT-T. (Initially, a reinforced regiment may act as a covering force at a distance as great as 50 to 60 kilometers from the main body.)
- Developing situations earlier than a guard force can, fighting longer and more often, and defeating larger enemy forces.
- Accomplishing all screen functions including destroying or repelling enemy reconnaissance units and forcing the enemy's advance guard and first echelon regiments to deploy.
- Accomplishing all guard functions including destroying or repelling enemy reconnaissance units, forcing the enemy's advance guard to deploy, and destroying the advance guard if possible.
- Reconnoitering, screening, and fighting to accomplish the mission without becoming decisively engaged, bypassed, or cut off.

Covering force missions are not assigned to air troops, because the air troops have insufficient closing and staying power. However, air troops can be used to reconnoiter and screen and to act as rapid-reaction forces within the covering force area.

AIR ASSAULT SECURITY OPERATIONS

Purpose. Air assault operations are conducted to rapidly disperse and concentrate forces at the critical time and place to influence the tactical situation. These forces can be extracted quickly and employed in a different area. Air assault forces can quickly bypass forward enemy units and achieve surprise in a swift, violent, and bold operation to deceive, destroy, and disrupt. Air assault operations are directed primarily toward destroying enemy personnel and equipment and disrupting command and control. They also obtain information about enemy installations, units, and activities and force the enemy to concentrate in more than one area. The air troop is a key element in air assault operations. The aviation brigade or ground commander must integrate air troops into his combat planning and operations. Figure 3-20 shows air troops employed during an air assault operation.

Phases. The squadron and its air troops are normally employed to conduct reconnaissance and screening or overwatch operations during all five phases of an air assault operation. These phases are staging, loading, air movement, landing, and ground tactical.

Staging phase. Air troops may conduct screening operations to provide early warning and limited security while friendly troops form on or near the pickup zones. If enemy forces are close by or contact is likely, air troops may conduct special-purpose operations, such as feints or demonstrations, away from the staging areas or PZs.

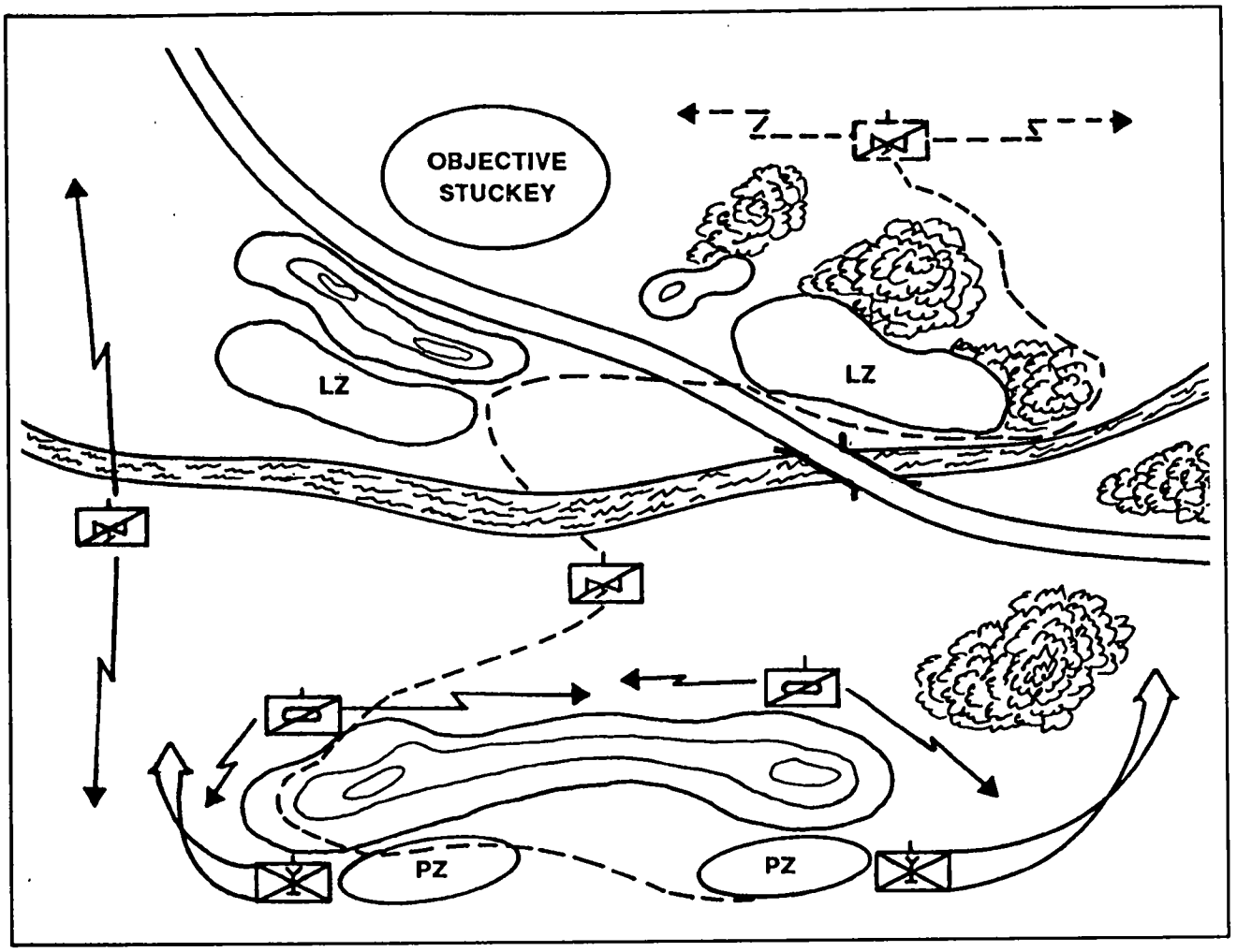


Figure 3-20. Air troops employed during an air assault operation

Loading phase. The air troops reconnoiter the PZs preceding the arrival of assault helicopters. Once the PZs are cleared, air troop elements may screen a vulnerable flank or likely avenues of approach. Ground troops are well suited to participate in the first two phases of this operation (staging and loading).

Air movement phase. Air troop elements normally precede the air assault task force along the route. They conduct a route reconnaissance followed by an area reconnaissance of the LZs and possibly the objective, depending on METT-T. Air troop elements penetrate the FEBA or FLOT at a time interval dictated by the mission and conduct or assist with a passage of lines. Along the route, they locate enemy air defense weapons and radars and suppress those systems or develop a bypass route for the AATF. Air troops also provide pertinent information about a route that poses a threat to flight, including all natural and man-made obstacles. Although attack helicopters normally provide en route security or overwatch, air troops may perform this mission. This is accomplished by a moving advance or flank screen or by occupying successive BPs along the route. Air troops provide early warning of the enemy's approach and engage the enemy with organic fires. Air troop elements may assume responsibility for downed aircrew recovery operations of all aviation assets involved. The assault helicopter company may provide recovery aircraft, maintenance recovery teams with the AVUM company, and limited medical evacuation. However, this role is neither a common occurrence nor a normal mission for the assault helicopter company.

Landing phase. Air troops accomplish the same tasks during the landing phase as they do during the loading phase. They may occupy BPs to overwatch the LZ as well as the objective.

Ground tactical phase. As the ground force moves to and seizes its objective, air troop elements may again conduct reconnaissance and screening operations. Air troop elements may rapidly reconnoiter the ground route to the objective as well as the objective itself from standoff range. They may also screen the main body's movement to the objective and provide overwatching fires on the objective from battle positions. This is accomplished by attack helicopter units until they are relieved on station or the mission is completed. Air troops may be tasked to provide overwatching fires during the extraction sequence.

Fire Support.

Planned fires along the flight route aid aircraft flying past areas of known or suspected enemy positions. These fires should be intense and of short duration because of aircraft speed past specific locations. They are planned and scheduled at times when flights are endangered. Fire plans cover PZs and LZs, flight routes, and suspected enemy avenues of approach to LZs. Fire support plans include suppression of enemy air defense systems and smoke to protect formations from enemy detection. Plans should ensure that friendly fire support elements do not use ordnance that obscures aircrew vision.

All available fire support is used to suppress or destroy enemy weapons. Fire support is provided by TACAIR, field artillery, mortars, and naval gunfire. Attack helicopters normally provide security and overwatch en route to the LZ. Support may consist of smoke (rocket fired or projectile or canister delivered), chaff (air-dropped, shredded aluminum foil to foul radar), or other countermeasures for SEAD operations. On-call fires are planned along the flight route to ensure rapid adjustment on targets of opportunity. Requests for fire support are made through the squadron FSO who may operate from a squadron TOC. If an air liaison officer or a tactical air coordinator (airborne) is available (on station), the request for TACAIR may be made directly. This type of fire support request is frequently of an immediate nature. FM 6-20 series and FM 6-30 describe immediate and planned requests for fire support and TACAIR, and TC 6-40A describes automated cannon gunnery procedures.

Section IV
SPECIAL OPERATIONS

AIR COMBAT OPERATIONS

Mission. Army aviation units conduct air combat operations as a part of the Army's air defense combined arms initiative. Army air defense is similarly a part of the joint theater counterair operation. Air troops conduct air combat operations in the close and rear operational areas of the battlefield. The objectives of air combat operations are to protect combined arms maneuver forces, augment air defense forces, and provide aviation self-defense. The worldwide increase of armed helicopters will heighten the probability of air combat in future conflicts. Army aviation

units must be prepared to fight for and dominate the terrain flight environment. Although air combat may be specified as a primary mission, it will normally be an implied mission. Air troops plan for and conduct air combat as an integral part of all other missions. Air combat planning must be accomplished before the mission and integrated into the scheme of maneuver. Attempting to coordinate air combat operations after the battle has been joined will be difficult at best and may jeopardize the mission.

Planning Considerations. Normally, air troops will not be dedicated to the counterair function but will conduct air combat operations as part of the maneuver commander's scheme of maneuver. Deliberate and chance aerial encounters will occur throughout the battlefield. Therefore, detailed air combat planning must be conducted down to the lowest appropriate level. Specific planning factors and employment techniques may differ, depending on the operational area (close or rear) and METT-T. METT-T and other factors are discussed below.

Mission. The aviation mission and the maneuver commander's intent are the major factors that determine the extent of the aviation units' involvement in air combat. Aviation units must not allow themselves to become diverted from their primary mission by a chance air encounter. The air troops should plan to protect themselves and members of the combined arms team regardless of their mission. One or both of the air troops may receive the mission to conduct air combat operations in response to an increased air threat or to augment ground air defense forces. This type of mission requires more detailed planning to synchronize the squadron's efforts with the combined arms team.

Enemy. When planning and executing air combat operations, the troops must consider the size, training, equipment, and air-to-air capability of the enemy. The combat power dedicated to countering the air threat must be commensurate with the air-to-air capabilities of the enemy. The intelligence preparation of the battlefield should identify potential air threats and enemy air routes into the squadron's area of operations. Upon contact with a superior enemy force, aviation units have three options. They can—

- Avoid the enemy aviation force and request assistance from other members of the combined arms team.
- Engage the enemy force and delay to provide reaction time and maneuver space for the main force.
- Destroy the enemy aviation force and continue the primary mission.

The viability of a specific course of action will depend on the relative combat power of the two forces. The air troops may not have the option of which action to take because of the unit's mission or prescribed actions on contact. In all cases, the air troops attempt to avoid decisive engagements (dogfights) with a superior enemy force.

Terrain and weather.

Terrain. Although the terrain does not hinder the helicopter's maneuverability, it does enhance the helicopter's survivability. Effective use of the terrain is one of the keys to successful air combat. During the IPB, analysis of vegetation and terrain relief will show where terrain masking and adequate maneuver space are available. Air-to-air BPs provide air sectors of fire and effective overwatch of the air threat. Air routes provide cover and concealment from suspected air and ground threats.

Weather. The weather affects equipment, terrain, and troops. Low visibility degrades all aviation operations. Although some attack aircraft have "near all-weather" capability, low visibility degrades the speed and ease at which operations can be executed. The weather may also limit the amount of airspace available for air combat maneuvering. Low ceilings and visibility also limit the acquisition ranges of aircraft involved in terrain flight air combat. These factors will change the optimum munitions load because of the increased probability of short-range cannon and rocket engagements. Low ceilings provide concealment from threat fixed-wing aircraft operating above the cloud layer and complicate acquisition and engagement by fighters operating below the ceiling.

Troops. Troops available include all types of forces—air defense, CAS, attack, assault, artillery, armor, and infantry—as well as air troops. During the planning and allocation of combat power, division and corps commanders will decide, based on METT-T, whether to assign a specified air combat mission to the aviation brigade.

Time available. Available planning time will determine the detail of planning and coordination for air combat. The time that operations are to be conducted will impact significantly on how well aviation forces are protected. Night operations, especially when aviation forces cross the FLOT, enhance survivability and mission accomplishment against significant air and ground threats.

Other factors. In planning for air combat, aviation commanders must consider C^3I, armament and fuel, and aircraft availability. They must plan for the most efficient use of available communications equipment to ensure positive C^2 of their subordinate elements and the timely flow of intelligence. Plans must include the armament and fuel loads required for the mission. The number and types of aircraft available will influence the tactics and techniques used. Although tactics will tend to be defensive when forces are outnumbered, aggressive offensive action is usually possible and desirable. The improved performance and capabilities of new and future aircraft will enhance the effectiveness of air combat operations.

Coordination. When properly coordinated, the synchronized effort of the combined arms team and supporting assets can overwhelm potential adversaries. Premission planning should include coordination to ensure every available asset operates in concert to defeat the threat. Potential participants in air combat operations are air defense, armor and infantry, artillery, and close air support.

Air defense. Ground air defense retains the primary mission to defend the combined arms team against the air threat. According to the Army tactical C^2 systems concept, the functional air defense control at the corps, division, and brigade is the forward area air defense C^2I. FAAD C^2I unifies the air defense effort. It combines intelligence and targeting information from organic and external sources. It then distributes this information, along with weapon control orders, to FAAD command elements and combined arms team members. Thus air defense provides tremendous firepower, which enhances and complements the air combat efforts of aviation forces. Air defense also develops the means to provide C^3I to Army units involved in the counterair effort. The squadron and aviation brigade commanders and staffs must ensure that communication links are established with the air defense ABMOC of the division or corps.

Armor and infantry. Armor and infantry units occupy the ground where air combat may be conducted in close operations. Therefore, coordination of routes, corridors, and engagement areas is vital. Weapon effects of air combat on ground forces should be minimized when possible. Ground force fires should be coordinated in the air battle to maximize effectiveness and reduce fratricide. To accomplish this,

the ground force commander may give a subordinate unit an air combat role and direct it to maintain communications with the ABMOC through the FAAD C^2I net. The designated unit's preplanned air engagement areas, rules of engagement, call signs, and frequencies should be disseminated to aviation units operating in the area.

Artillery. Artillery coordination includes preplanning targets for SEAD, suppressing critical air threat nodes, and denying threat helicopter standoff firing positions.

Close air support. JAAT and CAS assets are normally configured for their air-to-ground role. They carry air-to-air missiles for self-protection and 20- or 30-millimeter forward firing cannons for use in countering air threats. Coordination with the USAF TAC(A) may enable some of the CAS aircraft to assist aviation forces in destroying or disengaging from the air threat.

Employment Considerations.

Air combat techniques. The increasing threat from enemy helicopters may cause modifications to existing techniques and procedures used by the air troops. The air-to-air Stinger may further change the way the troops operate to maximize the use of this system. When faced with an air threat, aviators must incorporate air combat techniques into their missions. Various air combat techniques have been distilled from many years of fixed-wing combat experiences. Some of these techniques, in concert with Army doctrine, apply to helicopter air combat. These techniques have been incorporated into the approved final draft of FM 1-107. They are briefly discussed below.

Avoid detection. Aircrews accomplish this by frequently altering heading, varying airspeed, flying at the most concealed altitude, and avoiding abrupt maneuvers. Detection is also avoided by reducing shadows and using camouflage and free formations.

See the enemy first. Good observation techniques and cuing from FAAD C^2I enable the aviation unit to seize the initiative and choose a course of action.

Recognize the threat. Any aircraft sighted must be considered hostile until positively identified. Aircrews must be able to identify all aircraft types, national markings, and enemy tactics. They also must be able to determine aircraft intentions by observing the altitude, direction of flight, armament, and number of aircraft in the flight.

Decide whether to engage. The commander's decision to engage is based on whether engagement will enhance mission accomplishment. The following five questions influence the commander's decision:

- Have friendly aircraft been observed by the enemy?
- What is the relative size of the enemy force?
- How are enemy aircraft armed?
- Can friendly aircraft engage at standoff ranges?
- Are other combined arms team fires available?

Be unpredictable. Unpredictability is vital to success in air combat. What works today might not work tomorrow. The key to unpredictability is keen situational awareness. Commanders and aircrews must assess the situation and

instantly recognize opportunities to defeat the opposing forces. Individual air combat training will expand the aviator's level of proficiency in his aircraft and enable him to get maximum performance from both the airframe and the onboard systems.

Scout-attack roles. Initial fielding of the ATAS will be to scout aircraft and then to attack aircraft. In a situation where scouts are ATAS-equipped and attack aircraft are not, the air troop's air combat techniques may need to be modified. Commanders may be advised to consider a nontraditional task organization when employing forces in air combat. The teams may be organized either in scout-attack mixes or in pure sections. The scout section provides long-range ATAS fires, whereas the attack section maneuvers to engage at shorter ranges with rocket and cannon fire. When performing reconnaissance missions with a high rotary-wing threat, scouts with ATAS are mut-ually supportive and may overwatch other scout-attack teams. Tests have shown that scouts are vulnerable to threat rotary-wing attack when they are positioned to the front of overwatching attack aircraft. Attack aircraft may also compromise their location and give up the element of surprise when they are forced to move forward to protect the scouts. When aeroscouts lead, they must divide their attention between air and ground lookout navigation tasks. This may result in poor reaction times for the engagement of enemy aircraft and allow the enemy to close within gun and rocket system ranges. Another problem is the limited weapon system effectiveness of the AH-1. The AH-1 may not always be able to engage enemy aircraft before the enemy engages the scout. During overwatch, the scout may concentrate on air observation techniques with the attack helicopter or another scout leading. The scout cockpit work load is thereby reduced, increasing the scout's lookout capability. This should shorten detection time and permit ATAS engagement before the enemy helicopter can engage the overwatched element with its gun and rocket systems.

Providing air assault security. When providing air assault security, the air troops provide local air security and suppressive fires. Using fire and movement techniques, the security force destroys, neutralizes, or delays enemy short-range air attacks. The security force must be aggressive and sufficiently removed from the main body to provide reaction time and maneuver space. Scout elements of the security force should be employed to gain first sighting and report the threat so that a timely decision can be made. The security element must be briefed about the actions on contact so that it can destroy or delay the threat or avoid contact. Otherwise, late acquisition of an air threat may preclude a timely decision from the AATF commander.

Destroying the threat. If ordered to destroy the threat, the scout should engage with the ATAS at maximum effective range. The scout element should also attempt to lure, deceive, or force the air threat into the attack helicopter's fire. During the scout engagement, the attack aircraft maneuver into attack positions to counter the anticipated enemy movement. The attack element should be organized into maneuver elements to provide "close-in" mutual support during the attack. These elements retain the flexibility to adjust to unexpected enemy actions.

Delaying the threat force. If ordered to delay the threat to ensure mission accomplishment, the security force attempts to prevent the threat force from closing with the main body of the AATF. Fighting from subsequent BPs, the aeroscout and aeroweapons sections of the attack element trade space for time while avoiding decisive engagement.

Avoiding detection and engagement. If ordered to avoid detection and engagement by the threat, the security element will mask and continue to report to the AATF commander. The AATF will then maneuver to avoid the threat.

Engaging the threat. The decision to engage the threat with insufficient forces or the failure to gain first sighting may result in the defeat of the security

forces and the AATF. The security forces and AATF must execute prebriefed actions on contact to disengage, reconstitute, maintain unit integrity, and provide mutual support during the engagement.

COUNTERRECONNAISSANCE

Air troops may be employed in the counterreconnaissance role. Counterreconnaissance consists of all measures taken to prevent hostile observation of a force, an area, or a place. This role may be performed as an implied or a specified task of reconnaissance and security operations. Appendix B outlines some of the possible threats that may oppose the air troops; most are the threat reconnaissance units. The air troop has at its disposal several means for killing enemy reconnaissance forces: organic attack helicopters, indirect fire support, CAS, and battle handover to the ground cavalry troops. Section V contains further details on engaging the enemy.

PASSAGE OF LINES

Purpose.

A passage of lines is an operation in which one force moves either forward or rearward through another force to gain or break contact with the enemy. If a unit must pass laterally through another unit, movement is conducted as a forward passage. The passing force is particularly vulnerable during a passage of lines. Personnel and units may be overly concentrated, stationary unit fires may be masked temporarily, and the passing unit may not be dispersed properly to react to enemy action. Detailed reconnaissance and coordination are critical to ensure the passage is conducted quickly and smoothly. A passage of lines is often necessary because the factors of METT-T do not permit one unit the freedom of bypassing another friendly unit and each unit must pass through another. Forces may conduct a passage of lines to—

- Envelop an enemy force.
- Pursue a fleeing enemy.
- Continue an attack or counterattack.
- Pass forward or withdraw reconnaissance units.
- Pass forward or withdraw a covering force or main battle area forces.

Air troops frequently conduct a passage of lines as a part of reconnaissance, screening, and air assault security operations. They may coordinate and assist the divisional passage of lines.

Planning Considerations. The squadron commander or S3 prepares a tentative plan for the passage of lines and analyzes METT-T factors and the higher commander's intent. The squadron commander or S3 places additional emphasis on the factors listed below.

Organization. When possible, unit integrity is maintained to provide better command and control.

Order of movement. An order of movement is prescribed based on the number of passage points and degree of security required. The enemy situation and the terrain also influence the order of movement and the priorities on who moves when.

Security. Air troops assist in a passage of lines by screening between the enemy and the passing force to provide early warning and limited protection. Noise, light, and radio discipline must be enforced. The air troops may perform screen operations or serve as the controlling element for a battalion or squadron passage of lines.

Command and control. The techniques of command and control depend on the number of passage points. Ideally, multiple passage points are established to facilitate decentralized control. Commanders of units involved in the passage of lines must decide how they can best influence the action and then position themselves accordingly.

Control Measures. The time, conditions, or circumstances when the responsibility for the zone or sector is transferred are planned in advance. The air troop commander and the passing unit commander understand the control measures, or the measures are specified by the headquarters directing the passage. The responsibility for a zone or sector normally changes at a specified time or when the disengaging or passing unit passes a specific location (usually a designated PL). Coordination and control are facilitated when the boundaries of the participating units coincide and when commanders coordinate face-to-face. Other control measures that may be incorporated into a passage of lines are discussed below.

Assembly areas. Assembly areas are areas in which a force prepares or regroups for further action. They are located where they will not interfere with friendly forward positions.

Battle handover line. The BHL is the location where the stationary force assumes control of the battle on rearward passage. It must enable the stationary force to engage the enemy with direct fire systems. The BHL should be portrayed on the operations overlay as a PL. The designated passage PL normally is the battle handover line. The BHL is also the place where a moving force assumes the responsibility for the battle in a forward passage of lines.

Attack position. An attack position is the last covered and concealed position an attacking force may occupy before crossing the LD. It may also be a PZ, a holding area, or an assembly area.

Passage lanes. Passage lanes are routes along which a passing unit moves to avoid stationary units and obstacles. Planning should provide for primary and alternate lanes.

Passage point. A passage point is the point where one unit will pass through another, either in an advance or a withdrawal. Passage points are located where the commander desires subordinate units to physically execute a passage of lines. Included in the plan are instructions directing who will overwatch the passage points and how lanes and gaps will be closed. Air passage through a particular passage point within the tactical operations area requires close coordination with ground and A^2C^2 elements. Unique planning considerations and coordinating procedures are necessary to avoid confusion and provide safe passage for aircraft traversing these points. Previously coordinated and agreed upon control methods are used to provide friendly aircraft identification to air defense systems. Control methods include specifying types and quantities of aircraft and a range of permissible airspeeds. Other control methods include designating the altitude, direction, lateral boundaries, and time limitations to supplement other forms of IFF and visual identification.

Time or event of passage. The commander ordering the passage prescribes the time or particular event when it will occur.

Recognition signals. These signals are messages that consist of one or more letters, words, visual displays, characters, signal flags, or special sounds with prearranged meaning. They are used to determine whether other persons or units are friendly or enemy. As a minimum, weapon systems are oriented toward the enemy. This is especially critical in a rearward passage.

Contact point. A contact point is a designated, easily identifiable point on the terrain where two or more units are required to make physical contact before a passage can occur.

Release point. A release point is a clearly defined point on a route where the control of units reverts to respective unit commanders. Each unit then continues movement toward its assigned destination.

Route. The route is the prescribed course a unit must travel from a specific point to a specific destination.

Fire Control. Direct and indirect fires of the stationary unit are normally integrated into the fire support plan of the passing units. Assets and control facilities are collocated to provide coordinated and responsive support. Although the squadron normally does not have organic indirect fire support, artillery (battery to battalion) may be placed in direct support of the squadron for a particular operation.

Liaison and Coordination.

Liaison. Liaison involves the exchange of information that may be necessary for the conduct of the passage of lines. Usually, the flight operations officer or the S3 performs the initial liaison for all passages of lines. Liaison information includes the—

- Routes.
- Fire support.
- Enemy situation.
- Passage points and lanes.
- Airspace control measures.
- Obstacle locations and types.
- Signal operation instructions.
- Presence of NBC contamination.
- Contact and coordination points.
- Observation posts and patrol routes.
- Friendly locations for day and night.
- Designation and types of units to pass.
- Mission and scheme of maneuver of units.
- Assembly areas, attack positions, or both.
- CS and CSS locations for emergency support.
- Designated location of the passage PL. (This may be a battle handover line.)

Coordination. When the air troop is involved in a passage of lines, timely and specific coordination before the operation is essential. The most desirable method is a face-to-face exchange of information. As a minimum, the exchange of information should include the—

- Period of time required for the passage.
- Locations of passage points along the FEBA or FLOT.
- Disposition and scheme of maneuver of friendly units.
- Enemy situation in the sector, to include air activity.
- Types and numbers of vehicles to make the passage, if appropriate.
- Methods of communication, to include frequencies and nets, visual and backup communications, and recognition signals.
- Control of friendly supporting fires, to include restrictive fire support coordination measures and air defense weapons control status.

NOTE: If time permits, the unit should conduct a rehearsal to make sure that all problems are worked out and that everyone knows what he is supposed to do. Passage of lines is one of the most difficult operations that a unit can conduct, and a good rehearsal may lessen the difficulty.

FEINT

A feint is a limited attack to divert an enemy's attack. As a rule, brigade and smaller units conduct feints before or during a main attack to deceive the enemy. To succeed, the feint must appear as a serious attack. Additional feints are conducted to cause the enemy to move its reserves, shift its fire support, reveal its defensive posture, and disrupt its decision-making cycle. This reduces the resistance that the main attack will encounter. Air troops normally conduct reconnaissance and screening operations during a feint. However, the situation may require the troops to engage targets more aggressively than normal with or without augmentation. The troops may have to develop the situation more thoroughly in the objective area to compensate for the lack of reinforcements. The troops screen the flanks and rear of the force conducting the feint, or they move to join operations in the main attack area. However, the force commander must assess the risks and determine whether air troop assets will be employed in this role.

DEMONSTRATION

A demonstration serves the same purpose as a feint but differs in that it does not involve contact with the enemy. The objective of a demonstration is to deceive and confuse the enemy as to the real intentions of the attacking force. For a demonstration to succeed, the enemy must observe the demonstrating force's operation and be deceived by it but not actively engage the force. The nature of a demonstration allows for the use of decoys, simulations, and inoperable equipment for deception purposes. The air troop's principal role in a demonstration may be to be seen and heard conducting operations in a given area. The assault helicopter company, in conjunction with an air troop, may simulate an air assault operation. The force commander should conduct a risk analysis for this operation in the same manner as for a feint.

RAID

A raid is an attack into enemy-held territory for a specific purpose other than to gain or hold terrain. It usually ends with a planned withdrawal when the assigned mission has been completed. Air troops seldom accompany a ground force as it moves to the objective. These units usually link up at the objective. Air troop missions during a raid include—

- Reconnoitering air routes for raiding aircraft.
- Screening air assault elements en route to objectives.
- Controlling preparatory fires on objectives before air assault forces arrive.
- Screening PZs while air assault forces board aircraft for the withdrawal.
- Screening raid forces while at the objective by identifying enemy reinforcement attempts.
- Providing local security for attack helicopter units as they engage targets in the objective area.

Section V
OFFENSIVE OPERATIONS

TYPES

The five types of offensive operations are movement to contact, hasty attack, deliberate attack, exploitation, and pursuit. The air troop participates in these operations and in the defense as part of a larger force. Whether the air troop operates as part of the squadron or independently, the troop will generally conduct reconnaissance and screening operations during offensive and defensive operations. Because of their inability to hold terrain, Army aviation assets are always employed offensively, even when the supported unit is in the defense. The operations discussed below will give a commander some techniques he can use when employing an air troop. The air troop is employed based on METT-T and the commander's guidance.

MOVEMENT TO CONTACT

A movement to contact gains or reestablishes contact with the enemy. It takes place after a force's withdrawal, after nuclear or chemical attacks, or during the initial hours of movement to a new battlefield. Even when the corps or division is attacking, the leading battalion task forces will often be moving to contact. In fact, most offensive actions begin with a movement to contact.

A corps and its divisions usually organize a covering force, an advance guard, and a main body. The air troop is best employed when it operates well forward of the main body.

The air troop assumes, along with its squadron, a leading role in assisting the main body forces to move across the battlefield. Its mobility keeps the main body movement continuous, aggressive, and at maximum speed. The air troop's speed does not mean it moves recklessly; its speed is a result of terrain independence.

The air troop moves forward of the main body to provide early warning and immediate battlefield information to the main body commander. It moves forward of ground elements as it does in a zone reconnaissance. Emphasis is placed on developing the situation early. When detailed information concerning route trafficability is desired, the air troop is task-organized with ground elements to maintain squadron integrity.

The air troop is a commander's ideal tool with which to lead a small mobile force. It enables the commander to maneuver the main body when initial contact is made. If the air troop is organized into a flank guard force, the commander has a highly mobile security force with C^2 assets and organic antiarmor capability. This helps to gain maneuver space and reaction time for the main body.

The air troop responds to initial enemy contact to ensure that the main body is not surprised. Using direct and indirect fires and CAS, the air troop harasses and impedes enemy elements to preclude their influence on the main body. The air troop commander directs ground elements to the vicinity of enemy units and supports the ground elements with fire. If attack helicopter battalions are employed, the air troop commander maintains contact with the enemy force. He coordinates with attack elements and then hands over the targets. (Appendix F describes attack helicopter battle positions and target handover procedures.)

When initial contact is made with the enemy in an urban area, the air troop reacts by providing the squadron commander with as much information about the area as possible. Urban fighting is slow and resource-intensive. Therefore, the squadron commander must decide whether to bypass the area or fight through it.

If the main body is directed to bypass the enemy after initial contact, the air troop is ideally suited to an economy-of-force role. With its organic attack helicopter firepower, the air troop can maintain surveillance and contain small forces until follow-on elements arrive to destroy them. Figure 3-21 depicts an air troop in a movement to contact.

HASTY ATTACK

A hasty attack usually evolves from a movement to contact. The objectives are to overwhelm the enemy quickly and seize the initiative. Speed is paramount. If momentum is lost, the hasty attack can fail. An attack with speed, audacity, and boldness offsets the inherent lack of thorough preparation.

The hasty attack depends on timely and accurate information as well as speed. When contact is made, commanders must immediately evaluate their chances of success. Situational information must be passed to higher headquarters. Possible courses of action include enveloping or bypassing enemy forces or reinforcing the attack.

When the attack begins, the air troop commander employs direct and indirect fires to develop the situation. The air troop supplies battlefield information and situation updates on which the commander can base immediate decisions concerning the attack. It provides suppressive fires for a maneuvering ground element and security to the attacking force through early warning. If additional firepower is needed, the air troop facilitates the sequencing of the attack helicopter battalion into the battle.

When planned ATKHB assets arrive, the air troop returns to its reconnaissance and security missions. It continues to provide information about alternate attack routes and aerial or ground envelopment routes.

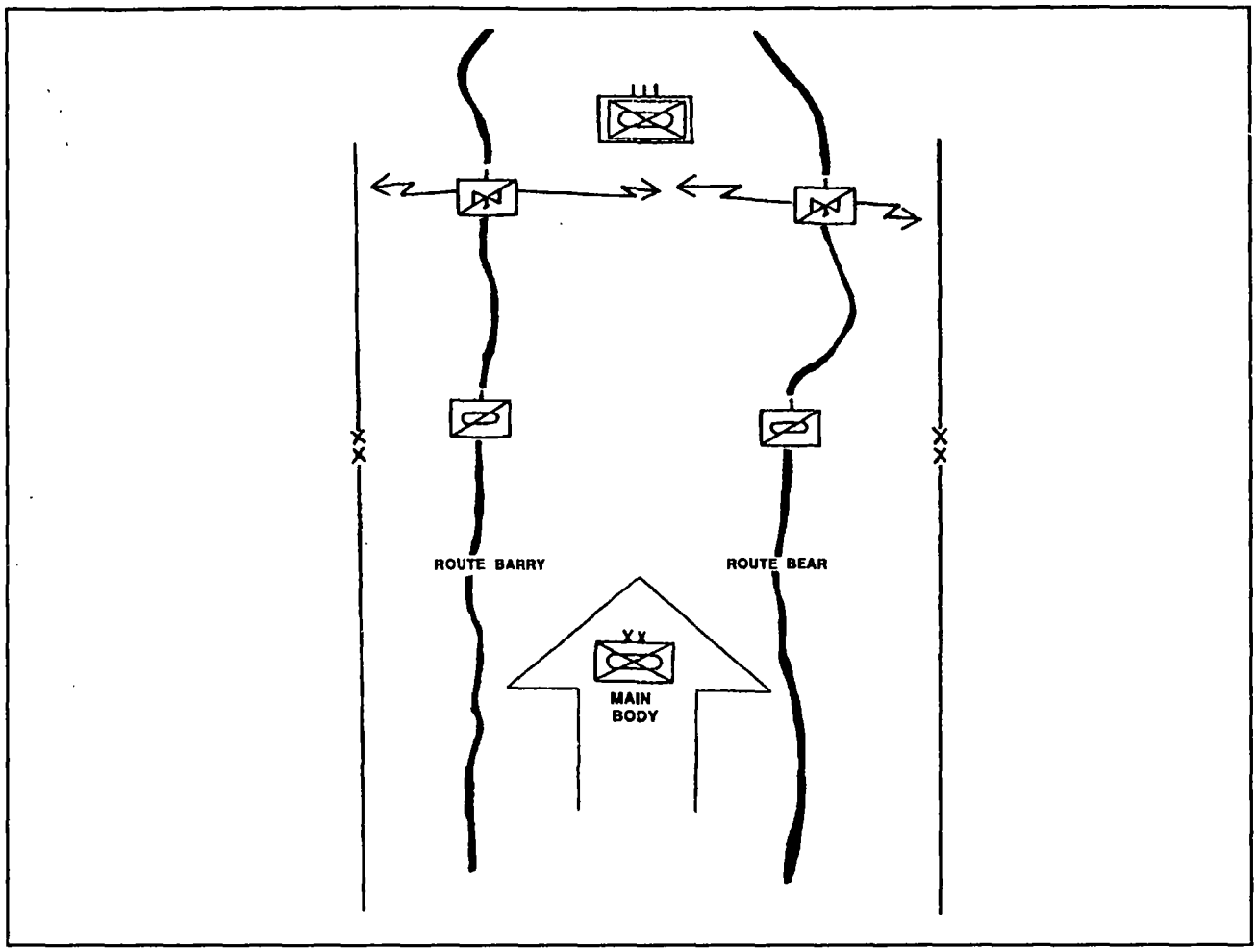


Figure 3-21. Air troop in a movement to contact

The air troop commander can orchestrate all the fire support assets used in a hasty attack as well as direct attack helicopter assets. In the hasty attack, the air troop primarily provides information to the commander and then orchestrates firepower and maneuver. Figure 3-22 (page 3-48) depicts an air troop in a hasty attack.

DELIBERATE ATTACK

A deliberate attack is usually necessary when the defender is well-organized and cannot be turned or bypassed. It is characterized by extensive planning, a detailed scheme of maneuver, and an integrated fire support plan. The objective is either terrain or enemy forces.

The goal of the initial assault is to concentrate maximum firepower on enemy forces and to destroy them as rapidly as possible while friendly forces sustain only minimum casualties. In the initial assault, both sides employ all available firepower; this includes CAS, field artillery, rockets, and armor. The vulnerability of helicopters to such intensive fire often precludes their use in the initial assault.

The security efforts of the air troop are oriented toward protecting the attacking force from flank and rear area attacks in an economy-of-force measure. This may be the air troop's most critical contribution. It allows the ground commander to mass all his forces in the deliberate attack. Surveillance of possible enemy LZs is included in the security role.

A commander's IPB will determine how the attack is planned and initiated. Because the primary attack route could be modified before the attack begins, situational development is essential. After the initial assault begins, the air troop can identify weak points. As the assault continues, immediate reports from the air troop enable the main body commander to direct his attack at the most vulnerable points. If a feint becomes more successful than the main attack, the air troop commander relays this information to the supported commander and directs forces to the newly defined main attack area.

If the initial assault succeeds and friendly forces breach the enemy's defenses, the air troop moves through the penetration and outward on the flanks where the enemy is weak and fragmented. It suppresses second echelon overwatching fires. The air troop also locates counterattacking enemy forces, C^2 centers, logistical centers, and other soft targets. After these have been located, the air troop employs indirect fires to destroy them. When attack helicopter battalion assets are available, the air troop commander identifies and hands over the targets to the attack elements. The air troop then resumes reconnaissance for other targets in the area. Figure 3-23 depicts an air troop in a deliberate attack.

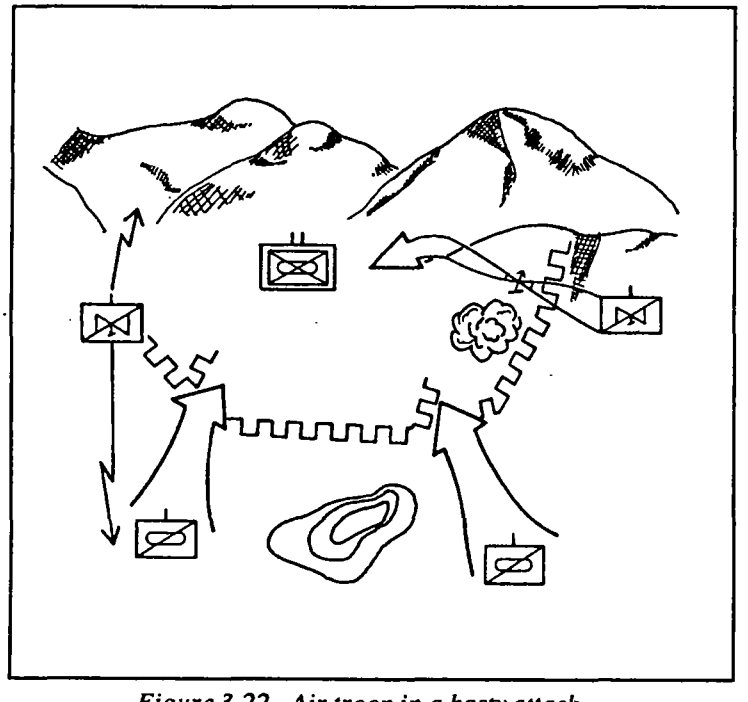


Figure 3-22. Air troop in a hasty attack

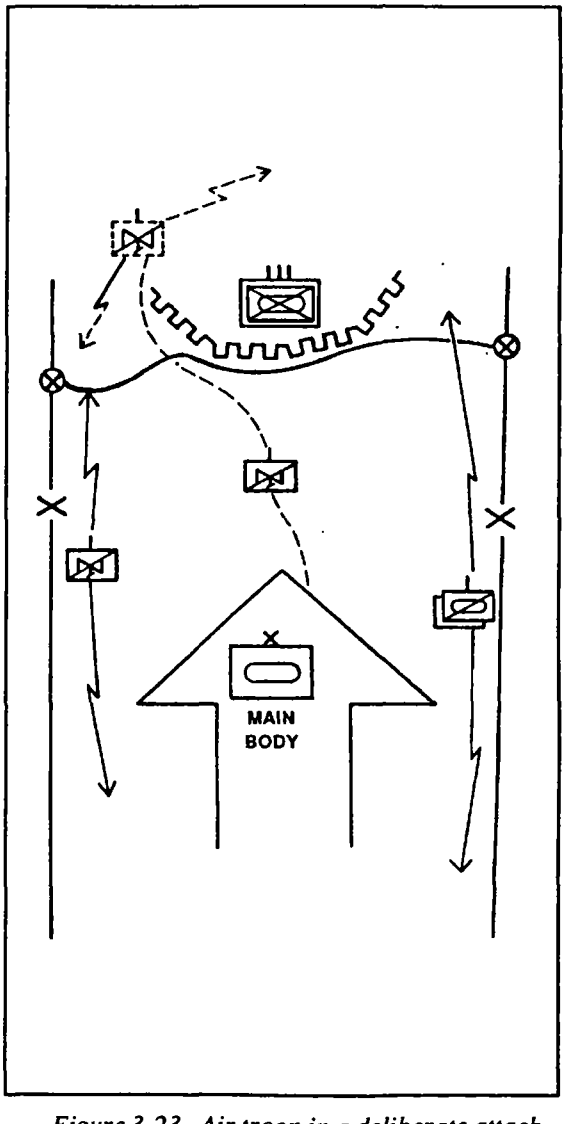


Figure 3-23. Air troop in a deliberate attack

EXPLOITATION

An exploitation takes immediate advantage of newly created or discovered enemy weaknesses. It follows successful attacks and is designed to disorganize the enemy and prevent its orderly withdrawal. The objective of the exploitation is to avoid enemy combat units, destroy enemy support systems, and prevent the enemy from reorganizing an effective defense.

The mission is executed by advancing rapidly toward the enemy's rear operations area, by bypassing pockets of resistance, and by destroying lightly defended and undefended activities. These actions include seizing objectives deep in the enemy's rear operations area and cutting enemy lines of communication. They also include isolating and destroying enemy units and disrupting enemy C^2 facilities.

By maintaining constant pressure on and contact with the fleeing enemy, the air troop allows the ground exploitation force to advance rapidly. It provides continual reports about escaping enemy forces, enemy reinforcements, and heavily and lightly defended areas. The air troop moves ahead of the lead elements in the exploitation to gather information that the ground commander uses to direct his assets. Key intelligence includes information about artillery positions, abandoned vehicles, supply installations, command posts, and signal installations. After identifying these locations, the air troop suppresses and isolates them while waiting for stronger forces to arrive or it destroys them. The air troop should have indirect long-range fires available. The air troop commander coordinates with attack helicopter unit leaders in moving attack assets into the battle. After ground forces penetrate the enemy's defenses, many tasks in an exploitation are similar to those in a movement to contact.

The air troop commander's main concern during an exploitation is that his elements may outrun their support. Timely relocation of aviation brigade FARPs, as well as squadron FARPs, is critical to sustained combat for the air troop. To ensure that the air troop can support the exploitation, FARPs must move with the ground forces. The air troop commander ensures that higher headquarters is aware of his special support requirements. Figure 3-24 depicts an air troop in an exploitation.

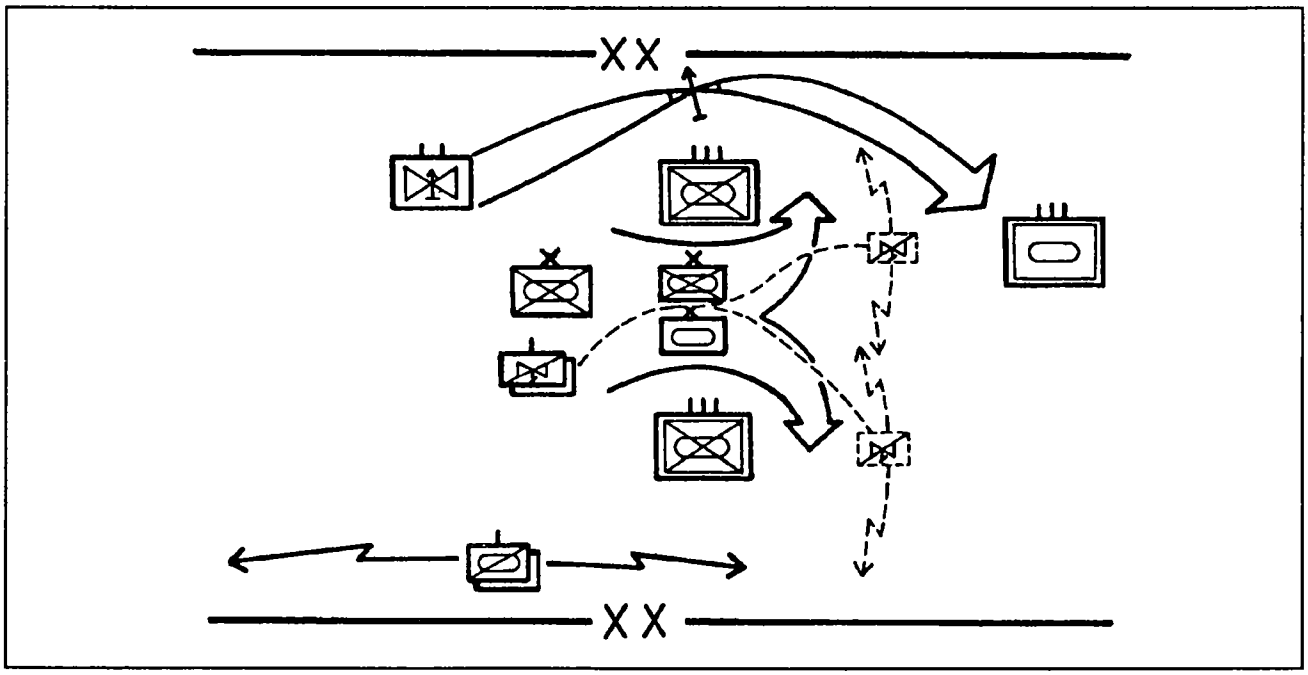


Figure 3-24. Air troop in an exploitation

PURSUIT

A pursuit completes the destruction of an enemy force that has lost the ability to delay in an organized fashion and is attempting to disengage and withdraw. The pursuit is a logical extension of the exploitation. The objective of the pursuit is to destroy the enemy.

The pursuit force is organized into two elements. The first element is a direct pressure force that conducts a series of hasty attacks to maintain attack momentum and to exact maximum casualties. Armor-heavy forces are ideally suited for this operation. The second element is an encircling force that moves swiftly to cut off the retreating enemy. It advances parallel to the enemy's line of retreat to reach key bridges, road intersections, and mountain passes ahead of the enemy. Figure 3-25 depicts an air troop as part of a pursuing force.

