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FM 1-114

TACTICS, TECHNIQUES, AND PROCEDURES FOR THE REGIMENTAL AVIATION SQUADRON

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*****This publication supersedes FM 1-114, 27 August 1986.

PREFACE

The regimental aviation squadron is an organic element of the armored cavalry regiment. It is organized and equipped to perform reconnaissance and screening operations in support of the overall scheme of maneuver. In addition, the RAS plays a vital role in command and control enhancement for the ACR commander. Successful employment of this unit on the modern battlefield depends heavily on the proper use of the tenets of AirLand Battle by combined arms forces.

This publication describes the organizational structure of the RAS and its doctrinal and tactical employment on the modern battlefield. Appendixes A through F provide supplemental material on risk management, the threat, NBC operations, reports and orders, Kiowa Warrior employment, and unit movement. Techniques are briefly described to further explain the employment of the RAS. 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, 1-116, 1-117, 17-95, and 100-5. In accordance with the Concept Based Requirements System, this manual addresses the Army Aviation Mission Area Concept application to reconnaissance and security operations.

This publication applies to commanders and staffs who will lead, employ, or fight with a RAS 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 RAS.

The proponent of this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 directly to Commander, US Army Aviation Center, ATTN: ATZQ-DOT-DD, Fort Rucker, AL 36362-5263.

This publication implements the following international agreements:

STANAG	QSTAG	Air Std	Title
2003 (Edition Six)	502		Patrol Reports
2014 (Edition Five)	506		Operation Orders, Warning Orders, and Administrative/Logistics Orders
2019 (Edition Three)	509		Military Symbols for Land Based Systems-- APP-6
2020 (Edition Three)	510		Operational Situation Reports
2022 (Edition Seven)	511		Intelligence Reports
2041 (Edition Four)	520		Operation Orders, Tables and Graphs for Road Movement
2084 (Edition Five)	528		Handling and Reporting of Captured Enemy Equipment and Documents

2112 (Edition Three)			Radiological Survey
2398 (Edition One)			Friendly Chemical Attack Warning
2404 (Draft)			Joint Anti-Armour Operations
2904 (Edition One)	665		Airmobile Operations--ATP-41
3497 (Edition One)			Aeromedical Training of Aircrews in Aircrew NBC Equipment and Procedures
3805 (Edition Three)		45/6B	Doctrine and Procedures for Airspace Control in the Combat Zone--ATP-40

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

This publication has been reviewed for operations security considerations.

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CHAPTER 1
MISSION AND ROLES

This chapter implements portions of STANAG 2019.

This chapter addresses the mission and roles of the regimental aviation WS-squadron in AirLand Battle doctrine. It provides the RAS organizational structure within the armored cavalry regiment. Subsequent chapters discuss the actual employment of the RAS in detail. The RAS serves as one of the HUMINT-gathering assets of the ACR and the corps. It is the ACR commander's most critical HUMINT-gathering asset. The RAS collects and disseminates vital information that helps commanders "see" the battlefield.

1-1. AIRLAND BATTLE DOCTRINE

AirLand Battle doctrine is based on seizing and retaining the initiative and on employing aggressive and offensive actions to impose our will on the enemy. To use this concept successfully, the RAS must establish a close working relationship between air and land forces. As one of the HUMINT-gathering assets of the regiment or corps, the RAS plays a vital role in AirLand Battle. With the RAS, the ACR commander is more able to capitalize on the use of initiative, depth, agility, and synchronization.

a. 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 RAS allow the ACR 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.

b. Depth. Depth refers to time, distance, and resources. 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 fire and maneuver to destroy, disrupt, or delay the enemy. Commanders also need adequate space for force disposition, maneuver, and dispersion. Additionally, commanders must see the whole battlefield. The RAS provides the reconnaissance and screening capabilities to meet these requirements.

c. Agility. Agility--the ability of friendly forces to act faster than the enemy--is the first prerequisite for seizing and holding the initiative. Agility requires flexible organizations and quick-minded, flexible leaders. Leaders 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 sufficiently agile, leaders must continuously conduct intelligence preparation of the battlefield. They must use the information provided by the RAS, as well as other intelligence-gathering assets; decide on a course of action quickly; and act immediately.

d. Synchronization. Synchronized operations achieve maximum combat power. These coordinated actions are the result of a prevailing unity of effort. Synchronized, violent execution is the essence of decisive combat. The commander can increase synchronization when he has explicit knowledge of friendly and enemy forces--their disposition, strengths, weaknesses, and intentions. The RAS provides 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 forces complement and reinforce each other, magnifying their individual effects. Not only must the RAS synchronize with the ACR commander's scheme of maneuver, but the troops within the RAS must also synchronize with each other. This synchronization facilitates forceful and rapid operations to achieve, at least, local surprise and shock effect. The RAS commander, like his superiors, must make specific provisions in advance to exploit the opportunities created by tactical success.

1-2. MISSION

The primary mission of the RAS is to conduct reconnaissance and screening operations. When appropriately task-organized, the RAS may participate in other security missions. The squadron performs air combat to protect the overall force or organic units as part of the Army's air defense effort. It assists in command, control, communication, and intelligence enhancement throughout the ACR. The RAS may conduct attack missions with its organic attack helicopter troops. Its assault helicopter troop may conduct assault helicopter operations in support of the ACR. The RAS may also participate in special-purpose operations such as passage of lines, river crossing, and retrograde.