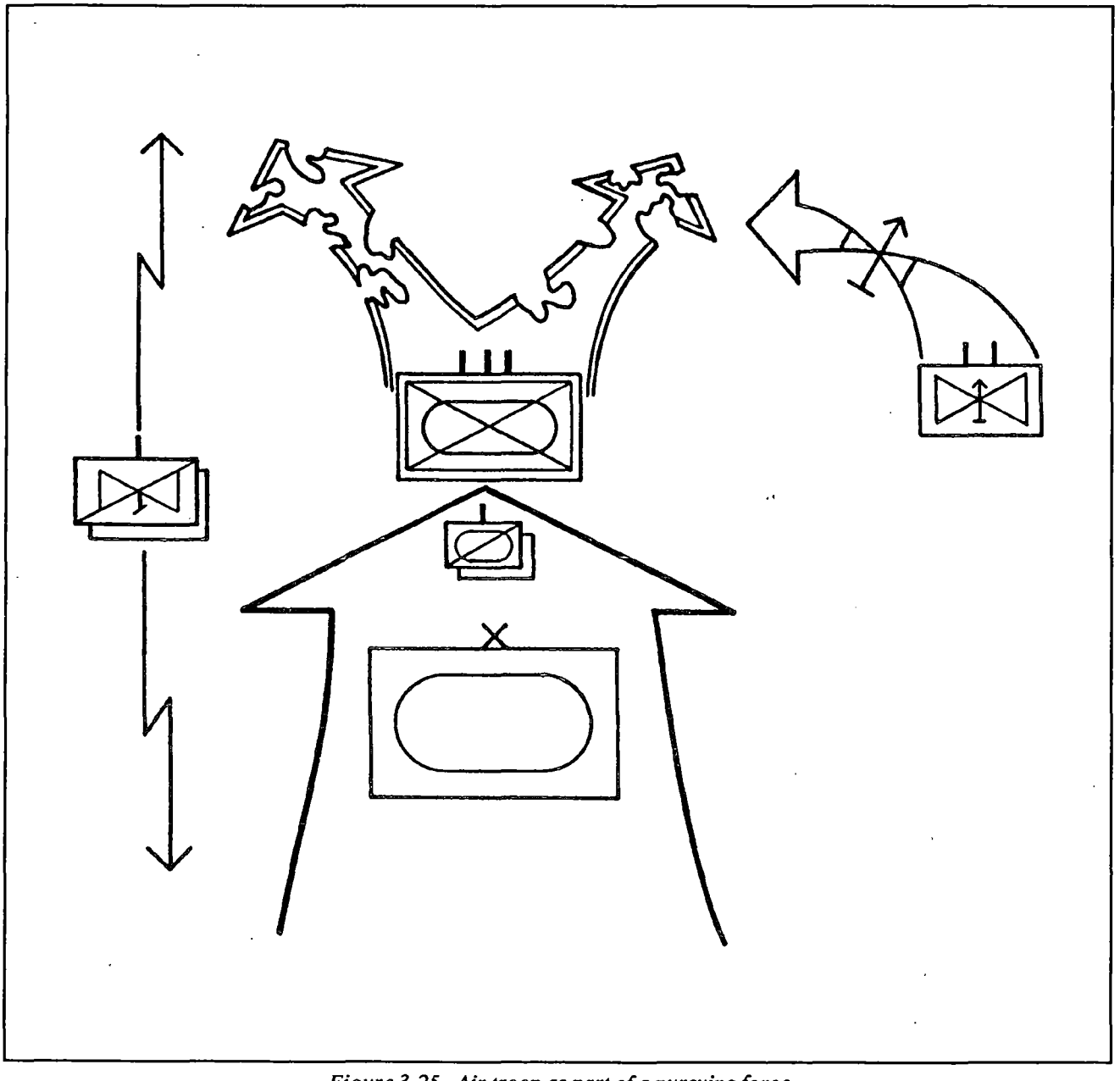


Figure 3-25. Air troop as part of a pursuing force

The air troop may be organized as part of the direct pressure force. In this role, it secures the force from flanking attack by reinforcements. When the air troop precedes the direct pressure force, it provides intelligence information to support hasty attacks. The air troop also maintains contact with isolated enemy strongpoints until ground elements can attack and reduce them.

The air troop is usually used as part of the encircling force. In this role, it maintains contact with the fleeing forces to identify locations that can be used to block the enemy's retreat. If air assault forces are used to establish these blocking positions, the air troop reconnoiters for air routes, LZs, and strongpoints. It may also provide en route security for the air assault force. When armor forces attempt to encircle the fleeing force, the air troop conducts a hasty route reconnaissance to expedite the movement of ground forces to blocking positions. Throughout the operation, the air troop employs direct and indirect fires to further disrupt and destroy the enemy.

The air troop provides continual reports about any changes in the enemy's direction of movement, location, or disposition. It also assists in directing attack helicopter units into battle positions to complete the enemy's destruction.

Section VI
DEFENSIVE OPERATIONS

PURPOSE AND MISSION

The defense is not the decisive form of war. While the defense can deny success to the enemy, it seldom assures victory. The defense, however, is the stronger form of war because of the advantages of the defender. AirLand Battle doctrine recognizes the strength of the defense but emphasizes the necessity of quickly changing to offensive operations after a successful defense. Air troops participate in defensive operations as part of a larger force. They normally perform security missions for the ground units in the defense or reconnaissance to support the attacks. The area of operations for the aviation brigade includes three simultaneous operations. They are the close, rear, and deep operations. Figure 3-26 (page 3-52) depicts the three brigade operational areas.

CLOSE OPERATIONS

Air troops conduct close operations in two separate areas: the security area and the main battle area.

Security Area. As in a movement to contact, the air troops provide security for the main body by screening the covering force. As part of the covering force, the air troops may be tasked to screen the entire division front. In this role, the air troops are employed as an integral part of the cavalry squadron. A zone reconnaissance is conducted during movement to the initial screen. If the division occupies a broad front, air troop assets will be stretched thin. Therefore, the air troops must have long-range indirect fires available to impede and harass the enemy. During the screening mission,

the air troops continually pass spot reports concerning the enemy's movement, location, and disposition. Roles of the air troops in the security area include—

- Providing security for the air assault movement of light infantry forces.
- Orchestrating CAS, artillery, and attack aircraft in JAAT engagement areas.
- Orienting assets on high-speed avenues of approach and areas not efficiently covered by ground elements.
- Developing intelligence for a hasty attack and then securing the attacking forces by a screening operation.
- Conducting aerial route reconnaissance for attack helicopter battalions when they are moving to attack follow-on elements.
- Operating with the squadron in an economy-of-force role to free ground units so that they can mass in other areas of the battlefield.
- Screening the flanks of the division to maintain contact with friendly forces and to prevent the enemy from conducting flank attacks.
- Providing overwatch for moving ground elements. (This is essentially a screening mission designed to gain reaction time and maneuver space.)

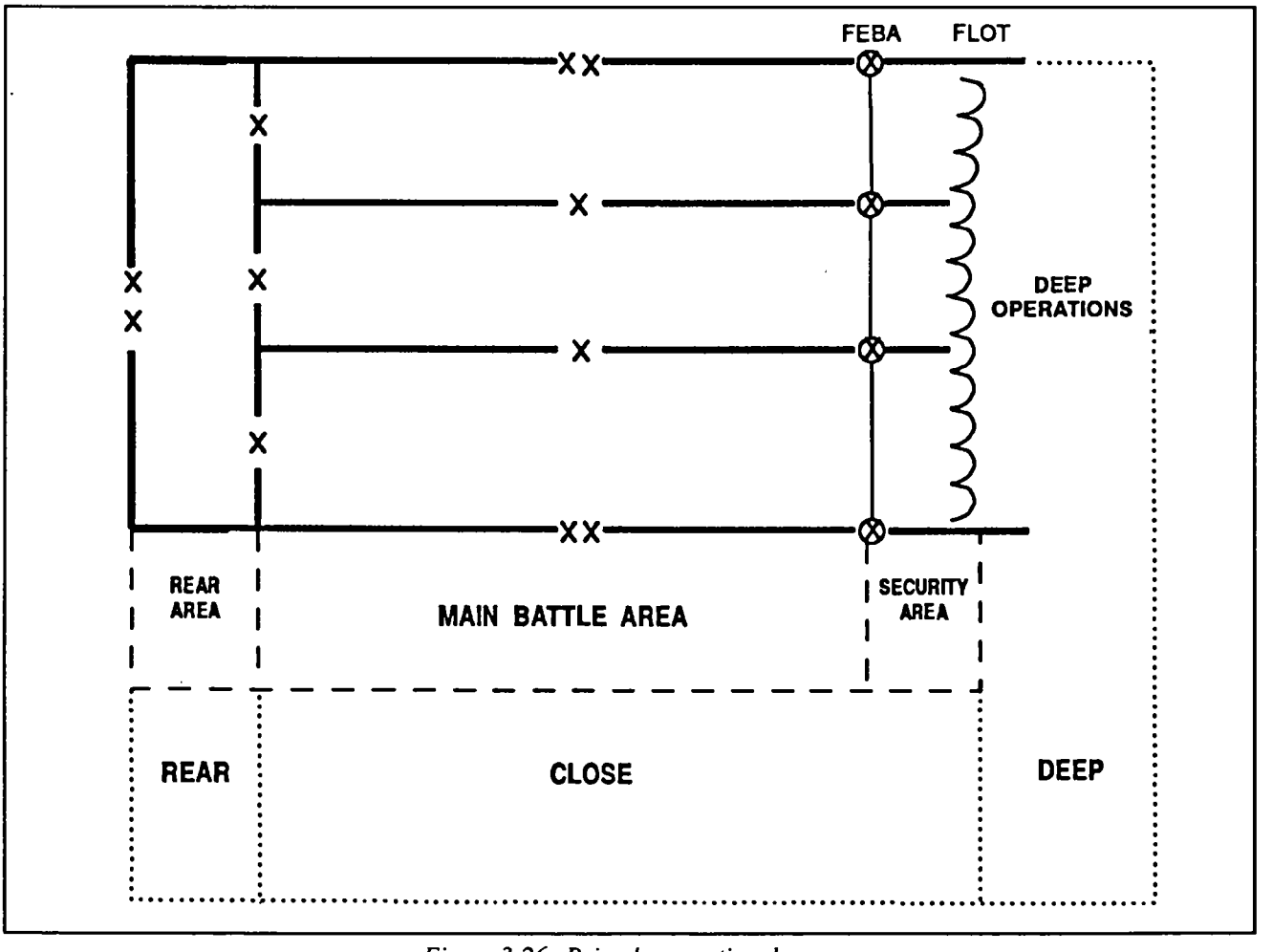


Figure 3-26. Brigade operational areas

Main Battle Area. The decisive battle is fought in the main battle area. Covering force elements will have developed the situation to slow the enemy and buy time for the main body. The battle handover is critical and includes a passage of lines and a shift of responsibilities from the covering force to the main battle commander. This handover must occur quickly and efficiently to reduce vulnerability. The principal duty of the air troops is to provide security during the handover phase. Security helps to ensure an orderly handover. Specific air troop missions include—

- Securing the flanks and rear of the main body.
- Orchestrating JAAT operations within the main battle area.
- Acting as a rapid-reaction force to counter initial enemy penetrations.
- Countering enemy airborne operations into the main battle area.
- Maintaining lines of communication and supply in the main battle area by conducting reconnaissance and security operations along routes.
- Conducting air combat operations.

REAR OPERATIONS

Air troops perform security and reconnaissance missions in the rear operations area. Rear operations differ in orientation but not in type. Air troops normally perform these missions as part of their parent squadron or regiment.

Security Operations.

Protection of installations and units. The air troop is seldom used to protect installations and units. However, it may be used as a roving screen with armored cavalry or other ground elements forming a perimeter around the installations.

Denial of drop or landing zones. One of the air troop's first concerns when assigned a rear operations security mission is the identification of probable drop or landing zones. It conducts this mission in a manner similar to a zone reconnaissance so that it can cover the entire area.

Surveillance of landing zones. If the main body commander does not have enough observation aircraft to cover the LZs, the air troop may be directed to maintain surveillance of possible LZs at various locations. The air troop may conduct this mission as a screening operation. The primary emphasis is on early warning. The air troop takes immediate action to destroy enemy airborne and heliborne forces before they leave the LZs. Indirect fires, TACAIR, and available attack helicopters are committed to destroying the enemy forces. The enemy must not be allowed to organize and consolidate on the ground; preventing this is a critical air troop priority.

Reconnaissance Operations.

Actions against stay-behind forces. Stay-behind forces may include infiltrators and guerrilla forces operating to the rear of forward brigades. Air troops conduct continual roving patrols to find these forces. They use zone reconnaissance techniques, giving special attention to choke points and other likely ambush locations along convoy routes. They also pay special attention to areas near installations such as headquarters and large supply depots. Once found, the enemy must be rapidly

fixed in place with fire from attack helicopters, artillery, or maneuver forces and destroyed with overwhelming firepower.

Actions against enemy penetrations. Air troops are normally used to find the flanks of enemy penetrations. They use techniques similar to zone reconnaissance, focusing on determining friendly and enemy situations. Once the enemy is located, air cavalry attack helicopters can often wear down and slow breakthrough forces. The information that the air troops gain can help ground units respond effectively. Indirect fires are used for suppression, and CAS is used to help destroy the enemy.

Reconnaissance of main supply routes. The air troops assist in the movement of supply vehicles throughout the rear area by employing route reconnaissance techniques. They maintain surveillance on main supply routes to identify obstacles and choke points and to prevent possible problems associated with them. The air troops report on these problem areas and help direct convoys around or through them.

DEEP OPERATIONS

Air troops perform reconnaissance and security missions to support attack helicopter battalions performing deep operations. The air troops report enemy air defense locations and possible air corridors through the FLOT. They can also assist the attack battalion in returning back across the FLOT. The air troops themselves can perform cross-FLOT operations in the form of raids against such targets as C^2 nodes, artillery, and CSS assets.

Section VII
RETROGRADE OPERATIONS

PURPOSE AND MISSION

A retrograde operation is an organized movement to the rear or away from the enemy. It may be forced by the enemy or be made voluntarily. The basic reason a squadron conducts a retrograde operation is to improve a tactical situation or keep a worse one from occurring. Air troops normally assist the squadron in conducting this operation. A retrograde operation may be conducted to—

- Gain time.
- Preserve forces.
- Shorten lines of communication.
- Reposition forces on the battlefield.
- Avoid combat under undesirable conditions.
- Draw the enemy into an unfavorable position.
- Permit the withdrawal of a force for use elsewhere.

Three types of retrograde operations are performed by a cavalry squadron or regiment. They are delay, withdrawal, and retirement. Each is discussed in subsequent paragraphs and shown in Figure 3-27. FM 17-95 contains further details on retrograde operations..

OPERATION	INTENT	ENEMY CONTACT
DELAY	TRADE SPACE FOR TIME—ECONOMY OF FORCE	IN CONTACT—AVOID DECISIVE ENGAGEMENT
WITHDRAWAL - UNDER PRESSURE - NOT UNDER PRESSURE	DISENGAGE FORCE TO FREE UNIT FOR USE ELSEWHERE	IN CONTACT—BREAK CONTACT
RETIREMENT	MOVE A FORCE AWAY FROM THE ENEMY	NONE

Figure 3-27. Retrograde operations

DELAY

A delay is normally performed as part of a defensive battle. Integration of air troops is crucial to a successful delay operation. Air troops can be used to fill gaps within the squadron, provide depth during the movement of ground troops, and help the commander see the entire battlefield. The intent of a delay is to gain time. The destruction of the enemy is of secondary importance. The delaying force must simultaneously—

- Preserve the force.
- Preserve freedom to maneuver.
- Maintain operational coherence.
- Cause the enemy to deploy and react to successive attacks.
- Maintain contact with the enemy to avoid being outmaneuvered.

The air troops accomplish several of the missions identified above during their normal reconnaissance and security missions. Maintaining contact and retaining freedom to maneuver are essential to the air troops' success, regardless of how they are employed.

The air troops complement the ground elements by controlling long-range overwatching fires as the friendly elements disengage and move to alternate or successive positions. They maintain surveillance of high-speed avenues of approach to ensure that the delaying force is not bypassed or encircled. Sometimes the air troops may be unable to deliver enough direct fire on the enemy to force its deployment for the attack. When this happens, the squadron will ask for additional firepower in the form of attack helicopter battalions.

Utility aircraft are often used to move light infantry forces to alternate and successive positions. The air troops support these operations by conducting an aerial

route reconnaissance. They also provide security for the air assault forces and conduct PZ and LZ reconnaissance and security missions. Figure 3-28 depicts the air troops as part of a delaying force.

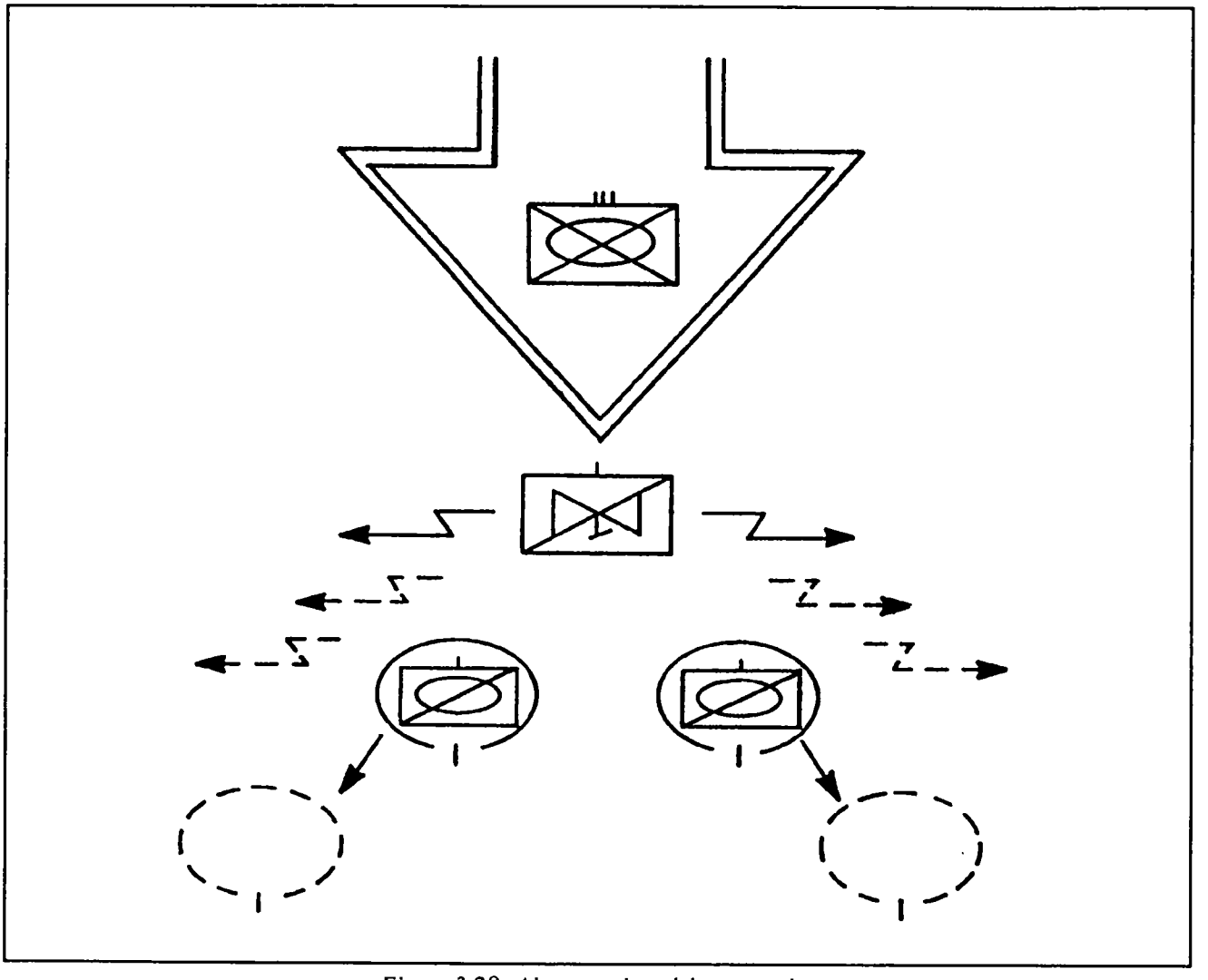


Figure 3-28. Air troops in a delay operation

WITHDRAWAL

A withdrawal occurs when a force in contact with the enemy frees itself for a new mission. The force may withdraw to continue the defense in depth or to perform a different mission. There are two types of withdrawal: under enemy pressure and not under enemy pressure.

Under enemy pressure, the unit depends on fire and movement to break contact with an attacking enemy force and then withdraws.

Not under enemy pressure, the unit depends on the speed of execution and deception. If the unit is not under attack, the withdrawal is not under pressure.

Air troops perform the same missions during a withdrawal operation as they would in a delay operation. In addition to performing reconnaissance and security missions, the air troops provide the squadron with battlefield intelligence in the form

of spot reports. They assist the squadron in passage of lines and battle handover, and they can provide the squadron with a highly maneuverable antitank capability. Air troops can also coordinate fire support and CAS.

RETIREMENT

A retirement occurs when a unit out of contact moves away from the enemy. Movement to the rear is conducted in an organized fashion. Air troops should use the same planning considerations for a retirement that they would for a withdrawal. A retirement may be a continuation of a withdrawal. Movement is tactical and is conducted at night or during periods of limited visibility. Contingency missions, such as screens or route reconnaissance, can be assigned to the air troops if contact with the enemy is made.

CHAPTER 4

COMBAT SUPPORT AND COMBAT SERVICE SUPPORT

This chapter implements portions of STANAGs 2404 and 3805.

This chapter describes the combat support and combat service support that air troops may receive during the conduct of operations. The parent squadron provides CS and CSS for the air troops. Combat multipliers increase combat power without requiring additional combat units. Combat multipliers include fire support, air defense, tactical air support (specifically CAS for the air troops), engineer support, signal support, aviation combat support, IEW support, CSS, and A^2C^2. Combat service support sustains combat operations by manning the force and maintaining weapon systems. It includes supply operations, maintenance, and personnel and field services. The CSS internal to the squadron that supports air troops is consolidated in the HHT. The regimental support squadron provides most of the CSS for squadrons in an armored cavalry regiment. The main support battalion or forward support battalion provides the CSS for squadrons in a division. All AVIM and a majority of the POL will likely come directly from COSCOM.

Section I
COMBAT SUPPORT

FIRE SUPPORT

The air troop has no organic FSE. Therefore, it coordinates with the unit providing fire support to the squadron, ground troops, or ground maneuver elements in the area in which it is operating. Typical fire support assets that may be available to the air troop are field artillery (all types), mortars, and naval gunfire.

The air troop commander controls the fires of the FA supporting the troop during the mission. However, he may delegate this authority to any of his platoon leaders or aircrews. Call-for-fire techniques and range estimation procedures are discussed in FM 6-30.

All air troop crew members are trained to locate, call for, and adjust indirect fire. Normally, observation aircraft crews engage targets with indirect fire while attack helicopter crews engage with organic weapon systems.

The call for fire is made to the supporting unit FDC, ground cavalry FIST, or squadron FSE. The supporting unit's FDC has the most responsive lines of communication. When TACFIRE interface is planned and available in the observation aircraft, calls for fire are made directly to the firing unit.

When the air troop is employed in either a reconnaissance or screening role forward of ground elements, it may be given priority of fires. The observation and mobility capabilities are the primary reasons that an air troop can employ fire support earlier than its ground counterparts. When ground elements are engaged in close combat, priority of fires normally shifts to the ground elements. Coordination and communication between air and ground elements are essential to ensure that fire support is delivered where it is most needed.

When an air troop is employed independent of a ground cavalry element, priority of fires is more critical to mission completion. During reconnaissance and security operations, long-range fires are necessary to develop the situation and to provide reaction time and maneuver space for the main body. The air troop commander coordinates with the supporting FSE to ensure his personnel receive the fire support they need to accomplish the mission.

Organic mortar assets found at company and battalion levels in mechanized and light infantry divisions and heavy divisions may provide fire support for the air troop. These fires, depending on the controlling unit, may be available to the troop.

When operating with ground cavalry, the air troop may receive fire support from the organic mortars of a ground cavalry troop. However, when working in concert with another ground element, the air troop commander coordinates the use of mortars with that maneuver element commander.

TACTICAL AIR SUPPORT

The most common tactical air support available to the air troop is close air support. The air troop employs CAS in concert with other weapon systems to maximize their effects on the enemy. When attack helicopters are sequenced into the operation, JAATs are formed. The JAAT operation is an effective means of destroying or neutralizing an enemy that is massed or in open terrain. The JAAT operation should complement the ground commander's scheme of maneuver. FMs 1-112 and 1-117 discuss JAAT operations in more detail.

The air troop commander or AMC has the overall coordination responsibility for the JAAT operation. He coordinates the JAAT operation with the ground commander, CAS flight lead, and fire support personnel. Ground elements, artillery, and attack helicopters contribute to SEAD operations.

The air troop commander may assume the role of the tactical air coordinator (airborne). As the TAC(A), he will communicate directly with the CAS flight lead. Pertinent information they discuss includes the—

- Initial points.
- Air defense threat.
- Marking of the target.
- Location of friendly forces.

- Restrictions such as firing.
- Position of air troop or attack assets.
- Location and description of the target.
- Heading and distance from the initial point to the target.

The air troop commander coordinates the attack and recommends to the flight leader the attack method to be used based on how the threat is employed. The attack is controlled by the flight leaders and the aeroscout crew. When available, the tactical air control party at the squadron TOC is the initial point of contact for the air troop commander to begin his coordination. The TACP provides liaison and control for USAF assets at the squadron level. The squadron commander's intentions and the fire support assets available will dictate how the JAAT operation is conducted.

Face-to-face preplanning may not occur before a JAAT operation. The air troop commander remains current on the ground tactical plan and fire support availability. A spontaneous JAAT occurs as CAS aircraft arrive into the air troop's area of operations. The air troop commander or team leader synchronizes CAS aircraft, FA, and air troop assets into the operation. He contacts the TACP for assistance in joining them on a common frequency. When mission essential information is passed between the air troop commander and the CAS flight leader, the JAAT is formed.

ENGINEER SUPPORT

The division's organic engineer battalion may provide the squadron an engineer company during covering force and screening operations. An engineer platoon from that company is usually placed in direct support of a ground troop to assist in its missions. These missions include mobility, countermobility, and survivability. Corps engineers may provide additional engineer support to the division for sustainment engineering and topographic engineering.

Engineers are not in support of air troops unless the troops are task-organized with ground maneuver elements for a specific mission. When appropriate, air troops receive engineer support based on the work priorities established by the squadron commander. This support usually consists of mobility tasks such as constructing or clearing LZs or PZs and constructing berms and trenches for FARPs. The support also consists of survivability tasks such as protective emplacements for aircraft and equipment and camouflage and deception operations.

Of particular note is the topographic engineer support from the division engineer officer at the division G3. A nine-man team from corps is attached to each division. The team can provide various overlays to include the route, vegetation, water, and aerial and ground obstacles. This element can greatly assist in the IPB process by providing the combined obstacles overlay and by locating LZs, PZs, FARPs, battle positions, and engagement areas.

AIR DEFENSE

The cavalry/reconnaissance squadron normally receives air defense protection from organic division AD assets (SHORAD), depending on the priorities established by the division commander. Additional AD protection is provided on an area basis by high-to-medium-altitude AD systems (theater-dependent). Division AD assets may

be supplemented by corps AD units. Depending on the commander's priorities, AD assets can be situated to provide air defense protection to the squadron FARP, the trains area, and other collocated facilities or units. The air troops are protected when they are located in these areas.

The air troop commander will probably not receive any air defense protection, but he can use passive countermeasures to enhance the survivability of his troop trains area, the TAA, and the FAA. Natural camouflage is used when possible. Camouflage nets are used along with natural camouflage to hide the air troops' wheeled vehicles and tentage. The air troops will have to use natural camouflage, together with the lightweight screening system, for their aircraft assets.

Airborne SWT assets are protected by positive and procedural control methods when they operate near AD elements that are supporting the division. Additionally, the air troops will take active and passive measures to defeat the enemy. Primarily, these measures involve the use of proper terrain flight techniques and engagement drills.

SIGNAL SUPPORT

Signal requirements are normally accomplished at squadron level. However, the troop commander and the first sergeant are responsible for making sure their vehicle's radio equipment and AN/PRC-77s are in working order. If they are not, the squadron signal officer needs to be notified so that the equipment can be fixed. The signal officer should be made aware of the requirement for classes on how to operate and maintain the troop's radio equipment and for updates on electronic countermeasures.

ARMY AIRSPACE COMMAND AND CONTROL

The air troops, along with other elements of the squadron and division or corps, must be aware of positive and procedural A^2C^2 measures. In addition, air troops (through squadron) may frequently request the implementation of A^2C^2 measures for their own protection. The air troop commander, as well as the squadron commander, must plan, coordinate, and implement A^2C^2. A^2C^2 planning is accomplished as part of the normal decision-making process. The flight operations officer, with guidance from the squadron commander, does the actual planning and coordinating of A^2C^2 measures. A^2C^2 must be considered to facilitate minimum risk of engagement by friendly AD forces.

Common Control Measures.

High-density airspace control zone. The HIDACZ is a defined area of airspace that is requested by a commander (usually division and above). The commander of the HIDACZ reserves and controls airspace, determining which airspace users have access to the zone. This allows him to restrict the volume from users who are not involved with his operations.

Coordinating altitude. Coordinating altitude is a method designed to separate fixed-wing and rotary-wing aircraft. It does not prohibit the use of the airspace above or below the coordinating altitude. However, the controlling authority for the airspace must be notified before aircraft penetrate that airspace.

Restricted operations area. The ROA is a volume of airspace, of defined dimensions, developed for a specified operational requirement. Some or all airspace

users are restricted from the area until the end of the mission. The ROA is normally activated to support drop zones, search and rescue operations, and SEMA orbits or to facilitate air defense operations.

Minimum risk route. The MRR is a temporary route of flight recommended for USAF use. It presents the minimum known hazards to low-level aircraft transiting the zone. It normally extends from the COMMZ through the theater army, corps, and division areas and across the FLOT, terminating in the vicinity of the FSCL. The MRRs and SAAFRs are used only by US forces; NATO does not use this control measure.

Low-level transit route. The LLTR is a temporary corridor, of defined dimensions, for low-level passage of friendly aircraft through air defenses and controlled or restricted airspace. The LLTRs are established to avoid concentration of FA units, significant groups of fire support targets, LZs and DZs, FARPs, known enemy AD, and other planned or active special-use airspace.

Standard-use Army aircraft flight route. The SAAFR is a route established below coordinating altitude to facilitate the movement of Army aviation assets. The SAAFRs do not require joint approval and are normally located in corps and division rear areas. The SAAFRs are intended for single aircraft or small flights of aircraft.

Base defense zone. The BDZ is an air defense zone established around an air base. The BDZs are limited to the engagement envelope of the SHORAD systems defending the base.

Weapons-free zone. The WFZ is an air defense zone established for the protection of key assets or facilities other than air bases. Aircrews must avoid WFZs or coordinate with the appropriate controlling headquarters before entering or transiting the zones. Air defense systems within a WFZ are normally maintained at a control status of weapons free.

Air corridor. The air corridor is a restricted air route of travel specified for friendly aircraft use. It is established to prevent friendly fires against friendly aircraft. The air corridor is an Army operational procedure.

Other Control Measures. Other operational airspace control measures are the FSCL, air control point, initial point, and way points. FM 100-103 discusses A^2C^2 in detail.

Section II
COMBAT SERVICE SUPPORT

PLANNING AND COORDINATION

Planning. Combat operations planning and CSS planning are conducted simultaneously. The air troop commander employs his unit, and the S1/S4 and the HHT commander provide support. Therefore, the air troop commander and the flight operations officer must coordinate closely with the staff and HHT to provide

adequate CSS support to the air troop's mission. During planning, the air troop commander must consider the—

- Locations and requirements of FARPs (Classes III and V) and the times available.
- Coordination for the pickup and delivery of Class I.
- Coordination of maintenance support from the HHT for wheeled vehicles and aircraft, the location of the AVUM troop, and the employment of contact teams to at least the main FARP.
- Locations of services such as the medics, the water point, the fuel for the wheeled vehicles, as well as other services provided by the squadron.

Coordination. The air troop commander is responsible for making sure that all needed CSS support has been coordinated for his troop. The air troop commander cannot plan a combat operation and CSS at the same time. Therefore, he relies on the flight operations officer to plan and coordinate FARPs and the location of the contact teams. The first sergeant assists in coordinating Class I, AVUM, contact maintenance teams, and other services needed to support the troop.

SUPPLY

The air troop stocks some prescribed and basic loads. The minimum stockage level is normally directed by division, corps, or DA. The air troop does not have the capability to transport or store Classes I, II, III, V, VI, and VIII; the troop must coordinate the pickup of these items. The first sergeant is the air troop's logistician. With the commander's guidance, he will coordinate the troop's supply needs except aircraft Classes III(A) and V(A), which will be accomplished by the S3 (flight operations officer).

MAINTENANCE

Individual operators and users of equipment are responsible for the preventive maintenance of assigned equipment. Crew chiefs are assigned to aircraft to perform daily servicing, inspections, and aircraft repairs, which are high-frequency, remove-and-replace types of repairs. When repairs are time consuming, operator-level repairs will be accomplished by the maintenance section in the HHT for wheeled vehicles or in the AVUM troop for aircraft. The platoon leaders, platoon sergeants, and maintenance officer are responsible for that coordination.

PERSONNEL SERVICES

Personnel Administration. The first sergeant or designated individual assists in personnel matters, but the air troop personnel will go to the squadron PAC for personnel administration.

Evacuation and Medical Support. Air-ground medical evacuation procedures and medical support are coordinated through the squadron aid station or the squadron TOC.

Feeding Plans and Activities. The S3 integrates the squadron's feeding plans. The air troop's first sergeant is responsible for Class I pickup and transport. The

pickup times and location within the squadron field trains area will be coordinated through the S4.

Field Sanitation. The air troop's first sergeant will plan and coordinate the troop's field sanitation procedures according to FM 21-10-1. Refresher training in personal hygiene and field sanitation measures should be provided before any operation.

NBC DETECTION AND DECONTAMINATION

Through training from the squadron NBC officer and the equipment provided, such as an M-8A1 alarm, selected members within the air troop are responsible for NBC detection. The NBC officer and his team are responsible for setting up decontamination sites and suit exchange in addition to individual decontamination methods. The first sergeant will coordinate to obtain new suits, decontaminants, and filters and to select the location of the decontamination site. Appendix C addresses NBC operations.

FIELD SERVICES

The air troop commander and his first sergeant coordinate the appropriate field services through the squadron staffs. These services are—

- GRREG (S1 and S4).
- Baths (S4).
- Salvage (S4).
- Laundry (S4).
- Clothing exchange (S4).
- Religious services (S1).
- Other services.

APPENDIX A

RISK MANAGEMENT

Tough, realistic training conducted to standard is the cornerstone of Army warfighting skills. An intense training environment stresses both soldiers and equipment, creating a high potential for accidents. The potential for accidents increases as training realism increases. Thus realistic training poses a serious drain on warfighting assets. Commanders must find ways to protect their soldiers and equipment from accidents during realistic training to prepare for war. An accidental loss in war is no different in its effects from a combat loss; the asset is gone. Commanders must compensate for the numerical advantages of the threat by protecting their combat resources from accidental loss. How well they do this could be the decisive factor in winning or losing. Commanders and staffs can use this appendix as a guide for managing risk as it applies to their organization and mission.

CONCEPT

Risk management is a tool leaders can use to make smart risk decisions in tactical operations. It allows leaders to execute more realistic training scenarios not otherwise possible because of the high probability of accidents. Risk management is a common-sense way of accomplishing the mission with the least risk possible. It is a method of getting the job done by identifying the areas that present the highest risk and taking action to eliminate, reduce, or control the risk. Risk management thereby becomes a fully integrated part of mission planning and execution.

RESPONSIBILITIES

Risk management is not complex, technical, or difficult. It is a comparatively simple decision-making process—a way of thinking through a mission to balance mission demands against risks. Once understood, risk management is a way to put more realism into training without paying a price in deaths, injuries, or damaged equipment or all three. Risk management is not limited to training scenarios. It is performed during actual combat as well as in peacetime. Leaders must learn to assess risks during training events and apply the same techniques during combat actions. During combat, risks may be taken but only after they are evaluated and weighed as they are during training.

Commanders. As in all other areas, commanders are responsible for the effective management of risk. To meet this responsibility, commanders—

- Seek optimum, not just adequate, performance.
- Select from risk reduction options provided by the staff.
- Accept or reject residual risk based on the benefit to be derived.
- Train and motivate leaders at all levels to effectively use risk management concepts.

Staff. The staff—

- Assists the commander in assessing risks and in developing risk reduction options.
- Integrates risk controls in plans and orders.
- Eliminates unnecessary safety restrictions that diminish training effectiveness.

Troop Leaders. Troop leaders—

- Develop a total commitment to mission accomplishment and the welfare of subordinates.
- Consistently apply effective risk management concepts and methods to operations they lead.
- Report risk issues beyond their control or authority to their superiors for resolution.

PROCESS

Step 1: Identify Risks. Identify major events of the operational sequence and list them chronologically; then, if necessary, display them in a flow chart. This process will aid in the detection of specific risks associated with all specified and implied tasks. Safety can be built into an operation by first seeing the operation in its entirety. Operations invariably can be broken down into a series of phases, each with special characteristics and considerations. As soon as the commander states the mission and concept, it is usually possible to define the key events. Operations also have a time factor—a beginning-to-ending series of events in which the timing of events is often as significant as the events themselves. The operations analysis is a useful tool in quickly defining the flow and time sequencing of events in an operation. The objective is to reflect the total operation from the preparatory actions until the operation is completed or the next phase of operations is under way. The operations analysis is a simple but highly effective tool. It ensures that risk is evaluated in every aspect of the operation. Operations safety techniques are effective to a point, but they do not detect risk with the reliability required to achieve the degree of safety needed in today's Army.

Step 2: Assess Risks. Determine the magnitude of risks by estimating loss cost and probability. Assess each event, determine whether it is routine, and make an initial risk assessment. Ensure that standards for routine events are adequate to provide an acceptable level of risk.

Consider the value of a risk matrix or decision guide for all or part of the operation. Risk matrices provide a quick and ready method of breaking down an operation into its major operational aspects and eliminating or controlling the risks associated with it. Like other risk assessment tools, risk matrices can be used alone or with other risk analysis techniques to provide a quick overview of the risk situation. Risk matrices are simple enough to be routinely used by tactical leaders in operational planning. These matrices are nearly always more effective than intuitive methods in identifying the extent of risk. Figure A-1 (pages A-5 and A-6) illustrates a typical matrix that can be used to estimate the level of risk associated with an operation. When using risk matrices, the risk assessor should—

- Review each situation to ensure that all significant areas of concern are evaluated, even if they are not included in the matrices.
- Use the matrices to analyze the risk to target areas of concern for risk-reducing action.

- Review the individual areas of concern before recommending an option. (If an area of concern is off the scale in a particular situation, a higher decision level may be required than the risk gauge suggests.)
- Keep in mind that Figure A-1 represents arbitrary weighted factors; modify these factors to fit particular missions and units.

Consider using the METT-T format as another means to assess risks. Leaders can subjectively determine the likelihood and extent of accidental loss based on this type of analysis. When using the METT-T format, the risk assessor should—

- Determine *mission* complexity and difficulty.
- Assess the *enemy* situation and identify specific hazards.
- Consider all aspects of the *terrain* as well as weather and visibility.
- Determine the supervision required and evaluate the experience, training, morale, and endurance of *troops*; also determine the availability of equipment.
- Determine the *time available* for planning and executing the mission.

Step 3: Make Decisions and Develop Controls. Make risk acceptance decisions by balancing risk benefits against risk assessments. Eliminate unnecessary risks. Reduce the magnitude of mission-essential risks by applying controls. Controls range from hazard awareness to detailed operational procedures. Focus on high-hazard events and events not covered by a good set of standards. Complete a preliminary hazard analysis of these events. The preliminary hazard analysis is the initial examination of the hazards of an operation and their implications. It is normally based on the mission analysis and data-base review and takes place before the details of an operation have been completely defined. The objective of the preliminary hazard analysis is to define, at the earliest possible point in the operational life cycle, the hazards that can be expected. Doing this early means that these hazards can be addressed when they are still preliminary; that is, when the operation is still being planned.

Based on the preliminary risk analysis and products of analytical aids, develop a roster of options for eliminating or controlling the risks. Select or offer options for command decision. Once risks are identified and measured as accurately as possible, the leader must act to. eliminate or control them. These controls must not unnecessarily interfere with training objectives. The best options often come from reviewing the doctrinal publications relevant to the operation to glean information about the proper procedures for hazard control. Merely reviewing the analysis and assessment will often suggest options. Some options will be more effective than others. AR 385-10 provides a convenient list of actions that commanders can use as an aid in ranking options. In order of priority, commanders should—

- Eliminate the hazard totally, if possible. Engineer out the hazard or design equipment to eliminate the hazard or incorporate fail-safe devices.
- Guard or control the hazard. Use automatic monitoring or alarming devices. Provide containment or barriers.
- Change operational procedures to limit exposure. Modify operational procedures to minimize exposure (numbers and duration) consistent with mission needs.
- Train and educate personnel in hazard recognition and avoidance.
- Provide protective clothing or equipment that will minimize injury and damage potential.

- Use color coding and signs to alert personnel to hazards. Motivate personnel to use hazard avoidance actions.

Leaders can detect and eliminate unnecessary safety restrictions that impede the realism or effectiveness of training. With proper controls, these restrictions can be eliminated or scaled back. Check for residual effects before implementing risk reduction options. Visualize what will happen once the option has been implemented. Sometimes reducing one risk will only introduce others.

Step 4: Implement Controls. Integrate specific controls into plans, OPORDs, SOPs, training performance standards, and rehearsals. Knowledge of risk controls, down to the individual soldier, is essential for the successful implementation and execution of these controls.

Step 5: Supervise. Determine the effectiveness of standards in controlling risk. The commander must enforce controls and standards. This is key to loss control. The commander may have approved a number of risk reduction procedures, but approval does not mean that the procedures are carried out. Leaders must monitor the situation to ensure that action is actually taken. The prudent leader then follows up to see that the doers understand and accept the guidance. Leaders should also monitor the effect of risk reduction procedures to verify that they really are good ideas. This is especially true for new and untested procedures.

Leaders must always monitor the operational activities of subordinate elements. Only by seeing the character of operations can leaders fully appreciate risk implications. When monitoring operational activities, leaders should—

- Avoid administrative intrusions and not get in the way.
- Go where the risks are and spend time at the heart of the action.
- Analyze and think through issues, not just watch.
- Work with key personnel to improve operational procedures after the action and not hesitate to address imminent danger issues on the spot.
- Fix systemic problems that are hindering field effectiveness.

Leaders must be able to balance the cost of the risk involved with the value of the outcome desired in an operation. They must consider and manage risk in making decisions. Three general rules apply when leaders select a tactical procedure.

No unnecessary risk should ever be accepted. The leader who has the authority to accept or reject a risk is responsible for protecting his soldiers from unnecessary risk. If a risk can be eliminated or reduced and the mission still be accomplished, the risk is unnecessary and must not be accepted.

Risk decisions must be made at the appropriate level. The leader who will answer for an accident is the person who should make the decision to accept or reject the risk. In some cases, this will be a senior officer. In other cases, it will be the first-line leader. Small-unit commanders and first-line leaders are going to make risk decisions in combat. Therefore, they should learn to make risk decisions in training.

The benefits of taking a risk must outweigh the possible cost of the risk. Leaders must understand the risk involved and have a clear picture of the benefits to be gained from taking the calculated risk.

Side A

Planning

CIRCLE ONE	Risk Value		SCORE _____
Guidance	Preparatory Time		
	Optimum	Adequate	Minimal
FRAGO	3	4	5
OPORD	2	3	4
OPLAN/LOI	1	2	3

Mission Control

CIRCLE ONE	Risk Value		SCORE _____
Task Organization	Training Event		
	Support Nontactical/ Garrison	Day Tactical	Night Tactical
OPCON	3	4	5
Attached	2	3	4
Assigned	1	2	3

Crew Endurance

CIRCLE ONE	Risk Value		SCORE _____
Environmental Preparation	Crew Preparation		
	Optimum	Adequate	Minimal
Tactical	3	4	5
Training	2	3	4
Garrison	1	2	3

Crew Selection

CIRCLE ONE	Risk Value		SCORE _____
Task	Experience Level		
	Highly Qualified	RL 1	RL 3
Complex	3	4	5
Routine	2	3	4
Simple	1	2	3

Side A Subtotal _____

Figure A-1. Suggested format for a risk assessment work sheet

Side B

Weather

CIRCLE ONE	Risk Value		SCORE _____
Wind Velocity	Ceiling/Visibility		
	>1000/3	<1000/3	Minimums
>30 kt	3	4	5
16-30 kt	2	3	5
0-15 kt	1	2	5

Terrain

CIRCLE ONE	Risk Value		SCORE _____
Type of Terrain	Modes of Flight		
	Low Level	Contour	NOE
Mountain	3	4	5
Desert/Jungle	2	3	4
Hills, Flat/Rolling	1	2	3

Equipment

CIRCLE ONE	Risk Value		SCORE _____
Equipment Age	Aircraft Status		
	FMC	PMC	Mission Equipped
Old	4	5	5
Average	2	4	4
New	1	2	2

Subtotal Side A _____ Subtotal Side B _____ Total _____

0 to 12 Low Risk	13 to 23 Caution	24 to 35 High Risk*

*High-risk operations assigned a value of 24-35 require coordination, before executing the mission, with the next higher level of command external to the organization making the assessment. When two or more areas are assigned a risk factor of 5, the overall rating is high risk.

Figure A-1. Suggested format for a risk assessment work sheet (continued).

APPENDIX B

THREAT OVERVIEW

The most challenging threat to forward deployed aviation will be the forces of the Soviet Union. Soviet principles of land warfare are based on violent, deep, and sustained offensive actions. These actions will be accomplished using motorized rifle and tank formations supported by CS and CSS units. The Soviets will also conduct major air operations with both fixed- and rotary-wing aircraft in support of offensive ground operations. These forces will be used to seize the initiative at the outset of hostilities and to penetrate enemy forward deployed forces in order to drive rapidly into enemy rear areas. A thorough knowledge of the threat is essential to success on the battlefield. Commanders and staffs who are well informed about the European threat will be able to employ their forces more effectively. This appendix provides a brief overview of Soviet doctrine and tactics. It specifically addresses those Soviet reconnaissance forces that air troops may frequently encounter. FMs 100-2-1, 100-2-2, and 100-2-3 describe the threat in detail.

EUROPEAN THREAT FORCES

The combined forces of NATO will be opposed by Soviet forces in the European mid- to high-intensity conflict. Forward deployed units can expect to be opposed by all or portions of a Soviet army. The two types of Soviet armies are the combined arms army and the tank army, each organized according to its specific mission. The CAA and the tank army have organic CS and CSS units to complement their maneuver divisions.

COMBAT ACTIONS

Current Soviet doctrine describes two forms of combat actions: offense and defense. Each is briefly discussed below.

Offensive Operations. Offensive operations are divided into three categories, depending on enemy actions and disposition. These categories are the attack against a defending enemy, the meeting engagement (battle), and the pursuit (exploitation).

Defensive Operations. The Soviets consider the offense as the only means to achieve decisive victory. However, Soviet defensive doctrine has not been overlooked and, in fact, has been stressed recently by the Soviets. This greater emphasis does not represent any abandonment of capabilities for offensive operations but reflects the view that they will have to defend against enemy attacks as well as stage their own offensive operations. In most cases, the defense is a temporary measure leading to the resumption of offensive operations. The Soviets recognize two types of defense:

the hasty defense and the prepared defense. The distinction between these types of defense is not absolute; with time, a hasty defense can become a prepared defense.

RECONNAISSANCE

As defined by the Soviets, reconnaissance is the collection of information about the location, activity, disposition, composition, size, armament, combat readiness, and intentions of an enemy. The Soviets recognize that reconnaissance will be met by enemy countermeasures and deception. They employ multiple, overlapping collection measures to ensure the success of their reconnaissance efforts.

Soviet divisions and regiments have organic reconnaissance assets. These units gather and produce intelligence to assist in the accomplishment of regimental and divisional missions.

Divisional reconnaissance battalion. This battalion is controlled by the chief of reconnaissance. The reconnaissance assault company (also called the airborne reconnaissance or long-range reconnaissance company) performs long-range reconnaissance. It provides the division commander with a deep-look capability out to 100 kilometers. Other elements of the battalion operate up to 50 kilometers ahead of the main body. During tactical movements, a divisional reconnaissance battalion usually moves one or more hours ahead of division lead elements. The battalion may form one to two reconnaissance groups and several patrols. The number of groups and patrols will depend on the situation and the mission. Generally, elements of the battalion try to avoid combat with enemy forces. Figure B-1 depicts a divisional reconnaissance battalion.

Regimental reconnaissance. The regimental reconnaissance company elements are controlled by the regimental commander. They typically operate 25 to 30 kilometers and sometimes as far as 50 kilometers ahead of the main body. The regimental reconnaissance company normally organizes for reconnaissance in much the same way and with the same constraints as the divisional reconnaissance battalion. Figure B-2 depicts a regimental reconnaissance company.

The Soviets perform most of their tactical reconnaissance using ground-based systems and organizations. The air troop must be able to recognize and report these organizations. The first step in defeating the Soviets is to deal with their reconnaissance elements. Reconnaissance elements are either denied the ability to perform tactical reconnaissance or their organizations are destroyed before they can complete their assigned missions.

REGIMENTAL COMBAT ORGANIZATION

A regiment is the smallest fully combined arms ground force. It is capable of limited independent action but normally attacks as part of a parent division. A regiment conducting an attack is normally preceded by an advance guard which, in turn, dispatches a forward security element and a combat reconnaissance patrol.

Advance Guard Organization. The advance guard usually consists of a reinforced rifle battalion with artillery, tank, air defense, engineer, and chemical elements. The advance guard is the security element for its parent regiment. The mission of the advance guard is to engage and destroy any enemy elements it encounters. By fighting through any enemy in its zone, the advance guard also

facilitates the uninterrupted advance of its parent regiment and, by extension, the division as a whole.

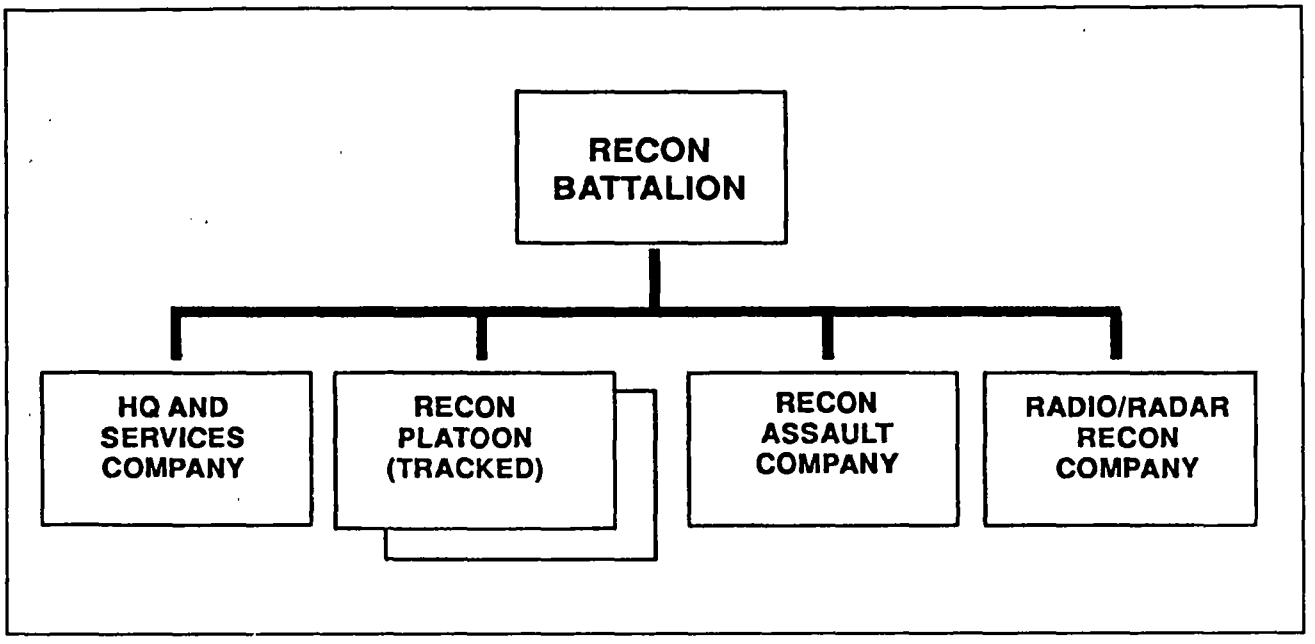


Figure B-1. Divisional reconnaissance battalion

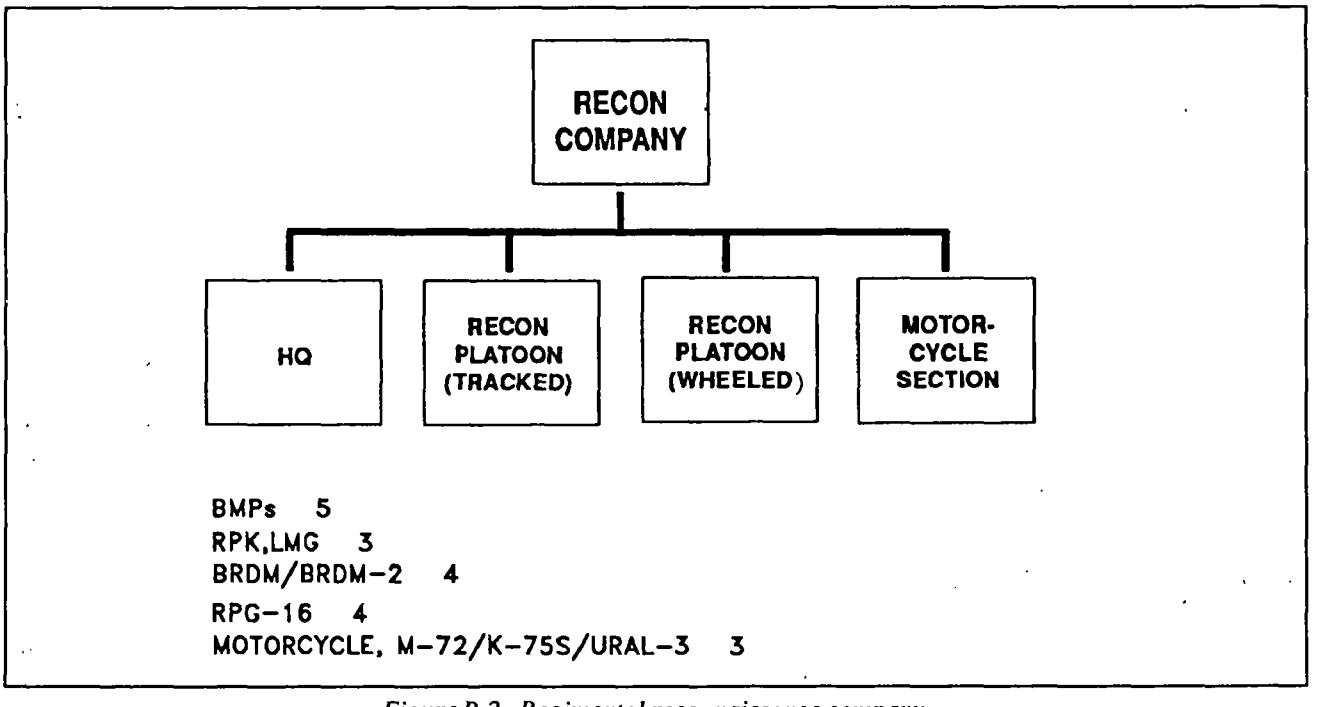


Figure B-2. Regimental reconnaissance company

Advance guard main body. The advance guard main body constitutes the bulk of the combat power of the advance guard. Its mission is to eliminate or fix enemy opposition forces to allow continuation of the march or to permit a flank attack by the main force. The advance guard main body normally operates 20 to 30 kilometers in front of the main force. Figure B-3 (page B-4) depicts the advance guard main body.

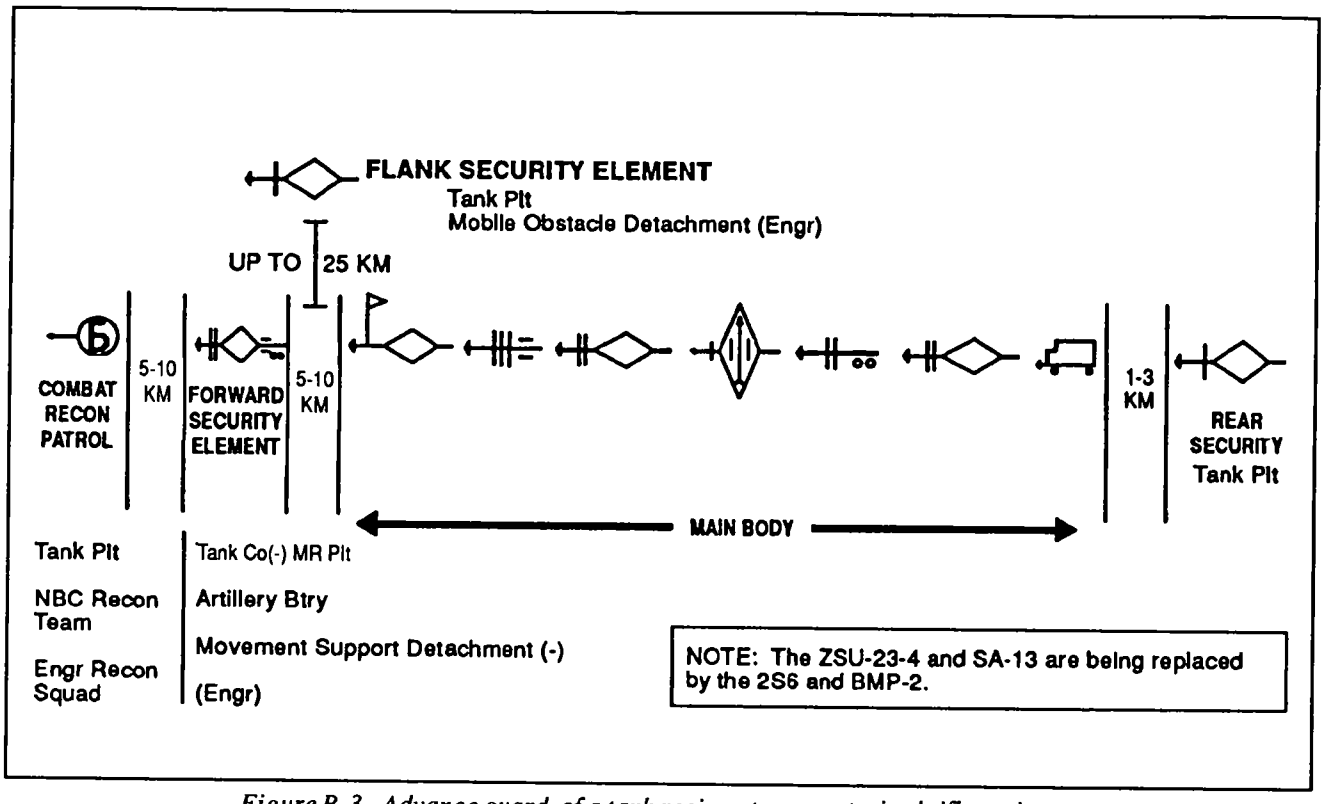


Figure B-3. Advance guard of a tank regiment or a motorized rifle regiment

Forward security element. The forward security element is normally a motorized rifle company reinforced with a tank platoon, an artillery battery, engineers, and chemical protection. It normally operates 5 to 10 kilometers ahead of the advance guard main body. The forward security element moves at maximum speed and engages enemy lead elements. It seizes and holds positions advantageous to the subsequent commitment of the advance guard main body. Figure B-4 depicts a forward security element.

Combat reconnaissance patrol. The CRP is normally a reinforced rifle platoon. Its mission is to provide prompt information about the enemy's strength, disposition, composition, and direction of movement. The patrol can be augmented by one or two tanks plus a chemical reconnaissance vehicle. It provides reports about routes, radiological and chemical situations, and terrain characteristics. The CRP normally operates 10 kilometers in front of the forward security element. Figure B-5 depicts a combat reconnaissance patrol.

Advance Guard Action. When the advance guard becomes engaged, the main force continues its forward movement. The deployment of the main force depends on the outcome of advance guard action. In any attack by an MRD or a TD, the initial phase of combat is carried out by an advance guard action. The air troop should not be surprised by the initial encounter with the CRP. The troop's timely reporting of intelligence will enable the corps to react effectively to the attack. With the employment of artillery and aerial fires, further advance of the main force may be delayed up to one hour.

DEFENSIVE TACTICS

The tactical defense is important at division level, because it can become an integral part of a larger offensive operation. A typical Soviet response against a counterattack

is to place a division on the defense to halt the attack while other divisions continue the advance. Figure B-6, on the following page, depicts a typical defense by a motorized rifle battalion.

An MRD or a TD will typically defend a sector 20 to 30 kilometers in width and 15 to 20 kilometers in depth. The commander normally organizes his sector into two echelons and a reserve. First echelon forces inflict losses on the enemy to force the enemy to concentrate and to canalize the enemy into fire sacks. Second echelon forces stop and destroy enemy penetrations or reinforce or replace first echelon troops.

The Soviets have no rigid requirement for the composition of defense echelons. However, at least two regiments are normally placed in the division's first echelon. In an MRD, the first echelon consists of motorized rifle regiments.

Once a Soviet defense is fully organized, it can be difficult to defeat. A Soviet defense can be more effectively attacked during the initial transition to defensive operations.

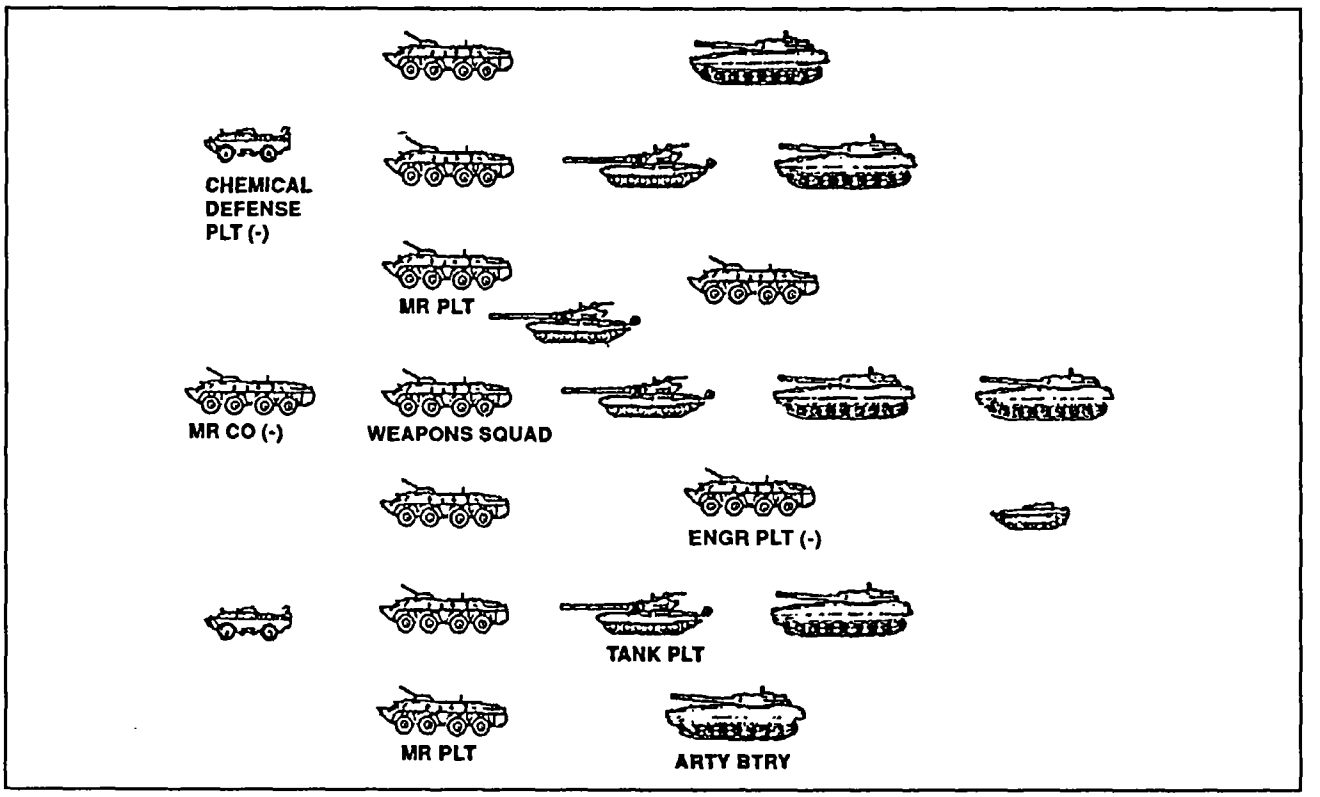


Figure B-4. Forward security element

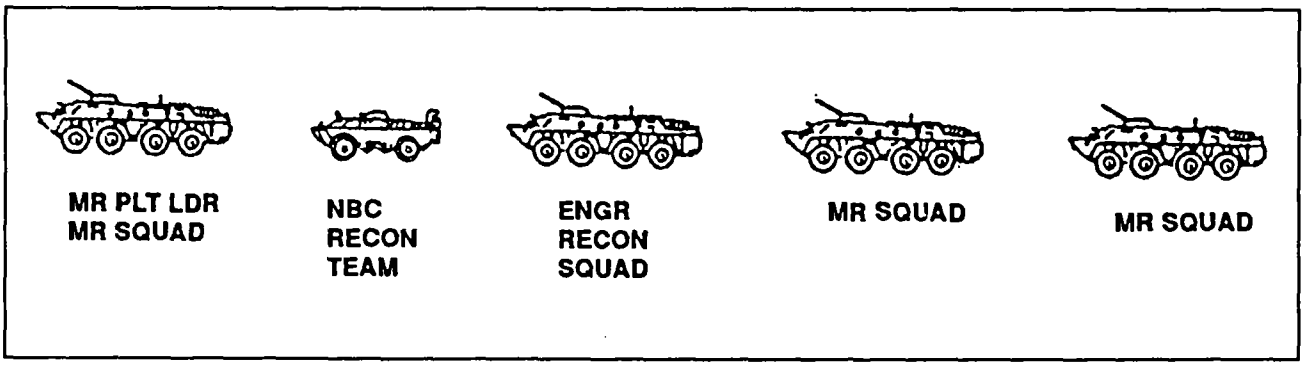


Figure B-5. Combat reconnaissance patrol

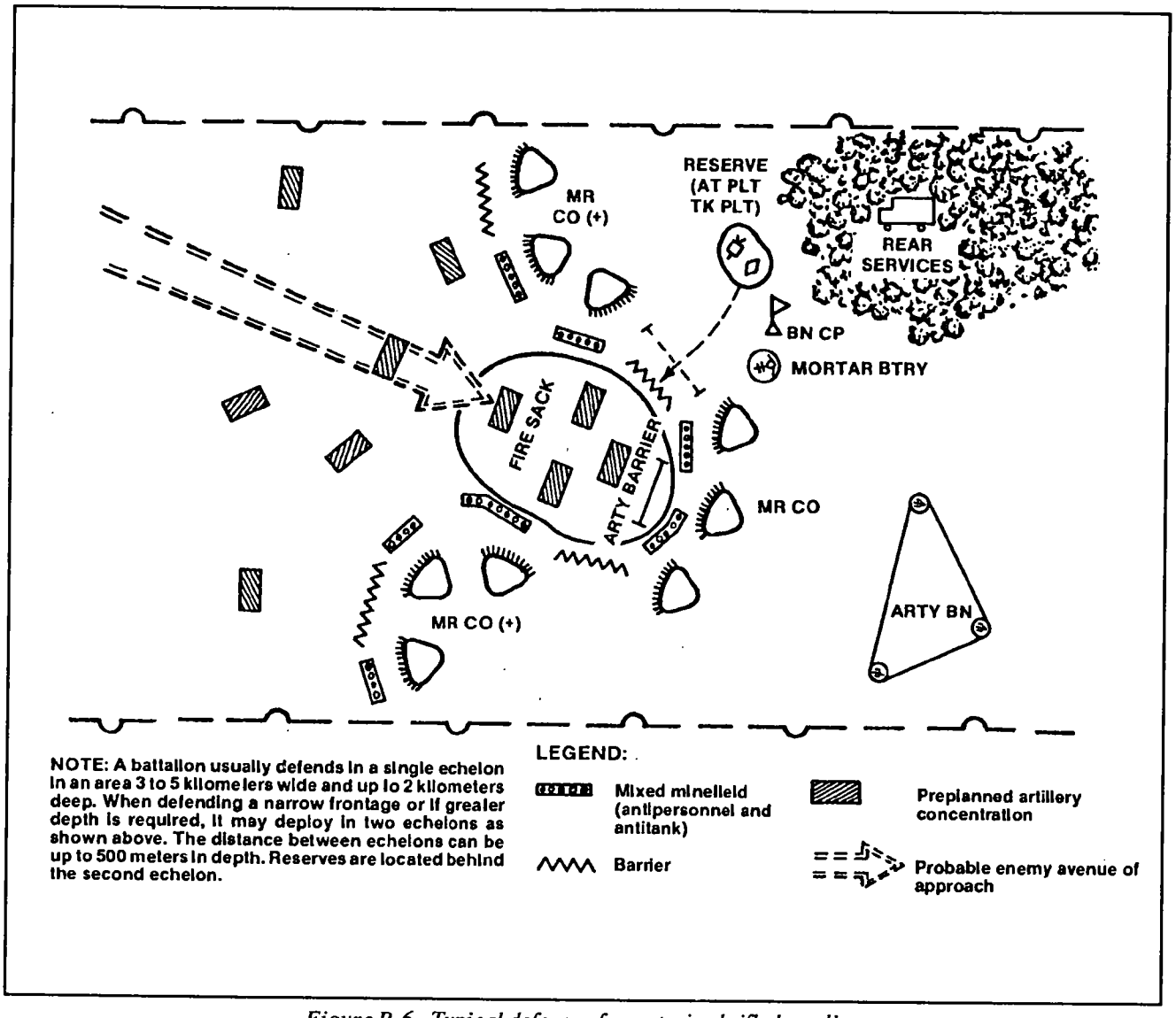


Figure B-6. Typical defense of a motorized rifle battalion

AIRBORNE, AIR DEFENSE, AND AVIATION OPERATIONS

Airborne. Air assault and heliborne operations have been a part of Soviet doctrine since the 1960s. Theoretically, by day or night, Soviet heliborne units will be inserted into enemy territory 50 kilometers or more forward of the line of contact. However, Soviet doctrine implies that the airmobile force is usually battalion size or smaller and is assigned an objective within divisional artillery range. The airborne force operates in daylight and links up with an advancing maneuver force within hours.

Air Defense. The objective of the Soviet tactical air defense system is to reduce the effectiveness of enemy air attacks. Radars are employed to provide an unbroken detection envelope, extending well into enemy territory and across the entire zone of operations. The mission of air defense forces is to counter air threats to the deployed ground forces. Tactical- to troop-level SAMs, antiaircraft artillery, and radars are inherently mobile and are designed to counter low-altitude threats. Soviet air defense weapons and associated radars are employed as an integrated system and pose a formidable threat.

Aviation.

Army aviation. CAA and tank army aviation assets include an attack helicopter regiment and a general-purpose helicopter squadron. The regiment is equipped with 20 Hips and 40 Hinds. The general-purpose helicopter squadron is equipped with 20 helicopters.

Division aviation. The division has a helicopter squadron with about 18 aircraft. The squadron normally has 6 Mi-24 Hinds, 6 Mi-8 Hips, and 6 Mi-2 Hoplites. In some squadrons, the number of Hinds has been increased.

Frontal aviation.

The air army organic to the Front has a considerable number of aircraft. Of greatest significance to the ground force is the fighter-bomber division. This division has approximately 120 aircraft to be used mainly in the ground attack role. These aircraft will be seen in the vicinity of the FLOT, back to the division rear area, and focused against the Front's main effort.

A direct correlation exists between the enemy's main attack and its commitment of air assets. This is particularly true of the attack helicopter regiment of the army and the fighter-bomber division of the Front. Soviet forces will likely commit the army's attack helicopter regiment coincident with the commitment of the tank regiment (second echelon) of the first echelon division. These helicopters will attack targets not reached by artillery to a depth of 3 to 10 kilometers on the defender's side of the FLOT. Further to the defender's rear, from 10 to 60 kilometers back from the FLOT, Soviet fixed-wing aircraft will attack nuclear assets, C^2 modes, logistical sites, and reserves.

SPECIAL OPERATION FORCES

Operations. The Soviets maintain a complement of special operation forces, the most prominent of which are known as Spetsnaz. These forces are managed by the GRU. They are trained to conduct a variety of sensitive missions, including covert actions abroad.

Doctrine. Unconventional warfare is a key element of Soviet doctrine. Soviet unconventional warfare forces conduct reconnaissance, espionage, sabotage, assassinations, and interdiction of lines of communication. During peacetime, the GRU coordinates Spetsnaz reconnaissance programs to meet wartime intelligence requirements.

Missions. Typical missions of the Spetsnaz are reconnaissance and tactical operations against specific targets. Potential targets include airfields, command and intelligence centers, communication facilities, ports and harbors, radar sites, and nuclear weapon facilities.

OTHER-NATION THREAT

The air troops may be required to conduct operations against nations other than the Soviet Union. These potential threats can be found in every part of the world. Many Third World countries where these threats are likely to occur are trained in Soviet tactics and possibly equipped with older Soviet equipment. Some deviation from Soviet practices and techniques is expected because of differences dictated by climate,

geography, or culture. Although the Soviets represent the most significant threat, they also exert a great influence on various other nations, to include Third World surrogates. The air troops must be ready to support division or corps operations in the lower end of the spectrum of conflict. Contingency operations in the lower end of the spectrum continue to be the most probable form of conflict. Regardless of the level of conflict, the IPB process must be completed and continually updated to determine how the threat will conduct its operations. The results of this process will then help determine how the corps will conduct its operations and how the air troops will support these operations.

APPENDIX C

NBC OPERATIONS

This appendix implements portions of STANAGs 2398 and 3497.

The air troop may expect to conduct all or part of its operations in an NBC environment. Reconnaissance forces are typically the first to encounter NBC conditions on the battlefield, particularly during NBC reconnaissance operations. Therefore, the air troop must develop an internal organization that will not only support the unit's mission but also support operations in an NBC environment. To accomplish the mission, the air troop commander must prepare his soldiers to fight and win in an NBC environment. He must also train his personnel to exploit friendly nuclear strikes or retaliatory chemical strikes once the enemy employs NBC weapons. This appendix serves as a guide for planning purposes by which the air troop commander and his staff may employ troop forces in an NBC environment.

Section I
NBC THREAT

THREAT DOCTRINE AND PREPAREDNESS

The NBC threat can exist anywhere, including Third World countries that have an NBC capability. However, the air troop commander must focus on the Soviet Union and Warsaw Pact countries as the most formidable NBC threat. Threat employment doctrine stresses offensive operations and a willingness to use nuclear and chemical weapons to win. Threat leaders know these NBC weapons may alter tactics, advance rates, force and power ratios, and logistics. The threat can produce and stockpile NBC weapons and employ them with a variety of delivery systems.

The Soviets classify nuclear and chemical weapons as weapons of mass destruction when relating them to troop protective measures. However, they consider chemical weapons as conventional when relating them to employment doctrine. The Soviets have many options for employing nuclear and chemical weapons. Thus any future conflict involving the Soviets should be considered likely to include the employment of NBC weapons.

The Soviets have developed and fielded a large inventory of defensive equipment, and they have well-trained chemical personnel. As part of their overall preparedness,

the Soviets conduct extensive, realistic training. However, NBC warfare will impose the same constraints on Soviet soldiers as it will on US soldiers. Individual protective clothing and psychological factors will also degrade the performance of both Soviet and US soldiers in an NBC environment.

NUCLEAR WARFARE

The Soviet Union has a wide range of systems that can deliver nuclear weapons. As illustrated in Figure C-1, no area on the battlefield is free from the threat of a nuclear strike. The Soviets have stated priorities for nuclear strikes. They include the following in order of priority:

- Enemy nuclear delivery means, aircraft, field artillery, missiles, and rockets.
- Airfields.
- Division and higher-level headquarters.
- Defensive positions.
- Reserves and troop concentrations.
- Supply installations, especially nuclear ammunition storage points.
- Command, control, and communication systems.

Troop elements are not directly targeted for a nuclear strike. However, the air troop's mission may place troop elements in an area where they would become a target for nuclear weapons.

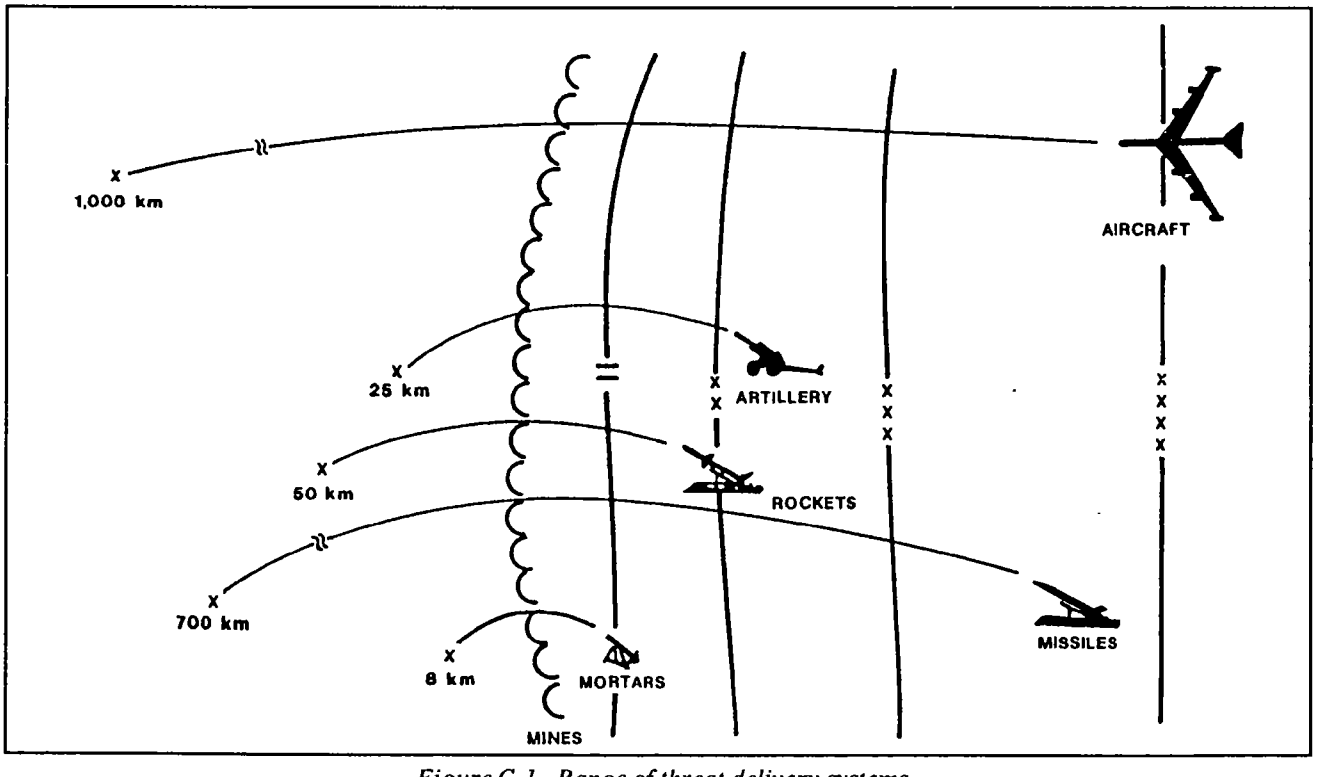


Figure C-1. Range of threat delivery systems

BIOLOGICAL WARFARE

Biological warfare is the intentional use of organisms to cause death or disease in personnel, animals, or plants. Examples of these living organisms—called pathogens or germs—are bacteria, rickettsiae, viruses, and fungi. Germs can be dispersed by artillery, rockets, aircraft, sprays, vectors, or covert operations. The possibility of biological warfare exists even though treaties prohibit it. The policy of the United States is to never engage in biological warfare.

The United States defines a biological agent as any living organism or toxin produced by an organism that can incapacitate, seriously injure, or kill personnel. The threat considers toxins to be chemical agents. The agents covered by biological treaties are bacteriological agents.

CHEMICAL WARFARE

The Soviets classify chemical agents in six major types: nerve, blood, blister, choking, psychochemical, and irritant. The United States classifies chemical agents by physiological categories: nerve, blood, blister, choking, incapacitating, and riot control agents. In a nuclear war, chemicals may be used to complement nuclear weapons. Normally, chemicals would be employed after a nuclear strike when protective equipment has been damaged and personnel are physiologically weak. A combination of agents can be used to complicate medical treatment and/or compound the effects of individual chemical agents. FM 8-9 describes the effect that agents have on the human body. Chemicals do not require pinpoint targeting because of the potential for contaminating a wide area downwind of the attack.

Soviet targeting priorities for chemical agent attack are nearly identical to Soviet priorities for nuclear strikes. The Soviets may target airfields and rear area lines of communication to disrupt US resupply and reinforcement operations. However, they might keep these points intact for later use by their forces. The Soviets may target frontline troops, such as the air troop, with nonpersistent agents. The Soviets may also target US or allied flanks and rear areas with persistent agents to act as obstacles and to delay the retrograde of friendly forces.

Section II
NUCLEAR WEAPONS

THERMAL RADIATION EFFECTS

The energy released from a nuclear detonation interacts immediately with the surrounding air. Almost instantly with the detonation, an intense light pulse is emitted. Also, the air is heated to thousands of degrees Celsius, vaporizing even the unreacted bomb material. The sphere of superheated air is called the fireball; the heat and light are referred to as thermal radiation. Thermal radiation will continue to be emitted from the detonation for several seconds to tens of seconds, depending on the yield of the weapon.

Heat Effects. Heat can affect personnel as well as equipment, supplies, and the environment.

Skin burns.

Unprotected or exposed skin is susceptible to thermal radiation burns. These may be first-, second-, or third-degree burns. First-degree burns are similar to a sunburn; they involve injury to the epidermis. In second-degree burns, the epidermal layer is destroyed but some viable tissue remains. These burns usually form blisters. In third-degree burns, the thick epidermis and underlying layer, or dermis, are destroyed. These burns have a dark brown or charred appearance.

The severity of the burns depends on the yield of the weapon, proximity of personnel to ground zero, and level of individual protection. For example, from a 1-kiloton explosion, unprotected skin would receive third-degree burns at 600 meters, second-degree burns at 800 meters, and first-degree burns at 1,100 meters. Wearing clothing that does not leave the skin exposed reduces the chance of severe burns. However, the dark color of the battle dress uniform causes it to absorb more thermal radiation; therefore, early warning and defensive measures must begin as soon as a nuclear threat is discovered. Nomex flight suits somewhat protect aircrews from skin burns.

Materiel damages. Thermal radiation is hazardous to ground support equipment and supplies as well as personnel. JP8 stored in blivets is especially vulnerable. The black rubber in the blivets will absorb thermal radiation and may become heated and hardened. The blast may also puncture or stress the blivets, causing them to leak. Burning rubber, leaves, or grass might ignite the fuel, causing explosions and fires. Personnel (fuel handlers) at FARPs must protect the blivets by burying them or covering them with tarpaulins.

Fires. The heat from thermal radiation may cause fire storms in forests and urban areas. These fires may affect aviation units directly if they are in the path of the storm. Fires will affect aviation units indirectly if these units are used to evacuate ground units. Ground personnel may be unable to evacuate such areas with their ground transportation assets because of obstacles such as fallen trees.

Light Effects. Light mainly affects personnel. The effects of light on aircrews range from flash blindness to retinal burns.

Flash blindness.

The retina may receive more visible light from a fireball than is needed for light perception but not enough to cause permanent damage. Visual pigments of the photoreceptors bleach out, and vision is briefly impaired. This effect is called flash blindness; it is sometimes referred to as dazzle. Flash blindness is more of a hazard at night than during the day because the pupil is larger and admits more light at night. How flash blindness affects military operations depends on the tasks of affected personnel. While the temporary loss of vision may be hazardous to ground soldiers, it could be fatal for aircrews.

The severity of flash blindness is directly related to the yield of the weapon, distance between the fireball and personnel, and atmospheric conditions. Low visibility will reduce the magnitude of the visible light pulse. In the daytime, a 1-kiloton weapon could cause flash blindness from a distance of 6 kilometers. At night, the same weapon would produce flash blindness from a distance of 51 kilometers.

Retinal burns. An excessive amount of light focused on the retina can cause retinal burns. The intense light burns the photoreceptors and causes a blind spot. The damage is permanent, because photoreceptors cannot be replaced. The degree of incapacitation would vary. For example, a person looking directly at the explosion could suffer destruction of the fovea centralis and be considered functionally blind. Another person with a burn in the periphery of the retina might not be aware of the blind spot. Soldiers facing a 1-kiloton detonation could receive retinal burns from as far away as 6.7 kilometers.

BLAST EFFECTS

The rapid expansion of the fireball creates a wave of compressed air. This is referred to as a shock wave or a blast wave. The blast wave causes damage by two kinds of pressure: dynamic pressure, referred to as winds, and static overpressure, referred to as overpressure. The compressed gases produced by a nuclear explosion expand outward in all directions from the point of detonation. This wave travels at about the speed of sound.

Dynamic Pressure.

Wind velocity. The wind velocity can range from a few miles per hour to hundreds of miles per hour. The velocity will depend on the yield of the weapon, height of the burst, and distance from the point of detonation. The wind velocity decreases with distance. For example, a 100-mile-per-hour wind will occur about 6 miles from a 1-megaton detonation, 4 miles from a 300-kiloton detonation, or 1 mile from a 5-kiloton detonation. However, when a nuclear burst first detonates, the observer will be unable to predict the wind force because he will not know the yield of the weapon or the location of ground zero.

Drag forces. The winds cause damage by drag forces. Drag forces collapse buildings, overturn vehicles, and create missiles from flying debris such as rocks, sticks, or glass fragments. They also hurl exposed personnel against structures and solid objects and blow down trees. For nuclear weapons, the time from the initial blinding flash of light until the blast wave reaches the area can be several seconds or longer. For large-yield weapons at great distances, the time can be longer than 30 seconds. Thus personnel will have some time to seek shelter before the blast wave hits.

Wind phases. Winds have a positive phase and a negative phase. During the positive phase, winds travel outward from the point of detonation. As the fireball rises, a slight vacuum is created. This will cause the winds to reverse and blow back toward the detonation. The velocities of this reverse wind are mild compared to the positive phase. The reversal of the winds will keep missiles in the air longer and possibly cause more damage. The missiles may fall back to the ground and settle after the positive phase and then be picked up again by the negative phase. Because of the turmoil, ground troops may not even notice the negative phase. Aircrews may notice it more because wind reversal will create more air instability for them to overcome.

Aerodynamics. The effects of high winds on fixed- and rotary-wing aircraft have been studied in wind tunnels and in open-air testing. Nuclear blast winds have the same effects on aerodynamic surfaces and airframes as any other type of high wind. Nuclear weapons can produce enormous wind velocities, extreme turbulence, and wind shear. The winds persist longer than those produced by conventional munitions. Rotary-wing aircraft may experience sudden yaw, pitch, roll, and lift

changes. Extreme effects can include blade flapping and bending, mast bumping, loss of tail rotor effectiveness, flameout, and airframe crushing.

Static Overpressure.

Overpressure force. The compressed gases create a force that causes the ambient air pressure to increase; this is overpressure. A conventional high-explosive munition also has an overpressure effect; however, it is not as powerful and lasts only for microseconds. The nuclear explosion creates overpressure that can be hundreds of times greater than the ambient air pressure. As with the winds, the overpressure decreases as the distance from the point of detonation increases.

Aircrew injury. Wind velocity and overpressure are interrelated. For example, the wind velocity is approximately 35 miles per hour at 1 psi overpressure and about 160 miles per hour at 5 psi. At overpressures of .5 psi and greater, windscreens begin to shatter and flying fragments may injure aircrews. At 35 miles per hour, glass fragments are a significant hazard to the eyes and the throat. At higher pressures, the wind velocity could cause casualties from fragments penetrating the flight suit and skin. Also, with the windscreen gone, external missiles may enter the cockpit and cause injuries.

Airframe damage.

Airframes are vulnerable to overpressure effects. Glass (Plexiglas, safety Plexiglas, or safety glass) begins to shatter at .5 to 1 psi overpressure. At .5 to 2 psi, larger windows that face the point of detonation shatter first. As the overpressure increases (2 to 5 psi), all windows will shatter. Overpressure may cause glass to implode initially. Then the positive wind phase creates missiles of the glass fragments.

The overpressure initially affects only the side facing the detonation. However, the blast wave envelops the aircraft within microseconds, exerting forces on the opposite side as well. The sequential occurrence creates buckling and twisting forces, resulting in skin wrinkling and internal frame stresses.

Light damage to the airframe, other than glass, begins to occur at 3 to 5 psi overpressure. On rotary-wing aircraft, the tail boom weakens and may undergo slight separation. Subsequent severe flight maneuvers may result in tail boom failure. On all aircraft, the fuselage and internal frames undergo substantial stresses and skin panels rupture. Longerons, stringers, and frames may fail at these pressures.

NUCLEAR RADIATION EFFECTS

Nuclear radiation consists of all types of ionizing electromagnetic and particulate radiation; specifically, alpha, beta, neutron, and gamma. FM 8-9 describes the effects of each type of radiation on the human body. Nuclear radiation travels outward in all directions from the detonation point. The effects of nuclear radiation are categorized as initial and residual.

Initial Effects. The initial effects are those manifested within 60 seconds after detonation. They consist of all types of electromagnetic and particulate ionizing radiation. For small yields, the initial radiation will cause numerous personnel casualties. However, an aircraft flown close enough to the nuclear detonation for the aircrew to receive incapacitating dosages would probably not survive the blast

damage anyway. This initial radiation remains a concern for aircrews on the ground and personnel at FARPs, the AVUM unit, and the headquarters.

Residual Effects. The residual effects are those that remain hazardous after 60 seconds. The most important residual effects are fallout and induced radiation or neutron-induced gamma activity.

Fallout. The fireball continues to grow in size after a nuclear detonation, stabilizing within several minutes. Because hot air rises, the fireball also gains altitude as it grows. The rising and cooling of the fireball create an area of low pressure directly beneath it. If the point of detonation is close to the earth's surface, dirt and debris are drawn up into the fireball. Vaporized bomb material then mixes with the dirt and debris. The mixture of radiological dirt and debris, called fallout, begins to fall back to earth and may cover hundreds of kilometers as it travels downwind. Fallout can result in significant radiation dose-rate levels and communication blackouts from the large quantities of dust and debris in the atmosphere. Large particles may also cause structural damage and FOD to aircraft.

Induced radiation or neutron-induced gamma activity. Neutron radiation occurs only during the initial nuclear reaction. However, neutrons can cause other elements to become radioactive. The ground directly below the point of detonation will most likely become radioactive. This induced pattern, usually not exceeding 2 kilometers in diameter, will present a significant radiation hazard for ground personnel for two to five days. Routine occupancy is possible after five days. The extent of the hazard can be determined by reconnaissance or survey teams.

Radiation Exposure and Sickness.

Radiation exposure. Radiation exposure considerations are relatively the same for aviation personnel as those for ground personnel. The ground commander establishes exposure guidelines, and NBC personnel keep track of the radiation exposure. The aviation commander has the more difficult job of determining when an aircrew becomes ineffective from radiation exposure. Table C-1 (page C-8) shows estimates of performance degradation over time. Individual response to a particular dose will vary, depending on such variables as health, previous exposure, and injury.

Radiation sickness. Aviators must be alert to symptoms that impair their ability to fly. Leaders should observe their personnel closely to detect behavior that may necessitate grounding them. Initial symptoms of radiation sickness, such as nausea, fatigue, and listlessness, may mimic those of other illnesses. Flight surgeons should monitor radiation exposure and provide appropriate guidance to the commander.

ELECTROMAGNETIC PULSE

An EMP is a wave of electromagnetic energy produced by a nuclear detonation when gamma rays make contact with the atmosphere. It occurs immediately after nuclear detonation and travels outward in all directions. EMP presents no significant biomedical hazard to humans. However, it can damage electronic components. Because EMP is a form of electricity, it will follow the path of least resistance into electrical equipment.