1-3 . ORGANIZATION

a. The RAS is organic to each ACR. The ACR is a self-contained force from which the RAS can draw combat support and combat service support. The RAS greatly contributes to the HUMINT collection efforts of the ACR. Figure 1-1 shows the organization of the ACR.

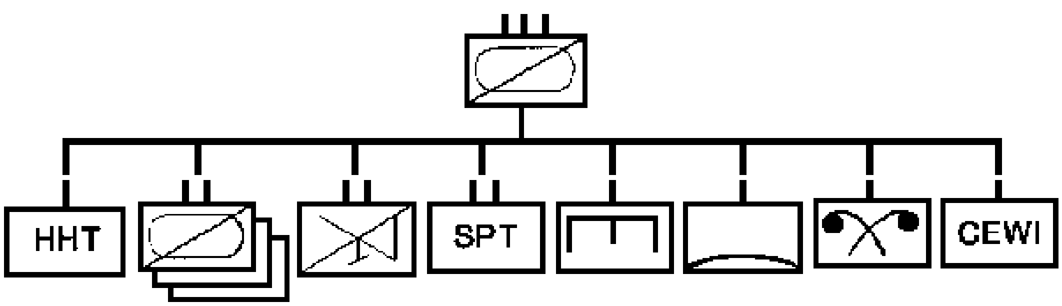


Figure 1-1. Organization of the ACR.

b. The RAS has a headquarters and headquarters troop, three air cavalry troops, two attack helicopter troops, an assault helicopter troop, and an AVUM troop. Figure 1-2 shows the organization of the RAS.

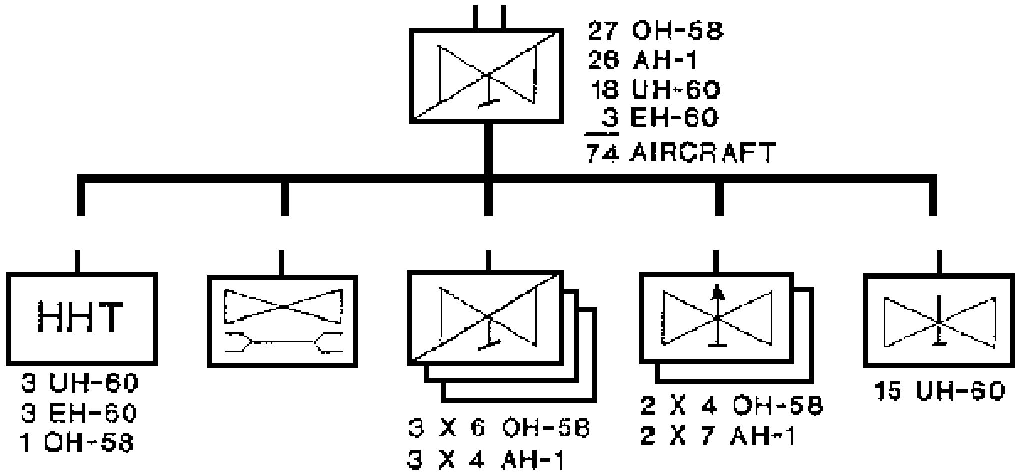


Figure 1-2. Organization of the RAS.

(1) Headquarters and headquarters troop. The HHT provides command and control and staff planning for the RAS. The squadron headquarters consists of the commander and his coordinating staff. The headquarters troop consists of a headquarters, a troop supply section, an automotive maintenance section, a consolidated mess section, a medical treatment squad, a Class III/ V platoon, a command aviation platoon, a unit ministry team, and a communications platoon. A separate CEWI flight platoon provides the ACR's CEWI company with its aerial SIGINT asset. Figure 1-3 shows the organization of the HHT.

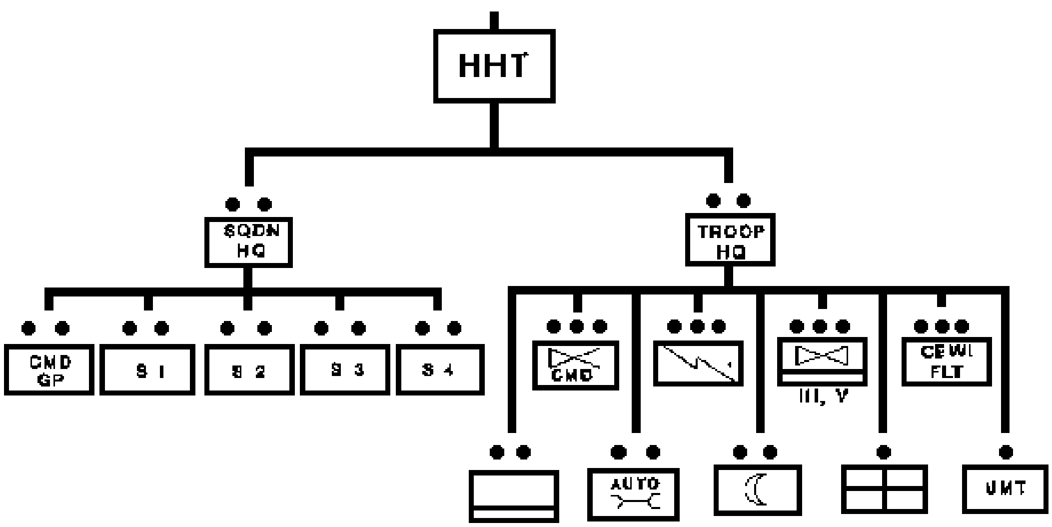


Figure 1-3. Organization of the HHT.