Table C-1. Expected response to radiation

Free-in-Air Dose Range cGy (rads)	Initial Symptoms	Performance (Mid-Range Dose)	Medical Care and Disposition
0 to 70	From 6 to 12 hours: none to slight incidence of transient headache and nausea; vomiting in up to 5 percent of personnel in upper part of dose range.	Combat-effective.	No medical care, return to duty.
70 to 150	From 2 to 20 hours: transient mild nausea and vomiting in 5 to 30 percent of personnel	Combat-effective.	No medical care; return to duty, no deaths anticipated.
150 to 300	From 2 hours to 2 days. transient mild to moderate nausea and vomiting in 20 to 70 percent of personnel; mild to moderate fatigability and weakness in 25 to 60 percent of personnel	DT: PD from 4 hours until recovery UT: PD from 6 hours to 1 day PD from 6 weeks until recovery	In 3 to 5 weeks: medical care for 10 to 50 percent. At low end of range, death may occur for less than 5 percent; at high end, death may occur for more than 10 percent, survivors return to duty.
300 to 500	From 2 hours to 3 days transient moderate nausea and vomiting in 50 to 90 percent of personnel, moderate fatigability in 50 to 90 percent of personnel at high end of range	DT PD from 3 hours until death or recovery UT: PD from 4 hours to 2 day. PD from 2 weeks until death or recovery	In 2 to 5 weeks. medical care for 20 to 60 percent At low end of range, death may occur for less than 10 percent, at high end, death may occur for more than 50 percent; survivors return to duty
500 to 800	Within first hour: moderate to severe nausea, vomiting, fatigability, and weakness in 80 to 100 percent of personnel.	DT PD from 1 hour to 3 weeks CI from 3 weeks until death UT: PD from 2 hours to 2 days. PD from 7 days to 4 weeks CI from 4 weeks until death.	In 10 days to 5 weeks. medical care for 50 to 100 percent At low end of range, death may occur for more than 50 percent in 6 weeks; at high end, death may occur for 90 percent in 3 to 5 weeks.
800 to 3,000	Within first 3 minutes severe nausea, vomiting, fatigability, weakness, dizziness, and disorientation, moderate to severe fluid imbalance and headache	DT PD from 45 minutes to 3 hours; CI from 3 hours until death. UT PD from 1 to 7 hours CI from 7 hours to 1 day PD from 1 to 4 days. CI from 4 days until death	Medical care from 3 minutes until death. 1,000cGy: 100 percent deaths in 2 to 3 weeks 3,000 cGy: 100 percent deaths in 5 to 10 days
3,000 to 8,000	Within first 3 minutes severe nausea, vomiting, fatigability, weakness, dizziness, disorientation, fluid imbalance, headache, and collapse.	DT. CI from 3 to 35 minutes PD from 35 to 70 minutes CI from 70 minutes until death UT CI from 3 to 20 minutes. PD from 20 to 80 minutes CI from 80 minutes until death.	Medical care from 3 minutes until death. 4,500 cGy 100 percent deaths in 2 to 3 days
Greater than 8,000	Within first 3 minutes: severe and prolonged nausea, vomiting, fatigability, weakness, dizziness, disorientation, fluid imbalance, headache, and collapse.	DT and UT CI from 3 minutes until death	Medical care needed immediately 8,000 cGy 100 percent deaths in 1 day

LEGEND: CI--combat ineffective (less than 25 percent performance)
DT--demanding task
PD--performance degraded (25 to 75 percent performance)
UT--undemanding task

Component and Aircraft Systems Damage.

Component damage. EMP can affect any electrical component. A sudden surge of EMP will cause overvoltage, shorting out wiring and transistors. Vacuum tubes may be somewhat affected by EMP, but more energy is required to destroy them. EMP can enter through the casing of radios and destroy them. It can destroy

circuitry even with radios turned off and antennas disconnected. The severity of the damage depends greatly on component design. Testing continues to determine the extent to which a system can be disabled by EMP damage. Not every electrical component will be destroyed by EMP. Some components may be only temporarily disabled.

Aircraft systems damage. Aircrews should know which aircraft electrical systems are critical and how failure of those systems will affect the flight. For example, some aircraft instruments may be disabled, radios or navigational aids may not work, or visual or targeting aids may fail.

Communication Net Impairment. EMP will affect the command and control nets of the air troop. Because the air troop is highly mobile, radio is the primary means of communication. Commanders must prepare for EMP degradation by training with backup units and alternate means of communication.

Section III
BIOLOGICAL AGENTS

LIVING ORGANISMS

Classical biological agents include anthrax, plague, cholera, smallpox, botulism, typhoid, and microtoxins. These agents are living organisms that usually require a host body to mature. Because the effects of these agents are usually delayed, a natural outbreak may be difficult to differentiate from a covert attack. Some agents are highly persistent, while others have a short life span outside the host body.

TOXINS

Toxins are poisonous chemical substances produced by living organisms. They are found in nature but only in small quantities. Microorganisms, plants, animals, reptiles, and insects produce toxins.

Common Toxins. Some commonly known lethal toxins that microorganisms produce are botulism, staphylococcus, and tetanus. Other toxins are produced by poison ivy, snakes, poisonous frogs, bees, spiders, and scorpions. Their toxicity ranges from extremely lethal to simple harassment such as an ant bite.

Yellow Rain. Tricothecene toxin is also known as yellow rain. T2, as it is commonly called, is a by-product of the respiration process of an organism that grows on decomposing grains. Individuals exposed to large doses of T2 soon experience an onset of violent itching, vomiting, dizziness, and distorted vision. Within a short time, they vomit blood-tinged material and later larger quantities of blood. The affected individuals die within hours, manifesting shock-like symptoms. Personnel may be exposed to smaller doses directly or indirectly through consumption of contaminated water or food. These individuals experience a slower onset of similar symptoms along with bloody diarrhea. Many die eventually of dehydration. Survivors may take several months to heal.

Botulism. Another highly lethal toxin is the by-product produced by clostridium botulinum. This agent causes botulism and is extremely lethal to humans. It is several times more lethal than any of the standard chemical agents.

EFFECTS

Mild exposures to biological agents can severely degrade performance. Many of the classical diseases have delayed effects, whereas the effects of most toxins are immediate. Toxins can create area contamination as well as downwind and vertical vapor hazards. Medical personnel, especially flight surgeons, must constantly monitor aviation personnel to detect unusual symptoms that may indicate exposure to a biological agent. FM 8-9 contains detailed information about the effects of biological agents.

PROTECTION

Commanders must be prepared to protect against biological agents used by an enemy. The United States has immunization programs for many of these agents to help protect personnel against the diseases.

Section IV
CHEMICAL AGENTS

NERVE AGENTS

Effects.

Extremely low dosages of nerve agents can disable personnel. The dosages can degrade the ability of aircrews to operate aircraft and the ability of ground personnel to support aviation operations. Nerve agents will severely disable personnel in any occupation requiring dexterity and high mental function. Nerve agent exposure is cumulative; so repeated exposure to low dosages will result in a cumulative increase in personnel disabilities.

Nerve agents are lethal in either vapor or liquid form and can be employed as persistent or nonpersistent agents. They cause casualties through any portal of entry: respiratory tract, skin, eyes, or mouth. (They are usually ingested by mouth with contaminated food or water.) Within one to two breaths after flying into a vapor cloud, aircrews can inhale lethal amounts of the agents. The effects are convulsive movements of the extremities within 30 seconds; collapse and unconsciousness within 1 minute; and flaccid paralysis, respiratory failure, and death within 2 to 3 minutes. When agents are ingested in contaminated food or water, symptoms may vary or be delayed.

Extremely low doses of a nerve agent will cause miosis. Symptoms of miosis are pinpointed pupils, blurred vision, and eye pain. The victim cannot adapt to night vision because the dark adaptation of the rods in the peripheral portion of the retina is restricted. Miosis may last for hours or several days. Full recovery may not occur for weeks. Symptoms of miosis may be evident in the absence of any other nerve agent symptom.

The absence of miosis does not exclude nerve agent poisoning, especially in cases of ingestion or skin exposure. Miosis may occur almost immediately after exposure, or it can be delayed 30 minutes or longer after a mild exposure. When drinking with the M24 mask on, soldiers must shut their eyes until the mask is cleared. This will lessen the chance of the eyes absorbing tiny doses of nerve agents. Intramuscular atropine injections do not reverse miosis, but they may help slightly. Eye drops may be administered to relieve pain, but they do not return vision to normal. Recovery time depends on individual reactions. Near vision, night adaptation, far vision, and accommodation will slowly return to normal in varying degrees.

During bright daylight, the only effect of miosis may be dimness of vision. During periods of low visibility and at night, dusk, and dawn, the impact of miosis may be significant. Aircrews may not be able to fly.

The impact of miosis on personnel is not limited to aircrews. Ground support personnel in air traffic service and AD units and command and control facilities also will be affected by miosis. This degradation of support capability will affect all aviation missions.

Antidotes. The nerve agent antidote treatment available for soldiers is the nerve agent antidote kit. Each NAAK includes one atropine autoinjector and one 2-PAM chloride autoinjector. FM 8-285, FM 21-11, and STP 21-1-SMCT describe the procedure for administering the nerve agent antidote.

The NAAK will keep a nerve agent victim alive; every soldier must be thoroughly trained in its use and in subsequent first-aid measures to restore breathing. Nerve agents are powerful and require powerful antidotes to keep the victim alive. The NAAK must not be used on a soldier unless he has actually been exposed to a nerve agent. However, some soldiers may panic during the initial encounter of chemical warfare on the battlefield. Many symptoms of other chemical agents, especially toxins, overlap nerve agent symptoms. Therefore, soldiers may misdiagnose the symptoms.

The effects of atropine and 2-PAM chloride on aircrews are being studied. Serious side effects may affect a person's fitness for flying duty. When an adequate dose of atropine is injected for lifesaving measures, dryness of the mouth is a side effect. This side effect will also occur even if no agent is present in the body and atropine is injected. Three autoinjections may cause hallucinations. One autoinjection probably will not seriously degrade an aircrew member's ability to function. Some side effects of atropine are denial of illness, loss of insight, and loss of consciousness. Other symptoms include perceptual difficulty, judgment and memory impairment, confusion, short attention span, slurred speech, and restlessness. These reactions are also similar to the symptoms experienced from incapacitating agents such as psychochemicals, cocaine, and cannabis.

The current nerve agent pretreatment drug is pyridostigmine. The pretreatment drug is taken every eight hours. The unit commander will determine when personnel will begin the pretreatment. Procedures for nerve agent pretreatment are in FM 8-285.

BLOOD AGENTS

Effects. Blood agents are nonpersistent and are usually dispersed by wind within 30 to 45 minutes. Within one or two breaths, individuals can inhale a lethal dose of blood agents. Death may follow within 1 minute. Mild exposure will result in the

same symptoms as those experienced from lack of oxygen. Soldiers who survive moderate to severe exposure may not be able to return to flying status for several weeks or longer. The damage to cells caused from lack of oxygen may result in persistent fatigue, irrationality, loss of coordination, vertigo, and headaches. One type of blood agent, CK, causes chronic bronchitis.

Antidotes. No current self-aid or buddy-aid antidote exists for blood agents. Amyl nitrite was recalled in 1984.

BLISTER AGENTS

Blister agents cause severe skin blisters and respiratory damage. These persistent chemical agents can cause injury whether in liquid or vapor form. The blisters damage the subdermal layers of skin and cell protein structure and take from weeks to months to heal. Very low concentrations of blister agents cause painful eye damage, to include conjunctivitis, edema of the lids, and a feeling of grit in the eye. In large concentration, mustard agents can cause permanent damage, corneal scars, or opacity. A tiny amount of liquid droplet (Lewisite or phosgene oxime) in the eyes may cause permanent injury or blindness. Blister agents cause systemic poisoning throughout the body and can impair performance. Some symptoms are blood pressure decrease, nausea, malaise, and dehydration. Blister agents usually are not lethal, but severe respiratory damage, secondary infection, or dehydration may cause death. FM 8-285 contains blister agent treatment procedures.

CHOKING AGENTS

Choking agents are nonpersistent agents that can cause injury to unprotected personnel. The injury may result in mild eye irritation and damage to the lungs and respiratory tract. The initial choking effect may cause the aviator to lose control of the aircraft. In severe cases, membranes swell, the lungs fill up with fluids, and death results from a lack of oxygen. Procedures for treatment are in FM 8-285.

INCAPACITATING AND RIOT CONTROL AGENTS

Irritating agents and psychochemical agents employed by the threat are not usually lethal. They should not cause death unless personnel are exposed to much larger concentrations than would normally be employed on the battlefield. FM 3-8 describes these agents in detail. FM 8-285 describes the effects of these agents and treatment procedures.

PROTECTION

Even a mild exposure to chemical agents may be fatal to aircrews because aircraft control may be lost. Also, the long-term, systemic effects of agents and treatments can degrade performance, causing aircrews to be grounded. Flight surgeons must carefully monitor aircrews for symptoms of exposure to chemical agents and advise the commander. When personnel are not wearing NBC protection and exposure to agents is suspected, they may be temporarily grounded and observed for symptoms. However, in the absence of actual symptoms, the tactical situation may preclude preventive grounding. Aircrews should wear full MOPP4 gear during flight, and ground troops should also have adequate protection. Local commanders will make this decision based on METT-T and a risk analysis.

Section V
NBC DEFENSE FUNDAMENTALS

CONTAMINATION AVOIDANCE

Contamination avoidance—the first fundamental of NBC defense—means taking the appropriate action to reduce NBC hazards. The term *avoidance* does not necessarily mean aborting a mission or canceling an operation just because contamination is present. The factors of METT-T are considered for all operations, to include entering contaminated areas and preparing to encounter unknown contaminated areas. Soldiers go into hazardous areas only when necessary. The air troop uses the NBC warning and reporting system and survey monitoring to help locate contaminated areas.

Contamination Transfer.

All soldiers should understand how they and their equipment become contaminated and how contamination spreads to other personnel and equipment. Contamination refers to the deposit or absorption of hazards. A unit may be the target of an enemy NBC attack, or the downwind hazard from a contaminated unit may cause agents to drift into another unit's area. Also, a unit may move or fly into contaminated areas from which aircraft can transport contaminated equipment or personnel.

Rotary-wing aircraft can transfer contamination from the ground into the aircraft or vice versa. This transfer occurs when the rotor wash picks up dust, sand, leaves, or other contaminated debris. The debris or liquid droplets are then scattered throughout the aircraft. Some agents are like a fine spray and, although suspended in the air, can settle on personnel or equipment like dew. Aircraft vibrations increase the settling of agents in remote areas of the airframe such as panel points or rivets. Also, the type of paint on the aircraft affects contamination. Alkyd-based paints absorb the agents like sponges.

Principles. The principles of contamination avoidance are applying passive defensive measures; warning and reporting; locating, identifying, and marking NBC hazards; limiting the spread of contaminants; and avoiding contaminants.

Applying passive defensive measures. Passive defensive measures reduce the chance of being hit by an NBC attack or, if hit, the aftereffects of the attack. They are not direct reactions to a specific attack but rather are measures taken to reduce vulnerability to being targeted. Each unit must apply the principles of detection avoidance, dispersion, and training to protect personnel and materiel.

Detection avoidance. Commanders must train their units in the principles of detection avoidance. If the enemy does not know the location of aircrews, it cannot target them for an NBC attack. Commanders should carefully choose unit positions and CP locations. They must ensure that their troops are protected as much as possible from enemy detection by using natural concealment, cover, and camouflage. In addition, aviation units can use air routes and firing positions that take advantage of natural vegetation and terrain features. These same principles apply to ground units.

Dispersion. In some cases, the terrain will not be suitable for concealment. However, commanders can disperse their assets so that the unit presents a

less lucrative target. By constantly varying the pattern of unit deployment, the commander avoids stereotypic patterns that allow the enemy to identify the type of aviation unit being observed.

Training. Units must train to survive initial NBC attacks and to continue their missions without slowing down. One goal of this training is to render enemy weapons ineffective.

Warning and reporting. Once an NBC attack has occurred and personnel have located an area that is contaminated or is threatened by downwind hazards, they must inform affected units without delay. Early warning will give personnel time to protect themselves against the hazard. The warning and reporting of attacks are done by simple, standard messages with the NBCWRS. The NBCWRS consists of standard reports, system management, and attack warnings. A recent addition to standard reports includes an NBC-6 summary report on chemical and biological attacks. Another addition is a chemical downwind message that gives surface meteorological data so that personnel can prepare new chemical downwind hazard predictions. FM 3-3 and GTA 3-6-3 show report formats.

Collection sources. NBC information is collected from many sources. It may be obtained from a direct attack on a unit or after an attack through reconnaissance, monitoring, and survey operations conducted by the air troop. Units in attack or hazardous areas will forward monitoring reports.

Observers. For nuclear weapons, only designated observers will automatically forward reports on burst parameters. Nondesignated observers collect the information and hold it until it is requested. The air troop commander may designate several aircrews as aerial observers. Their mission, like that of ground observers, is to obtain nuclear burst information. Aviation units can obtain good visual data such as cloud parameters, approximate ground zero location, and crater size. However, the designated aerial observer team does not necessarily comprise the same personnel as the survey team. Troop commanders determine the composition of the team. Utility or observation aircraft are probably best suited for the designated aerial observer mission.

FARP elements. The commander must forward hazard information to FARPs and other separate activities. These elements need hazard information for selecting routes, setting up sites, and selecting clean areas for rest and relief. Unit SOPs should address how messages will be forwarded. The FARP will probably become contaminated while support aircraft will remain clean. The opposite may also occur. Therefore, aircrews and FARP personnel should establish a standard method of communicating NBC hazard warnings between them. Hand-and-arm signals, panels, flags, or any other type of standard signal should be included in unit SOPs.

Attack warnings. Nuclear weapons pose significant hazards to aircraft, whether they are fired by enemy forces or by friendly forces. Therefore, commanders must thoroughly understand the attack warnings so that the capabilities of aviation assets are not degraded. Warnings of friendly nuclear and chemical attacks ensure that friendly forces have time to protect themselves from the attacks. These warnings are called STRIKWARNs or CHEMWARNs. FM 3-3 and GTA 3-6-3 outline the message formats. The executing commander is responsible for starting the warning. Messages must be sent to adjacent units and to the subordinate headquarters whose units are likely to be affected by the attack. When a nuclear strike is canceled, units warned previously must be notified without delay. Local policies may specify a wait time after the planned time of detonation when the message is automatically canceled. Aviation assets are dispersed throughout the battlefield.. The supported unit

may not be inside a STRIKWARN zone; therefore, it may not receive the warning. However, aircraft supporting that unit may be where overpressures will cause damage. Because of the long-distance hazard of nighttime flash blindness, aviation units must know when friendly nuclear weapons will be fired. For these reasons, executing commanders should send the attack warning to all aviation units. All aviation assets, including ground support, must receive information about friendly nuclear strikes. Units should develop alternate methods of passing an immediate warning to aircraft during flight.

Locating, identifying, and marking NBC hazards.

Once personnel detect an NBC hazard, they must mark and identify the hazard. Units must plan their area of operations outside of the contaminated area when possible. The unit has three methods of determining the limits of a contaminated area: reconnaissance, monitoring, and survey. Contaminated hazards may be the result of enemy or friendly forces. In either case, the effects are the same; they will affect either enemy or friendly operations equally. Therefore, hazardous areas must be located, identified, and marked, especially along defiles, routes, and point hazards. Marking may be immediate or hasty. Hazardous areas may be permanently marked later with standard NATO signs.

Aviation assets are ideally suited for conducting reconnaissance and radiological surveys. Chapter 3 of this manual and FM 3-3 discuss radiological surveys. A new aerial radiological instrument, the Advanced Airborne Radiac System, is being developed for use with aircraft. This instrument will automatically record altitude and speed. It also preprograms terrain factors, eliminating the requirement for aircrews to land and determine an air-ground correlation factor. The AARS will make air surveys easier, safer, and more accurate.

Chemical agent detectors or alarms are not mounted on aircraft. Using aircraft with point detectors in this role is not considered feasible. Chemical reconnaissance with aircraft will be limited to flying a chemical detection team to selected areas. NBC detection equipment consists of standard issue items such as radiological detection and monitoring devices, total dose instruments, and chemical agent detection kits and alarms.

Aircrews can help identify contamination on or in the aircraft. They can mount M8 or M9 chemical agent detection paper on the inside or the outside of the airframe at various locations. Because the paper does not stick to the paint on the aircraft, it should be wrapped around a painted area with the ends of the paper overlapping. Recommended areas for mounting this paper include the inside and outside of Plexiglas, seat frames, landing gear, floor panels, or other areas where agents are likely to collect. When the paper is placed on exterior Plexiglas, the spots can be seen from inside the cockpit during the day. Ground support personnel can read the paper on other exterior surfaces. Personnel should not use the paper in a way that creates an FOD hazard.

Limiting the spread of contaminants.

When operating in a contaminated area, all personnel must take steps to limit further exposure to the hazard. One solution is to move personnel out of the contaminated area if the factors of METT-T permit. Reconnaissance personnel can often find clear routes through a contaminated area so that exposure to NBC hazards is reduced. If movement is not possible, the unit must employ individual and collective protection measures to prevent casualties. Almost any shelter that protects from the weather will also protect somewhat from fallout and liquid chemical agents.

Personnel can cover ground equipment at the FARP and in rear areas to avoid direct contact with contaminants and then discard the covers to operate the equipment. Examples of covers are tarpaulins, plastic bags, and cardboard boxes. If possible, personnel should keep equipment in original containers; for example, ammunition cans. Personnel can also place equipment in covered vehicles or shelters and operate it from these locations. These measures decrease the amount of contamination transfer and may reduce the need for decontamination.

Protective measures for aircraft are similar to those for ground equipment. Areas that provide natural cover should be used for unit locations. Aircrews can park aircraft near buildings in built-up areas for limited protection. If cargo or utility aircraft are used to pick up or deliver troops in contaminated LZs, aircrews must ensure that doors, vents, and windows are closed to reduce contamination transfer.

Placing a cover on the floor of the cargo area also helps reduce the amount of contamination transfer to the interior of the aircraft. Plastic covers, tarpaulins, paper, cardboard, clothing, or even leaves can aid in limiting contamination transfer. However, covers must be secured so that they do not present an FOD hazard. When flying rotary-wing aircraft out of contaminated areas and into clean areas, aircrews should open all doors and windows. About 20 minutes of flight will rid the aircraft of accumulated vapor hazards; however, liquid contaminants will remain a hazard.

Avoiding contaminants.

The best way aircrews can keep aircraft free from contamination is to avoid flying them into contaminated areas. However, aircrews have no onboard means of determining, in the air or on the ground, which areas are contaminated. So they may be unable to avoid contaminated areas. Contamination avoidance also applies to ground support locations such as FARPs. FARPs are vulnerable because of their mission, but their mobility may lessen the chance of their being targeted by enemy forces. Aircraft are also vulnerable while being serviced at FARPs.

Air troop commanders will rely heavily on the NBCWRS and intelligence reports to learn what battlefield areas are contaminated. However, some areas may not be reported and new attacks may occur at any time.

Another source of information is the supported unit. Commanders should select alternate locations where they can complete their mission if the area of operations becomes contaminated. The flexibility of aviation assets allows aircrews to "fly around" known contaminated areas and still accomplish the mission. When choosing among options, however, the commander knows the primary consideration is always mission accomplishment.

PROTECTIVE MEASURES

Protection—the second NBC defense fundamental—is both individual and collective. When the unit cannot avoid contamination or is under direct attack, soldiers must take appropriate actions to survive. Specific actions are taken before, during, and after an attack. To sustain operations in an NBC environment, unit personnel must understand and practice individual and collective protection. Individual protection involves those measures each soldier must take to survive and continue the mission. These measures include acting immediately upon observing a nuclear detonation, donning MOPP gear, and wearing other protective equipment and devices. Collective protection provides a contamination-free working environment for selected personnel and precludes the continuous wear of MOPP gear.

Individual Protective Equipment and Clothing.

MOPP gear. Soldiers are issued MOPP gear to protect themselves from a chemical or biological hazard. MOPP gear consists of the CB protective mask, hood, overgarment, overboots, protective gloves, an individual decontamination kit, detection equipment, and antidotes. FM 3-4 describes each item, to include service life and proper use.

Nomex flight suit and gloves. Until a fire-retardant overgarment is fielded, aircrews will continue to wear the Nomex flight suit and gloves under the overgarment and protective gloves. When aircrews wear the Nomex gloves, they do not need to wear white cotton inserts.

Aviation life support equipment. All soldiers must be issued a mask, an overgarment, and protective gloves in the correct sizes. Soldiers should ensure that they have the correct glove size so that their tactile sensitivity is not degraded. The size of the overgarment depends on the unit's policy for wearing ALSE. Usually, soldiers will wear the ALSE over the overgarment. During an emergency in a CB environment, aircrews need access to the contents of the survival vest. If the vest is worn under the overgarment, the soldier risks contamination to get to the vest. Commanders should carefully evaluate their policy and requisition overgarment sizes accordingly.

Night vision devices. Current procedures state that aircrews should wear the mask hood over the flight helmet. When flying with night vision devices that attach to the flight helmet, aircrews will have to wear the hood under the flight helmet. Units preferring this procedure should procure the hood for the M25 mask, which is designed to be worn under the helmet. Wearing the hood under the helmet creates more hot spots; individuals may need to be refitted with a larger size helmet.

M10A1 canister. Commanders should carefully evaluate whether individuals should change their own canisters. Changing the M10A1 canister is currently an organizational-level maintenance task. However, aviation personnel are widely dispersed on the battlefield, and maintenance or NBC personnel may not be available to change the canisters. Blood agents will degrade the canister, requiring the operator to change it after an attack. Therefore, aircrews should receive training in the procedure for changing the canister.

M24 mask. When wearing the M24 mask while operating the AH-1 telescopic sight unit, aviators should be careful not to scratch the mask lens. They should use a clear visor over the mask lens to prevent scratches.

Mask carrier.

In some aircraft, aircrews may not have room to wear the mask carrier during flight. If not, the items from the carrier that are needed during flight should be stored in the aircraft or in the protective clothing. Units should establish a policy so that aircrews know what procedures they are to follow. The procedures will vary with the type of aircraft; therefore, units are encouraged to examine several possibilities and then establish standard procedures for each aircraft.

Some of the items that will be needed during flight are the antifog kit, M258A1 skin decontamination kit, antiglare shield, and antidotes. Soldiers can take the packets of the decontamination kit from the hard plastic container and put them in overgarment pockets. Also, personnel can make a storage area inside the cockpit for the carrier or the M258A1 kit and antidotes.

Skull cap. Some personnel have procured the skull cap, a small cap of Nomex material worn under the flight helmet to keep the helmet from irritating the scalp. The skull cap can be worn under the mask head harness if it does not interfere with the seal of the mask about the face. If the cap is worn inside out, the seams will not dig into the scalp and cause more irritation.

Overboots. Overboots can present a safety hazard (foot slippage) if personnel use laces stretched from wear or do not tie the laces properly.

Gloves. During maintenance, such as preflight, postflight, and FARP operations, personnel can easily tear their protective gloves on the aircraft. When personnel perform maintenance tasks, they should consider wearing a leather glove over the CB protective glove; but they should remove the leather glove before they fly.

CB mask. The CB mask is required for protection against chemical agents. However, it can also protect aircrews from radioactive dust when they conduct aerial surveys or other missions over radiologically contaminated areas. The mask filters out dust or dirt that has radiological agents. In the absence of a CB threat, soldiers may wear other protection such as surgical masks or handkerchiefs. Aircrews may elect to wear the CB mask to keep the large amounts of dust that are present from irritating the eyes.

Faceform. A faceform is used to store the M24 mask to prevent face set. Units may elect to keep the faceform in place to lessen the damage when the mask is being carried. The unit SOP should specify when to carry or remove the faceform.

External drinking adaptor. TM 3-4240-280-10 and STP 21-1-SMCT describe the procedures for drinking water while wearing the M24 mask.

Mission-Oriented Protective Posture. Commanders select a level of protection based on the chemical or biological threat, temperature, work rate, and mission. The levels of protection are MOPP zero through MOPP4 plus a mask-only option. FM 3-4 describes the MOPP levels and option.

In-flight MOPP status. Aircrews fly in MOPP4 gear when a high threat of CB agent use exists or when agents have been used on the battlefield. Aircrews also fly in MOPP4 gear when they conduct NBC reconnaissance operations. Some of the reasons for this are as follows:

- Personnel cannot detect agents with their senses.
- Agent clouds travel vertically as well as horizontally.
- Aircrews exposed to CB agents may be grounded for an extended period.
- Aircraft are not equipped with advanced warning or detection devices.
- The donning of CB equipment, including the mask, during flight is not practical.
- Aircrews exposed to sublethal dosages of CB agents during flight may lose control of the aircraft and crash.
- Rotor wash may transfer droplets or contaminated dust inside the cockpit, creating a skin contact hazard.
- Aviation missions cover large areas, and agents may be present where troops are unavailable to report the attack.
- Even when agent hazard areas are marked on a map, winds and temperature gradients may change during the mission.

On-the-ground MOPP status. When aircrews are on the ground, the MOPP status will depend on the ground situation. Preflight and postflight inspections may be conducted with a lower MOPP level if the ground situation does not require MOPP4. When aircrews fly in MOPP4 gear in uncontaminated aircraft, they may fly into known clean areas for rest and relief. If ground support areas (such as a FARP or troop and maintenance areas) are clean, aircrews may lower their MOPP status once they are on the ground.

Performance Degradation and Countermeasures. CB protective equipment will keep soldiers alive. However, the equipment degrades performance because it hinders dexterity, limits vision and movement, and increases heat stress. Commanders must weigh actual performance degradation against perceived problems with the equipment. MOPP gear has a physiological and psychological impact on personnel. Training is the key to limiting performance degradation. Thoroughly trained personnel can perform most required tasks while wearing MOPP4 gear.

Vision. Use of the M24 protective mask reduces the peripheral vision of aircrews. To overcome this limitation, aircrews must continuously scan in all directions. The normal range of motion for the head is 90 degrees from either side of the centerline. The mask limits this 180-degree range to a 140-degree range. Therefore, aircrews must turn their heads to scan and compensate for the lost visual range. The mask also blurs or distorts the aircrew's vision in the cockpit, especially during night operations.

Fatigue. Each crew member must become familiar with the symptoms and causes of fatigue. To become more aware of these symptoms and causes, aircrews can refer to FM 1-301.

Collective Protection. Collective protection shelters are designed to keep out unfiltered outside air by means of positive overpressure. Personnel inside these shelters do not have to wear CB protective equipment. In a contaminated environment, either a shelter or clean terrain is needed for long-term rest and relief such as sleeping, showering, eating, or shaving. The continued integrity of the shelter depends on personnel following entry and exit procedures closely. The shelter becomes worthless if contamination is tracked in or carried in. Air troops are widely dispersed while operating throughout the battlefield. Therefore, they must carefully evaluate the number and placement of shelters. Shelters that belong to supported units may not accommodate aviation personnel. Therefore, their use by aviation elements must be coordinated. FM 3-4 describes collective protection shelters and their operation, including entry and exit procedures.

Protective Actions.

Aircraft protection while parked.

Aircraft on the ground must be protected from strong winds. In a high-nuclear-threat environment, aircrews should park aircraft inside natural revetments, bunkers, barricades, or man-made structures and then tie down the aircraft. Aircraft should also be covered as much as possible to protect them from toxic rain. Intelligence personnel can estimate what areas are likely to be targeted. When friendly nuclear strikes are planned, information on ground zero is given.

Blast is not strictly an LOS hazard as is thermal radiation. The blast wave bends around obstacles and rolls over hills in the same manner as normal winds. However, the reverse slope of a hill may substantially lessen the effect of winds. Just because an explosion cannot be seen from behind a hill does not mean the blast wave

will not affect that location. Aircraft cannot be effectively protected from the over-pressure. Taping the windscreen may help, but it is not effective against higher pressures.

Aircraft protection during terrain flight.

Aircrews can take several immediate actions to protect aircraft during a nuclear attack. When a nuclear detonation occurs during the day, the aircrew will not immediately know the yield or distance. At night, the aircrew may become blinded. Immediate action depends on whether the aviator is blinded. During the day, flash blindness is not likely unless personnel actually focus on the fireball. At night, however, the risks of flash blindness are substantial.

For friendly nuclear strikes, aircrews should mark the areas on a map during premission planning so that they can stay outside minimum safe distance limits. However, once a nuclear detonation occurs, aircrews will have no indication of who fired it. When a nuclear detonation is observed, the rotary-wing aviator in terrain flight should turn away from the fireball immediately and land the aircraft as soon as possible. Even though nuclear detonation will be visible, the aircraft may not be within range to receive severe damage.

The aviator has to make a split-second decision upon sighting the fireball. By immediately turning the aircraft away from the fireball, the aviator increases his chance of survival. Also, the missile effect on the Plexiglas is less hazardous to the aircrew because it travels away from the cockpit. In addition, the airframe provides protection from external missiles. After landing the aircraft, the aviator and crew should remain inside because the aircraft offers some shielding against radiation. The aviator should keep the aircraft on the ground for several minutes to ensure that either the blast wave has passed or the aircraft is far enough away to be unaffected by the blast. The positive and negative phases of the blast will occur about the same time. Therefore, the aircrew should wait until debris stops falling before exiting the aircraft. After checking the airframe to ensure that it is not damaged structurally, the aircrew can continue the mission.

At night, ten-second flash blindness can occur at distances beyond the range of any other effect, including EMP. For large-yield nuclear detonation, flash blindness can occur at the horizon. It will occur before individuals know they have retinal burns. For rotary-wing aircrews, protective measures are limited. However, when aircrew members wear the AN/PVS-5 that fits flush against the face, the amount of light that can enter around the goggles is reduced. Another protective measure is for one aviator to wear an eye patch over one eye. When either the AN/PVS-5 or the eye patch is worn, the aviator should have enough vision to land the aircraft. For the first few seconds after an aviator removes either the AN/PVS-5 or the eye patch, his immediate action is to gain altitude. (This is the same immediate action prescribed for night vision device failure.) If the aviator is able to see, he should land the aircraft in the nearest suitable area. If the aviator is wearing no protection, he must immediately determine his vision limitations. If the aviator has little or no vision, he should gain altitude and attempt to wait until his vision returns. If the aviator has some peripheral vision, he should use night vision techniques to scan the area.

Aircraft protection at cruise altitude. At night or during the day, aviators have the best chance of survival if they turn the aircraft away from the point of detonation and gain altitude. They should also protect their face and neck from Plexiglas fragments. In rotary-wing aircraft, aviators may be able to gain time until their vision returns. Nuclear detonations will probably affect the enemy's electronic

air defenses. Placing distance between the point of detonation and the aircraft and gaining altitude will lessen the damage from the blast. If detonations are multiple, the aviator can estimate the direction of the largest or closest detonation. Turning the aircraft away from the detonation will lessen the possibility of thermal radiation damage to the eyes. After the blast wave passes, the aviator should decrease altitude and attempt to estimate damage by control feedback. If the aviator suspects damage, he should land the aircraft as soon as possible to inspect it.

Equipment protection against EMP. Equipment may be protected against EMP, but this protection must be installed by the manufacturer. Field-expedient methods of wrapping equipment in foil or burying it are not feasible. If electronic components have been EMP-hardened by the manufacturer, maintenance crews must be careful not to degrade this protection. Electrical equipment that meets specifications for protection against lightning strikes is not necessarily guarded against EMP, but any protection may help. Lightning strikes in milliseconds, whereas EMP effects occur in only nanoseconds (billionths of a second).

Section VI
DECONTAMINATION

DECONTAMINATION FUNDAMENTALS

In the past, Army doctrine dictated that when a unit became contaminated, soldiers stopped fighting, pulled out of battle, and found a chemical unit for the cleanup. This process was time-consuming and not tactically or logistically feasible. With the threat's capability to contaminate large areas of terrain, a contamination-free environment after every chemical attack is impracticable if not impossible. Today's emphasis is on "fighting dirty" and conducting hasty decontamination along with natural weathering to reduce chemical or biological hazards.

There are four principles of decontamination: as soon as possible, only what is necessary, as far forward as possible, and prioritized. The commander uses the factors of METT-T and some additional considerations to determine when, where, and how to conduct decontamination. When planning operations, commanders should consider the following:

- Length of time that personnel have been operating in MOPP gear.
- Those missions that are planned in contaminated areas.
- The capabilities of NBC personnel and the decontamination team.
- The external support that is available from chemical units.
- The decontamination support that the supported unit will provide.
- The separated elements that must also receive support.

DECONTAMINATION LEVELS

Figure C-2 shows ground and aircraft decontamination levels. Unit personnel conduct basic skill tasks and hasty decontamination, whereas a chemical decontamination unit usually conducts deliberate decontamination. Although hasty decontamination reduces the hazard level, personnel must still use protective equipment. The goal of deliberate decontamination is to reduce the hazard level to a point where protective equipment is no longer required. When the tactical situation permits, deliberate decontamination may be performed during unit restoration operations in the rear area. Chemical decontamination units establish deliberate decontamination sites, and the supported unit assists in the operation. FM 3-5 describes decontamination techniques in detail.

DECON TYPES	GROUND FORCES	AVIATION FORCES
Basic Soldier Skills	Skin Decon Personal Wipedown Operator Spraydown	Skin Decon Personal Wipedown Aircrew Spot Decon*
Hasty	MOPP Gear Exchange Vehicle Washdown	MOPP Gear Exchange Aircraft Washdown*
Deliberate	Detailed Troop Decon Detailed Equipment Decon	Detailed Troop Decon Detailed Aircraft Decon*
*Aviation decon techniques substituted for ground forces decon techniques.		

Figure C-2. Ground and aircraft decontamination levels

AIRCRAFT DECONTAMINATION

The sensitivity of aircraft components to caustic solutions has necessitated the development of special decontamination procedures. Air troop, AHT, and ATKHT commanders must combine these special procedures with decontamination principles and determine where and when to conduct decontamination operations. Spot decontamination is the most cost-effective technique and will limit the spread of agents. Units may find that deliberate aircraft decontamination is not cost-effective when aircraft are in great demand. Because aircrews fly in MOPP4 gear, commanders must compare how decontamination versus no decontamination will affect the mission.

Decontaminants.

Only approved cleaning compounds may be used to decontaminate aircraft. Caustic decontaminants, such as DS2, STB, bleaches, or sodium hypochlorite, are not considered safe. DS2 corrodes rubber or plastic components and Plexiglas, and STB corrodes aircraft skin and metal components.

Soap and water, kerosene, JP8, and diesel fuels are approved as decontaminants on selected parts of aircraft. JP8 is effective in removing some agents from aircraft skin and components. However, it does not neutralize the agents. Personnel

must use care when handling JP8. When using a cloth soaked with JP8 to wipe contaminated areas, personnel must avoid wiping internal components near the exhaust. If water is available, personnel may use it to rinse off the JP8.

When components are removed from the aircraft for repair, some caustic chemical may remain. Personnel must decontaminate these components before cannibalization or overhaul. Once components have been decontaminated, personnel must rinse the components thoroughly before they are reinstalled on the aircraft. No guidelines exist on which decontaminants can be used on specific components.

Actual flight and aeration can help decontaminate external surfaces. The wind will blow some of the agent off the aircraft skin and expedite evaporation. However, some of the agent will remain in the paint and continue to be a hazard.

Personnel must be careful when using pressurized water for decontamination. Aircraft skin and internal components can be damaged by moderate to high water pressures. Personnel must follow the guidelines in the appropriate aircraft maintenance manuals. Commanders should ensure that safety, maintenance, and NBC personnel coordinate decontamination operations.

Decontamination Techniques.

Spot decontamination. The goal of spot decontamination is to limit the spread of contaminants by removing most of them from selected areas of the aircraft. These areas are where personnel work and may pick up and spread the contaminants; for example, the landing gear, fuel ports, doors, and handholds. Either aircrews or ground personnel may conduct the spot decontamination. Fuel and soap and water are probably the most common decontaminants.

MOPP gear exchange. In a contaminated environment, MOPP gear exchange and rest and relief operations must be conducted. Every soldier must know how to change his MOPP gear to survive. Aircrews are often isolated from their parent unit and may not be able to return to their unit for MOPP gear exchange. Therefore, they will conduct the exchange with units in their area of operations. When the mission allows, aircrews may return to a unit decontamination area for the exchange.

Aircraft spraydown. Aircraft spraydown is basically the same technique as vehicle washdown and includes detailed, time-consuming procedures both for exterior and interior decontamination. Units are encouraged to develop site layouts that are appropriate for their specific missions and the terrain. In addition, chemical units should develop procedures for assisting aviation units at spraydown sites.

Deliberate decontamination procedures. Deliberate decontamination sites are established by chemical units, usually in the rear areas. The supported units decontaminate their own personnel and equipment. The chemical unit decontaminates vehicles, provides technical assistance, and supervises the entire site. Aviation units must be thoroughly familiar with their responsibilities at these sites. The supported aviation unit must coordinate closely with the chemical unit to ensure that aviators do not land contaminated aircraft in clean areas.

Decontamination Operations.

Arming and refueling operations. Arming and refueling operations normally take place at the FARP. All aircraft areas that FARP personnel touch should be decontaminated. In most cases, these are fuel port areas. A more detailed decontamination is required for attack aircraft because of onboard weapon systems.

Personnel should be careful to not soak areas of these firing systems that are sensitive to the decontaminant.

Entry and exit procedures. During training, commanders should outline entry and exit procedures for all types of aircraft because the procedures will vary with each type of aircraft. When procedures have been established, aircrews should practice them until they become proficient. In addition, FARP personnel must become familiar with the procedures. Aircrews should signal the FARP personnel if they intend to exit the aircraft. Then the FARP personnel can decontaminate most areas that the aircrews will touch in exiting the aircraft. The crew chiefs of most aircraft can conduct decontamination with equipment from the FARP. The possibility of transferring contamination into the cockpit is increased when aircrews exit the aircraft at the FARP. Aircrews should attempt to limit the amount of contamination transfer by using contamination avoidance measures. Before entering the aircraft, aircrews should use an M258A1 kit to decontaminate their gloves and overboots.

Preflight and postflight inspections. When conducting preflight and postflight inspections on contaminated aircraft, aircrews must try to avoid becoming contaminated themselves. Spot decontamination helps reduce this possibility. Decontamination of gloves and overboots after the inspections will likewise reduce the chance of transferring contaminants into the aircraft. Aircrews may need to wear wet-weather clothing to keep most of the contamination off the overgarment. Preflight and postflight inspections and decontamination operations during or after these inspections are physically demanding tasks that increase heat stress.

Maintenance inspections. Personnel may conduct maintenance inspections before or after decontamination of the aircraft. Inspection crews use the decontamination techniques discussed in the two previous paragraphs to avoid spreading contamination.

Repair or recovery. Repair or recovery crews should be aware of the contamination level before they enter the area. Teams will evaluate the situation to determine when or if an aircraft component can undergo decontamination. Some items may be decontaminated before they are returned to the maintenance section if the maintenance area is clean. However, if the maintenance area is contaminated, decontamination should occur there. Units may be able to move clean aircraft or components into clean facilities. Likewise, units may be able to direct contaminated aircraft or components to contaminated facilities. The management of clean and contaminated areas depends on the intensity of the battle and the availability of contamination information.

Cannibalization and overhaul. The same decontamination considerations of clean versus contaminated aircraft and components also apply to cannibalization and overhaul maintenance activities. Maintenance unit leaders should closely evaluate specific repairs that require a clean area.

DECONTAMINATION SITES AND LAYOUT

Aircraft decontamination poses unique challenges to commanders. They must decide when to conduct the various levels of decontamination. Normally, the air troop conducts hasty decontamination operations. It may also conduct deliberate decontamination operations if required by the situation and time is available. Deliberate decontamination operations are normally conducted at squadron level and require an area that meets the appropriate criteria.

Site Selection Requirements. The decontamination area or site must accommodate the required aircraft, have a readily available water source, and allow for adequate drainage. The site should also be relatively secure but close enough to the FLOT or area of operations and FARP to allow a reasonably quick turnaround of aircraft. The site must have sufficient NOE routes no less than 2 to 3 kilometers from the station for entry and exit. The slope angles at the site must not exceed the capabilities of the aircraft assigned to the air troop. Tentative decontamination sites must be considered and integrated into the tactical plan as are tentative CP and FARP sites.

Station Layout. Any of several techniques may be used to decontaminate aircraft. An effective method is the one-step method. In this method, troops are sequenced into a particular area, shut down, decontaminated, and returned to duty. The squadron is responsible for selecting and securing the site as well as augmenting chemical personnel. The chemical unit is responsible for operating the site. Figure C-3 shows a typical layout of an aircraft decontamination station. After the site is selected, reconnoitered, and secured, squadron NBC defense personnel and the supporting chemical unit jointly establish the decontamination site. The squadron commander may choose to employ the tactical CP or a representative from the S3 section to supervise the operation. As each troop-level unit is sequenced through the station, the remaining troops provide security. After aircraft are shut down, the entire aircraft or specific areas are washed with hot, soapy water and rinsed. If available, hot air may be used to dry the aircraft and decontaminate the interior or otherwise sensitive areas of the aircraft. This sequence is continued until all squadron elements have completed the decontamination. The site is then cleared, and the squadron continues its mission.

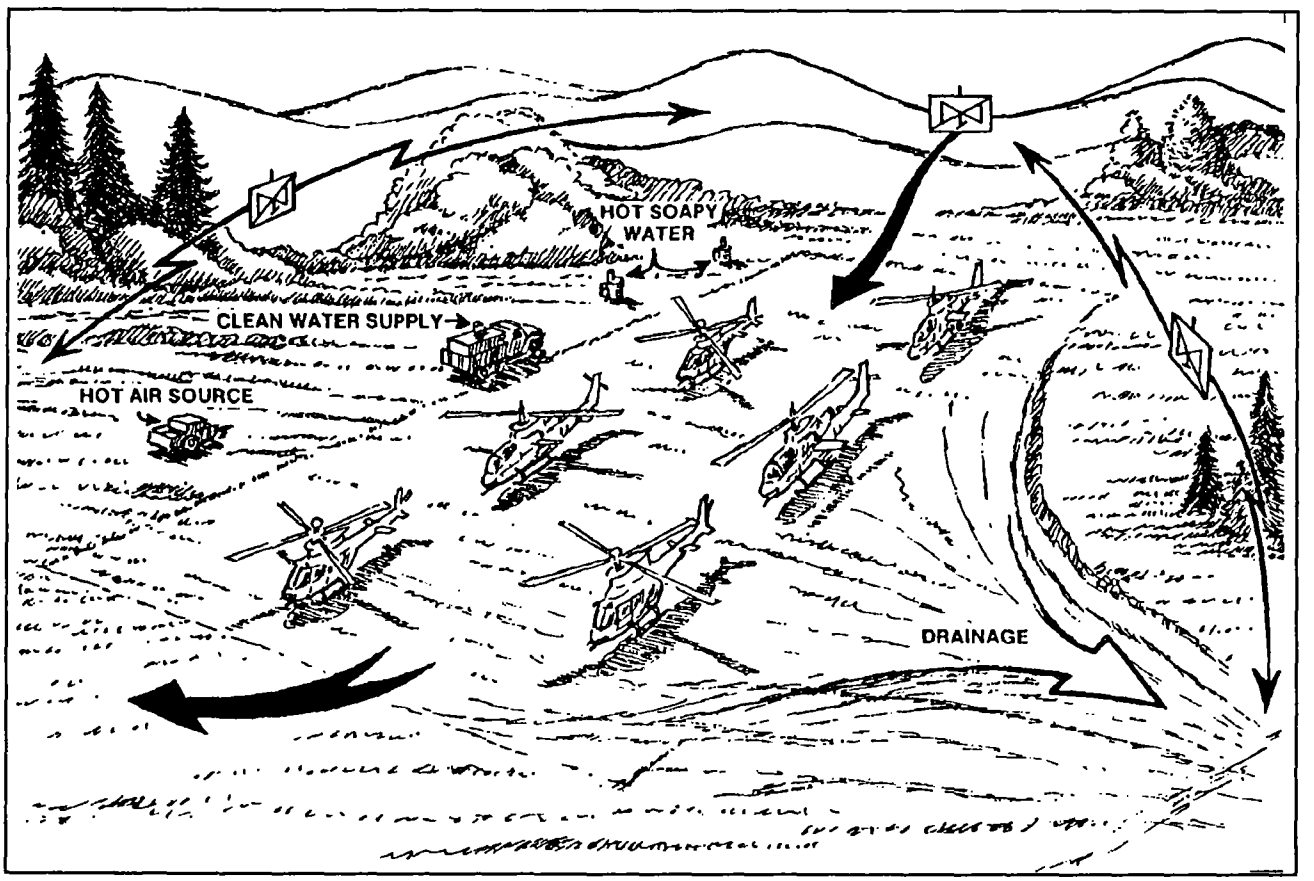


Figure C-3. Aircraft decontamination station

Safety Precautions.

At no time will station personnel cross in front of an aircraft that has a turret weapon system whether it is armed or not. If an aircraft has a weapon system of any type, the aircrew will ensure that the system is cleared and placed on SAFE before the aircraft enters the decontamination station.

Station personnel will not cross in back of an operating helicopter unless they maintain a proper distance from the turning tail rotor.

The team leader will give all signals to aircrews. Before signaling the aircrews to move aircraft, the team leader will have visual contact with the other team member. Team leaders in each substation will wear white arm bands in the manner prescribed by the unit SOP.

Alternate Site Layouts. Units are encouraged to establish their own site procedures and equipment requirements. Alternate sites should be considered during the planning phase of troop operations, particularly decontamination operations. FM 3-5 contains examples of alternate site layouts.

Section VII
SUSTAINED OPERATIONS

FORWARD ARMING AND REFUELING POINTS

Aircrew Support. Aviation units use FARPs to sustain operations. FARPs enable the unit commander to apply continuous pressure on the enemy by decreasing turnaround times and by increasing loiter times. If FARPs are near or collocated with other units that have NBC support, NBC support for the aviation elements may be arranged with those units. In a CB environment, the commander will have difficulty keeping attack aircraft in operation. However, the attack teams can rotate in and out of the MOPP gear exchange or rest and relief site after several turnarounds. Clean and contaminated FARPs may be established to facilitate rapid relief-on-station operations and prevent repetitive contamination. The mission and temperature will determine how often the crews visit a rest and relief station. They can visit either before or after refueling operations at the FARP. If additional aircrews are available and the mission allows it, a crew change during rest and relief could make aircraft available for more missions.

NBC Planning. Detailed preplanning is the key to successful FARP operations in an NBC environment. Because FARPs are vital to the aviation mission, the following issues are included to assist commanders in planning FARP operations. These issues cover general, nuclear damage, and CB contamination considerations.

- The manner by which friendly STRIKWARNs or CHEMWARNs will be passed to FARPs and to aircraft being serviced at the FARPs.
- The use of smoke to lessen FARP vulnerability during site preparation and closure.

- The training of at least one member of the FARP in the two previous considerations.
- Dosage estimates when the FARP is operating in a radiologically contaminated area; how this dosage estimate will affect operational planning.
- Awareness of FARP personnel concerning nuclear damage to aircraft. They must be able to identify nuclear damage to armament systems.
- Knowledge of FARP personnel on how to minimize nuclear blast effects and thermal damage to fuel blivets and other FARP equipment.
- Assistance of the supported or parent unit in hasty decontamination.
- Guidance to FARP ground personnel concerning the best routes through or around contaminated areas.
- Visual or radio communications that FARP personnel can use to warn the aircrew on an incoming aircraft that a FARP site is contaminated. Also, the method by which an aircrew warns FARP personnel that the aircraft is contaminated.
- In a chemically contaminated area, the individuals designated to dismount at the FARP.
- If aircrews dismount, the provisions made for spot decontamination to lessen the transfer of contamination.
- The provisions made to keep contamination (especially that carried on boots) out of the cockpit when aircrews enter the aircraft.
- During high-sortie missions, how FARP personnel wearing MOPP4 gear can keep up with the work load; plans made for rest and relief or assistance.
- When JP8 is used as a spot decontaminant, the need for personnel to be trained in its hazards.
- The training of FARP personnel to use covers in a manner that does not create FOD hazards.
- The preparation of FARP personnel to accept supplies that are contaminated.
- The coordination and provision of personal needs for aircrews at the FARP.

AIRCRAFT MAINTENANCE

In an NBC environment, maintenance operations will be affected more by nuclear detonations than by chemical or biological agents. Nuclear detonations will cause greater structural and component damage than conventional explosions. While CB agents create a lethal environment for personnel, they do not damage aircraft components or airframes.

ARMY AIRSPACE COMMAND AND CONTROL

The control of airspace is important during a conflict as it is in peacetime. A^2C^2 elements must work closely with NBC elements or control centers. STRIKWARNs and CHEMWARNs may be passed through A^2C^2 networks as well as units. NBC personnel will use NBC contamination information and friendly nuclear minimum safe distances to establish air corridors.

SURVIVABILITY

Radiological Contamination. A nuclear strike may cause aircraft to crash or suffer a hard landing. Surviving aircrews should be alert for forest fires or other fires caused by thermal radiation. However, radiological contamination will be the greatest hazard to aircrews. If the aircraft goes down in a fallout area or the crew receives fallout, the dose rates can be high enough to cause casualties. Each aircraft will usually have an IM93 or a DT-236/PDR-75 that measures the total dose received by the aircrew.

Radiological Particle Ingestion. If the situation permits, the crew should attempt to dig a deep fighting position or find cover such as a cave, an upper story of a house, or an abandoned armored vehicle. Living off the land will pose long-term hazards from the ingestion of radiological particles. The best preventive measure for this is to wash the food. Heat will not reduce any radiological hazard. Running water will dilute radiological agents and reduce the risk of drinking contaminated water. Radiation weakens the body's ability to fight disease. One of the first symptoms of radiation sickness is diarrhea.

Lethal Chemical Agents. In a lethal chemical environment, surviving personnel will face many additional hazards. The current overgarment is not made of fire-retardant materials. When the situation permits, the crew should readjust the CB protective gear and take action to find out if the area is contaminated. They can use the M8 or M9 detection paper onboard the aircraft to identify chemical agents and the M256 detection kit to identify vapors. However, these will not detect toxins or biological agents. The crew should look closely at wildlife or population centers for evidence of lethal chemical agents. If personnel do not have another set of MOPP gear, they should not remove the gear they are wearing. If a second set of MOPP gear is available and the situation permits, the crew should change into the new clothing.

Section VIII
SMOKE OPERATIONS

SMOKE EFFECTS

Smoke is more effective when used at night or with natural obscurants such as fog, rain, natural dust, or battlefield dust and debris. It is the one obscurant that can be placed, within meteorological constraints, where the user wants it. Figure C-4 shows how smoke and other obscurants affect electro-optical systems.

Smoke is a suitable medium for hiding and dispersing CB agents. These agents may include irritants such as riot control agents, incapacitants, and other lethal CB agents. Smoke prolongs the life of CB agents by reducing the effects of sunlight or other weather conditions on agent persistency.

Smoke makes it difficult for personnel to see a target. The degree of visual difficulty depends on the type of smoke used and its mixture with natural obscurants. The Soviets possess smokes that deny visual identification and adversely affect light-intensifying and near-infrared devices. Mid- to far-infrared devices, thermal imaging, and heat seekers are degraded when the contrast between the target and

the background is reduced. The extent to which a laser can be degraded depends on the energy of the laser; the lower the energy, the more the laser can be degraded. Large dust storms can adversely affect threat acquisition systems. The threat employs self-screening smokes during road movement.

Soviet doctrine emphasizes the employment of smoke with other decoy or deception operations. Smoke draws attention to a general area, but the observer must determine where the unit or target is in the smoke and whether targets really exist in the smoke.

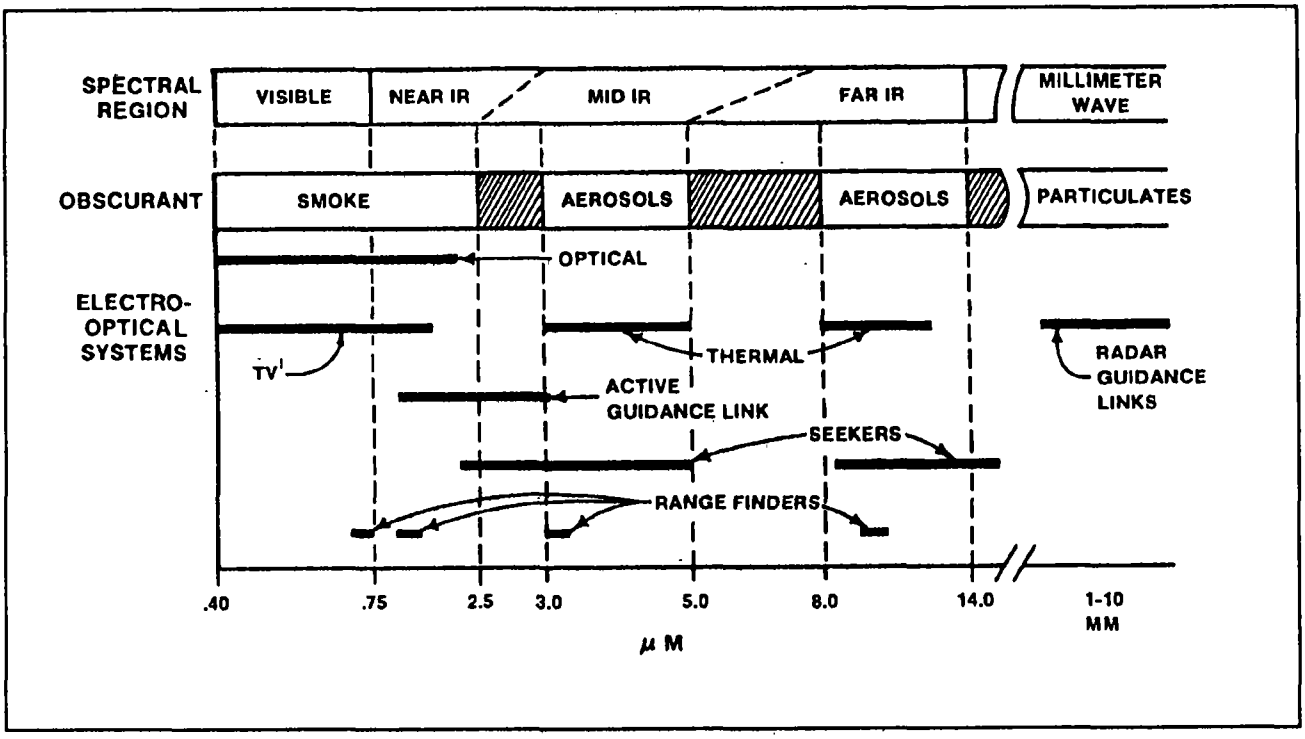


Figure C-4. Battlefield obscurants

SMOKE EMPLOYMENT

Threat Employment. When the threat employs smoke against US maneuver forces, aviation missions must increase to assist with observation and command and control. When employed on terrain features, smoke can force aircraft up and into threat air defense coverage. Smoke denies low-level corridors or possible LZs for air assault operations. Large areas of smoke can obscure terrain features that serve as navigational aids. Silhouetting aircraft against smoke increases their vulnerability. Smoke employed on ground-based aviation support units, such as FARPs and maintenance, will disrupt aviation operations. FM 100-2-1 provides detailed information about the threat's use of smoke.

US Employment.

US forces can employ smoke to keep the enemy from observing and acquiring them. For example, US forces use smoke to obscure an enemy or to screen their units. They also use smoke for deception, identification, and signals. Properly employed smoke enhances unit survivability. Units have organic assets such as smoke pots and grenades and external assets such as artillery and generators. Large-scale or

sustained smoke can be employed with smoke-generating systems. Deliberate smoke operations are discussed in FM 3-50.

When US forces employ smoke, their ability to observe and acquire enemy targets will be affected. Because smoke draws attention, aircrews may tend to concentrate more on the smoke than on the targets. Aircrews may have difficulty seeing targets in the smoke or seeing targets leave the smoke. When a ground vehicle leaves a smoke screen, it is easier to acquire because it is silhouetted against the smoke. Personnel need to be aware of how smoke affects their ability to see enemy targets.

Section IX
TRAINING

AIRCREW TRAINING

Aircrew training for NBC operations should be conducted in two phases: a ground phase and an air phase. The ground phase acclimatizes aircrews and ground personnel to wearing MOPP gear. The air phase is more flexible; commanders must determine how much of their units' flight time they can devote to NBC training. The concepts presented here can be applied to ground crews as well as aircrews.

Ground Phase.

Acclimatization must be accomplished gradually; once completed, it must be maintained. Therefore, before aircrews fly with MOPP4 gear, they should be able to operate in MOPP4 gear on the ground for at least six hours without interruption. This figure is not intended to be a limiting factor but rather a guideline for the commander. When aircrews enter into the ground phase of training, they should understand that the purpose of the training is twofold. First, it allows them to acclimatize to the protective clothing. Second, it gives them an idea of their personal limitations. For aircrews to realize their personal limitations, they must conduct the same activities they normally do in an uncontaminated environment. The commander must stress this, because all activity does not cease when the unit goes into MOPP4 gear. Normal operations include—

- Drinking.
- Map indexing.
- Flight planning.
- Preflight checks.
- Mission briefings.
- Basic personal hygiene.
- Flight clothing adjustment.
- Operation overlay construction.
- Routine maintenance such as scheduled or run-up maintenance.
- Cockpit procedures such as tuning radios, adjusting switches, or completing checklist items.

As individuals progress through the ground phase, they will identify those areas that affect them the most. After determining their limitations, individuals can find new ways to accomplish the task or modify existing procedures.

Air Phase. Flight time is a valuable asset to every unit. Although the air phase can be done during existing training, a commander may find that NBC training degrades his unit's ability to accomplish the mission. General goals are recommended below, but the actual method to reach these goals is left up to the commander. The recommended goal for individuals is 6 continuous hours of operating in MOPP4 gear. The goal for units is 48 continuous hours of operating in a simulated NBC environment.

For training to be realistic, commanders must rotate unit personnel, as they will in combat, through collective protection shelters. If enough shelters are available, 50 percent of the unit may be participating in rest and relief at any one time. Accordingly, unit effectiveness and mission accomplishment will be proportionally degraded. To achieve acceptable performance levels, commanders may have to move all or part of their units to a clear area.

When implementing training programs, commanders should gradually increase the time that aircrews fly in MOPP4 gear over a given period. However, the training must be in line with individual crew member capabilities and safety requirements. Commanders should refer to the scheduling guide in AR 95-1 when developing crew work and rest schedules.

TRAINING CONSIDERATIONS

As with all training, the aircrew NBC training program should be carried out aggressively, consistently, and realistically. However, commanders must remember that safety should never be sacrificed for realism. With this in mind, unit trainers and commanders must be aware of certain factors that will affect their units' success in carrying out their training program. Some factors are described below.

Ambient temperatures and humidity may be very high, thereby increasing the wet bulb globe temperature. Unit SOPs should specify that every soldier must be familiar with the symptoms of heat stress and other heat-related injuries. Early morning and late evening hours are the best times to conduct NBC flight training because of the lower temperatures and decreased humidity.

AR 95-1 specifies the flight uniform requirements for aircrews. TC 1-210 specifies safety requirements for MOPP training. Aviators not on the controls must recognize when aviators on the controls begin to lose concentration so that they can take control of the aircraft. Every individual has a different physiological makeup; therefore, commanders should not expect every crew member to progress at the same rate.

Overall physical conditioning plays an important role in an individual's ability to perform in MOPP gear. Commanders should ensure that their units pursue an aggressive and challenging program of physical training along with MOPP training.

APPENDIX D

COMBAT ORDERS AND REPORTS

This appendix implements portions of STANAG 2014.

Orders are the means by which the commander alerts his elements to prepare for future operations and to implement his concept of the operation. Orders are written or oral communications that convey information about action. As a rule, the air troop commander issues orders orally. A spot report is used to report information about the enemy and the area of operations.

WARNING ORDER

A warning order gives subordinate elements advance notice of a contemplated action or an order which is to follow. It allows elements to begin preparing for the execution of the mission. This order gives them maximum warning and essential details about the impending operation, including planning time available. Figure D-1 depicts the warning order format.

1. "Warning order."
2. Addressees.
3. Nature of operation.
4. Time of operation.
5. Earliest time of move.
6. Attachments and detachments.
7. Time and place to receive full order.
8. Acknowledgment.

Figure D-1. Warning order format

OPERATION ORDER

An OPORD gives subordinate elements the essential information they need to carry out an operation. An OPORD is issued before the operation begins and is usually given to all pilots involved. The commander may use the pilots sleeping quarters to brief the aircrews about the mission and to answer questions. Figure D-2 depicts the OPORD format.

1. SITUATION

- **a. Enemy forces.**
- **b. Friendly forces.**
- **c. Attachments and detachments.**
- **d. Present and expected actions.**

2. MISSION

3. EXECUTION

- **a. Concept of the operation.**
  - **(1) Scheme of maneuver.**
  - **(2) Fires.**
- **b. Specific instructions to subordinate units.**
- **c. Coordinating instructions.**

4. SERVICE SUPPORT

- **a. General.**
- **b. Materiel and services.**

5. COMMAND AND SIGNAL

Figure D-2. OPORD format

FRAGMENTARY ORDER

After the initial OPORD, the commander modifies and adjusts the actions of his elements by issuing a FRAGO. The commander usually issues a FRAGO while he is airborne. He directs or redirects his elements to adjust to changing battlefield

situations. A FRAGO follows the same sequence as the OPORD. It is issued as an oral or a written order and contains brief, specific, and timely instructions. FRAGOs are used to change or modify the OPORD and contain only information that is different from the OPORD.

SPOT REPORT

A spot report is arranged as depicted in Figure D-3. The information is organized in a logical order, making it easy to remember.

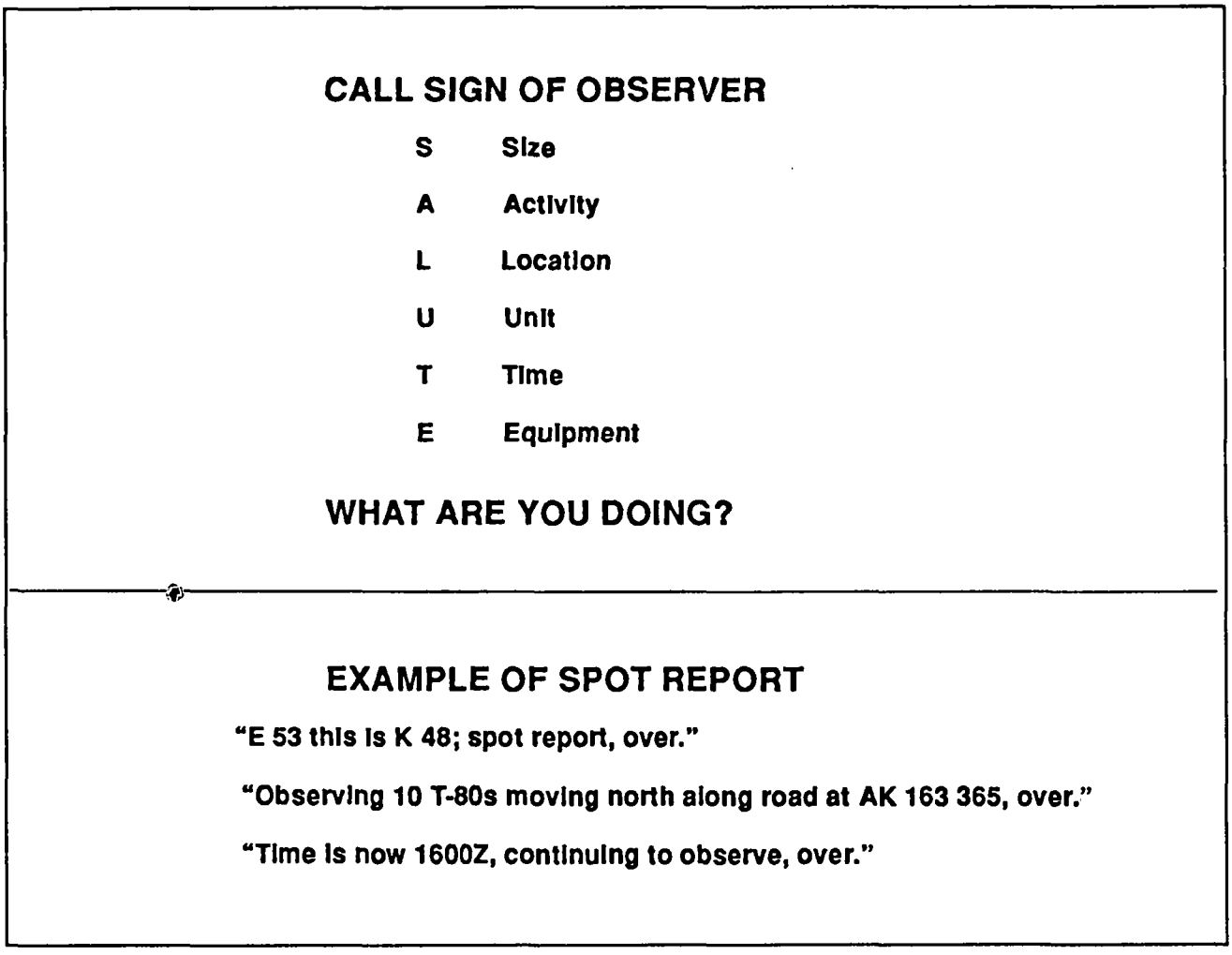


Figure D-3. Spot report format

APPENDIX E

AEROSCOUT OBSERVER RESPONSIBILITIES

The pilot and the aeroscout observer must act as a team to accomplish the mission. The AO assists the pilot in accomplishing preflight, in-flight, and postflight duties. This appendix briefly describes aeroscout duties.

PREFLIGHT DUTIES

The aeroscout observer attends the premission briefing with the pilot and assists him with posting necessary information to the map. During the preflight inspection, AO duties include—

- Assisting the pilot by conducting a walk-around inspection of the aircraft, noting obvious maintenance deficiencies or combat damage.
- Checking aircraft weapons, personal weapons, and ammunition for cleanliness, proper mounting or stowage, and condition.
- Checking the cockpit area to make sure it is free of foreign objects.
- Ensuring that required mission equipment is serviceable. (This equipment may include survival equipment, body armor, binoculars, ammunition, and water and rations.)
- Coordinating with the pilot on assigned responsibilities should an in-flight emergency occur.

IN-FLIGHT DUTIES

During flight, the AO must be able to communicate effectively with the pilot. Common phraseology and cooperation must be developed between the pilot and the AO. The use of rally terms with terrain features is recommended. Examples of terms are "Turn left," "Stop turn," "Follow the stream on the right," or "Turn down the valley on the left." The AO can direct the pilot by specifying a compass heading at higher altitudes. However, as the aircraft flies lower (particularly at nap-of-the-earth altitudes), the AO must avoid providing directional guidance to the pilot by compass reference. Specific in-flight duties of the AO include—

- Navigating.
- Recording information.
- Looking for enemy aircraft.
- Changing radio frequencies.

- Authenticating radio calls.
- Selecting landing and pickup zones.
- Assisting in monitoring the AN/APR-39.
- Submitting spot and situation reports.
- Calling for and adjusting artillery fire.
- Locating hazards and obstructions to flight.
- Identifying and locating enemy ground positions.
- Coordinating target handover to attack aircraft.
- Coordinating with all available fire support assets.
- Controlling the aircraft when the pilot is incapacitated.
- Selecting battle positions and attack helicopter firing positions.

When the AO detects a target, he mentally notes the sighting location; it may be necessary for him to return to the exact location of the original sighting or to pinpoint the coordinates on a map. (This is often required in rugged terrain and vegetation.) The AO alerts the pilot, gives a clockwise direction from the aircraft's nose, and estimates the range to the sighting. He describes the target and directs the pilot to the sighting location or tells him the map location.

POSTFLIGHT DUTIES

Specific postflight duties of the AO include—

- Assisting the pilot with aircraft refueling.
- Assisting the pilot in checking aircraft for battle damage.
- Being debriefed.

APPENDIX F

TARGET HANDOVER PROCEDURES

This appendix implements portions of STANAG 2999 and QSTAG 277.

Air cavalry troops will often precede attack helicopter units into an area of operations to develop the situation before other combined arms forces, such as attack helicopter battalions, are committed. The air troop reconnoiters battle positions for attack helicopter units and assists in the movement of those units into positions. During reconnaissance and screening operations, the air troops perform harassment and impeding actions which may necessitate fire from air troop attack aircraft.

BATTLE POSITIONS

Planning Premission Action. Whether for attack helicopter units or for organic attack aircraft, air troop aeroscouts conduct the initial coordination and reconnaissance for the preselected battle positions. The aeroscouts must know the friendly units in the assigned area and the units' missions, battle positions, and proposed concept of operations. They must also be familiar with the enemy's probable avenues of approach and suspected locations. The aircrews should then go through the normal steps for premission planning. They should emphasize a map reconnaissance to select additional BPs and tentative firing positions within those BPs. The ideal firing positions should permit attack helicopters to fire from multiple positions into enemy flanks and rear areas. This type of engagement, along with fire support, will destroy enemy targets and confuse the enemy. A frontal attack should be used as a last option.

Selecting Battle Positions.

The air troop commander, using his aeroscouts, selects the BPs. Cover and concealment are emphasized. The terrain and vegetation leading to surrounding battle positions must conceal attack helicopters from enemy observation. For this reason, aircrews should concentrate their map reconnaissance on locating BPs based on terrain relief, access routes, and availability of alternate positions.

The air troop commander coordinates with the ground force commander, who is responsible for the "real estate," to determine battle positions and plan fires. The remaining troop members move as rapidly as possible to confirm the suitability of various battle positions. The BP is a control measure within which individual firing positions for the team may be selected. These positions, which are dispersed laterally and in depth, are shown in Figure F-1 (page F-2). During an aerial reconnaissance, actual battle positions will be selected after the following are considered:

- Obstacle clearance.
- Range to the target.

- Nature of the target.
- Multiple firing positions.
- Adequate area for proper dispersion between helicopters.

Ideal battle positions should provide cover for the attack helicopters to prevent detection by enemy radar and engagement by enemy air defense weapons. The positions themselves should conceal the aircraft from visual observation. The enemy can easily detect helicopters by observing the unusual movement of trees, emerging dust clouds, or blowing debris caused by rotor wash.

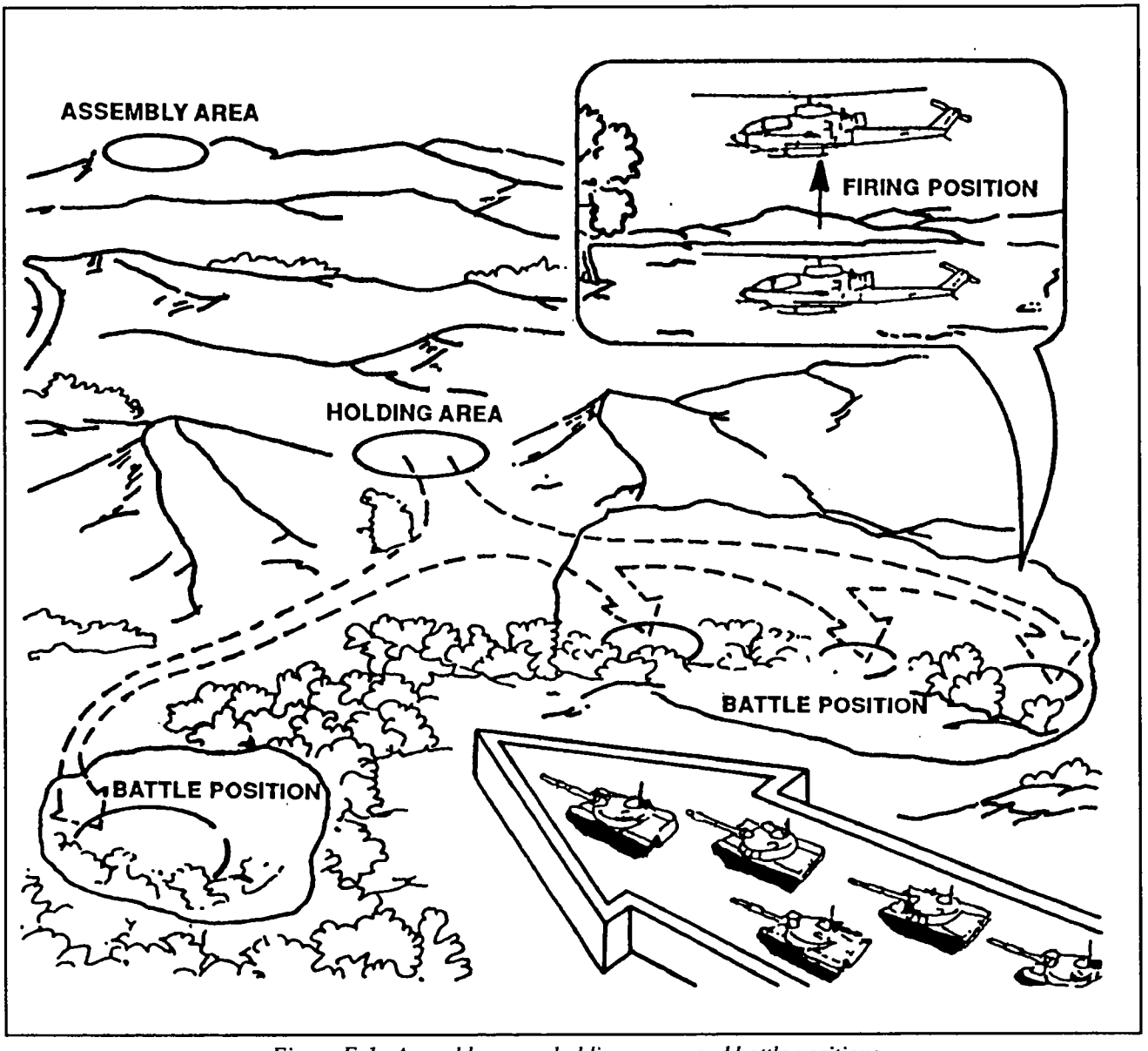


Figure F-1. Assembly areas, holding areas, and battle positions

During the hours of darkness, the enemy's visual acquisition capabilities are greatly reduced. Therefore, the primary consideration is to mask the helicopter from electronic acquisition by the use of terrain. When hidden in ground clutter, NOE helicopters can remain undetected on enemy radar screens.

Selecting Firing Positions.

A firing position is a specific location occupied by a single attack helicopter within a battle position. In selecting firing positions, the aircrews should consider the factors listed below.

Range. The firing position should be located so that the kill zone is within the last one-third of the missile range. This range would be 2,500 to 3,750 meters for the TOW or at the maximum standoff capability of the weapon system to be used.

Field of fire. The firing position should permit intervisibility with the target throughout the kill zone and for the duration of the engagement.

Target altitude. The firing position should be level with or higher than the target area, if possible.

Backdrop. Terrain features, such as vegetation and hills, should be behind the firing positions so that helicopters will not be skylined. This is very important at short ranges.

Shadow. When possible, the firing position should be in shadow.

Sun. The sun should be behind or to the side of the helicopter.

Rotor wash. Locations should minimize the effects of rotor wash on wires, debris, leaves, snow, and soil.

Maneuver area. The area surrounding the firing position should be large enough to permit easy in-and-out maneuvers.

Concealment. The vegetation surrounding the firing position should allow the helicopters to operate between or beside trees for concealment.

If time permits, aircrews should list these factors on their maps or use some other suitable method. They should record the directions and distances to target reference points and the locations of preplanned fires.

Positions are normally identified by distance and direction from checkpoints. As these positions are confirmed, locations should be sent encrypted or secured to flight operations and to the aeroscout who is coordinating with the ground commander. If the aeroscout cannot use radio and the time and situation permit, he can deliver the information face-to-face.

Occupying Battle Positions. When the air troop commander estimates that the time for employment is near, the attack helicopters move to the holding areas. Scouts lead the attack helicopters to the battle positions or instruct them by radio on how to proceed. When the aeroscouts hand the battle over to attack helicopter units, the air troop maintains security for the attack units or departs the area.

TARGET HANDOVER

A standardized procedure has been devised to simplify the process of handing over targets from the scout to the attack aircraft. This process is the same for attack helicopter and cavalry units.

Elements. The basic target handover between scout and attack helicopters includes five elements. They are the alert and target description, target location, method of attack, execution, and postattack action.

Alert and target description. This alerts the attack helicopter that a target handover is about to occur. It identifies the sender and describes the target (type, number, and activity).

Target location. The aeroscout gives the direction of the target in degrees and range from the battle position. The aeroscout may reference from the known point (for example, the target reference point or the engagement area) or use grid coordinates.

Method of attack. The aeroscout describes fire distribution and maneuver for the attack.

Execution. The aeroscout gives the command to initiate the attack. The two separate commands are as follows:

At my command. The attack helicopter engages when the scout says "Fire."

When ready. The attack helicopter fires when ready.

Postattack action. The aircrew unmasks the attack helicopter to evaluate the effect on the target and begins planning subsequent engagements. The aeroscout describes the ingress and egress routes for the new positions.

Example. An example of a target handover is shown below.

Alert and target description: "K 13 (AH-1S), this is K 06 (OH-58); three T-80s and four BMPs moving west."

Target location: 120 degrees at 2,800 meters.

Method of attack: Attack targets west of north-south road.

Execution: Engage when ready.

Postattack action: Move to holding area 4; on order, attack from battle position 21.

BREVITY CODES

A situation may occur where secure voice does not work or where some or all aircraft involved in a mission do not have secure voice capability. Therefore, to speed up radio transmission and provide radio security, the air troop designs its own brevity code system. The brevity code system is an SOP item and should not be used with troops outside the unit, because they will not understand the codes. An example of how the system works is given in Figure F-2.

"K 65, this is K 58 X-ray; 01, 15, 20, three hards in open, over.

At my command, on order 02 BP 5."

KEY

K 65—Attack aircraft	**15—Direction 150 degrees**
K 58—Scout aircraft	**20—2,000 meters**
X-ray—Fire mission	**Hards—Tanks**
01—From this position	**02—Go to**

Figure F-2. Example of brevity code system

APPENDIX G

AERIAL OBSERVATION

During missions that call for direct observation, the pilot's time and attention will be devoted to maneuvering the aircraft. Therefore, the aerial observer must take full responsibility for reconnoitering the terrain as thoroughly as possible within the time available.

VISUAL SEARCH TASKS

The way the aerial observer performs aerial observation may vary with the mission and the physical environment. However, the aerial observer always has four key tasks: detection, identification, location, and reporting.

Detection. The aerial observer must first determine if there is anything to report. It is just as important to report the absence of an object or a situation as to report its presence. He first searches the terrain and, after finding pertinent information, confirms what he sees.

Identification. The aerial observer must be able to discriminate between friendly and enemy units and equipment. He must be able to report and describe what he sees to include details of unit strength and disposition and the types of targets observed.

Location. The exact location of identified targets is the ultimate objective of visual search. Depending on the nature of the target, the aircrew may locate the center of mass or the boundaries of the target.

Reporting. To provide the commanders and their staffs with critical information during the conduct of the observation mission, aircrews must submit spot reports. Normally the G2 or S3 will request that spot reports be submitted. The aircrews must constantly gather and report information. Since they may not know the value of information, they should report everything. In addition to reporting actual enemy sightings, aircrews should report the absence of enemy activity, commonly called negative information. No information should be omitted because it seems irrelevant.

VISUAL SEARCH FACTORS

Visual search is the systematic visual coverage of a given area that ensures all parts of the area have been examined. The ability of an observer to search a given area effectively depends on several factors. The most important factors are altitude, airspeed, terrain conditions, and cues.

Altitude. Higher altitudes offer greater visibility; however, lower altitudes will normally be used because of survivability considerations.

Airspeed. The airspeed will be determined by the altitude selected and survivability factors.

Terrain Conditions. The type of terrain will largely determine the size and details of the area that can be covered effectively. Prevailing terrain conditions often mask the object. Even at NOE altitudes, observers are only allowed a brief exposure of the object.

Cues. In areas where the natural cover and concealment make detection difficult, cues may indicate enemy activity. Some of the various cues are as follows:

- Different colors of foliage may reveal a camouflage effort.
- Textures reflect and diffuse light. Smooth surfaces appear lighter than surrounding areas, and extremely smooth surfaces (such as glass) shine.
- Distinctive shadows are indicative of man-made objects.
- Regular shapes and contours of man-made objects can be distinguished from random patterns of nature.
- The type, quantity, and recent use of trails leading into an area can provide information.
- The color, smell, volume, and pattern of smoke are cues.
- Noise that is audible over the sound of the aircraft may indicate the type and direction of enemy activity.
- Light at night may indicate enemy activity.
- Movement is the most easily detectable cue to enemy activity. Disturbance of foliage, snow, soil, or heat wave patterns may indicate enemy movement.
- Dust clouds created by modern mechanized and armored formations are cues that can be recognized from great distances.
- Targets that appear too obvious may be enemy lures; these can be skillfully camouflaged concentrations of enemy antiaircraft fire.

VISUAL SEARCH TECHNIQUES

The three systematic visual search techniques are side scan, motive, and stationary. These techniques are used in different situations depending on the altitude and terrain.

Side Scan. This technique is normally employed at altitudes of 100 feet or higher. The observer begins by looking out to a 1,000-meter range and searching in toward the aircraft. Then he looks out to a 500-meter range and again searches in toward the aircraft. Finally, he looks out to a 250-meter range and repeats his search in toward the aircraft.

Motive. This technique is used at NOE altitudes and at speeds of 10 KIAS or faster. The aircrew mentally divides the area on either side of the aircraft, first into a nonobservation sector and an observation work sector. The work sector is further divided into an acquisition sector (the forward 45-degree area) and a recognition

sector (the remainder of the observation work area). The aircrew begins by looking forward at the center of the acquisition sector and scanning left and right, gradually working back toward the aircraft.

Stationary. This technique is used at NOE altitudes with the helicopter hovering in a concealed position. No clearly defined sectors of search exist in the stationary technique. The observer makes a quick, overall search for sightings, unnatural colors, outlines, or movements. Then he concentrates his search in the immediate area within 50 meters to the front of the aircraft. As time permits, he continues searching successive, 50-meter areas farther out until the entire search area has been covered.

APPENDIX H

KIOWA WARRIOR EMPLOYMENT

The OH-58D Kiowa Warrior is a true scout helicopter; its mission is armed reconnaissance. This aircraft has been operating effectively in the Persian Gulf for several years. Its capabilities have been tested and proven in hostile environments and in training at the combat training centers. The experiences of armed and unarmed Warrior aircrews show without question that this is the world's finest scout helicopter for night operations. This appendix is a compilation of the lessons learned and the tactics, techniques, and procedures used by Kiowa Warrior units.

Section I

SYSTEM OVERVIEW, CREW INTERFACE AND SYSTEM CAPABILITIES AND LIMITATIONS, AND OPERATIONAL EMPLOYMENT CONSIDERATIONS

SYSTEM OVERVIEW

Purpose. Built in response to a short-notice hostile situation, the Warrior represents state-of-the-art components. Its application across the operational continuum is unlimited. In the field today, the Warrior participates in a multitude of missions such as intelligence, field artillery aerial observation, armed reconnaissance, and target designation for attack helicopters and CAS aircraft.

Features. The Warrior is a multipurpose light helicopter; its similarity to the OH-58A/C ends with the airframe. The Warrior features an integrated "glass" cockpit with two multifunction displays and a four-bladed rotor system driven by an improved engine and transmission. It has a mast-mounted sight for day and night target acquisition and an inertial navigation system with doppler interface. The aircraft has a complement of air-to-air and air-to-ground weapon systems and an external cargo capability and can perform troop transport and MEDEVAC. The Warrior can be carried in C-130, C-17, C-141, and C-5 aircraft and can be mission capable approximately ten minutes after being unloaded. An unarmed version of the Warrior is fielded in target acquisition and reconnaissance companies and dedicated to field artillery employment. These unarmed aircraft will be retrofitted to the armed configuration and redistributed to the reconnaissance squadrons. The unarmed

aircraft does not have the multipurpose kits used on the armed Warrior. Warrior features are highlighted in Figure H-1. A description of the system follows.

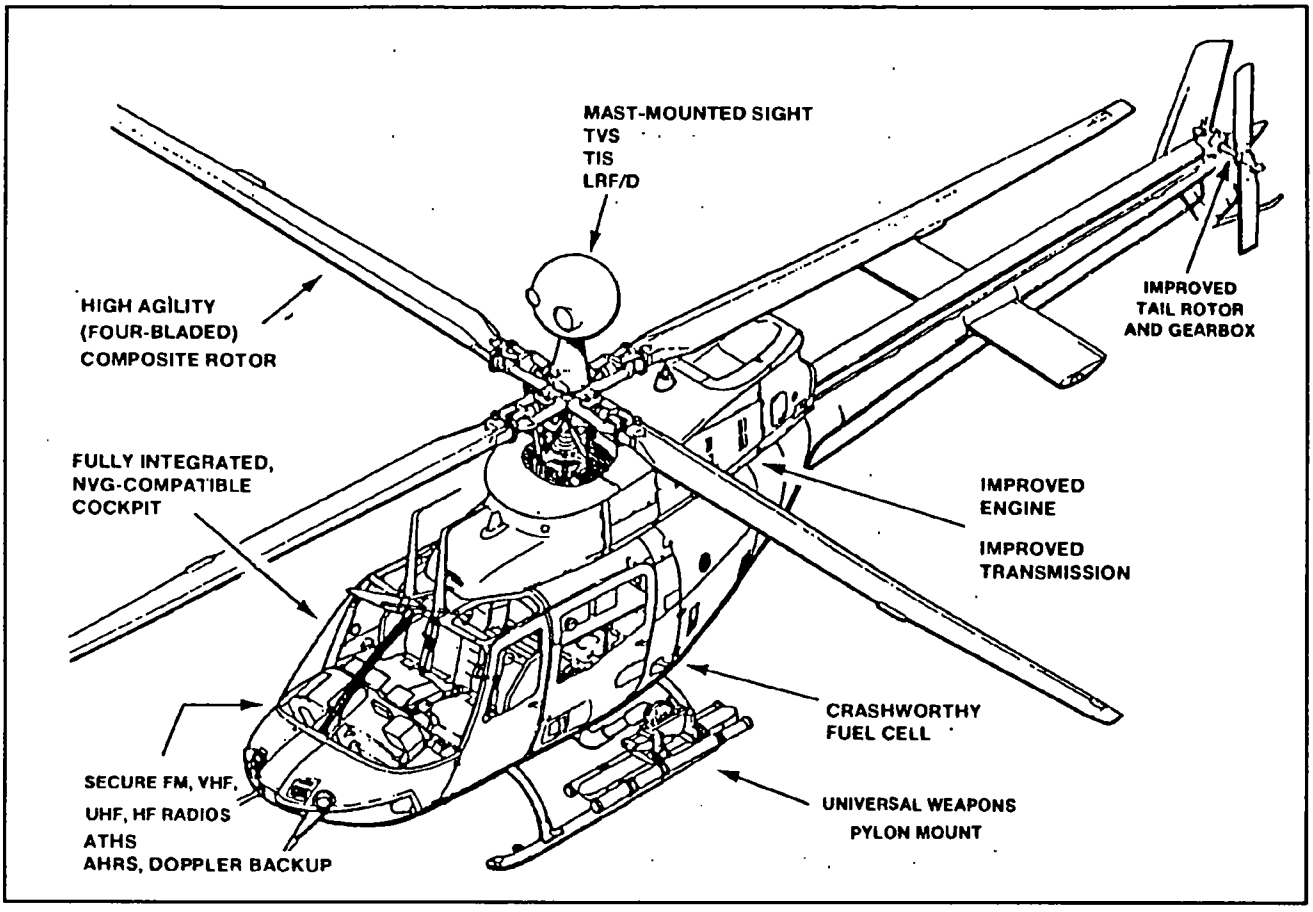


Figure H-1. Kiowa Warrior features

General description.

- Crew—2 pilots.
- Height—12 feet 10.6 inches.
- Length—41 feet 2.4 inches.
- Rotor diameter—35 feet.
- Maximum gross weight—4,500 pounds (unarmed); 5,500 pounds (armed).
- Maximum speed—125 KIAS.
- Cruise airspeed—80 KIAS.
- Endurance—2 hours.
- Cargo hook capacity—2,000 pounds.*

*Equipment installed on the armed Warrior only.

- Litter capacity—4 (externally).*
- Troop-carrying capacity—6 (externally).*
- Data transfer system—ground station, data transfer module, data transfer receptacle in the aircraft.*
- Video tape recorder—records up to 2 hours of copilot's MFD.*
- ANVIS display symbology system—provides basic flight information.*

Mast-mounted sight.

- Thermal imaging sensor.
- Television sensor.
- Laser range finder/designator.
- Optical boresight system.

Weapons.

- .50-caliber heavy machine gun.*
- 70-millimeter folding fin aerial rocket.*
- Air-to-air Stinger missile.*
- Hellfire modular missile system.*

Communication equipment.

- Two VHF-FM AN/ARC-186 or AN/ARC-201 SINCGARS.
- One UHF AN/ARC-164 Have Quick.
- One VHF-AM AN/ARC-186.
- Two TSEC/KY-58.
- HF capable (radio not installed).
- TSEC/KY-75 (device not installed).
- Retransmission capabilities.
- FM homing (AN/ARC-186 only).
- Airborne target handover system (digital communications).

Navigation equipment.

- Attitude and heading reference system (Litton LR-80 Inertial).

- AN/ASN-137 doppler.
- AN/ASN-43 directional gyro.

Aircraft survivability equipment.