(2) Air cavalry troop.

(a) Each ACT consists of a troop headquarters, an aeroscout platoon, and an attack helicopter platoon. The aeroscout platoon has six OH-58s, and the attack helicopter platoon has four AH-1s. Figure 1-4 shows the organization of the ACT.

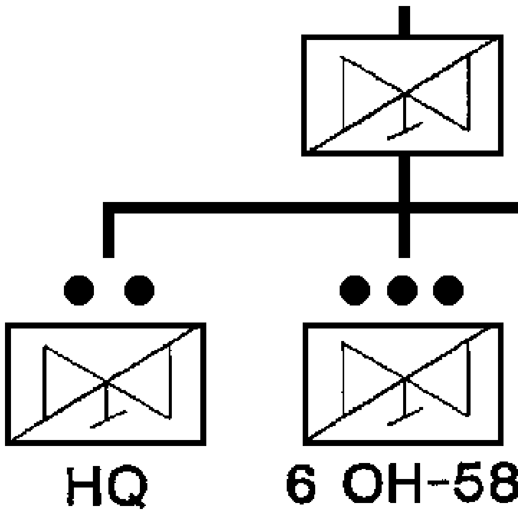


Figure 1-4. Organization of the ACT.

(b) The ACTs comprise the reconnaissance elements of the RAS. They detect, identify, locate, and report enemy forces. The aeroscouts are the "eyes and ears" of the commander. They can cover wide frontages and add depth to the battle area. Aeroscouts can also rapidly report information about the tactical situation to provide real-time intelligence to the ACR commander. The attack helicopters primarily provide suppressive and protective fires for the aeroscouts, enhancing the survivability of the entire team. As the situation develops, ACT attack helicopters can be used in an antiarmor role. FM 1-116 specifically discusses employment of the air cavalry/reconnaissance troop.

(3) Attack helicopter troop.

(a) Each ATKHT consists of a troop headquarters, an attack helicopter platoon, and an aeroscout platoon. The attack helicopter platoon has seven AH-1s; the aeroscout platoon has four OH-58s. Figure 1-5 shows the organization of the ATKHT.

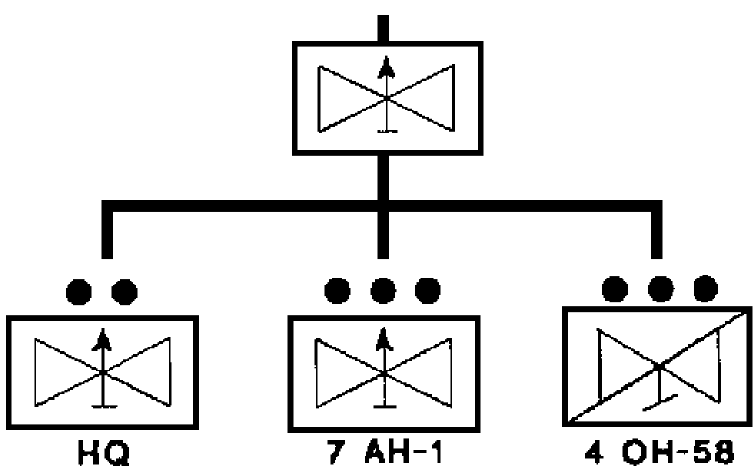


Figure 1-5. Organization of the ATKHT.

(b) The ATKHTs are the primary antiarmor forces of the RAS. They can fix and destroy limited enemy penetrations, exploit success, and provide long-range direct antiarmor fires. Although the ATKHTs have fewer scouts than the ACTs, they can perform reconnaissance and screening missions much like the ACTs can perform in the antitank role. Attack helicopter troops are employed the same as the attack helicopter companies discussed in FM 1-112.

(4) Assault helicopter troop.

(a) The AHT consists of a troop headquarters and three combat support aviation platoons. Each platoon has five UH-60s. Figure 1-6 shows the organization of the AHT.

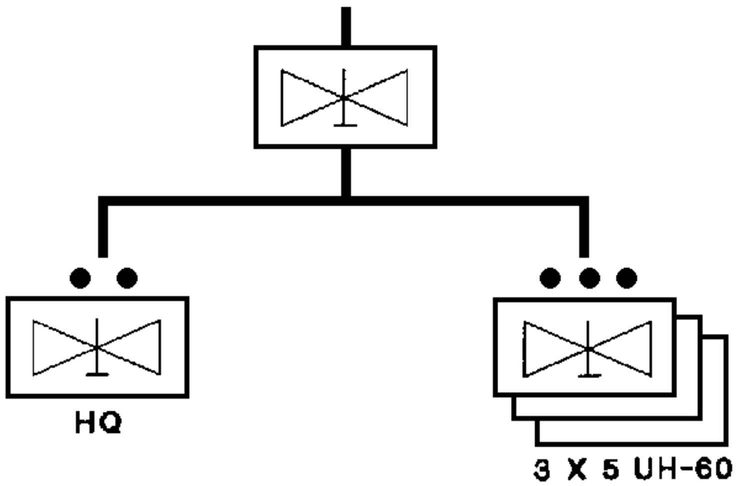


Figure 1-6. Organization of the AHT.