- AN/APX-100 IFF.
- AN/ALQ-144 IR jammer.*
- AN/APR-39A radar warning receiver.
- AN/APR-44(V)3 radar warning receiver.*
- AN/AVR-2 laser detecting set.*

CREW INTERFACE AND SYSTEM CAPABILITIES AND LIMITATIONS

The Warrior crew interfaces with a fully integrated glass cockpit as shown in Figure H-2. Master controller processor units correlate individual system information before displaying it on the multifunction displays. The crew can select various displays, referred to as pages, on the multifunction displays. (See Figure H-3 on page H-6 for examples.) The primary pages available are vertical situation, horizontal situation, mast-mounted sight, communications, airborne target handover system, and weapons. The system also has a series of pages known as built-in test and fault detection and location for maintenance purposes. Using 10 line-address keys (5 keys on each side of the multifunction display), the crew can manipulate displayed information or access subpages. Administrative flights require only one pilot. However, tactical employment requires two pilots because the mast-mounted sight and airborne target handover system can be operated from the left seat only. Except for the airborne target handover system, the pilot can access any of the multifunction display modes without removing his hands from the controls. Using various switches on his collective control head and cyclic, the pilot can also select the desired radio and preset frequency and choose the left or right weapons pylon and the level of ANVIS display symbology system declutter. The left seater does not have this capability. Warrior pilots fly the aircraft using AN/AVS-6 night vision devices.

Data Transfer System. The DTS consists of a ground station, data transfer module, and data transfer receptacle in the aircraft. Before a flight, the ground station can load up to three separate sets of mission data. During the flight, the operator can store data in the data transfer module. After the flight, the ground station can retrieve the data. Data include mission identification, way points, flight plans, radio frequencies, and IFF.

Video Tape Recorder. The VTR is not integral to the mast-mounted sight, but its main function is to record mast-mounted sight video. It is an 8-millimeter system and will record whichever page is selected on the left multifunction display. The VTR records for two hours. The crew can review the video recording in the cockpit. On completion of the mission, intelligence personnel can use the video recording for a detailed analysis. This VTR is extremely useful in both reconnaissance and security operations. It is also a useful training aid for mission debriefings.

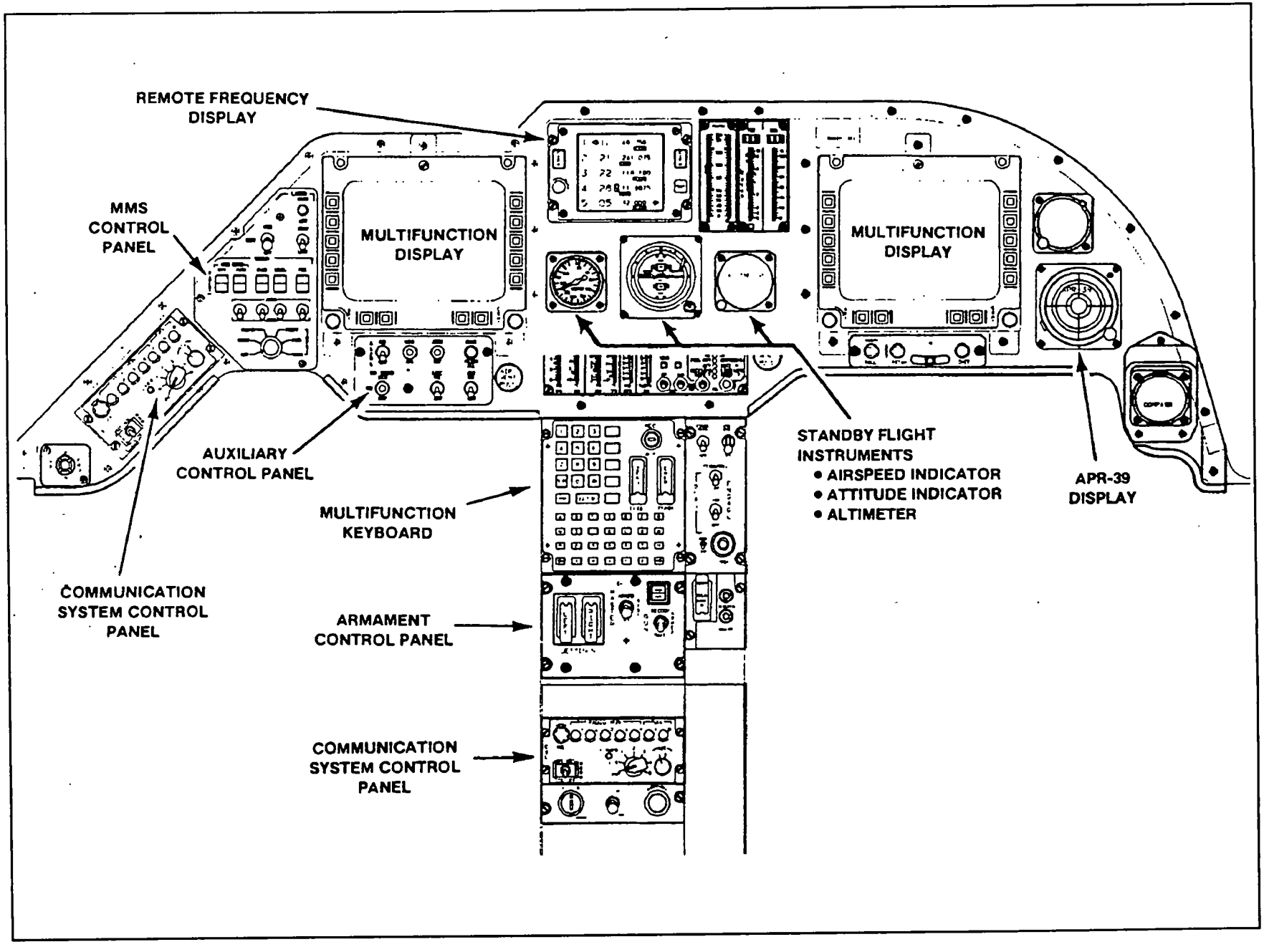
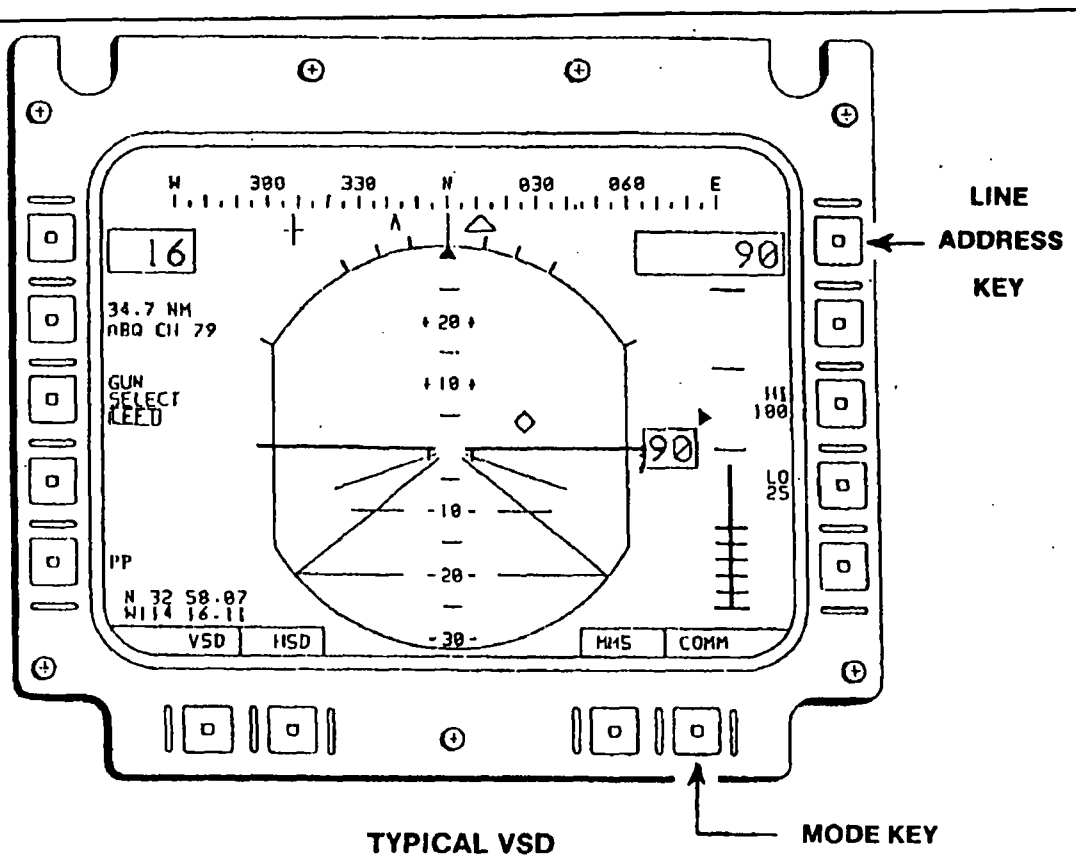
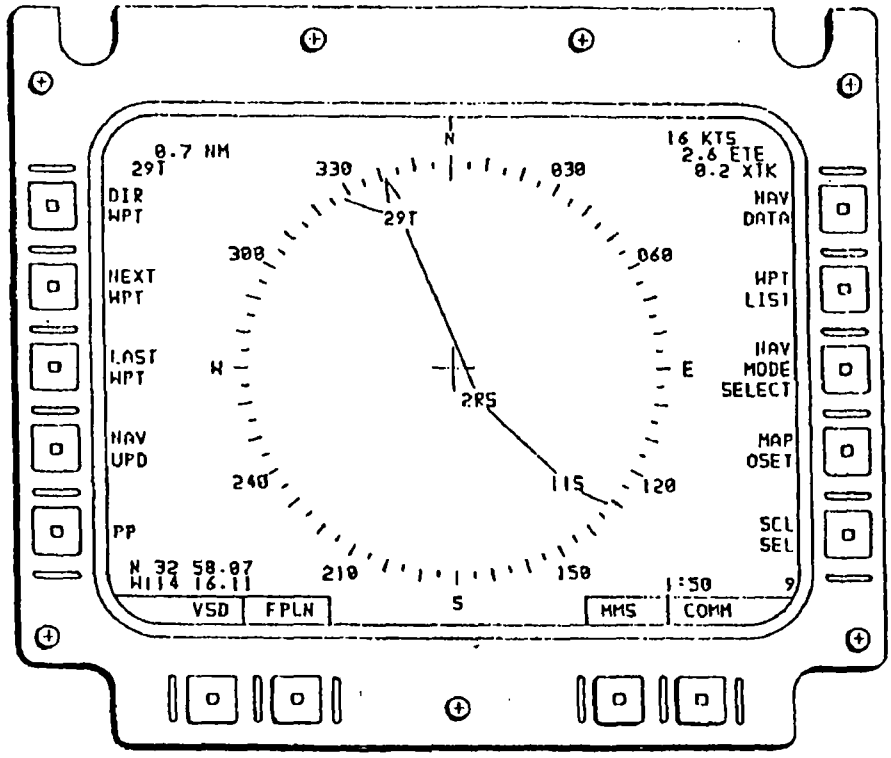


Figure H-2. Warrior instrument panel



TYPICAL VSD



TYPICAL HSD

Figure H-3. Sample multifunction display pages

ANVIS Display Symbology System. The ADSS consists of drive electronics and a small, lightweight optical display assembly. The ODA mounts directly to the AN/AVS-6 night vision device. The ADSS provides basic flight information to include vertical situation, airspeed, barometric and radar altitudes, heading, torque, mast-mounted sight orientation, and way point direction. The ADSS also has hover and hover bob-up modes.

Mast-Mounted Sight. The MMS is used only for targeting, not for flying the aircraft. Sensor ports of the MMS are approximately 6 feet above the pilot's eyes. This allows the crew to view an area while keeping the aircraft masked. The MMS can slew 190 degrees in azimuth, right or left, and 30 degrees in elevation, up or down, at a rate of 45 degrees per second. The MMS houses the thermal imaging sensor, television sensor, laser range finder/designator, and optical boresight assembly. The MMS has five operating modes and three tracking modes. Camouflage, ambient weather, and the type of terrain are major factors that affect MMS range capabilities. The following is a list of terms that are used to discuss MMS ranges:

- Detect—a target of military interest.
- Classify—tracked, wheeled, fixed-wing, rotary-wing.
- Recognize—tank, APC, bulldozer, ADA.
- Identify—T-80, M1A1.

NOTE: Some MMS system specification ranges are classified. This document provides examples to educate the reader on MMS employment. The ranges given should in no way be construed as actual specification ranges.

Operating modes.

Preflight. The preflight mode is used to prepare the system for flight.

Prepoint. In this mode, the MMS will automatically point to a preselected position or target whose coordinates have been entered in the way point list.

Forward. When this mode is selected, the MMS points straight ahead at zero degrees azimuth and elevation.

Search. In the search mode, the sight will automatically repeat various scanning patterns as selected by the operator.

Stow. In this mode, MMS data are stored in nonvolatile memory before the MMS is shut off.

Tracking modes.

Manual track. The MMS line of sight is controlled manually by the LOS control switch on the left cyclic. The crew can select the manual track mode at any time.

Area track. In the area tracking mode, the MMS remains directed to the designated area regardless of helicopter movement. This mode is normally used when an area of interest is detected during flight.

Point track. In this mode, the MMS locks onto a target selected by the operator, automatically tracks the target, and keeps it centered in the multifunction display.

Thermal Imaging Sensor. Like a FLIR, the TIS "sees" infrared energy (heat) and can detect radiation differences of less than 2 degrees Celsius. The 120 detectors are cooled to 90 degrees Kelvin (-190°C). A scanner mirror directs IR energy to the detectors at a rate of 30 times per second. The detector information is sent through an electronic multiplexer which combines individual detector signals with scan position information. The output is then displayed on the multifunction display as a monochromatic green picture when the mast-mounted sight TIS page is selected. Four major variables affect TIS capabilities. These variables are equipment condition, operator proficiency, temperature differential (Delta-T) of objects and terrain, and ambient conditions (weather).

Contrast modes. The TIS can be viewed in two contrast modes: black-hot or white-hot. In the BH mode, thermal energy appears darker on the TIS picture. The more thermal energy being radiated, the greater the contrast in the TIS picture. For example, an aircraft would appear darker than the sky and the exhaust from the aircraft would appear darker than the aircraft. When the WH mode is selected, the polarities are reversed.

Fields of view. The TIS has four fields of view: wide, wide-doubled (or 2X), narrow, and narrow-doubled. Wide FOV is 5X, wide 2X FOV is 10X, narrow FOV is 16 2/3X, and narrow 2X FOV is 37 1/3X. The 2X feature is an electronic doubling of the TIS picture; any distortion is also doubled.

Frame freeze. The TIS has a frame freeze feature. When depressed, the FR FRZ button will freeze the TIS display instantly. This enables crew members to unmask the MMS, freeze the TIS display, and then remask while they evaluate the TIS picture. The scene remains frozen on the multifunction display until the FR FRZ button is depressed again.

TIS integration. The TIS has a TIS INTG switch which, when pressed, lays TIS frames on top of each other. This capability improves the video in low contrast conditions such as during periods of IR crossover or high humidity.

Automatic low frequency gain limiting feature. When selected, the ALFGL reduces video "noise" in hot areas to give more detail. This feature is beneficial in a hot, rocky, desert-like environment or in an area where hot exhaust gases or equipment is present.

TIS employment. To control the TIS picture, the operator uses various amounts of gain (detector sensitivity) and level (contrast brightness) along with the ALFGL or TIS INTG feature and the BH or WH mode. The more Delta-T between the object and its background, the better it can be seen in the TIS. Infrared crossover degrades the TIS capability. Normally, IR crossover occurs around sunrise and sunset when terrain and objects are near the same temperature. The best TIS conditions are warm vehicles and a cold, low-humidity environment. The worst conditions are vehicles parked in vegetation during a rainstorm. The TIS can see through most battlefield obscurants such as fog oil and weapon effects. Both IR camouflage nets and IR paint affect TIS capabilities.

TIS setup lessons learned. When staging out of the same assembly area, aircrews will find that using the same area or object to adjust the TIS for each mission

can be helpful. This gives the crew an indication of TIS performance under the current conditions.

Grey scale adjustment. When the GREY SCALE is adjusted properly using the multifunction display BRT and CONT knobs, the background on the VSD, HSD, or COMM pages will be dark, not glowing. The aircrew must ensure that all 10 segments are displayed. If they are not, part of the spectrum will not be displayed on the TIS picture.

Gain adjustment. The aircrew should select an area or object 4 to 6.5 kilometers away and add GAIN until a good contrast is achieved. A "grainy" picture close in is normal when GAIN is properly adjusted to detect targets. If the operator adjusts GAIN while viewing an area close in, objects farther away will not be seen in the TIS. The farther away an object is, the higher the GAIN setting must be to detect it.

Level adjustment. After the initial TIS setup, one technique for target detection is to adjust the LEVEL down for WH (up for BH) three to five seconds and increase the GAIN two to three seconds for increased contrast.

WH versus BH use. Generally, WH is used for a cool background and warm objects and BH for a warm background and cool objects. At night over land, WH is normally preferred because it keeps down glare in the cockpit and targets seem to stand out more. During the day, BH is normally preferred, especially in the desert.

TIS operational experience.

Army Aerial Scout Test. During the Army Aerial Scout Test at Hunter-Liggett, California, crews could recognize an ADA system with rotating radar next to a tank at 6.5 kilometers and detect moving vehicles at distances of more than 10 kilometers. These ranges were achieved at night with cool ambient temperatures and operating vehicles. Sometimes crews were able to find tanks by following the hot tracks on the ground with the TIS.

National Training Center. At the NTC, vehicles have been detected at 15 kilometers. ADA systems with rotating radars have been recognized at 7 kilometers.

Operation Prime Chance. From off the coast of Virginia during the winter, the operator could distinguish a warship from a merchant vessel at 10 nautical miles. During periods of high humidity in the Persian Gulf, sometimes the operator could not make the same distinction from any farther away than 3 nautical miles.

Television Sensor. The TVS has 875 scan lines per frame for high resolution. In comparison, a home TV set has only 525 lines. Because the TVS picture displayed in the cockpit is monochromatic green, the crew cannot distinguish colors. The TVS is generally a day-only sensor. However, because of its low light level capabilities, the TVS can be used at night to look into areas with artificial illumination. For example, the TVS can effectively look inside a lighted aircraft hangar at night. This capability should not be confused with the light amplification capabilities of NVG. The TVS can see through light obscurants, such as haze, but not into thick smoke as with the TIS.

Fields of view. The TVS has two fields of view: wide and narrow. Wide FOV is 6 1/4X, and narrow FOV is 25X.

TVS operational experience. Experience has been gained with the television sensor through the AAST, NTC, and Operation Prime Chance.

Army Aerial Scout Test. At Hunter-Liggett, stationary tanks were routinely detected at 8.5 kilometers during the daytime. On a clear day, a crew could recognize vehicles at 7 kilometers.

National Training Center. In the daytime, moving vehicles have been detected from ranges in excess of 15 kilometers. Maximum recognition ranges are typically 6 to 8 kilometers.

Operation Prime Chance. Crews were able to distinguish large warships from merchant vessels out to 10 nautical miles. Because of the greater size differences in surface vessels, detection and recognition ranges will vary greatly over water compared to over land.

Laser Range Finder/Designator. The LRF/D is a powerful neodymium-YAG laser that operates at 1.064 microns (1,064 nanometers). It has a nominal ocular hazard range of 23 kilometers at 1.064 microns. The laser performs four basic functions: ranging, navigation update, target position location, and designation.

Ranging. Laser ranging can be performed out to 9.99 kilometers (software limit).

Navigation update. The navigation system can be updated by lasing a known point such as a water tower.

Target position location. The position of a target can be determined by lasing. The location is stored as an eight-digit UTM grid or latitudinal and longitudinal coordinates.

Designation. Designation can be performed either for laser spot trackers or for laser-guided munitions. The crew can select any three- or four-digit laser code and can store up to eight laser codes. A vehicle or an object can be designated from as far away as it can be seen with the TVS or TIS. Warriors have designated target areas for CAS in excess of 20 kilometers. Moisture and smoke degrade laser capabilities by refracting laser energy. The laser cannot designate through most types of smoke.

Optical Boresight System. The OBS is used to align the TVS and TIS line of sight to the LRF/D line of sight. The operator can automatically or manually perform a boresight at any time but normally only during run-up. The OBS makes the MMS LRF/D one of the most accurate in use today.

Video Down Link. Some Warrior aircraft may have the capability to send real-time video to a remote station. Video down link is a proposed product improvement.

Weapon Configurations. The Warrior has two universal weapon pylons, one on each side. The four primary weapon systems are the .50-caliber machine gun, 70-millimeter rockets, and the Hellfire and Stinger missiles. With the integration of the MMS and weapon systems, the Warrior has superior night-fighting capabilities. For example, the Warrior crew can keep the aircraft masked, acquire a threat aircraft flying while blacked out, and track it using the MMS. The pilot can then orient his weapon on the target, unmask, and fire before the threat can detect the Warrior. Weapon mixes are extremely flexible to accommodate METT-T (Figure H-4). Commanders should develop gunnery programs that are linked to the unit's METL according to FM 25-101. Configurations include the following:

• .50-caliber machine gun	500 rounds	left pylon
• 70-millimeter rockets	7-shot pod	either pylon
• Hellfire missiles	2 missiles	either pylon
• ATAS	2 missiles	either pylon

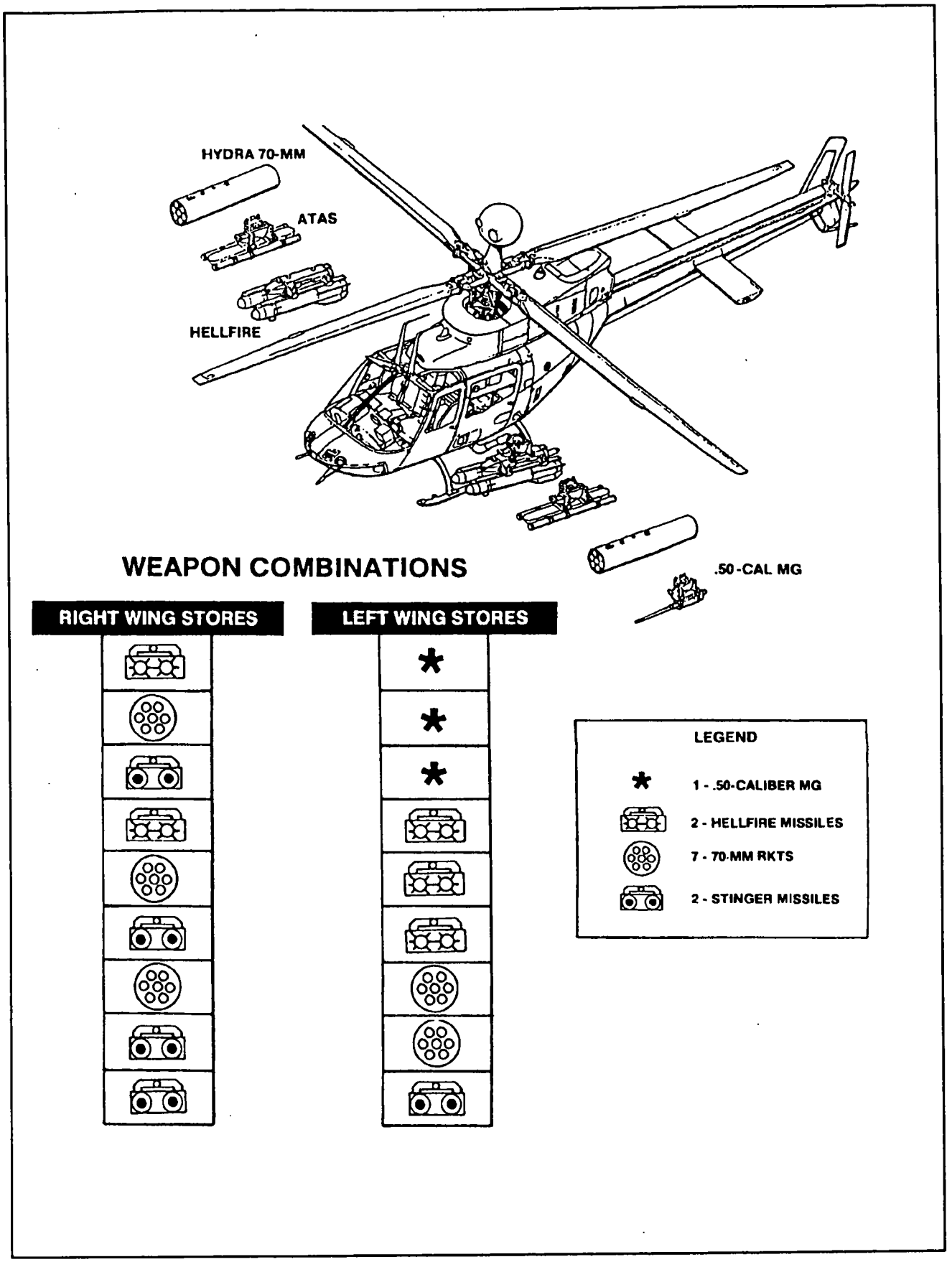


Figure H-4. Warrior weapon configurations

NOTE: A standard configuration would include a .50-caliber machine gun on the left pylon and a seven-shot rocket pod on the right. With the exception of the .50-caliber machine gun, the same system can be mounted on both pylons. (If the .50-caliber machine gun were installed on the right side, it would restrict access to the fuel filler port.) For example, two Hellfire missiles could be mounted on each pylon for a total of four missiles. All weapon systems except the .50-caliber machine gun can be jettisoned.

.50-caliber machine gun. The .50-caliber machine gun uses standard military linked .50-caliber ammunition. Its maximum effective range is 2,000 meters. Bullet drop at 2,000 meters is 33 feet; crews normally use the tracer burnout range of 1,600 meters as the maximum effective range. The pilot can use a gun display on his multifunction display for sighting; however, the preferred method is "heads up" for safety and tactical reasons. Some aircraft are equipped with an IR aim point laser for targeting (not the laser in the MMS). The basic load of .50-caliber ammunition is 500 rounds.

70-millimeter rockets. The Warrior can carry one or two rocket pods, for a maximum of 14 rockets. Seven-shot rocket pods have two zones; zone A has four rockets, and zone B has three rockets. This allows for warhead selection. The three primary warheads used are high-explosive rockets, flechettes, and multipurpose submunitions. The pilot can aim the rockets either through the multifunction display or heads-up. Heads-up employment is necessary for suppression engagements. The MMS operator must help set up multipurpose submunition shots because of mandatory ranging requirements.

High-explosive rockets. HE rockets are area fire warheads. They have programmable fuzes that can point-detonate or be set to detonate between 700 and 8,800 meters.

Flechettes. Flechettes also have programmable fuzes that can be set to detonate between 700 and 8,800 meters. They can be used for air-to-air combat or as a suppression and an antipersonnel round.

Multipurpose submunitions. The MPSM has nine bomblets in the warhead and operates on the "Wall in Space" concept. The crew ranges the target area and then fires the MPSMs above it. The MPSM warhead deploys the bomblets at the laser range distance, allowing them to fall into the target area. The dual-purpose bomblets are effective against lightly armored vehicles and unprotected personnel.

Air-to-air Stingers. The Warrior can carry two ATAS missiles on either pylon, for a maximum of four missiles. The ATAS has a minimum arming range of less than 1,000 meters and a maximum range in excess of 5 kilometers. The pilot can lock onto a target with either the pilot display unit, which is a heads-up sight, or through the multifunction ATAS display.

Hellfire missiles. The Hellfire is a laser-guided, point-detonating, 100-pound missile. The Warrior can carry two of these missiles on each pylon, for a maximum of four missiles. The crew guides the missile using the MMS. The minimum engagement range is 500 meters, and the maximum range is 8,000 meters, depending on launch modes. The missile can be employed either autonomously or by a remote designator. The seeker head can acquire the laser spot in either the lock-on before launch or the lock-on after launch mode. For remote designations, operators can use a maximum offset angle of plus or minus 60 degrees from launch azimuth, with a minimum separation angle of plus or minus 20 degrees from launcher to designator.

Copperhead artillery projectiles. The Warrior is the best system for employing the Copperhead because of the MMS and the maneuverability advantages of the helicopter. It can perform a digital call for fire to the artillery battery computer system and laser-designate for the Copperhead. Copperhead ranges are 3 to 16.1 kilometers from the gun tube. The Warrior crew can designate moving or stationary targets out to 10 kilometers. Designation ranges depend on the type of target, ambient conditions, and MMS performance. The maximum separation angle from the gun-target line is 45 degrees.

Communications. The Warrior has two FM radios, one UHF radio, and one VHF radio. Provisions for an AN/ARC-199 HF radio with TSEC/KY-75 are in place; however, HF radios are not installed in most Warriors. The Warrior has two TSEC/KY-58s; one is dedicated to the FM 1 radio, and the other can be used for the UHF, VHF, or FM 2 radio. The crew can switch between the UHF, VHF, and FM 2 radios in the secure mode anytime during flight. The UHF is Have Quick capable.

Airborne target handover system. The ATHS is a 10-pound, line-replaceable unit that transmits digital data to users via secure or unsecure existing radio links. It can communicate with artillery TACFIRE and BCS nets. It will also be compatible with the Air Force Improved Data Modem to be fielded in CAS aircraft starting in January 1992. The ATHS can maintain eight active aerial fire missions, two active and two preplanned artillery missions, six preset movement messages, and six preset free text messages. It has preformatted reports, such as SITUATION/STATUS, SPOT, ARTY, BDA, and CAS and requests for reports. Twelve received messages can be stored for later review by the crew. Target location information from the MMS and navigation systems is automatically placed in the ATHS for target handovers and reports. An enhanced ATHS is being developed.

FM homing. FM homing can be performed only when an AN/ARC-186 is used for the FM 2 radio. It cannot be performed with the AN/ARC-201 SINCGARS.

Retransmission. Retransmission can be accomplished between FM or HF radios. For example, the crew can receive on FM 1 and retransmit on HF.

Navigation.

Equipment. The Warrior has the best helicopter tactical navigation system in the world. The attitude and heading reference system is an inertial navigation system that receives input from a doppler. The information is combined by a processor which graphically displays navigation information on the horizontal situation display. The system can operate on UTM grid or latitudinal and longitudinal coordinates. On initial run-up, navigation alignment takes about six minutes. An in-flight alignment mode allows immediate takeoff with reduced accuracy until alignment occurs. Getting a navigation update every 15 minutes or 15 kilometers is desirable but not necessary. Forty way points can be stored, and a flight plan can be constructed using up to 20 way points. The flight plan is displayed on the horizontal situation display on a scale of 1:50,000 or 1:250,000. The crew can easily manipulate the information in the navigation system during flight. When the MMS system is used to locate a target, the navigation system automatically assigns the target a way point number and displays it graphically on the HSD page. The MMS can also be used to get an offset laser update for the navigation system.

Navigational experience.

Army Aerial Scout Test. The AAST demonstrated that this "smart" navigation system can operate on a two-hour mission and remain accurate within 100 meters at NOE flight profiles.

Operation Prime Chance. Overwater operations severely degrade the accuracy of the navigation system. Crews must have several fallbacks to verify overwater AHRS performance. For example, crews can use time-distance-heading, radar vectors from ships, or the LAMPS or AWACS. Operation Prime Chance aircraft use TACAN and LORAN-C.

Aircraft Survivability Equipment. The Warrior has an integrated ASE suite. It includes the following:

AN/APX-100. The AN/APX-100 transponder has Modes 1, 2, 3(A/C), and 4. The crew can change transponder information through the COMM page on the multifunction display.

AN/ALQ-144. The AN/ALQ-144 is an IR missile jammer. It sends out an IR signal that confuses the guidance system on hostile IR-seeking missiles.

AN/APR-39. The AN/APR-39 is a radar warning system. The Warrior can be equipped with either the AN/APR-39 or the AN/APR-39A. The "A" version has an improved display and expanded processing capabilities.

AN/APR-44(V)3. The AN/APR-44(V)3 is used to detect continuous wave threat signals. It complements the AN/APR-39 which detects only RF pulse threats.

AN/AVR-2. The AN/AVR-2 is a laser detection set. It provides a laser warning to the crew through the AN/APR-39 display. If the aircraft is being lased, the crew also receives a caution message and an audio tone.

Deployability. Because of its rapid deployment capability, the Warrior can be quickly integrated into armed conflict. This aircraft can be unloaded from all Air Force transport aircraft (C-130 to C-5) and operational in ten minutes. Unloading and reassembly can be done on a blacked-out dirt airstrip at night. Because the Warrior tail boom must be removed for C-130 and C-141 high-density loads, assembly time will increase. Table H-1 shows an airlift loading chart.

Table H-1. Airlift loading chart

Rapid Deployment Load	High Density Load
C-130: 2 each	C-130: 3 each
C-141: 4 each	C-141: 6 each
C-5: 10 each	C-5: 13 each

Loading. Key features of Warrior deployability are the folding main rotor blades, vertical fin, and horizontal stabilizer. For transport in the C-130 and C-141, the MMS is removed and placed on the utility hoist; armament pylons remain installed. Other key features are the kneeling landing gear and the retracted positions of the loaded rocket pod and gun (Figures H-5, H-6, and H-7).

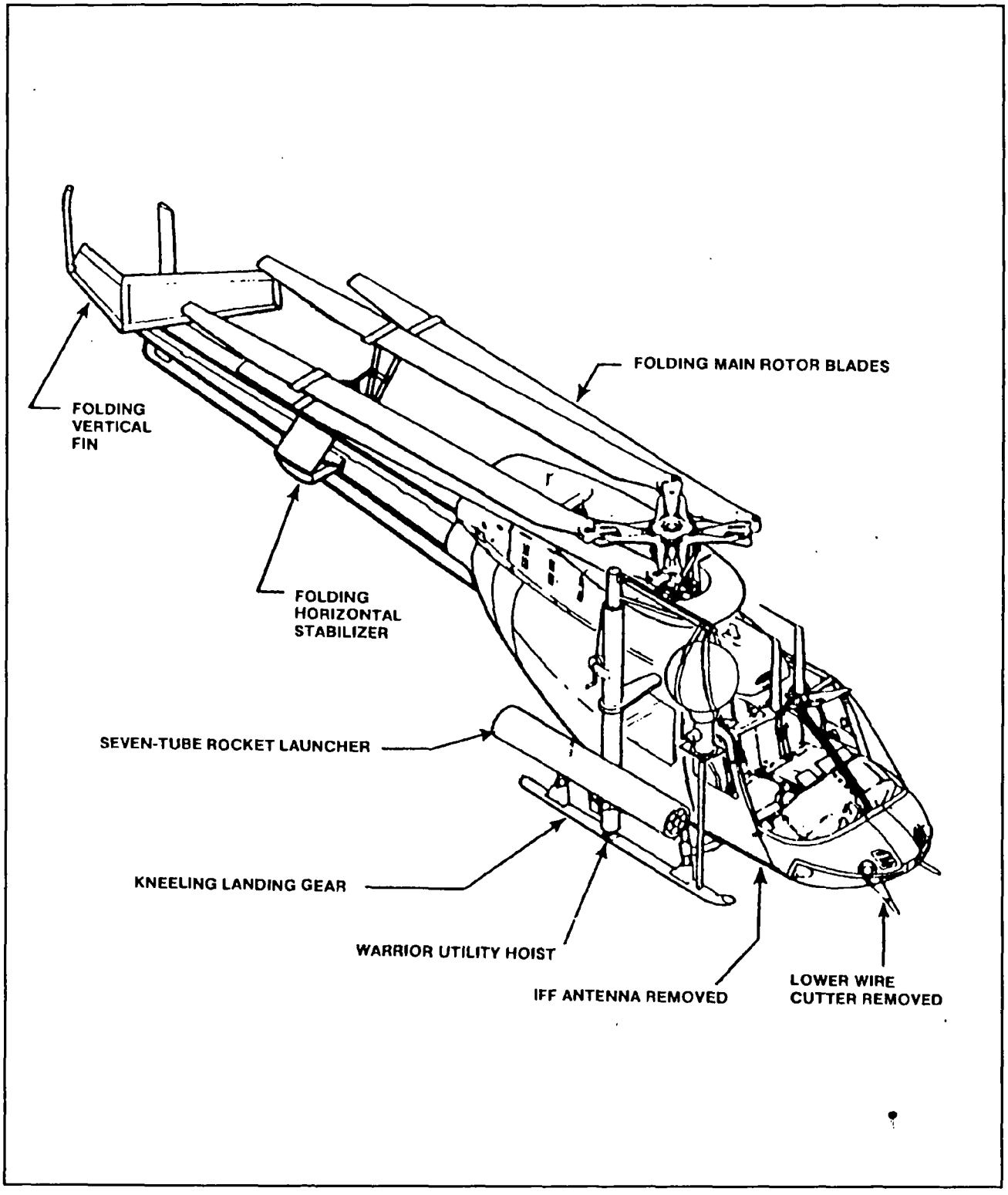


Figure H-5. Deployment load

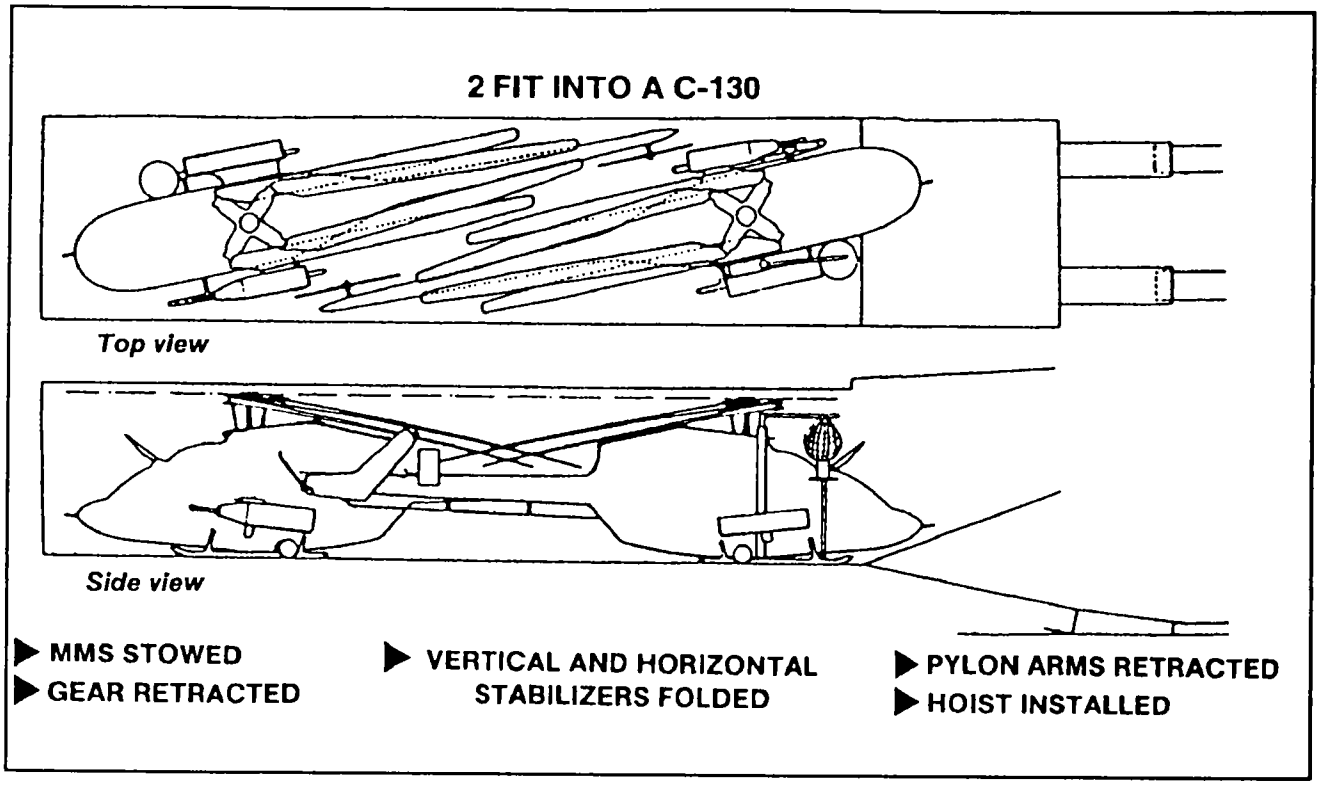


Figure H-6. C-130 RDF load

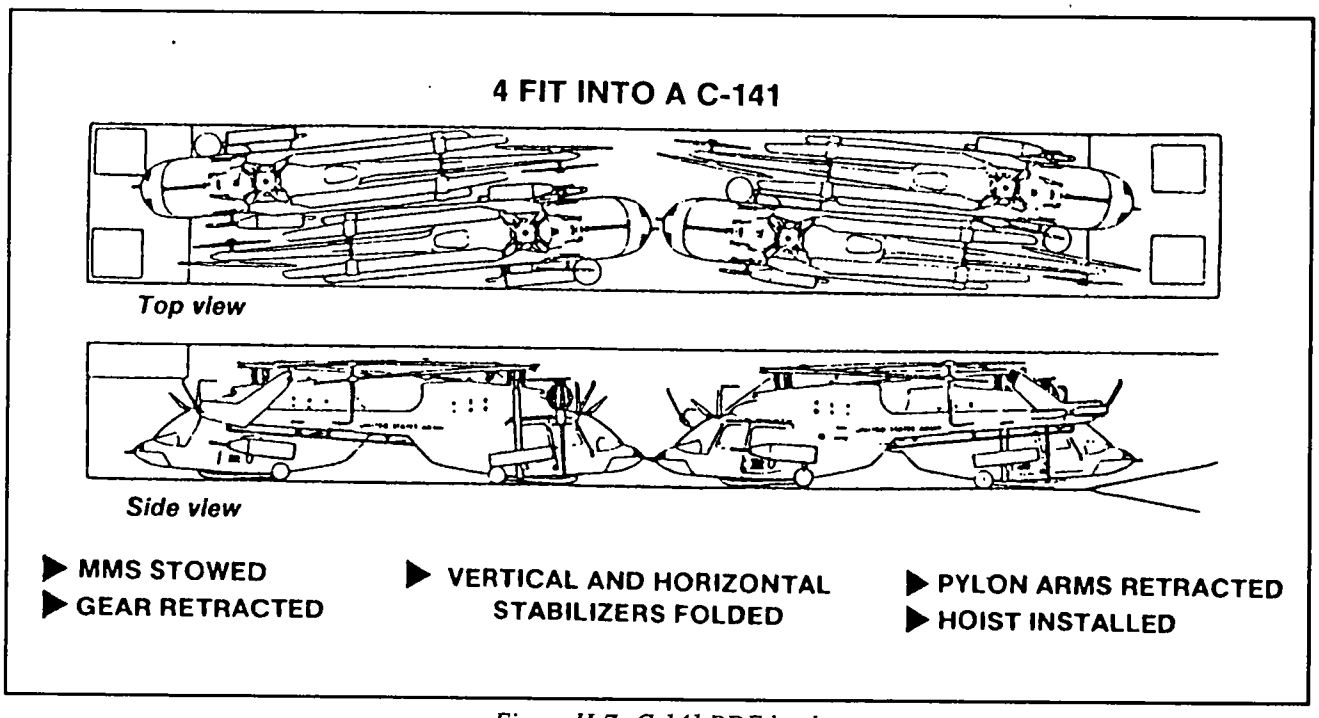


Figure H-7. C-141 RDF load

Unloading. When the Warrior reaches its destination, a crew of four (one pilot, one copilot, and two crew chiefs) reassembles and prepares the aircraft for combat. Team drills are critical; each member must know exactly what to do and when to do it. The goal is to have the helicopter airborne within ten minutes of rollout from Air Force transport aircraft.

Configurations.

Troop transport. A side-facing bench can be attached on each side of the fuselage just under the door frame. The bench begins at the aft edge of the forward door and extends to the aft fuel cell bulkhead, as shown in Figure H-8. Seat belts and tie-downs are included to allow the transport of cargo or three troops seated on each side. The platforms are completely removable to allow standard operation of the aircraft. In this configuration, the Warrior can be operated as a utility, cargo, or troop transport aircraft.

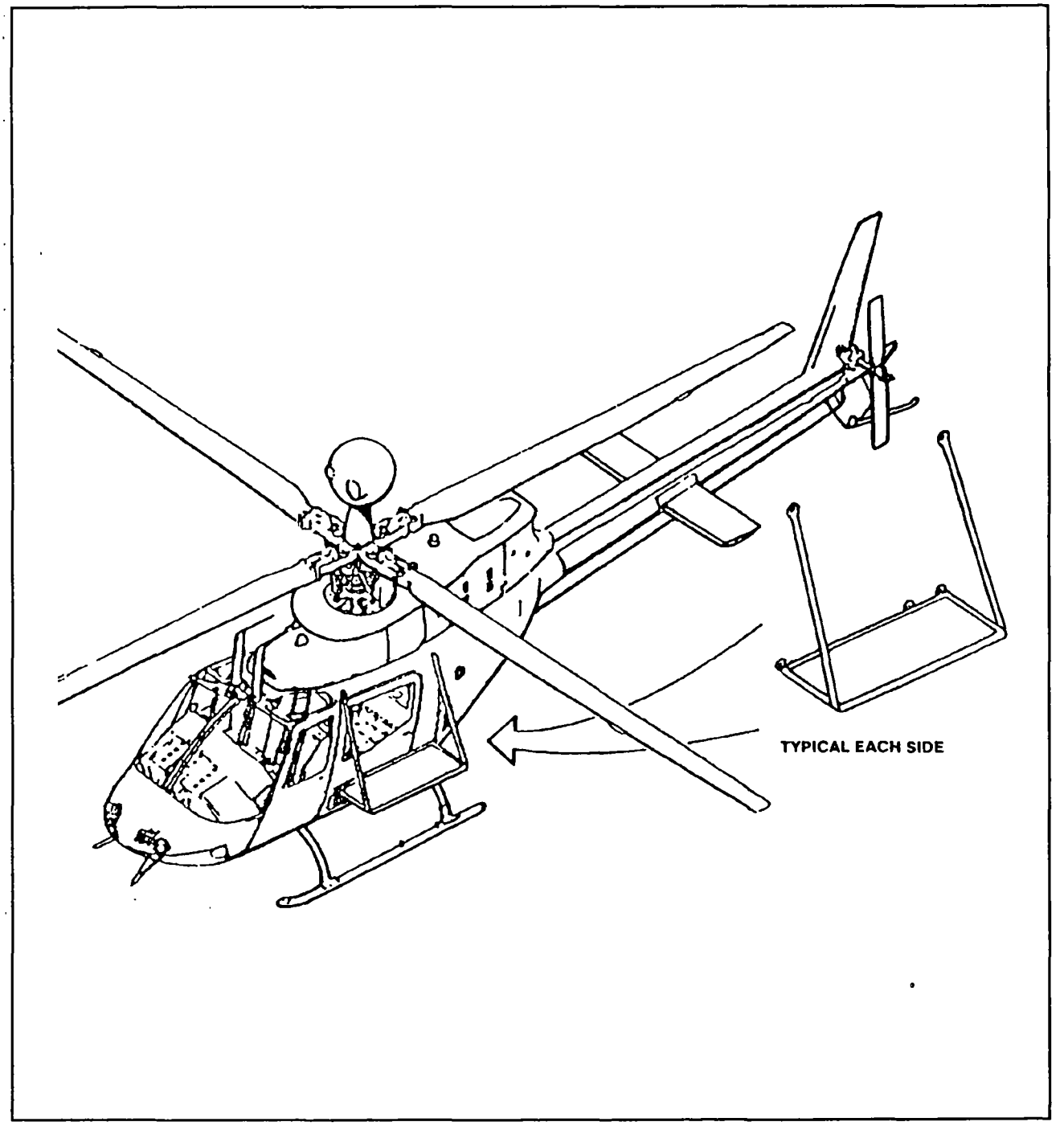


Figure H-8. Troop transport configuration

Medical evacuation. With the addition of another platform just above the troop seat platform, the Warrior can be converted into a MEDEVAC aircraft (Figure H-9). Two litters can be carried on each side. In this configuration, the platforms can be used for either litters or cargo. Both Stokes metal-framed litters and standard Army canvas litters can be carried interchangeably. The external litter configuration does not allow medical personnel to attend patients during flight. Severely wounded troops who require constant medical attention should not be evacuated using the Warrior.

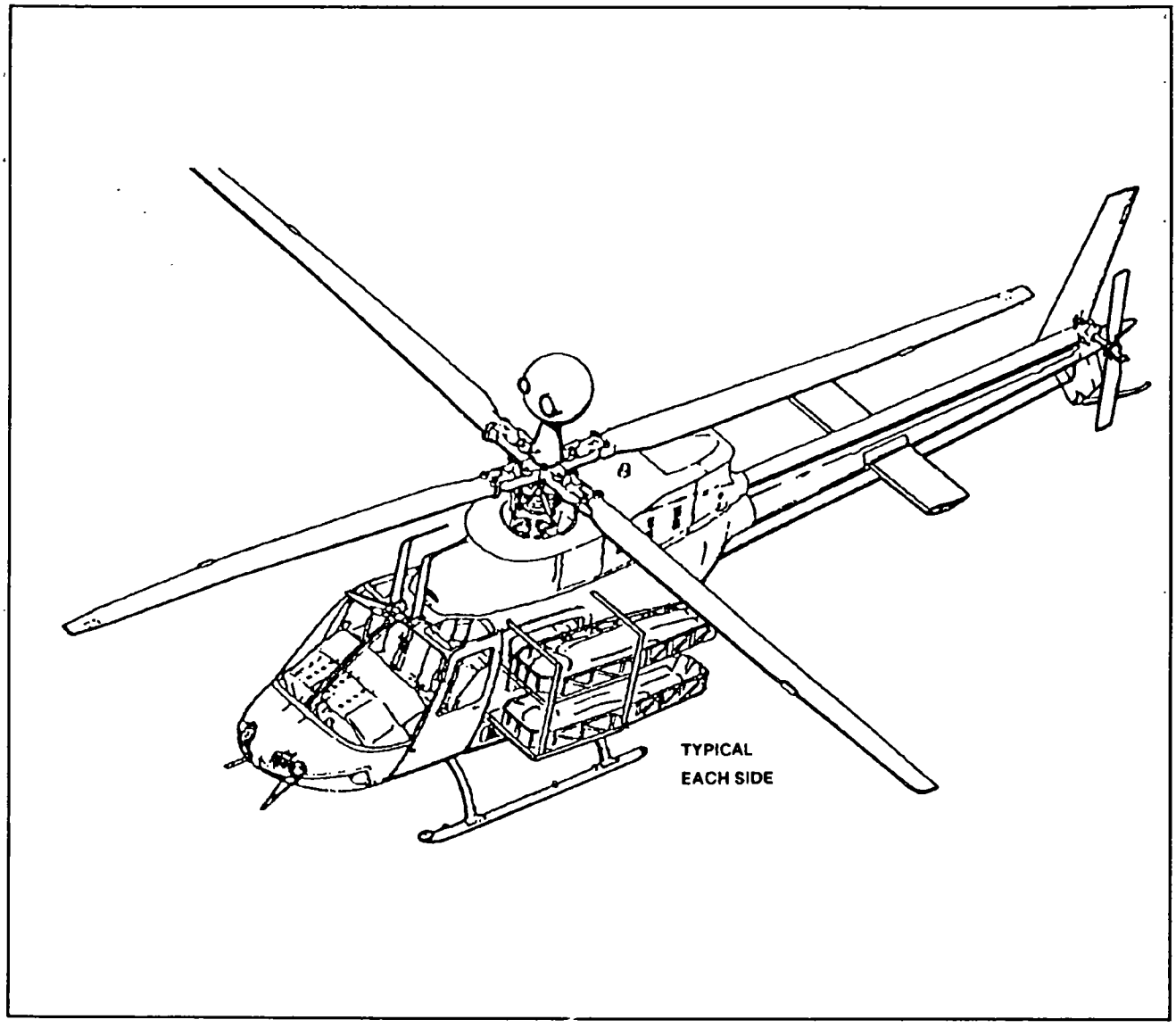


Figure H-9. MEDEVAC configuration

Sling loads. The Warrior has the capability to sling load 2,000 pounds (Figure H-10). The cargo hook assembly can be quickly installed and removed to accommodate rapid deployment. The hook is held in a stowed position during operations with no load. The following examples are sling-load capacities based on a 1,610-pound load, single-pilot mission, 40-minute operation with 20 minutes of reserve fuel, and the required slings:

- .50-caliber ammunition—19 boxes (3,800 rounds), which is 7.6 aircraft loads.

- 70-millimeter 10-pound HE rockets—11 crates (44 rockets), which is 6.3 pylon loads.
- ATAS—17 crates (17 missiles), which is 8.5 pylon loads.
- Hellfire—7 crates (7 missiles), which is 3.5 pylon loads.
- JP4—192.5 gallons, which is enough to refuel two Warriors.
- FARE System 1 (without blivets).

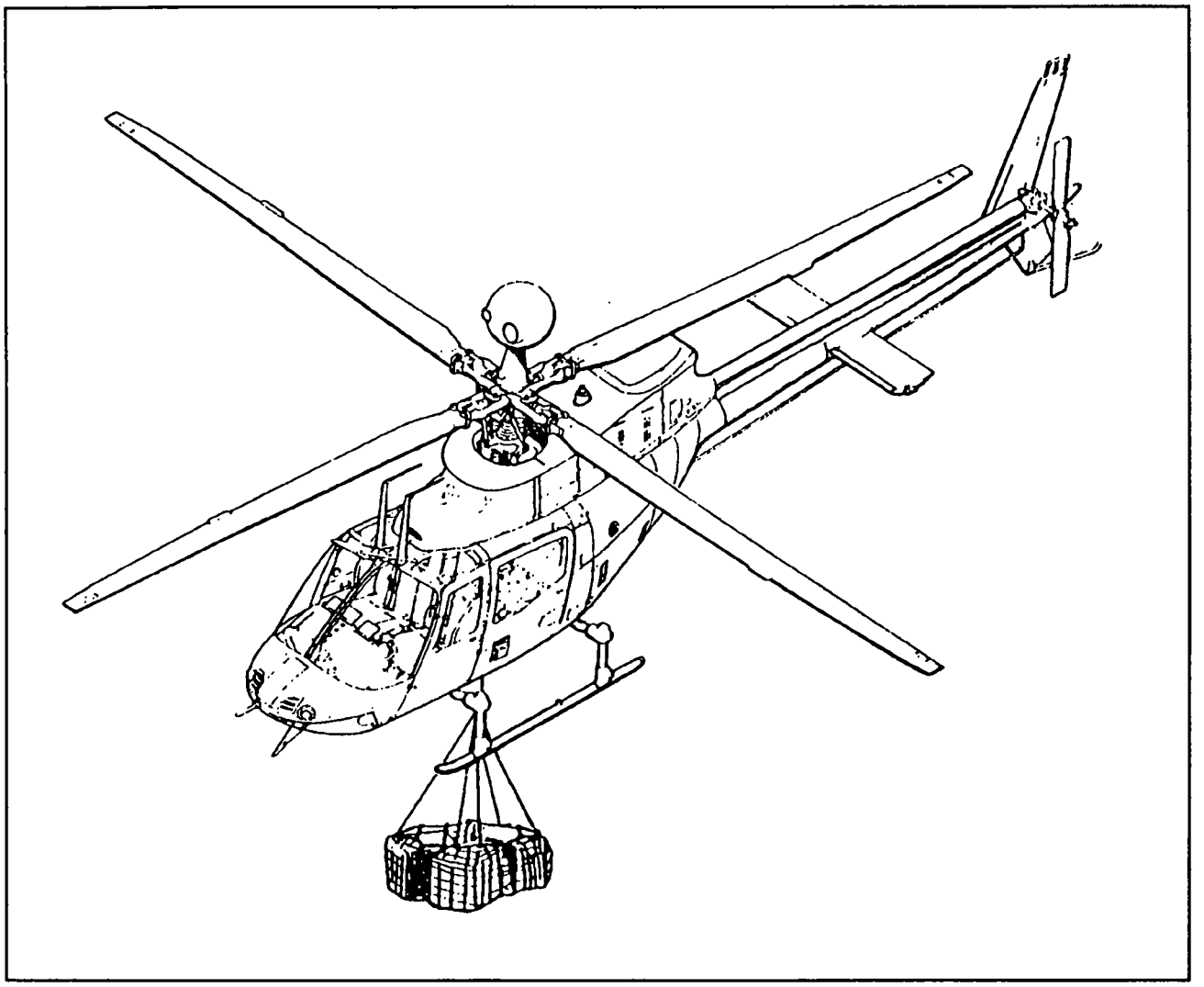


Figure H-10. Sling-load configuration

OPERATIONAL EMPLOYMENT CONSIDERATIONS

Although they are not necessarily aircraft limitations, the considerations discussed in the following paragraphs will affect the operational employment of the Warrior. To maximize the employment of their assets, commanders must formulate their estimates based on these considerations.

Obscurants. Some obscurants can keep the laser energy from reaching the target; they can also hide the target from the incoming munitions seeker. Dust, haze, rain, snow, and other particulate matter may limit visibility and affect sensor and weapon performance and standoff capability. Good laser return does not always

indicate good designation. The laser can give intermittent ranges or multiple targets which means the laser is being reflected by more than one target.

Low Cloud Ceilings. Low cloud ceilings may not allow the Hellfire seeker enough time to lock onto its target or may cause it to break lock after acquisition. At long ranges, the pilot may have to consider the ceiling to allow time for the seeker to steer the weapon onto the target.

Hellfire Danger Zones. Warrior aircrews must make sure that they are not in the danger zone of the Hellfire missile when it is launched. The ATHS aids in Hellfire missions by transmitting laser codes, the missile time of flight, the launch platform location, and the position of the Warrior in relation to the Hellfire danger zone. If a target is handed over verbally, the crew must conduct a map reconnaissance and a visual search to avoid positioning the aircraft in the Hellfire danger zone.

Instrument Meteorological Conditions. The Warrior has the instrumentation for flight in instrument meteorological conditions but is not certified to do so. During Operation Prime Chance, crews often flew the aircraft under IMC. If the Warrior pilot inadvertently enters IMC, he can recover the aircraft.

Crew Endurance. The day and night capabilities of the Warrior exceed aircrew endurance limits; thus commanders must strictly prioritize the use of this valuable asset and monitor crew endurance closely.

Operator Certification. Because of the level of sophistication of the Warrior sensor suite, operators of the systems in this aircraft must be graduates of the resident Warrior transition course. They should also be certified in both the left and right seats.

Other Considerations.

The Warrior airframe does not provide an overpressure system to protect the crew in an NBC environment.

During night operations, Warrior aircrews experience all the limitations of the aviator's night vision imaging system. Flight off the MMS is not possible.

Section II
PREMISSION PLANNING

OVERVIEW

This section contains lessons learned by experienced Warrior crews from testing, training, and real-world missions. These employment techniques were tried and proven against a real enemy or an active threat. Mission planning and aircraft employment are always METT-T dependent. Aircrews must train as they will fight and base new techniques on a hostile threat, not on a sterile environment.

MISSION BRIEFING

Following the mission briefing, the PC obtains all pertinent information from the operation order while the copilot copies the maneuver graphics. The crew then compares and reviews the information. The review is important because it allows both crew members to contribute to specific mission planning.

NOTE: For ease of understanding, PC refers to the pilot occupying the right seat and flying the aircraft. Copilot refers to the person in the left seat operating the MMS and the ATHS.

WAY POINT SELECTION

On the map, the crew selects way points for the navigation route (see navigation planning and employment on pages H-24 and H-25), maneuver graphics, observation posts, and prepoints for known or suspected enemy locations. At this time, way points are selected but not numbered. Crews need to be aware of a tendency to select too many WPTs. Through experience, crews will learn a proper balance in the number of WPTs to select for a mission.

OBSERVATION POST AND PREPOINT SELECTION

Observation Post. An aid for selecting OPs is a clear template with MMS FOV widths and ranges in kilometers for a 1:50,000 scale map, as shown in Figure H-11 (page H-22). With the clear template, the crew quickly conducts a map reconnaissance of possible OPs and PPTs. The crew should place the end of the template on a possible OP location on the map and then orient the centerline to the objective area. The crew checks terrain elevation and obstacle obstruction between the OP and objective area for intervisibility. OP standoff ranges of 4 to 6.5 kilometers generally give the best combination of standoff range and MMS employment. Normal considerations used in past OP selection (intervisibility, cover and concealment, elevation, background, accessibility) still apply. Selecting an OP lateral to the axis of advance, 45 degrees or more, can aid in target detection. See additional information on the use of observation posts on pages H-29 and H-30.

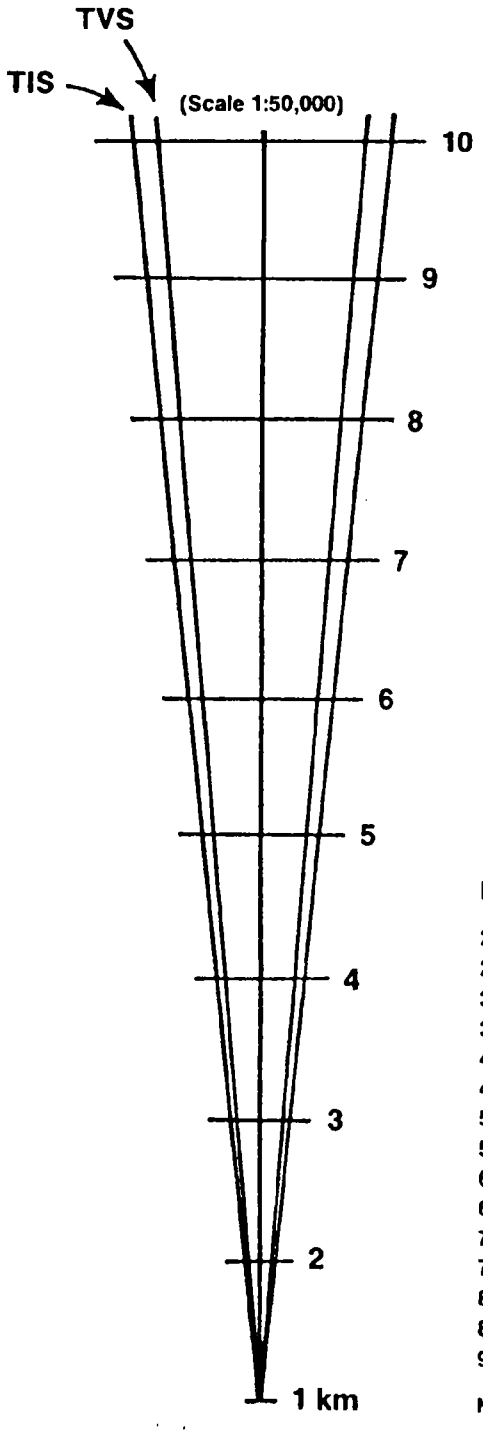
Prepoint. The PPT selection is important because PPTs orient the MMS to a known point for the start of the search. Therefore, PPTs should be easy to identify. Examples are a road intersection, a bridge, or a tower. Easily identifiable PPTs can also be used for offset navigation updates and to help determine the accuracy of the MMS PPT.

OPERATIONAL GRAPHICS DEPICTION

Crews should draw the operational graphics, OPs, proposed routes, and WPTs on a blank sheet of paper. This drawing aids the crew during mission planning, and the PC uses it during the flight. See the example in Figure H-12 (page H-23).

WAY POINT NUMBERING

The crew assigns a WPT number to each point on the graphics drawing. When assigning numbers for maneuver graphics such as end points for phase lines, the crew should use 1 through 20. The numbers 21T through 40T should be used for OPs and PPTs, which will appear as floating WPTs. (Floating WPTs are those that are not in the FPLN but will appear on the HSD.) Sequential numbering of OPs and PPTs from 21T through 40T is critical. When stores 21T through 40T are filled, subsequent lasing and target storage will erase information starting at 40T and will sequentially count down through 21T. Therefore, the crew should assign the lowest target number (21T) to the PPT farthest from the start point. The closest OP would be assigned the highest target number, 40T. Figure H-12 shows how WPTs should be numbered. WPT numbers on the map and the WPT list for the HSD must be the same. Clearly, aircraft working together must have the same WPT numbers. If not, crews must communicate using only common graphics names, grid coordinates, or SOP rally terms.



MMS Planning Overlay

(Place drawing on clear plastic.)

RANGE	TVS NFOV	TVS WFOV	TIS NFOV	TIS WFOV
2,000	70	279	98	332
2,500	87	349	122	415
3,000	105	419	147	497
3,500	122	489	171	580
4,000	140	559	195	663
4,500	157	628	220	746
5,000	175	698	244	829
5,500	192	768	269	912
6,000	209	638	293	995
6,500	227	908	318	1,078
7,000	244	977	342	1,161
7,500	262	1,047	367	1,244
8,000	279	1,117	381	1,326
8,500	297	1,187	415	1,409
9,000	314	1,257	440	1,492

NOTE: All distances are in meters.

Figure H-11. OP planning overlay

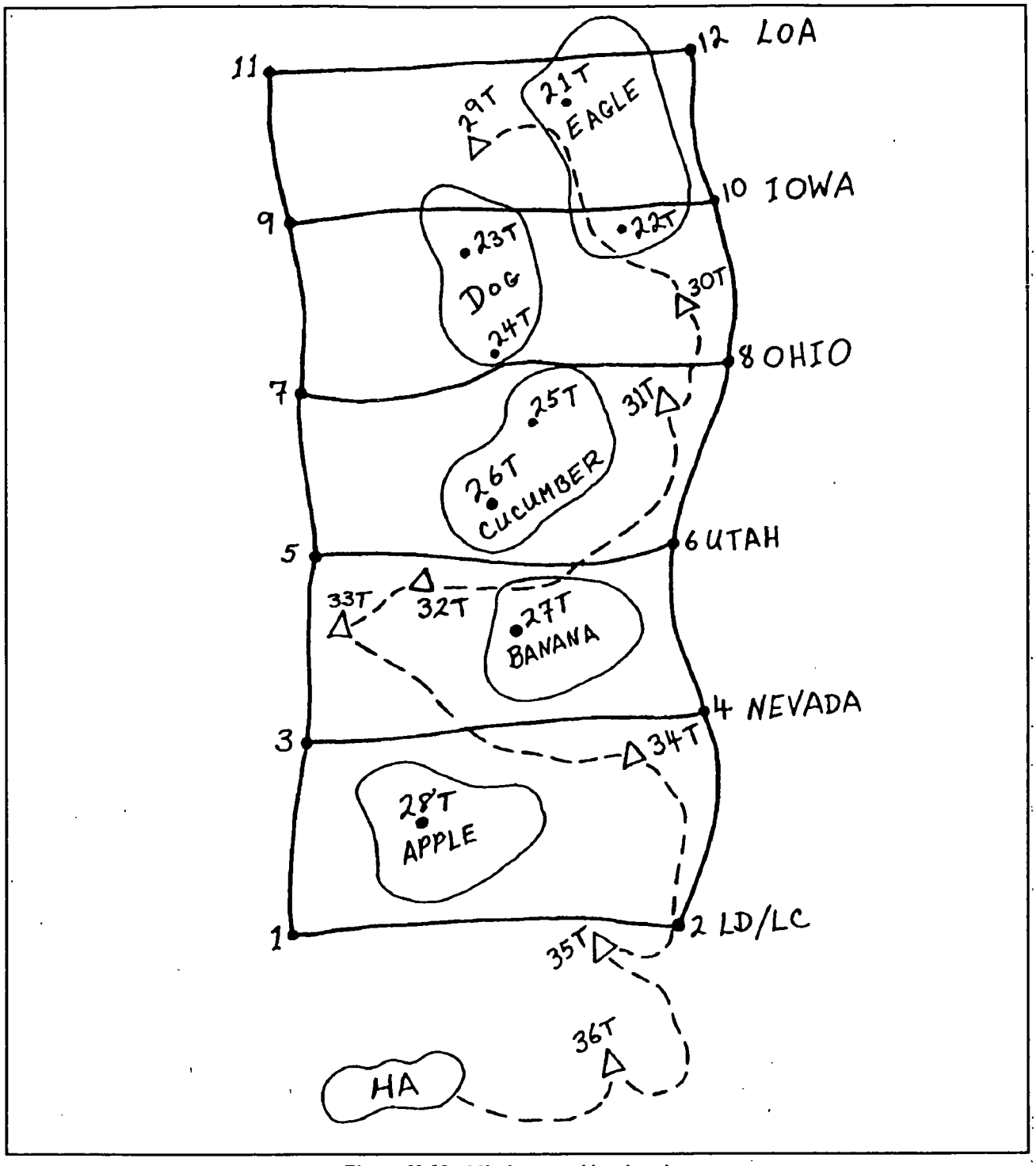


Figure H-12. Mission graphics drawing

FLIGHT PLANNING FOR THE HORIZONTAL SITUATION DISPLAY

The crew determines the WPT sequence needed to draw graphics on the HSD. For example, the phase lines from Figure H-12 are drawn onto the HSD; the FPLN would be 1, 2, 4, 3, 5, 6, 8, 7, 9, 10, 12, 11. The numbers 21T through 40T used for OPs and PPTs appear as floating WPTs on the HSD.

OBSERVATION POST/MISSION CARD COMPLETION

The crew fills in the OP/mission card as shown in Figure H-13. During the mission, the card is a quick reference for the copilot and helps keep the crew focused on the plan. Knowing the distance from an OP to a suspected enemy location helps the crew to determine the location of a target when it is detected. For example, the crew can see a vehicle 2 kilometers beyond the suspected location on the same azimuth as the PPT. Crew members may not realize that it is beyond the PPT and might call it in as being in the first proposed location. By knowing the distance from the OP to the PPT, the crew will recognize the difference in location immediately upon lasing.

OP	PPT	RNG	DESC/ THREAT	REMARKS
36	28	4 to 6 km	Trail/mech	Trails and tree line
	27	6 to 8 km	Road Int/arty	Road and tree line
35	28	1 to 4 km	Trail/mech	Trails and tree line
	27	3 to 6 km	Road Int/arty	Road and tree line
34	28	1 to 4 km	Trail/mech	Trails and tree line
	27	1 to 4 km	Road Int/arty	Road and tree line
	26	4 to 7 km	Road Int/ADA	Road and draw

Figure H-13. OP/mission card

MAP WAY POINT NUMBERING

The crew numbers the WPTs on the map to match the WPT numbers on the graphics drawing. During the mission, the PC keeps the drawing on his kneeboard and the copilot uses the map. The PC uses the drawing as a reference for comparing the terrain with the HSD and graphics names and for reviewing the proposed route between OPs. For example, a crew is at OP 34 in Figure H-12. The copilot performs a TGT LOC on a tank and stores it as 40T; 40T appears next to 26T on the HSD. Therefore, the PC knows by referencing the graphics drawing on his kneeboard that the tank is in Area CUCUMBER.

NAVIGATION PLANNING AND EMPLOYMENT

The navigation capability of the Warrior enables a skilled crew wearing NVG to fly over unfamiliar terrain, at low level and high speed, and stay within 100 meters of the route centerline. Three keys to en route navigation are proper WPT selection, combining the map and HSD course line, and good crew coordination. The crew may decide to have a separate FPLN for a navigation route and then load the mission FPLN upon entering the mission area.

NAV ALN Page Variation. On 715-series software, which is found only on the unarmed Warrior, whenever magnetic variation is added to the NAV ALN page, the

VSD heading tape and HSD compass rose are adjusted. If the way point caret is followed directly, it no longer leads directly to the selected WPT. It will lead the aircraft to the WPT in an arc unless the pilot compensates for the added magnetic variation. When NEXT WPT is selected, the crew should note the position of the WPT caret and add or subtract the variation to get a direct bearing. The crew can use the HSD graphics and cross track for precise low-level and NOE navigation. The WPT caret magnetic variation shift can be demonstrated in the aircraft with the following steps:

- Select a WPT that can be easily seen and is 3 kilometers or more from a start point.
- Place a 15-degree VAR in the NAV ALN page.
- Place two WPTs in the FPLN (the start point and the one that is 3 kilometers or more).
- Fly the WPT caret, and notice that it leads the aircraft to the WPT in an arc.
- Go back to the same start point, place zero degrees in the NAV ALN VAR, fly to the WPT using the caret, and notice the aircraft flies direct.

Navigation Way Point Selection. The three basic types of WPTs on a navigation route are a checkpoint, a turn point, and a hazard marker. A checkpoint is a distinguishable landmark, such as a road intersection or a bridge, that can be used for NAV UPD. A turn point leads the crew around or into the desired terrain feature such as a draw, saddle, or hill. For safety, major hazards (towers or wires) should be marked along the route with a floating WPT. A good technique is to place WPTs (CPs or TPs) a few hundred meters into a draw such as WPT 37T in Figure H-14 (page H-26). If a WPT is placed at a draw intersection, the HSD course line may confuse the crew. The HSD course line might run up the ridge between draws and cause doubts as to which is the proper draw. By placing the WPT in the draw, the crew will turn into the proper draw to fly over the WPT. The crew should use the same method to cross a ridge by placing the WPT across the ridge several hundred meters into the desired draw. If the 20-WPT capability of the flight plan is exceeded, a floating WPT may be used (such as WPT 39T in Figure H-14) and/or the copilot can enter a new flight plan along the route.

Route Way Point Numbering. WPT numbering of start points, checkpoints, and reporting points should start with 1 through 20. WPT numbering of turn points should start with 40T and work down in the direction of flight. This system enables the copilot to keep the proper alphanumeric sequence. A sample of combining map and HSD course lines can be seen in Figure H-14; a map with straight lines drawn between WPTs on the map navigation route depicts the HSD course line. Drawing straight lines on the map between WPTs as they appear on the HSD is a helpful visual aid. Thus the copilot can compare the HSD to the map and terrain outside the cockpit, which ties into crew coordination.

Navigation Crew Coordination. The PC normally keeps his HSD on a scale of 1:50,000 and uses center or offset to keep the next WPT on the screen. The copilot uses the necessary scale to stay oriented on the route. As he crosses WPTs, the copilot selects the NEXT WPT to keep the WPT caret directional for the PC. The copilot should talk the PC through route navigation. On the map in Figure H-14, for example, the copilot would tell the PC as they approach WPT 38T from the east, "Upon crossing 38T, fly left of the course line along the road to 2A." As they approach 2A, the copilot would say, "Upon crossing 2A, turn left and follow the road to the first draw to the right; then follow that draw to 37T." This method works best for low-level, high-speed navigation. For routes where enemy contact is possible or likely, the crew must stop at various points along the route and clear ahead with the MMS. If the route is simple enough, the PC can continue to conduct a traveling overwatch while the copilot clears with the MMS.

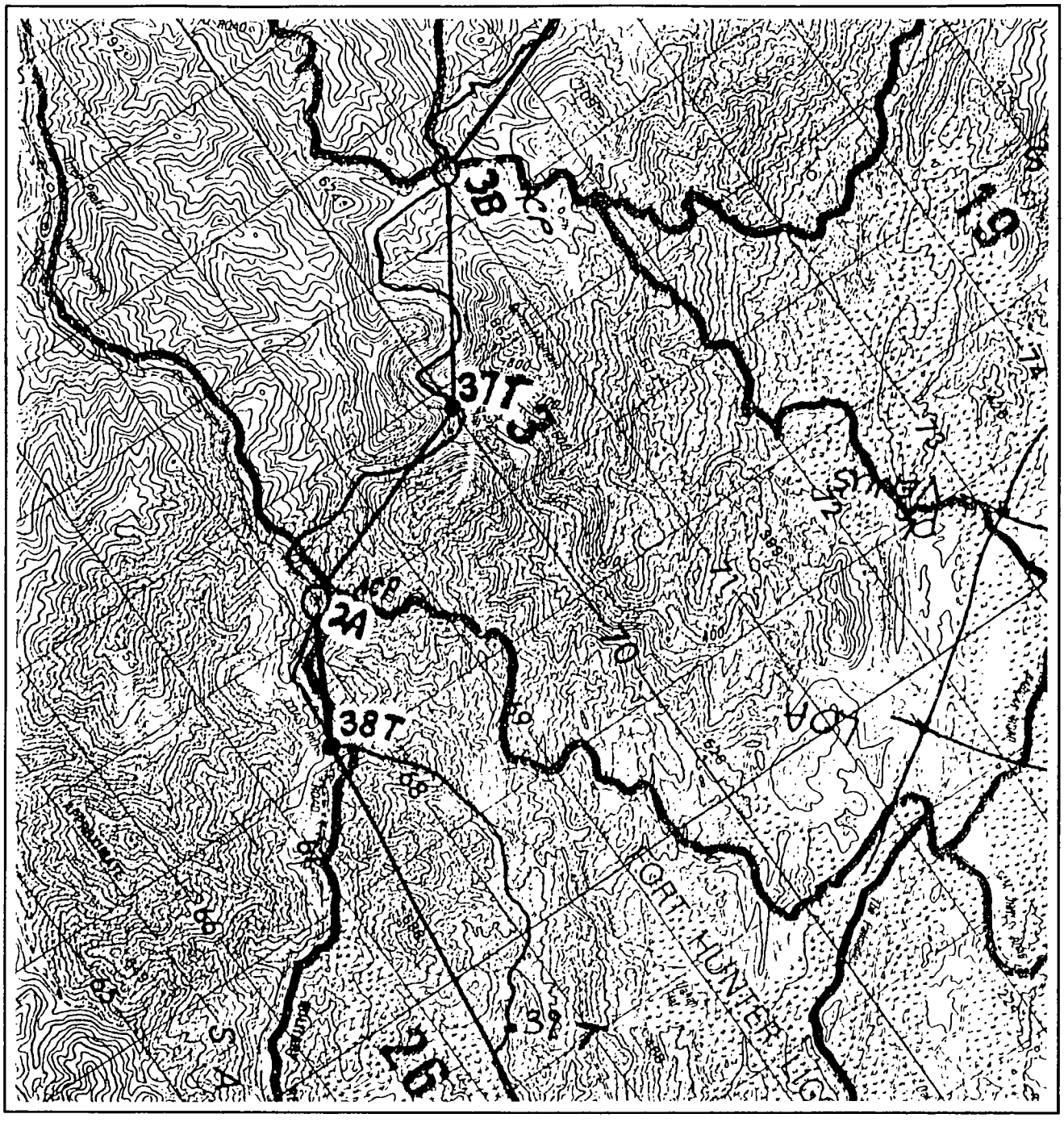


Figure H-14. Navigation route

PLANNING REVIEW

The planning review identifies planning errors and reinforces crew and team coordination. The crew should check the WPTs, FPLN, graphics drawing, map, and OP/mission card. All crew members must thoroughly understand every aspect of the mission. Premission planning includes alternate courses of action and contingencies. Suspected enemy locations should be viewed from several OPs if possible. The crew must cross-monitor each other during the mission to ensure that nothing is forgotten or overlooked. Cross-monitoring should be positive communication; a good mission starts with good planning.

Section III
EMPLOYMENT

METHODS

The Warrior is most effective when employed in the armed reconnaissance role. This highly mobile weapons platform gives the commander a lethal antiarmor and antipersonnel capability 24 hours a day. It can be used to acquire and designate targets for precision-guided munitions and provide self-protection for its crew and security for other elements. The Warrior is also used to coordinate close air support and employ indirect fire support. Capable of transporting passengers to man observation posts at any time, day or night, the Warrior significantly increases the unit's HUMINT-gathering capability.

ORGANIZATION

The basic organization of a Warrior-equipped air troop and attack helicopter company is two platoons of four Warriors each, for a total of eight aircraft. Armed reconnaissance is the air troop's primary mission. The primary mission of an attack helicopter company is to destroy massed enemy mechanized forces and other forces with aerial firepower, mobility, and shock effect. Regardless of the type of unit, Warrior-equipped units must be able to perform both reconnaissance and attack missions. The commander determines the optimal weapon configuration for the unit's aircraft based on METT-T. The minimum team configuration is two aircraft. Each aircraft can provide covering fires for the other team member; therefore, scout and attack roles are interchangeable. Figures H-15 and H-16 (page H-28) show the organization of an air troop and an attack helicopter company equipped with the Warrior.

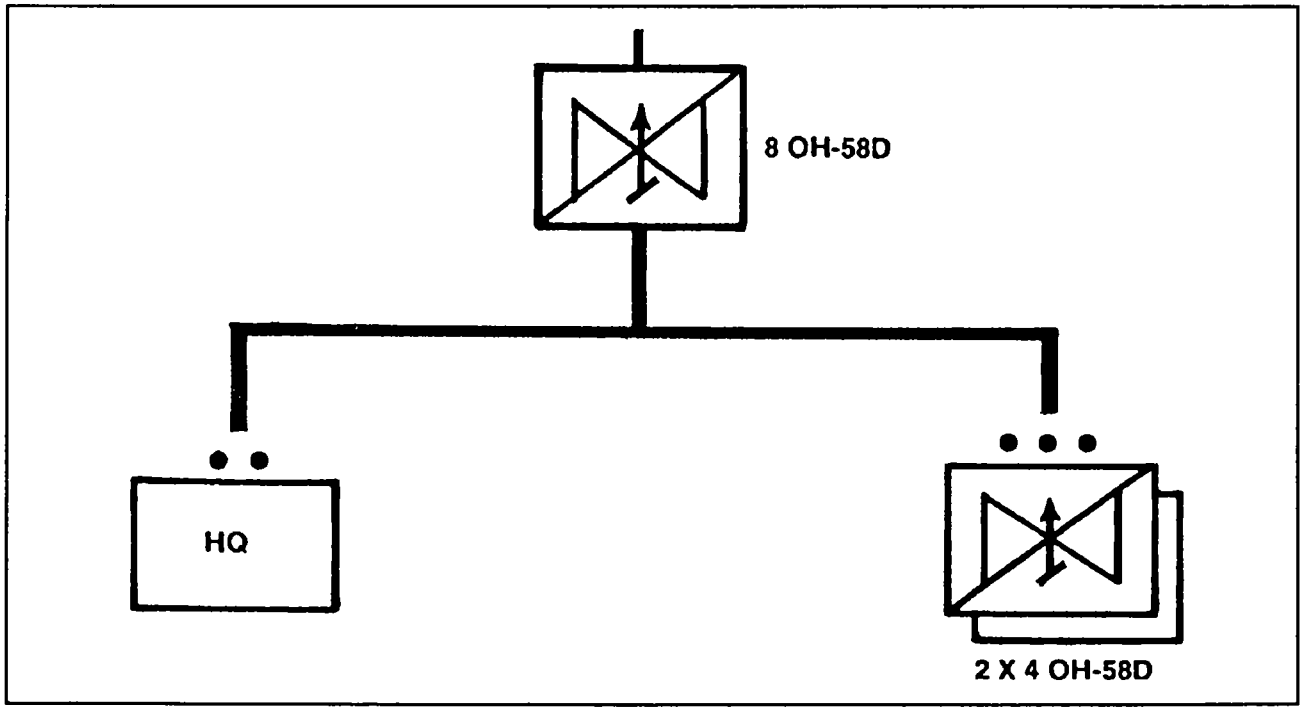


Figure H-15. Armed reconnaissance troop

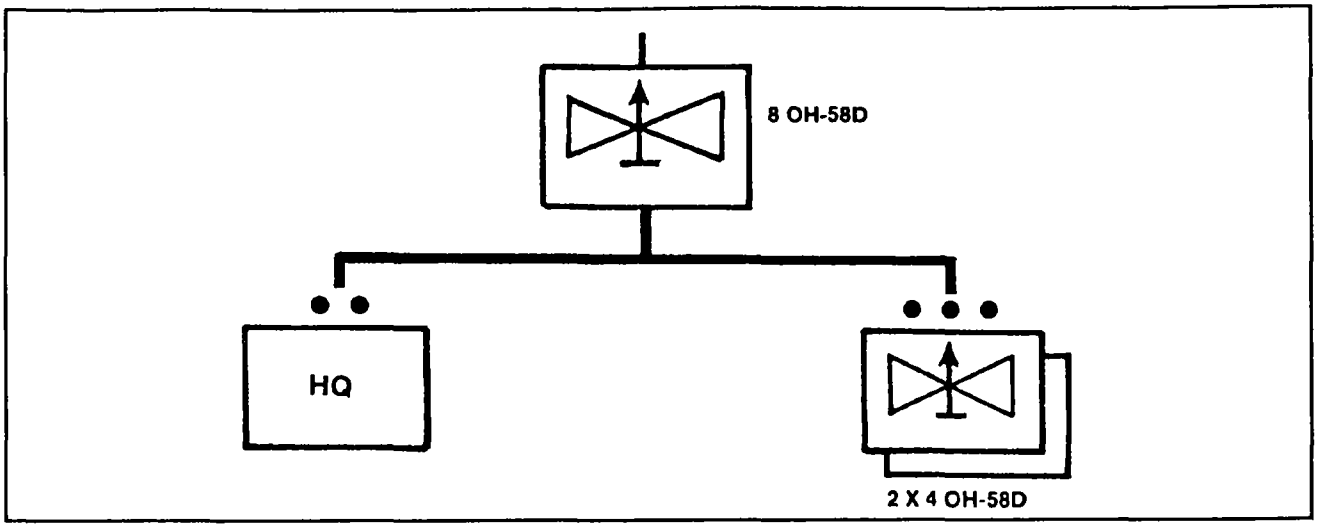


Figure H-16. Attack helicopter company equipped with the Warrior

COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE

The Warrior's agility, ATHS, SINCGARS, and Have Quick capabilities greatly enhance command and control. Modern combat forces will operate over extended distances and at various depths. The restrictions of LOS communications and enemy electronic warfare will impair the commander's a' ility to sustain uninterrupted communications. The ATHS helps to defeat these restrictions by broadcasting digital data in bursts over any radio. This capability, coupled with the enhanced optics of the Warrior, enables commanders to rapidly traverse and see the battlefield during the day, at night, and during periods of limited visibility. The video tape recorder and down-link capabilities of selected Warriors afford the commander a real-time picture of battlefield activities. Therefore, the Warrior is a critical link in the coordination and execution of combined arms air and ground maneuver throughout the depth and breadth of the battlefield. Because of the versatility of Warrior units, commanders must scrutinize and prioritize all missions to preclude piecemealing this valuable C^3I platform. Figure H-17 shows the Warrior communications network using the advanced communication suite.

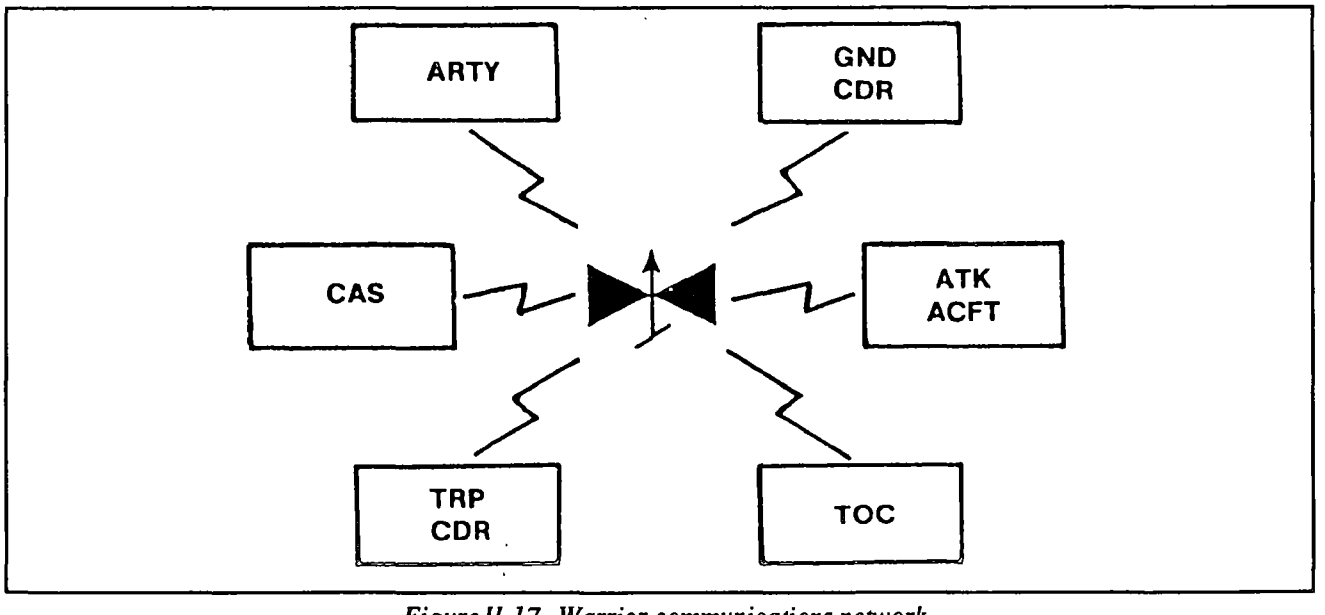


Figure H-17. Warrior communications network

MOVEMENT TECHNIQUES

Mission accomplishment in any operation requires sound movement techniques. A Warrior unit conducts traveling and traveling overwatch the same as air cavalry troops equipped with other types of aircraft; however, it conducts bounding overwatch in sequential or alternating bounds. ATHS preset messages may be used to aid in controlling movement. In other aircraft mixes, the scout aircraft primarily does the bounding and the attack aircraft does the overwatching. In Warriors, both team members bound and overwatch. Figure H-18 shows a team using the bounding overwatch movement technique.

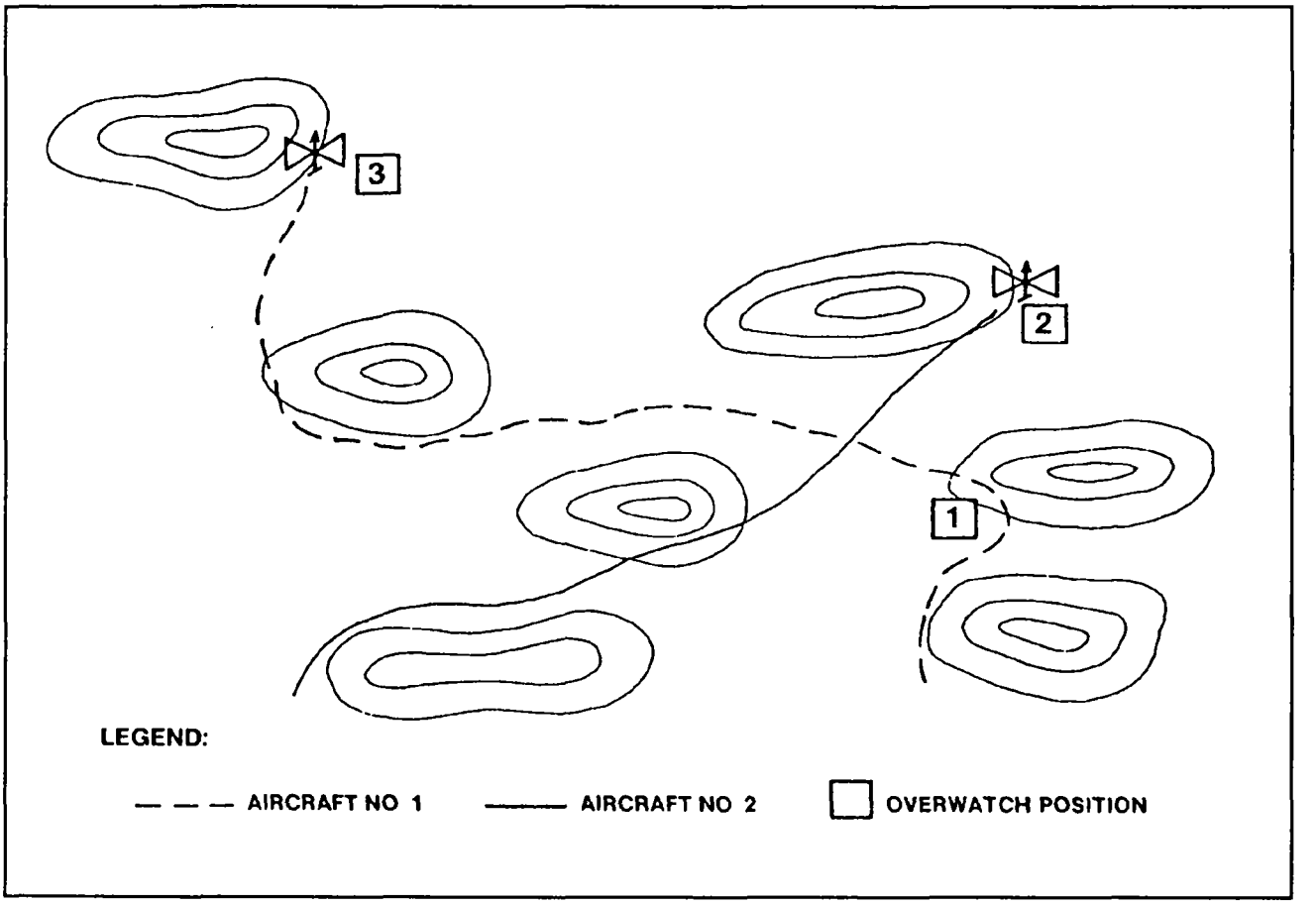


Figure H-18. Bounding overwatch

Movement Between Observation Posts. The best HSD selection for maneuvering between OPs is normally a 1:50,000 scale offset. One technique for movement between OPs is to make the next OP the last WPT in the FPLN. This will produce an HSD course line to the next OP. Another technique is to use the direct way point function; however, when DIR WPT is used, maneuver graphics are not displayed on the HSD. An easy method is to reference the proposed route between OPs on the graphics drawing (Figure H-12), scan the terrain, and maneuver to the next OP. Between OPs, the copilot is often busy sending an ATHS message, setting up the MMS for the next OP, or using the MMS to clear ahead. The copilot may prepoint to the next OP to clear it en route, and the PC can use the MMS caret for navigation information.

Observation Post Use. Before unmasking the MMS, the crew should check the OP/mission card (Figure H-13) and make sure that the correct PPT is set.

Unmasking. The pilot unmasks the aircraft at the lowest point in the OP by increasing altitude until a little blur remains in the bottom of the MMS picture. This indicates that only the MMS is unmasked. The crew should not attempt to view through branches because they create lasing problems. The copilot should be ready to target-locate or select area track while unmasking. Experience has proven that unmasking the entire aircraft and performing a visual search before using the MMS is not tactically sound. Doing so only gives away the position of the aircraft.