(b) The AHT provides the ACR and the RAS with combat support and combat service support by moving troops, supplies, and equipment within the combat zone. It may conduct air assault operations with one dismounted mechanized infantry company and may augment aeromedical evacuation efforts. In addition, the AHT provides UH-60 aircraft for command, control, and liaison as required by the ACR commander. It also allows the ACR and RAS commanders to support their own extensive Class III and V requirements. The AHT is employed the same as the assault helicopter companies discussed in FM 1-113.

(5) Aviation unit maintenance troop. The AVUM troop consists of a troop headquarters, a quality assurance section, an aircraft maintenance platoon, and an aircraft component repair platoon. The AVUM troop provides AVUM support for organic squadron aircraft. Figure 1-7 shows the organization of the AVUM troop. The aviation maintenance companies assigned to the COSCOM AVIM battalion provide aviation intermediate maintenance support for the squadron.

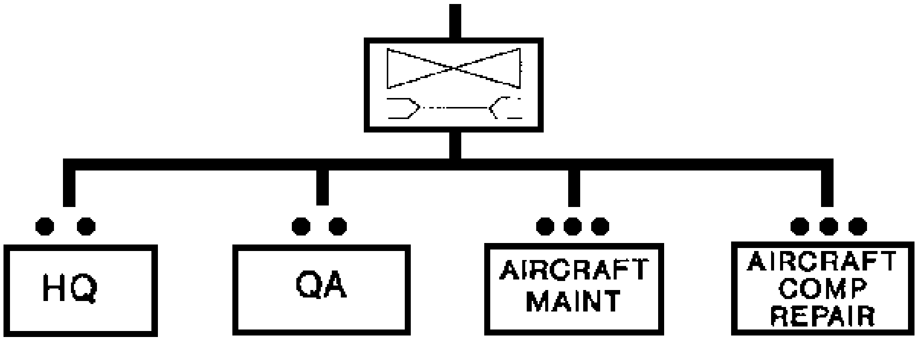


Figure 1-7. Organization of the AVUM troop.

1-4. CAPABILITIES AND LIMITATIONS

a. Capabilities. The RAS possesses many strengths which must be clearly understood for their effects to be maximized. The capabilities of the RAS include--

(1) Providing reconnaissance (route, zone, and area) during daylight and nighttime hours.

(2) Enhancing the command, control, communication, and intelligence process.

(3) Providing security (screen, guard [when task-organized]) during daylight and nighttime hours.

(4) Reacting quickly across a wide front to provide additional firepower to ground squadrons, if required.

(5) Moving tactical forces quickly over great distances during close, deep, and rear operations.

(6) Conducting aerial resupply for the ACR.

(7) Conducting lines of communication surveillance.

(8) Providing target acquisition for field artillery, attack helicopters, and tactical air support assets.

b. Limitations. The squadron's weaknesses also must be clearly understood to prevent an offset of its strengths. The limitations of the RAS include--

(1) Inability to operate in adverse weather or under zero visibility conditions.

(2) Limited reconnaissance and screening capability at night unless equipped with the OH-58D.

(3) Limited capability to operate in an NBC environment.

(4) Limited capability to adequately secure unit assembly areas against a Level I threat and little to no capability to secure against a Level II threat.

(5) Consumption of large volumes of Class III (and frequently Class V) supplies.

(6) Requirement for augmentation to perform security missions other than screening operations.

(7) Inability to transport in one trip 100 percent (required) of the assigned TOE and basic load with organic vehicles and aircraft.

CHAPTER 2
COMMAND, CONTROL, AND COMMUNICATIONS

This chapter implements portions of STANAGs 2014 and 2019.

This chapter describes the command, control, and communications of the regimental aviation squadron. It also describes the command and control process and command and staff responsibilities. Regimental commanders must operate with forces spread laterally and in depth throughout the battlefield. Normally, the RAS's area of operations and interest coincides with that of its parent regiment or corps. Coordination at all levels and between ground and air units is critical to the success of the mission.

2-1. COMMAND AND CONTROL PROCESS

At any level of command, the C^2 system provides the commander with the structure and means to make and convey decisions and to evaluate them continuously. The decisions and higher-level intent are then translated into productive actions. The decisions are based on the information derived from the C^2 process, which consists of the following four steps:

- Acquire information.
- Assess whether any new actions are required.
- Determine what these actions should be.
- Direct subordinates to take appropriate actions.

Commanders must continuously carry out the decision-making cycle. To assist the commander in doing this, subordinate reconnaissance elements must provide the commander with timely, accurate information about enemy dispositions and actions. The commander must get inside the enemy's decision cycle if he is to shape the battlefield to his own advantage. Planning, conducting, and sustaining the mission at the squadron level are critical in providing effective intelligence feedback to the parent unit commander. The RAS commander, his staff, and the troop commanders are responsible for detailed mission planning and coordination as well as troop-leading procedures. The squadron commander uses an eight-step process to develop and issue instructions for accomplishing the mission. Table 2-1 shows the correlation between the C^2 process and the mission-planning process. An explanation of the eight steps in the mission-planning process follows the table.

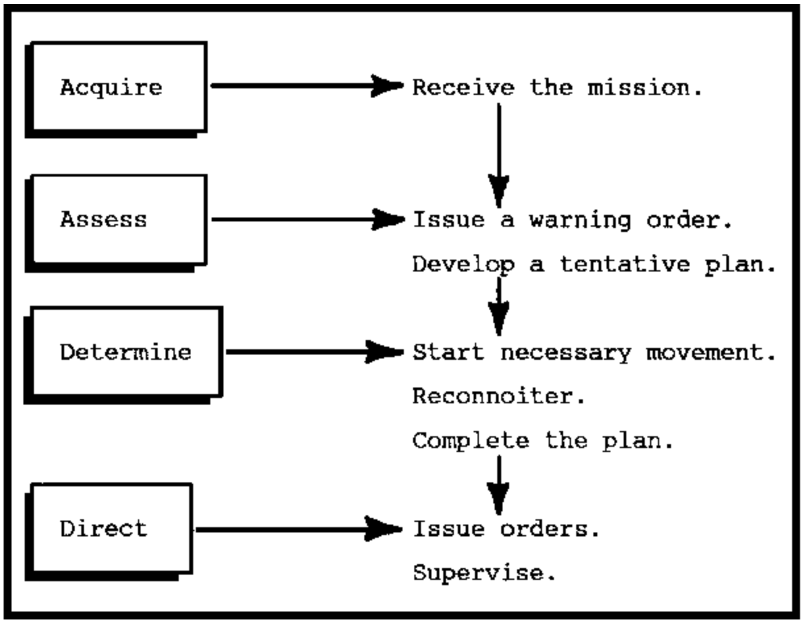


Table 2-1. Correlation between the C^2 process and the mission-planning process.

a. Step 1--Receive the Mission. The squadron commander receives the mission orally or in writing in the form of a FRAGO or an OPORD. After analyzing the issuing commander's intent, the RAS commander begins planning for the mission. The time between the receipt of the mission and the execution of the mission is the available planning time. Normally, the squadron commander will use no more than one-third of the available planning time. He allocates the remaining two-thirds to the troops for planning their portions of the mission. Parallel planning is used when adequate time is not available.

b. Step 2--Issue a Warning Order. After analyzing the mission, the RAS commander identifies those specified and implied tasks that the unit must do to accomplish the mission. The items found in paragraph 3 of the OPORD and those that are detailed by the commander's guidance are specified tasks. Tasks required to accomplish the mission but not addressed specifically are implied tasks. The RAS commander uses these essential tasks to restate the squadron's mission. He then issues a warning order to his subordinates to allow them the maximum time for planning. The amount of detail provided in the warning order is of little importance when compared to the planning time made available to subordinates. Early stages of planning are usually hindered by brief, sketchy situation outlines that are further developed and improved with time. Providing any amount of information, however sketchy, as soon as possible to subordinate units is important to completing the mission Waiting until the situation develops fully to issue a formal, detailed warning order may be too late. If the troop commanders have only the grid coordinates for lateral boundaries or FEBA intersections and the objective, they can begin their terrain analysis, route selection, and fire support planning The commander can issue subsequent warning orders to keep subordinates informed if the initial warning order does not include all required and desired information. Preliminary planning can begin with a general location of the area of operations, a vague mission statement, and a not-later-than time for crossing the LD or LC. The warning order should include a brief discussion of the situation, the time of the operation, and the specific missions of subordinate units. It should also include the time and place the complete order will be issued.

c. <u>Step 3--Develop a Tentative Plan</u>. The RAS commander and his staff use the reverse planning sequence in developing the tentative plan. They base the plan on the factors of METT-T and address several considerations. Some considerations for each factor follow.

(1) Mission.

(a) Degree of risk.

(b) Scheme of maneuver.

(c) Subsequent missions.

(d) Implied tasks for mission accomplishment.

(e) Specified tasks for mission accomplishment.

(f) Intent of the regimental or corps commander.

(2) Enemy.

(a) Strengths and weaknesses.

(b) Probable courses of action.

(c) Location of follow-on forces.

(d) Electronic warfare and NBC capabilities.

(e) Size, location, strength, composition, and equipment.

(3) Terrain.

(a) Obstacles.

(b) Light data.

(c) Key terrain.

(d) Weather forecast.

(e) Avenues of approach.

(f) Movement techniques.

(g) Cover and concealment.

(h) Battlefield obscuration.

(i) Airspace command and control.

(4) Troops.

(a) Positioning.

(b) Mutual support.

(c) Task organization.

(d) Logistical support.

(e) Troop crew-endurance factors.

(f) Aircraft, vehicle, and fire support availability.

(5) Time available.

(a) Preparation.

(b) Coordination.

(c) Reconnaissance.

(d) Logistical support.

d. Step 4--Start Necessary Movement. The order to prepare for movement is issued as soon as possible. Movement requires the preparation of personnel and equipment to relocate from one assembly area to another. The move may have to be accomplished with limited resources. A well-written unit SOP for movement will facilitate a successful move. Movement of aircraft throughout the regiment to support other ground forces may require coordination with AD, FA, and USAF assets. Therefore, early notification of and preparation for a move are critical.

e. Step 5--Reconnoiter. The commander must use every possible source of information to see the battlefield. These sources include friendly and enemy intelligence, weather data, and previous combat activity in the area. Limited time, however, may permit only a map reconnaissance.