Searching. A WFOV should always be used during the search. If targets are detected at 3.5 kilometers or less, the copilot should remain in WFOV after a TGT LOC is performed. For targets that are dug in, the best daytime detection cues are movement, unusual shapes, and silhouettes. At night, the best cues are flashes of light detected with the NVG or a thermal signature on the TIS. Crews should follow the OP/mission card as closely as possible. If they do not detect targets, they should move to the next OP without wasting time.

During the day. The crew may employ the MMS at an OP in a split-screen method. Using this method, the copilot has the left MFD on TVS and the PC has the right MFD on the TIS. This setup allows the copilot to cross-check the PC's multifunction display to compare the TVS and the TIS. During a day search, the PC normally displays TIS, BH, and WFOV. The PC can assist more in a day search than at night because of peripheral vision limitations imposed by the NVG. The PC should not fixate on the TIS display but keep it in his cross-check and look for hot spots. The PC's primary responsibilities are first to control the aircraft and then to scan for immediate threats and direct the conduct of the mission. When a target is detected and the copilot does a TGT LOC, the PC should switch to HSD and check the target location. Threat forces can visually detect the Warrior easier during the day than at night. This is the major factor in daytime Warrior "kills" at the combat training centers. The PC must be more aware of exposing the aircraft to enemy line of sight and producing a rotor wash signature. In the OP, the PC must not forget his responsibility to scan for the immediate threat.

At night. At night, the copilot has the left MFD on TIS. The PC should keep the right MFD on HSD to orient on maneuver graphics. When wearing NVG, the PC will not be able to assist by cross-checking the MMS display. The PC's primary responsibilities remain the same as during the day.

Detection. When the copilot detects a target, he immediately determines its position by performing a TGT LOC. He then continues to search around that target for other targets. Losing a target is easy if its position is not obtained when it is initially detected. When the copilot performs TGT LOC, he must ensure that the location of the target is accurate by checking the grid on the map or by observing where the target appears on the HSD. Lateral movement in the OP can reveal targets that were blocked by trees or other obstructions.

Reporting. The initial spot report may be a voice report. This quickly alerts higher headquarters and the wingman to the threat. Reporting by voice enables the copilot to continue the search. If time permits or to counter jamming, the copilot should send the report via the ATHS.

MISSIONS

The missions discussed in this paragraph are those that the Warrior significantly enhances. The basic missions of Warrior units remain the same as those of units equipped with the OH-58A/C and the AH-1. Doctrinally, these missions do not change with the use of the Warrior; however, the TTP for the missions do.

Armed Reconnaissance and Security. Armed and agile, Warrior units conduct reconnaissance and security operations with unprecedented effectiveness. Throughout the area of operations, the enhanced reconnaissance capabilities of Warrior units give commanders reliable intelligence that reduces the uncertainties about the terrain and the enemy situation. They also provide the commander with damage assessment information on friendly and enemy elements.

Team employment considerations. When employing Warriors in teams, commanders take advantage of having aircrews that can both see and shoot. Teams must maintain defined roles throughout the mission. The lead aircraft gathers information, and the trail aircraft covers the lead. Warrior flexibility allows team members to switch roles if necessary. Weapon configurations must be considered; the wingman must have a suppression weapon, flechettes, or a .50-caliber machine gun to cover the lead aircraft. Standard breaks should be SOP. This allows the wingman to provide immediate suppression if the lead is engaged. As a rule, the lead aircraft always breaks to the opposite side of the wingman. If the wingman needs to change sides, he merely informs the lead that he is switching left or right.

Video tape recorder. The VTR records everything displayed on the left multifunction display (including the MMS image) for two hours. This information can be replayed in the cockpit for review, and intelligence personnel can use the video recording for a detailed analysis.

Enemy location. Suspected or known enemy locations can be loaded into the navigation system as way points; the copilot can prepoint the mast-mounted sight to those locations. The way points provide accurate position data that allow the Warrior aircrew to avoid enemy concentrations. Using the mast-mounted sight to confirm the enemy's presence, the copilot determines exact enemy grid locations with the laser range finder/designator. These locations can be stored on the way point list.

Route reconnaissance. Route reconnaissance can be target-located at several different points to determine its slope, direction, and width. Some manual computation may be necessary when the crew is back on the ground. All other forms of reconnaissance may be done similarly. The route can be recorded on the VTR at key points for a review by commanders and aircrews.

Screen. This mission is best described using the following example of a screen mission over rolling terrain: The troop commander is given a six-hour screen mission. Six of the troop's eight aircraft are operational. The troop commander decides to place four aircraft on the screen line; two aircraft rotate to the FARP during the entire mission, as shown in Figure H-19 (page H-32). The troop commander can place the four aircraft on the screen line because each aircraft can provide overwatch for the aircraft on either side.

Attack.

Like the Apache's, the Warrior's attack mission encompasses aviation maneuvers executed during offensive and defensive operations. Small and agile, the Warrior can occupy positions inaccessible to the Apache and remain masked during target acquisition and designation. However, it lacks the Apache's capability to destroy large numbers of combat vehicles. The Warrior carries a maximum of 4 Hellfire missiles compared to the Apache which carries a maximum of 16.

Employed in advance, the Warrior enhances the survivability and effectiveness of the Apache. This employment method also eliminates problems encountered when mixing the PNVS and NVG in the same flight and enhances the Warrior's capability to perform reconnaissance while remaining undetected.

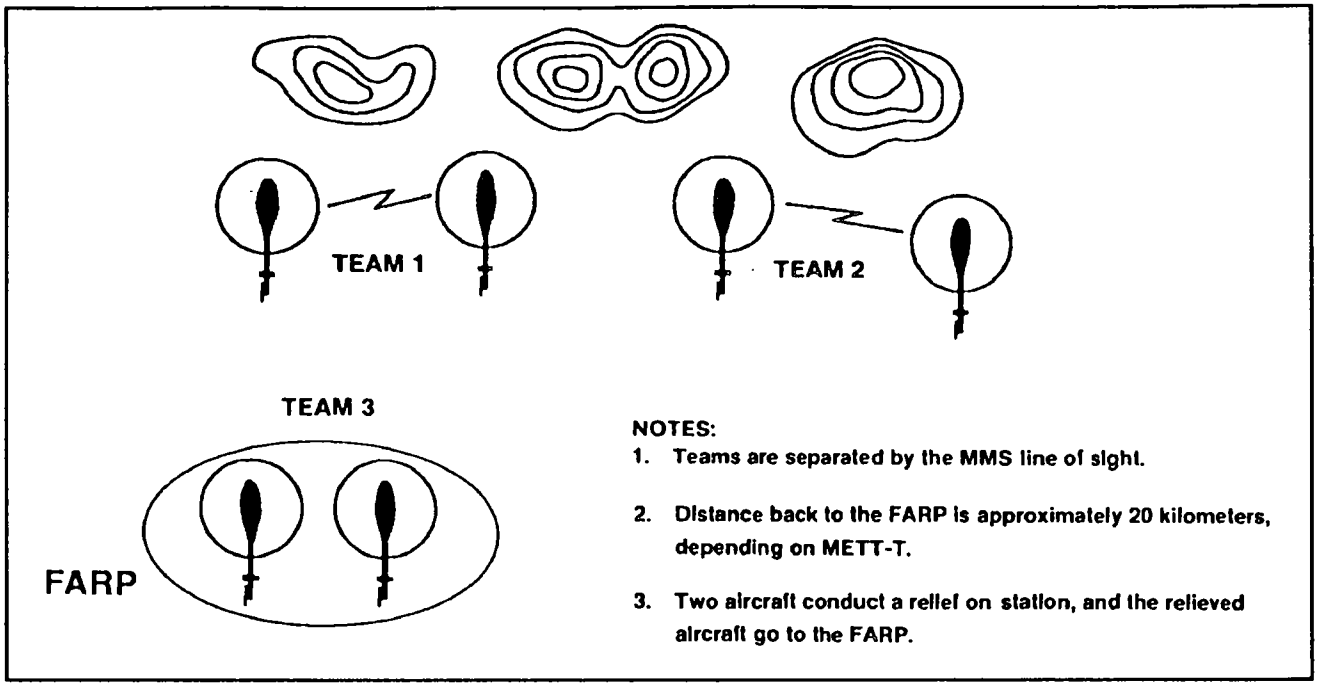


Figure H-19. Example of a screen mission

For remote LOAL Hellfire engagements, the Apache can remain masked at distances several kilometers behind the Warriors. Using only the LRF/D, the Warriors remain undetected and the Apache can employ Hellfire missiles from defilade. Experience has shown that missiles should always be coded to the designator code. The Warrior's ATHS capability improves target handovers. Crews need to consider the maximum and minimum offset angles of plus or minus 60 degrees and plus or minus 20 degrees, respectively. Smaller offset angles are more desirable.

JAAT Operations. JAAT operations focus combat power to destroy the enemy rapidly and enhance friendly force survivability. The target lasing capability of the Warrior, coupled with the TACAIR/CAS laser spot tracking equipment, offers greater efficiency and total integration and distribution of fires. Laser designation enables the CAS aircraft to engage targets beyond visual range. However, CAS aircrews must maneuver to acquire the laser spot. The Warrior ATHS digitally links AH-64, A-16, and fire support assets. With the ATHS, the crew can send laser spot codes, target locations, and all pertinent data with the push of a button. The unobserved Warrior enables CAS aircraft to engage targets at low level and high speed in a single pass. The Warrior brings the JAAT to the threshold of perfection for application in AirLand Battle-Future.

AirLand Battle-Future. Within the context of AirLand Battle-Future, the JAAT represents a mobile, highly lethal killing force that can decisively engage enemy ground forces at extreme distances. The communication capabilities of the Warrior provide the means to rapidly coordinate and employ multiple rocket fires, CAS, and attack helicopters without achieving overkill or wasting assets. In essence, the commander can simply place a standard JAAT engagement area anywhere within the range limitations of his JAAT systems (150 kilometers) and expect to disrupt or destroy any enemy force. This "floating JAAT box" is reminiscent of the German Schwerepunkt concept—the commander identifies the place where maximum force will be applied. The JAAT allows the commander to apply the point of maximum force throughout his area of influence. The JAAT in ALB-F represents an evolutionary continuation of the original JAAT philosophy and extends that philosophy to a

tremendous depth on a nonlinear battlefield. As newer deep-targeting assets are fielded and aviation acquires a true around-the-clock capability, the floating JAAT concept will reach and then surpass the killing capability of ground systems.

Heliborne forward air controller. For the commander to properly coordinate and integrate CAS, the FAC must see the battlefield, communicate, and survive. The Warrior enables a FAC to acquire and designate targets, communicate, and survive in a high-intensity conflict during the day, at night, and during periods of limited visibility.

Artillery and naval gunfire. With the Warrior, preprogrammed fire missions are sent digitally to supporting artillery battalions. First-round fire-for-effect is almost assured when the laser is used to locate a target; it achieves surprise and maximum destruction and limits artillery vulnerability to counterbattery fires.

Communications. When CAS aircraft arrive at the IP, the H-FAC or pilot of the lead aircraft conducts the standard JAAT briefing. To synchronize Have Quick, a Time of Day must be established. The US Army does not have the equipment to generate a worldwide TOD. It will rely on other services to insert accurate time into Have Quick radios. Primarily, time will be obtained from the tactical air control system elements such as TACPs and control and reporting centers and posts.

Improved CAS tactics. Tactics validated during Operation Apache Thunder apply equally to Warrior employment. Because of the laser-designation capability of the Warrior, CAS four-ship tactics can be used. Two flights of two aircraft can attack the same or different targets. Timing is controlled by the CAS flight lead. If maximum firepower is necessary, both sections can attack simultaneously by using a second Warrior or Apache to designate for one of the flights. When four-ship tactics are used, each flight of two aircraft is given its own laser code. If the surface-to-air threat permits, the Warrior can laser-designate the target for CAS aircraft at the IP. This long-range area identification allows the lead aircraft to fly an attack course that provides the best terrain masking and to maintain contact with the target using geographical terrain features. Initial point lock-ons have been achieved beyond 20 kilometers. Far from the target area, many ADA systems that have not been exposed may become active. These tactics significantly increase the CAS aircrews' flight situational awareness and decrease their overflight of the target while they look for a laser spot.

Contingency Operations. Force entry (opposed or unopposed) contingency operations characterize current and future warfare. This reality spans the spectrum of conflict around the globe. The Warrior provides the Army with unprecedented rapid deployability, force protection, and sustainment capabilities for such contingencies.

Rapid deployability. The United States Armed Forces must project combat power anywhere in the world. The rapid deployment capability of the Warrior enables a commander to integrate the Warrior into armed conflict quickly.

Force protection. Rapid employment of reconnaissance elements and firepower is essential to protect vulnerable combat power as it is phased into a lodgment. The Warrior can meet this challenge within ten minutes after being airlanded. With Warrior advanced avionics and optics, reconnaissance is accomplished during the day, at night, and during periods of limited visibility. The reconnaissance capabilities of the Warrior, coupled with a versatile arsenal of firepower, empower the commander to oppose any envisioned threat. Therefore, the Warrior should be the centerpiece for opposed force entries.

Sustainment capabilities. During a force entry, the Warrior's multifaceted role negates the immediate need for other types of helicopters to perform reconnaissance, attack, assault, and airlift missions. Therefore, this single aircraft streamlines sustainment. Additionally, the Warrior, in its multifaceted role, allows the commander to shift aviation priorities quickly without regard to the mission design of the aircraft.

Raids. The capability of a Warrior unit to surgically remove a target makes it an ideal unit to conduct a raid. Typical targets that might be assigned to a Warrior attack helicopter company are C^2 nodes, major ammunition and POL sites, nuclear sites, and helicopter staging areas. Two aircraft can conduct a raid, particularly if the target is within artillery range. Deeper and larger targets may require a larger force.

Air Combat. The Warrior can be used in offensive or defensive air combat operations. Crews must quickly assess the situation in an air-to-air encounter; they must consider weapon configuration, the type of air threat, whether they have been detected by the threat, the terrain, and the distance to the threat.

The ATAS is highly effective against an air threat from less than 1 kilometer up to 5 kilometers or more. If the Warrior is detected, ATAS employment will depend on threat distance and maneuverability. ATAS lock-on is hard to achieve and maintain at close ranges while maneuvering.

The .50-caliber machine gun is most effective for close fights. Because the Warrior lacks speed, crews must take advantage of its small size and agility in the close-in fight.

Multipurpose submunition rockets can be employed against an unsuspecting hovering threat, but the probability of kill is very low.

Flechettes are very effective in air combat. However, they pose danger to friendly forces and should not be employed in friendly areas.

Hellfire missiles can be used against stationary targets or targets moving at speeds up to 200 knots and at distances up to 5 kilometers. The main consideration is to keep a good laser spot on the threat. The best way to achieve a good laser spot is to lock on before launch, point-track, and use a flank shot.

Air Assault Security. The Warrior gives the commander the reconnaissance and firepower needed to provide security for an air assault. The air assault security force should be divided into two teams: a reconnaissance team and an overwatch team. The reconnaissance team is configured for the scout role; the overwatch team is configured for the attack role.

Overwater Operations. For overwater tactical operations, Warriors operate in teams of two: a lead aircraft and a trail aircraft. The lead aircraft gathers information. The trail aircraft protects the lead. Typically, the missions of the Warrior over water are to protect US shipping and provide reconnaissance for the Navy. These missions are consistent with land-based missions such as deliberate attack, hasty attack, screen, zone reconnaissance, and area reconnaissance. During these missions, the intent is to combine shipboard or Navy LAMPS MK-3 (SH-60B) radar with Warrior capabilities. Warriors can locate contacts with the mast-mounted sight or be vectored to a radar contact by a ship or Navy LAMPS MK-3 (SH-60B). (Contact is a Navy term for a vessel that has not yet been identified.)

Altitudes. Overwater altitudes will depend on the threat, sea state, and illumination. With NVG, surface contrast sometimes makes flying at 30 feet and 80 KIAS easier than flying at 60 feet and 80 KIAS. Most NVG missions during Operation

Prime Chance were flown at altitudes of 30 to 50 feet and 80 KIAS. Illumination variations in different quadrants can change the surface contrast level. Shallow water, known as shoal water, affects the sea state and changes the surface contrast. These factors may cause crews to climb or descend unintentionally. To maintain altitude, one technique is to set the low altitude warning system, or "low bug," 1 foot less than the 10-foot increment that the crew plans to fly. For example, if the crew plans to fly between 30 and 39 feet, it should set the low bug at 29 feet. The low altitude warning provides adequate reaction time under most circumstances.

Distance estimation. Distance estimation is difficult over water. Surface vessels vary greatly in size as compared to ground vehicles. Laser range, radar, or vertical position on the horizon is best used to determine range. At a 30- to 50-foot altitude, the distance to the horizon is 10 to 12 nautical miles; if a contact is halfway up to the horizon, it is about 5 to 6 nautical miles away.

Deck landings. Shipboard and overwater operations are demanding and dangerous. Two critical aircrew tasks are taking off and landing on the deck of a ship while wearing NVG. The aircrew must be keenly aware of the deck location, obstructions, and mechanical turbulence induced by the ship's superstructure. Prevailing wind and ship course and speed significantly affect relative wind and turbulence. Visual illusions, especially relative motion, and disorientation are important factors. The lack of visual cues and height perception problems increase a pilot's chances of disorientation. The pilot flying should announce vertigo the instant that disorientation occurs so that the other pilot can take the controls. During takeoffs and landings, the crew must be alert. The pilot flying the aircraft needs to keep his vision focused outside while the copilot assists in clearing the aircraft and monitoring system instruments. Determining the rate of closure is difficult because of the lack of references, especially when landing up the stern of a single-spot deck. If a safe landing is questionable anytime during the approach, the pilot should perform a go-around.

Overwater flight techniques. Echelon right is the standard overwater formation at 30 to 50 feet altitude and 80 KIAS. Between contacts or WPTs, the lead aircraft uses the MMS to scan 10 degrees right to 90 degrees left and the trail aircraft scans 10 degrees left to 90 degrees right. The trail aircraft flies slightly higher than the lead aircraft and at a distance of three or more rotor disk diameters. A separation distance of 500 meters allows the trail aircraft to provide cover for the lead aircraft en route. Flying echelon right allows the PC of the trail aircraft to fly in a position that places the lead aircraft left of the windscreen center post. This enables the PC of the trail aircraft to cross-check the system instruments with minimal head movement.

Actions on contact. When investigating a contact, the team may slow down but not below 50 KIAS. If possible, crews should not approach contacts with the moon to the rear of the aircraft. This silhouettes the aircraft for the contact. The lead PC will announce the direction in which he will break off the contact so that the PC of the trail aircraft can position for a clear gun-target line. If fired upon, the lead aircraft should always break away from the GTL to allow the trail aircraft to provide immediate suppression. When breaking off a contact, the lead aircraft will announce the linkup heading and maintain 60 KIAS until the trail aircraft has formed backup echelon right.

Engagement of surface vessels. Because of their speed and small size, fast attack boats are best engaged with flechettes and .50-caliber machine guns. During Operation Prime Chance, these weapons proved effective against

maneuvering small boats. The Hellfire missile is the weapon of choice for precision engagements of large vessels. The Warrior crew can select offset-designate to surgically disable the vessel by striking the bridge or engineering compartment. Flechettes are used to clear the decks so that friendly forces can board with minimum resistance. The ATAS is not effective against surface vessels because of lock-on constraints and its small warhead.

Drug Interdiction. Because of its stealth, sensor capability, and maneuverability, the Warrior is highly successful in the effort to combat drug traffickers. With video recording and down-link capability, Warrior crews provide the DEA with real-time, hard-copy evidence of suspected crimes.

Section IV
MULTIPURPOSE LIGHT HELICOPTER OPERATIONS

CAVALRY OPERATIONS

The Warrior can carry six combat troops. It can be used to deploy manned observation posts for the armored cavalry squadron at any time, day or night. This capability gives the armored cavalry squadron and the regiment around-the-clock, extended-range surveillance. The Warrior can also be used to extract patrols, downed pilots, or individuals from observation posts. Figure H-20 shows a Warrior-equipped air troop emplacing manned observation posts.

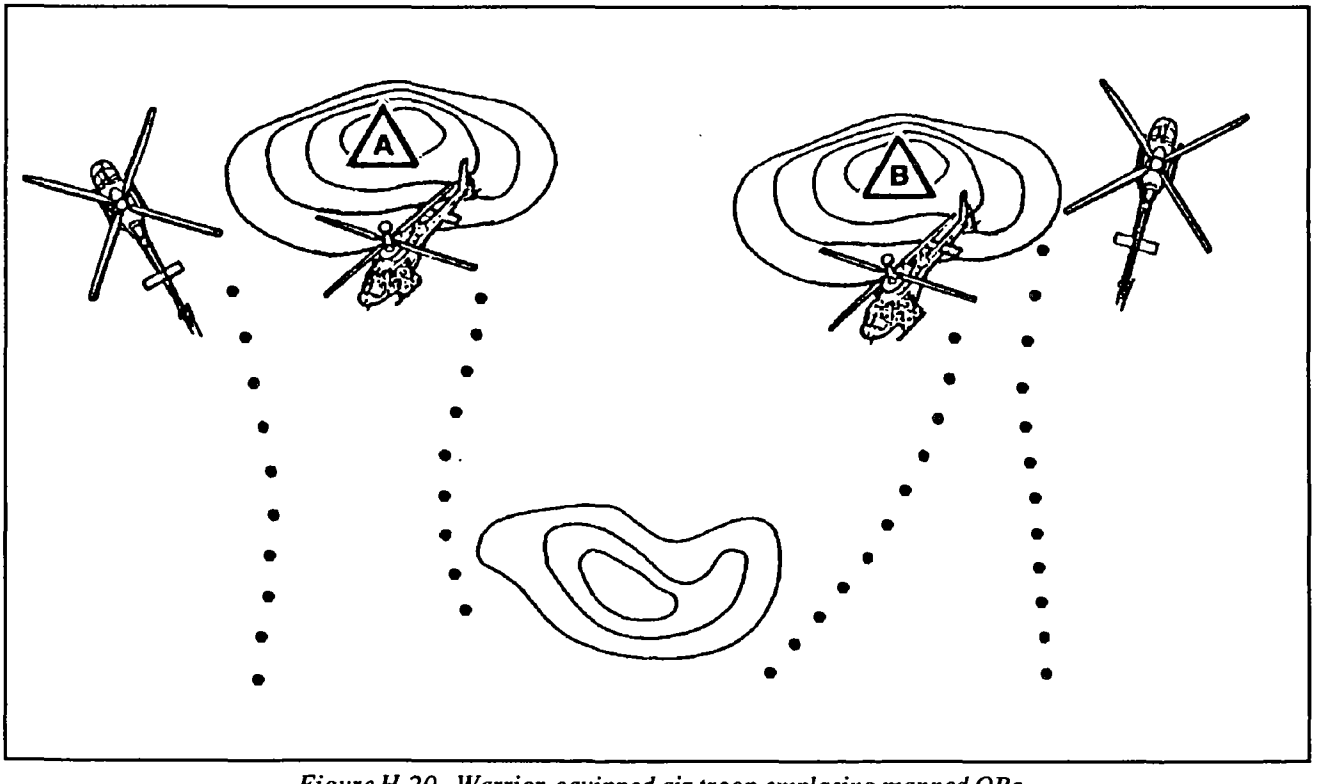


Figure H-20. Warrior-equipped air troop emplacing manned OPs

UTILITY OPERATIONS

The Warrior can be used to move limited supplies on the battlefield and, in turn, to conduct resupply missions. On a limited basis, Warriors can be used to move FARPs. With the external cargo hook, the Warrior can be employed in numerous utility missions; however, it is not a replacement for the UH-1, UH-60, or CH-47. The Warrior is organic to an air reconnaissance troop or an attack helicopter company and can be used for missions that are important to the success of those units. The ground commander must weigh the importance of the primary missions of those units before using the Warrior to perform utility missions. Figure H-21 shows an attack helicopter company moving a FARP while conducting a phased attack.

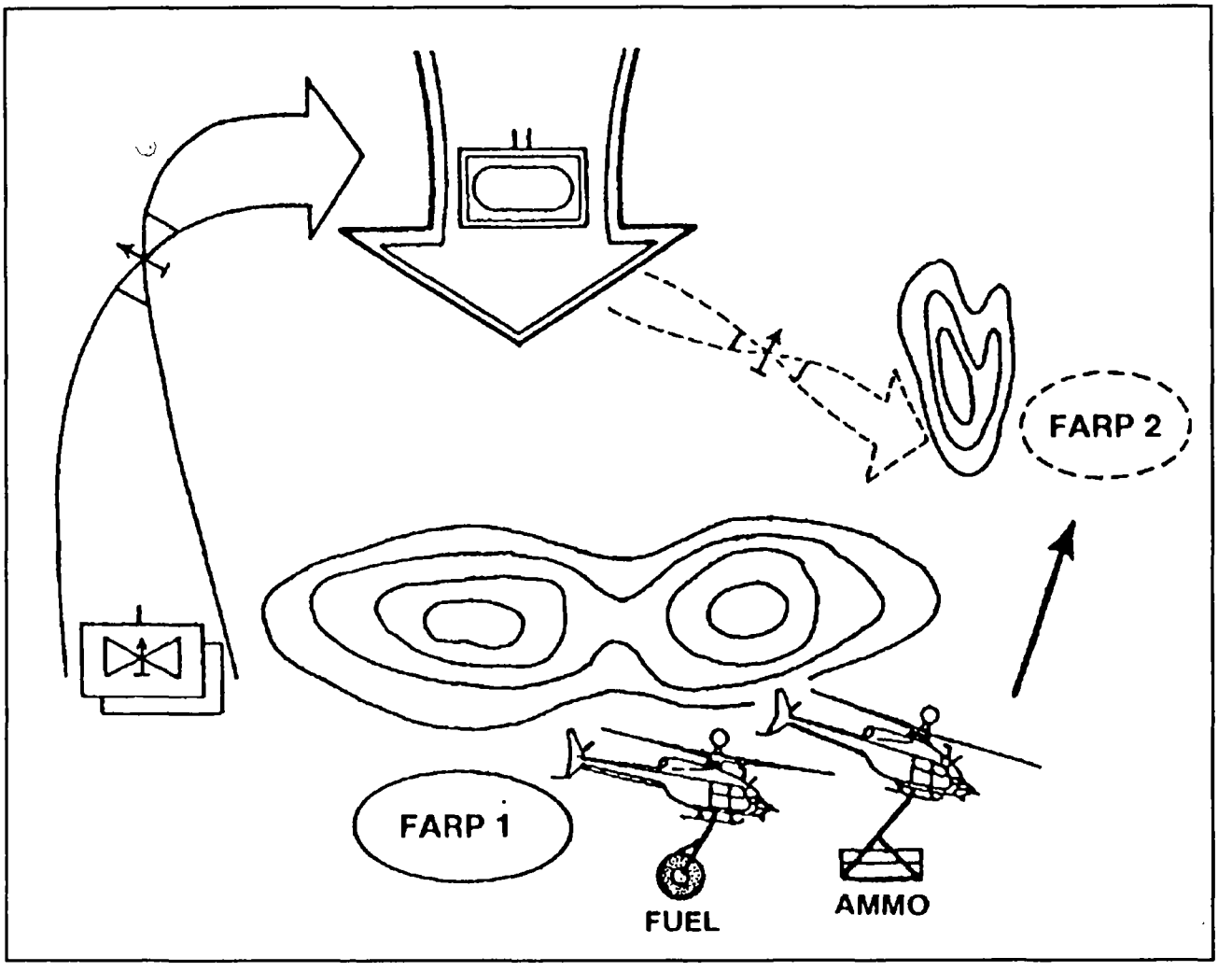


Figure H-21. Attack helicopter company moving a FARP while conducting a phased attack

OTHER MISSIONS

Other missions for the Warrior may include the movement of combat soldiers during rear operations or a hasty defense. Warriors can be used to supplement these operations, but they cannot perform as well as the larger utility helicopters. Utility

helicopters also provide passengers with better protection from the weather and ground fire. Passengers ride on the outside of the Warrior. A Warrior-equipped unit can conduct a raid against a lightly defended enemy by mixing the assaulting Warriors with the armed Warriors. This operation is well suited for low-intensity conflict. Figure H-22 shows a Warrior-equipped attack helicopter company conducting a raid.

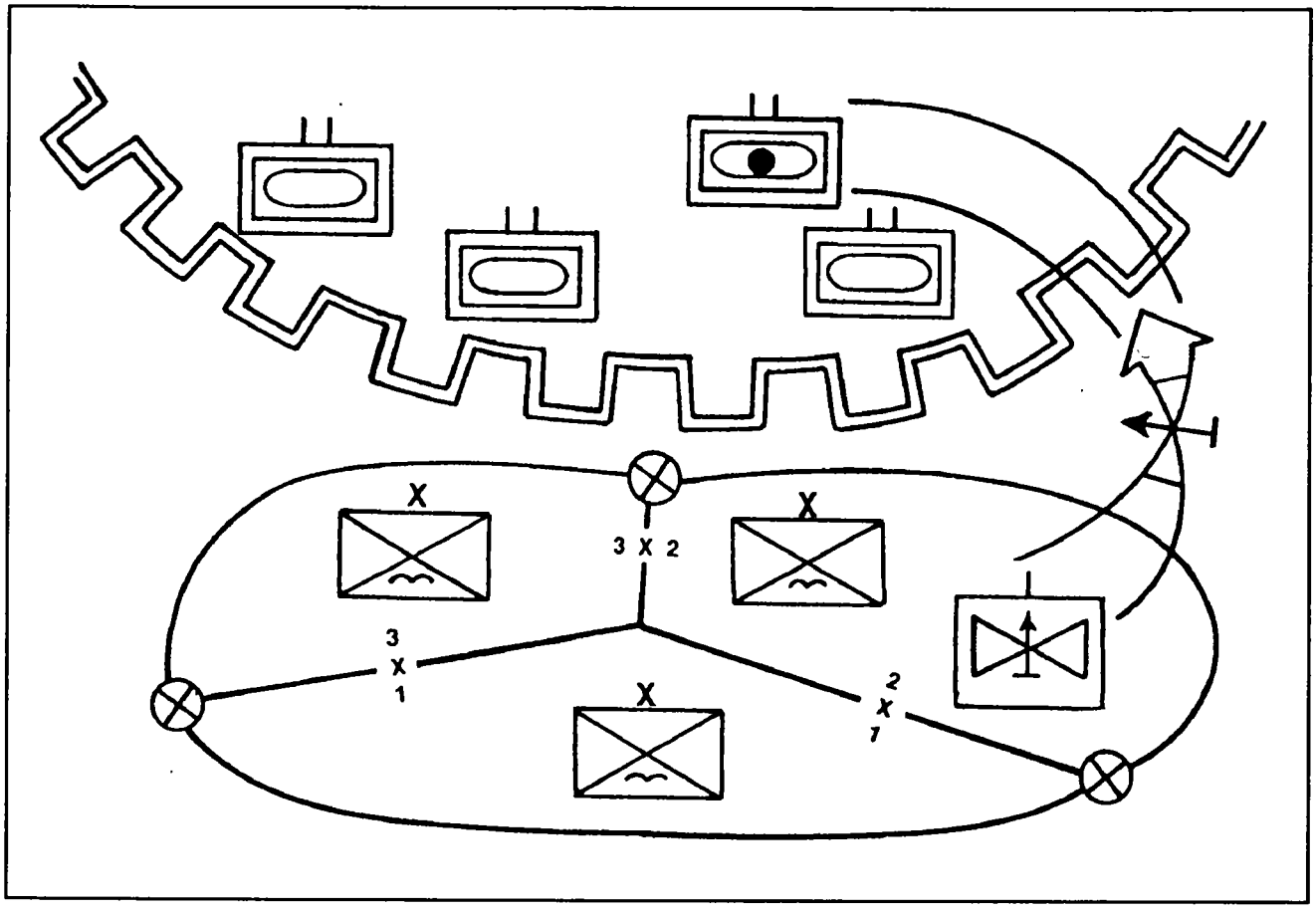


Figure H-22. Attack helicopter company conducting a raid

GLOSSARY

AARS . . . . . Advanced Airborne Radiac System
AAST . . . . . Army Aerial Scout Test
AATF . . . . . air assault task force
ABMOC . . . . . air battle management operations center
A^2C^2 . . . . . Army airspace command and control
acft . . . . . aircraft
ACP . . . . . air control point
ACR . . . . . armored cavalry regiment
AD . . . . . air defense
ADA . . . . . air defense artillery
ADSS . . . . . ANVIS display symbology system
AH . . . . . attack helicopter
AHRS . . . . . altitude and heading reference system
AHT . . . . . assault helicopter troop
A&L . . . . . administrative and logistics
ALB-F . . . . . AirLand Battle-Future
ALFGL . . . . . automatic low frequency gain limiting
ALSE . . . . . aviation life support equipment
AM . . . . . amplitude modulated
AMC . . . . . air mission commander
ammo . . . . . ammunition
ANVIS . . . . . aviator's night vision imaging system
AO . . . . . aeroscout observer
APC . . . . . armored personnel carrier
AR . . . . . Army regulation
arty . . . . . artillery
ASE . . . . . aircraft survivability equipment
at . . . . . antitank
ATAS . . . . . air-to-air Stinger
ATCCS . . . . . Army Tactical Command and Control System
ATHS . . . . . airborne target handover system
atk . . . . . attack
ATKHB . . . . . attack helicopter battalion
ATKHT . . . . . attack helicopter troop
ATP . . . . . allied training publication
attn . . . . . attention
AVIM . . . . . aviation intermediate maintenance
AVUM . . . . . aviation unit maintenance
AWACS . . . . . Airborne Warning and Control System

* Control display subsystem nomenclature

BCS . . . . . battery computer system
BDA . . . . . battle damage assessment
BDZ . . . . . base defense zone
BH . . . . . black-hot
BHL . . . . . battle handover line
BMP . . . . . Boyevaya Mashina Pekhoty [literal Russian: combat vehicle, infantry (amphibious armored)]
bn . . . . . battalion
BP . . . . . battle position
BRDM . . . . . Boyevaya Razvedyuatel'naya Dozornaya Meshina [literal Russian: combat reconnaissance patrol vehicle (amphibious armored scout)]
BRT* . . . . . brightness
BSA . . . . . brigade support area
btry . . . . . battery

C . . . . . Celsius
C^2 . . . . . command and control
C^2I . . . . . command, control, and intelligence
C^3 . . . . . command, control, and communications
C^3I . . . . . command, control, communications, and intelligence
CAA . . . . . combined arms army
cal . . . . . caliber
CAS . . . . . close air support
CB . . . . . chemical-biological
cdr . . . . . commander
CF . . . . . correlation factor
cGy . . . . . centigray
cGyph . . . . . centigray per hour
CH . . . . . cargo helicopter; channel*
CHEMWARN . . . chemical strike warning
CI . . . . . combat ineffective
co . . . . . company
comm . . . . . communications
COMMZ . . . . . communications zone
COMSEC . . . . . communications security
CONT* . . . . . contrast
COSCOM . . . . . corps support command
CP . . . . . command post
CRP . . . . . combat reconnaissance patrol
CS . . . . . combat support
CSS . . . . . combat service support

DA . . . . . Department of the Army
DEA . . . . . Drug Enforcement Agency
desc . . . . . description
DIR WPT* . . . . . direct way point

DS2 . . . . . decontamination solution number 2
DT . . . . . demanding task
DTS . . . . . data transfer system
DZ . . . . . drop zone

E . . . . . east
EH . . . . . electronic helicopter
EM . . . . . enlisted member
EMP . . . . . electromagnetic pulse
engr . . . . . engineer
ETE . . . . . estimated time en route

F . . . . . Fahrenheit
FA . . . . . field artillery
FAA . . . . . forward assembly area
FAAD . . . . . forward area air defense
FAC . . . . . forward air controller
FARE . . . . . forward area refueling equipment
FARP . . . . . forward arming and refueling point
FDC . . . . . fire direction center
FEBA . . . . . forward edge of the battle area
FFAR . . . . . folding-fin aerial rocket
FIST . . . . . fire support team
fld . . . . . field
FLIR . . . . . forward-looking infrared
FLOT . . . . . forward line of own troops
FM . . . . . field manual; frequency modulated
FMC . . . . . fully mission capable
FM(S) . . . . . frequency modulated secure
FOC . . . . . flight operations center
FOD . . . . . foreign object damage
FOV . . . . . field of view
FPLN* . . . . . flight plan
FRAGO . . . . . fragmentary order
FR FRZ* . . . . . frame freeze
FSCL . . . . . fire support coordination line
FSE . . . . . fire support element
FSO . . . . . fire support officer
ft . . . . . feet

G2 . . . . . Assistant Chief of Staff, G2 (Intelligence)
G3 . . . . . Assistant Chief of Staff, G3 (Operations and Plans)
gnd . . . . . ground
GRREG . . . . . graves registration
GRU . . . . . Chief Intelligence Directorate of the General Staff
GTA . . . . . graphic training aid
GTL . . . . . gun-target line

HA . . . . . holding area
HE . . . . . high explosive
HF . . . . . high frequency
H-FAC . . . . . heliborne forward air controller
HHT . . . . . headquarters and headquarters troop
HI* . . . . . high
HIDACZ . . . . . high-density airspace control zone
HMMWV . . . . . high-mobility, multipurpose, wheeled vehicle
HQ . . . . . headquarters
hr . . . . . hour
HSD . . . . . horizontal situation display
HUMINT . . . . . human intelligence

ID . . . . . inside dose
IEW . . . . . intelligence and electronic warfare
IFF . . . . . identification, friend or foe (radar)
IMC . . . . . instrument meteorological conditions
inf . . . . . infantry
int . . . . . intersection
INTG* . . . . . integrate
IP . . . . . initial point
IPB . . . . . intelligence preparation of the battlefield
IR . . . . . infrared

JAAT . . . . . joint air attack team
JP . . . . . jet petroleum

KIAS . . . . . knots indicated airspeed
km . . . . . kilometer
kt . . . . . knot

LAMPS . . . . . light airborne multipurpose system
LC . . . . . line of contact
LD . . . . . line of departure
ldr . . . . . leader
LLTR . . . . . low-level transit route
LMG . . . . . light machine gun
LO* . . . . . low
LOA . . . . . line of advance
LOAL . . . . . lock-on after launch
LOI . . . . . letter of instruction
LORAN-C . . . . . long range navigation-C series
LOS . . . . . line of sight
LRF/D . . . . . laser range finder/designator
lt . . . . . light
LZ . . . . . landing zone

m . . . . . meter
mech . . . . . mechanized
MEDEVAC . . . . . medical evacuation
METL . . . . . mission-essential task list
METT-T . . . . . mission, enemy, terrain, troops, and time available
MFD . . . . . multifunction display
MG . . . . . machine gun
min . . . . . minute
mm . . . . . millimeter
MMS . . . . . mast-mounted sight
MOPP . . . . . mission-oriented protective posture
MPLH . . . . . multipurpose light helicopter
MPSM . . . . . multipurpose submunition
MR . . . . . motorized rifle
MRD . . . . . motorized rifle division
MRR . . . . . minimum risk route

N . . . . . north
NAAK . . . . . nerve agent antidote kit
NATO . . . . . North Atlantic Treaty Organization
NAV ALN* . . . . . navigation alignment
NAV ALN VAR* . . navigation alignment variation
NAV UPD* . . . . . navigation update
NBC . . . . . nuclear, biological, chemical
NBCWRS . . . . . NBC warning and reporting system
NFOV . . . . . narrow field of view
NM . . . . . nautical mile
no . . . . . number
NOE . . . . . nap-of-the-earth
NTC . . . . . National Training Center
NVG . . . . . night vision goggles

obj . . . . . objective
OBS . . . . . optical boresight system
OD . . . . . outside dose
ODA . . . . . optical display assembly
off . . . . . officer
OH . . . . . observation helicopter
OP . . . . . observation post
OPLAN . . . . . operation plan
OPORD . . . . . operation order
OPSEC . . . . . operations security
OSET* . . . . . offset

PAC . . . . . personnel and administration center
PC . . . . . pilot in command
PD . . . . . performance degraded

PL . . . . . phase line
plt . . . . . platoon
PMC . . . . . partially mission capable
PNVS . . . . . pilot night vision system
POL . . . . . petroleum, oils and lubricants
pos . . . . . position
PP* . . . . . present position
PPT . . . . . prepoint
psi . . . . . pounds per square inch
PZ . . . . . pickup zone

QSTAG . . . . . Quadripartite Standardization Agreement

RD . . . . . road
RDF . . . . . rapid deployment force
RF . . . . . radio frequency
rkts . . . . . rockets
RL . . . . . readiness level
rng . . . . . range
ROA . . . . . restricted operations area
RPG . . . . . rocket-propelled grenade
RPK . . . . . (squad machine gun)

S . . . . . south
S1 . . . . . Adjutant (US Army)
S3 . . . . . Operations and Training Officer (US Army)
S4 . . . . . Supply Officer (US Army)
SAAFR . . . . . standard-use Army aircraft flight route
SALUTE . . . . . size, activity, location, unit, time, and equipment
SAM . . . . . surface-to-air missile
SCL SEL* . . . . . scale select
SE . . . . . southeast
SEAD . . . . . suppression of enemy air defense
SEMA . . . . . special electronic mission aircraft
sgt . . . . . sergeant
SHORAD . . . . . short-range air defense
SINCGARS . . . . single channel ground and air radio system
SMCT . . . . . soldier's manual of common tasks
SOP . . . . . standing operating procedure
STANAG . . . . . Standardization Agreement
STB . . . . . supertropical bleach
std . . . . . standard
STP . . . . . soldier training publication
STRIKWARN . . . friendly nuclear strike warning
SWT . . . . . scout-weapons team

T2 . . . . . tricothecene toxin
TAA . . . . . tactical assembly area
TAC(A) . . . . . tactical air coordinator (airborne)
TACAIR . . . . . tactical air
TACAN . . . . . tactical air navigation
TACFIRE . . . . . tactical fire
TACP . . . . . tactical air control party
TC . . . . . training circular
TD . . . . . tank division
TGT LOC* . . . . . target locate
TIS . . . . . thermal imaging sensor
TIS INTG* . . . . . thermal imaging sensor integrate
tk . . . . . tank
TM . . . . . technical manual
TOC . . . . . tactical operations center
TOD . . . . . Time of Day
TOE . . . . . table(s) of organization and equipment
TOW . . . . . tube-launched, optically tracked, wire-guided missile
TP . . . . . turn point
TR . . . . . tank regiment
TRADOC . . . . . United States Army Training and Doctrine Command
trp . . . . . troop
TTP . . . . . tactics, techniques, and procedures
TV . . . . . television
TVS . . . . . television sensor

UH . . . . . utility helicopter
UHF . . . . . ultra high frequency
US . . . . . United States (of America)
USAF . . . . . United States Air Force
UT . . . . . undemanding task
UTM . . . . . universal transverse mercator

VAR* . . . . . variation
VHF . . . . . very high frequency
VROC . . . . . vertical rate of climb
VSD . . . . . vertical situation display
VTR . . . . . video tape recorder

W . . . . . west
WFOV . . . . . wide field of view
WFZ . . . . . weapons-free zone
WH . . . . . white-hot
WO . . . . . warrant officer

XTK* . . . . . cross track

REFERENCES

Section I
REQUIRED PUBLICATIONS

Required publications are sources that users must read in order to understand or to comply with this publication.

ARMY REGULATIONS

95-1 . . . . . Aviation: Flight Regulations
385-10 . . . . . Army Safety Program

DA FORMS

1971-R . . . . . Radiological Data Sheet—Monitoring or Point Technique
1971-2-R . . . . . Chemical Data Sheet—Monitoring or Survey

FIELD MANUALS

1-100 . . . . . Doctrinal Principles for Army Aviation in Combat Operations
1-111 . . . . . Aviation Brigades
1-112 . . . . . Tactics, Techniques, and Procedures for the Attack Helicopter Battalion
1-114 . . . . . Tactics, Techniques, and Procedures for the Regimental Aviation Squadron
1-117 . . . . . Air Reconnaissance Squadron
1-301 . . . . . Aeromedical Training for Flight Personnel
3-3 . . . . . NBC Contamination Avoidance
3-4 . . . . . NBC Protection
3-5 . . . . . NBC Decontamination
3-8 . . . . . Chemical Reference Handbook
3-50 . . . . . Deliberate Smoke Operations
5-36 . . . . . Route Reconnaissance and Classification
6-20 . . . . . Fire Support in the AirLand Battle
8-9 . . . . . NATO Handbook on the Medical Aspects of NBC Defensive Operations
8-285 . . . . . Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries
17-95 . . . . . Cavalry Operations
21-11 . . . . . First Aid for Soldiers
100-2-1 . . . . . Soviet Army Operations and Tactics
100-2-2 . . . . . Soviet Army Specialized Warfare and Rear Area Support
100-2-3 . . . . . The Soviet Army Troops Organization and Equipment
100-5 . . . . . Operations
100-103 . . . . . Army Airspace Command and Control in a Combat Zone

Section II
RELATED PUBLICATIONS

Related publications are sources of additional information. They are not required in order to understand this publication.

DA FORM

2028 . . . . . Recommended Changes to Publications and Blank Forms

FIELD MANUALS

1-107 . . . . . Air-to-Air Combat

6-20-1(HTF) . . . . Division Artillery Cannon Battalion

6-20-1J . . . . . Field Artillery Battalion

6-20-2(HTF) . . . . Division Artillery, Field Artillery Brigade, and Field Artillery Section (Corps)

6-20-2J . . . . . Division Artillery, Field Artillery Brigade, and Corps Artillery Headquarters

6-30 . . . . . Observed Fire Procedures

21-10-1 . . . . . Unit Field Sanitation Team

GRAPHIC TRAINING AID

3-6-3 . . . . . NBC Warning and Reporting System

SOLDIER TRAINING PUBLICATION

21-1-SMCT . . . . Soldier's Manual of Common Tasks (Skill Level 1)

TECHNICAL MANUAL

3-4240-280-10 . . . Operator's Manual for Mask, Chemical-Biological: Aircraft, ABC-M24 and Accessories and Mask, Chemical-Biological Tank, M25A1 and Accessories

TRAINING CIRCULARS

1-210 . . . . . Aircrew Training Program: Commander's Guide

6-40A . . . . . Field Artillery Automated Cannon Gunnery

Section III
PROJECTED PUBLICATIONS

A projected publication is a source of information that is scheduled for printing but is not yet available. Upon print, it will be distributed automatically via penpoint distribution. It may not be obtained from US Army Publications Distribution Centers until indexed in DA Pamphlet 25-30.

FIELD MANUALS

1-107 . . . . . Air Combat Operations (Approved Final Draft, June 1989)

25-101 . . . . . Battle Focused Training (Approved Final Draft, April 1990)

90-21 . . . . . Multiservice Joint Air Attack Team Operations (approximate publication date, December 1990)

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This index is organized alphabetically by topics and subtopics. Topics and subtopics are identified by page numbers.

By Order of the Secretary of the Army:

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PIN: 060453-000