f. Step 6--Complete the Plan. After completing his estimate and analyzing the information obtained from the reconnaissance, the RAS commander, along with his staff, refines the tentative plan. The commander reviews his concept and identifies subordinate unit tasks. Other considerations for the plan include C^3I, task organization for combat, munition and fuel loads, maneuver and control graphics, and CS and CS requirements and availability.

g. Step 7--Issue Orders. The RAS commander usually issues orders using the FRAGO format or, if time permits, the five-paragraph OPORD format. If time or environmental constraints preclude the commander's issuing the order to all of his assigned officers, he usually issues the order only to a select "orders group." As a minimum, this group consists of the squadron XO, the coordinating staff, and the troop commanders. If the unit is moving or is involved in an operation, the commander may issue his order over the radio or by messenger using secure means.

h. Step 8--Supervise. Supervision is a continuous process. Once the operation is under way, the commander, his staff, and subordinate commanders ensure that the plan is followed. Together, these individuals make sure that the issuing commander's intent is carried out. As the situation develops, the RAS commander issues FRAGOs to modify or refine the operation.

2-2. COMMANDER'S ESTIMATE

The commander's estimate is the product of the commander's experience and personal evaluation of how his units can accomplish the mission. After evaluating METT-T and other relevant factors, the commander reaches a decision. He bases his estimate on personal knowledge of the situation, ethical considerations, and staff estimates. The commander and his staff consider all key factors in the problem-solving process. FM 101-5 describes the commander's estimate in detail.

2-3. COMMANDER'S CONCEPT

After the commander chooses a course of action, he formulates his concept. The commander's concept specifies and assigns tasks and missions to subordinate units, task-organizes as needed, sets priorities, and allocates support. A mission order is usually used to issue the commander's concept. The order should clearly state the task to be accomplished, allocate resources needed to accomplish the task, and point out limits or controlling factors for coordinating the outcome.

2-4. STAFF RESPONSIBILITIES

a. The squadron commander operates forward where he can better monitor the battle area and make timely decisions. Regardless of his location, the commander follows the enemy situation based on real-time information and communications with his subordinate commanders. The commander must monitor both the tactical and logistical needs of each of his troops. He should strive to ensure that subordinates thoroughly understand his intentions so that in his absence the senior officer present can make accurate decisions to accomplish the mission. For this reason, the commander must give his staff the flexibility and latitude to make quick decisions in response to rapidly changing situations on the battlefield. However, the commander's staff must be well schooled in understanding the commander's intent and concept of operations.

b. The squadron staff consists of those personnel required to plan, supervise, and support squadron tactical operations. The staff synchronizes maneuver, CS, and CSS operations to ensure total integration of all assets in support of the commander's concept. The duties and responsibilities of the staff members, detailed in FM 101-5, are similar to those of their counterparts on the regimental or corps staff.

c. To reduce the demands on the commander's time, the squadron staff obtains and provides information, anticipates the situation, makes recommendations, supervises the execution of orders, and coordinates operations. The responsibilities of key personnel must be carefully defined in the unit SOP to preclude overlaps and to ensure that all functions are supervised adequately. Delays in receiving or disseminating critical information will affect the entire regiment or corps. The staff must identify key indicators and deliver quick and accurate reports to the squadron commander. Although the staff estimate may be informal at this level, it must address battlefield activity, project courses of action, and predict results as accurately as possible. Careful intelligence preparation of the battlefield, selection of the most important enemy indicators, and development of contingency plans facilitate the estimates and allow for timely response. The key individual in this process is the XO; in this capacity, he serves as the chief of staff. Tactical operations dictate how the squadron commander uses his staff. Each staff officer has a responsibility not only to assist the squadron commander but also to assist the troop commanders in the execution of their missions.

2-5. COMMAND AND CONTROL FACILITIES

The RAS commander organizes his staff sections so that they can acquire and assess critical information and determine and address those actions required to command and control combat operations. He normally organizes the C^2 elements into a TOC and a rear CP and designates an alternate CP. A tactical CP is integrated into the planning phase and employed when required. In the unit SOP, the commander should outline procedures for establishing successive locations for C^2 posts. Other C^2 facilities include FARPs and forward and rear assembly areas. Figure 2-1 shows typical locations of CPs, FARPs, and assembly areas.

a. Tactical Command Post.

(1) The tactical CP is an extension of the TOC. It is located well forward on the battlefield,

enabling the commander to be near the subordinate units and to influence the battle directly. The forward location of the tactical CP must be coordinated through the ground unit commander responsible for the area. With a tactical CP close to the battle, the commander can establish face-to-face contact with subordinate commanders. This contact enhances the leadership climate of a unit by demonstrating that the commander is sharing the hazards of the battlefield with his troops.

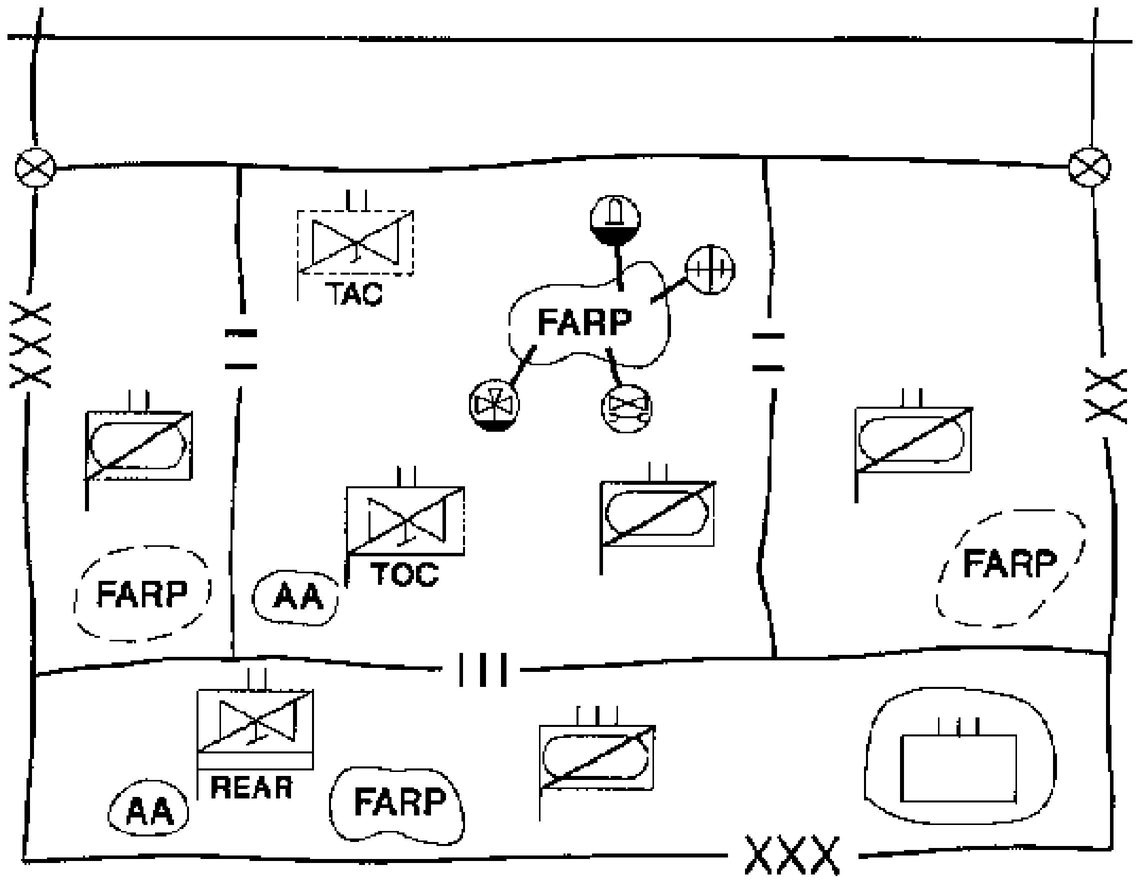


Figure 2-1. Typical locations of CPs, FARPs and forward and rear AAs.

(2) The tactical CP cannot operate continuously because of personnel and equipment limitations. Therefore, it is usually employed only during critical operations. The tactical CP is limited in physical size and electronic signature and can displace rapidly and frequently. Movement of the tactical CP is dictated by the flow of the operation and the desires of the commander. The tactical CP is composed of required personnel from the S2 and S3 sections and is normally the responsibility of the commander or S3. An FSO, a TACP, and ATS assets may also be located at the tactical CP. A standard arrangement of the tactical CP-may be stated in the unit SOP. The tactical CP may include aircraft (OH-58, UH-60) or ground vehicles. An example of a tactical CP configuration is shown in Figure 2-2.

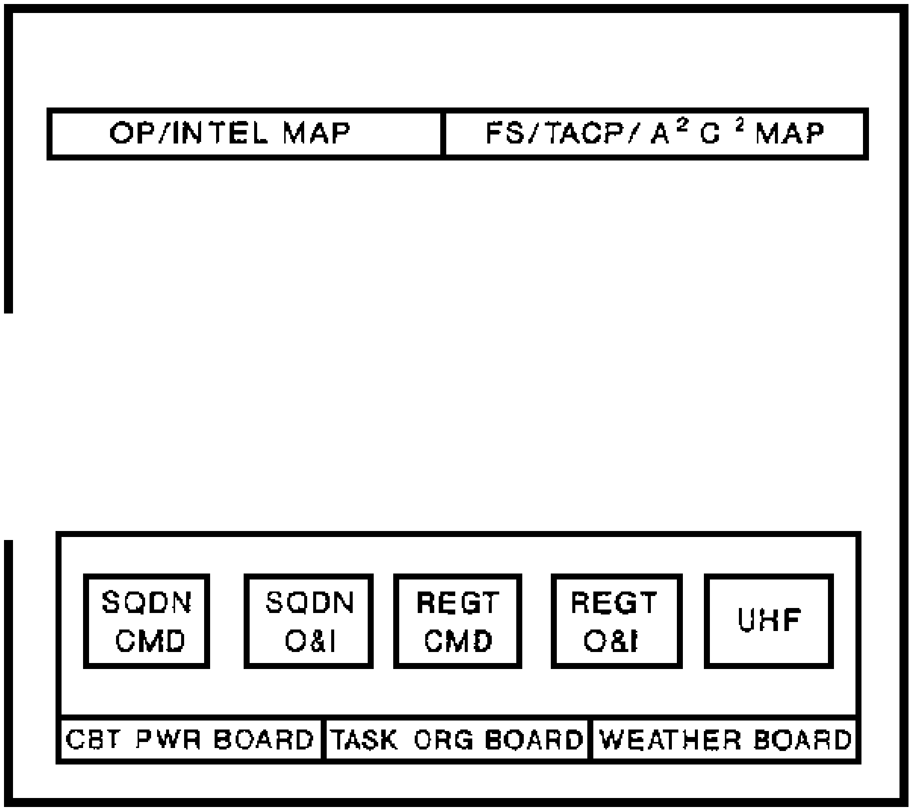


Figure 2-2. Example of a tactical CP configuration.

(3) The tactical CP must maintain communications with forward elements, the TOC, and higher headquarters at all times. The normal mode of communications at the tactical CP is FM(S). The tactical CP assists the commander in controlling current operations. Tactical CP personnel--

- Control maneuver forces.
- Coordinate JAAT operations.
- Coordinate Army airspace command and control.
- Analyze information for immediate intelligence.
- Control and coordinate immediately available fire support.
- Communicate CSS requirements (Classes III and V) to the TOC.
- Coordinate with adjacent units and forward air defense elements.
- Develop combat intelligence of immediate interest to the commander.

b. <u>Tactical Operations Center</u>.

(1) The TOC is the primary command and control structure for the RAS. It consists of those staff personnel required to conduct continuous current operations and to plan future operations. The squadron S3 normally supervises the TOC. The tactical situation may require the squadron XO to supervise the TOC when the commander and S3 are at the tactical CP. The TOC includes the S2 and S3 sections,

communications platoon elements, the FSE, and TACP elements. The TOC monitors operations around the clock and exercises command and control of the current operation when a tactical CP is not employed. When not operating from the tactical CP or his aircraft, the commander is normally at the TOC. The TOC displaces in either a phased movement or a single movement. The latter method is possible when a full-time tactical CP is employed. Communications with higher headquarters must be maintained at all times. The TOC functions to sustain operations and will plan the battle when the tactical CP is not employed. In addition, TOC personnel--

- Plan for future operations.
- Collate information for the commander.
- Provide reports to higher headquarters.
- Coordinate with higher and adjacent units.
- Coordinate Army airspace command and control.
- Analyze information for immediate intelligence.
- Acquire CS and CSS and coordinate their functions.
- Coordinate requirements for protection of rear operations.
- Coordinate and direct CS and CSS functions with the tactical and rear CPs to ensure that forward operating elements sustain operations.

(2) The S3 selects the site for the TOC considering the factors of METT-T and recommendations from the HHT commander and signal officer. This location must allow good communications with higher headquarters, subordinate troops, and supported units. The TOC should be near suitable vehicular routes. It should also be out of the range of enemy medium artillery and away from prominent terrain features that the enemy could use as target reference points. The TOC must be able to relocate frequently and operate with minimal electronic signature for extended periods. It must be well camouflaged to enhance survivability. An example of a TOC configuration is shown in Figure 2-3.

c. Alternate and Rear Command Posts, Assembly Areas, and FARPs.

(1) The RAS commander may designate an alternate CP to ensure continuity of operations during displacements or in case of serious damage to the TOC. The alternate CP may be the administrative and logistics center, the tactical CP, or a subordinate troop headquarters. Provisions for an alternate headquarters are normally established in unit SOPs.

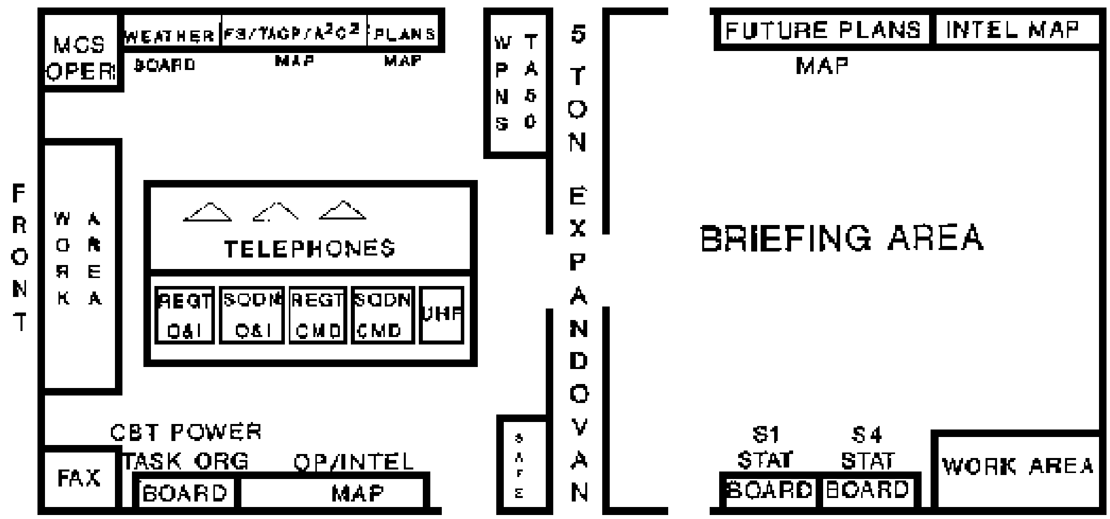


Figure 2-3. Example of a TOC configuration.

(2) The rear CP, located with the squadron field trains (rear assembly area), provides the CS and CSS required to sustain the squadron. It may be located in the regimental support area, the corps support area, or another area where major organizational support facilities are located. The squadron S1 and S4 sections operate from this area and coordinate all required support with the TOC. The ranking or otherwise designated individual, normally the squadron S4 or S1, is the rear CP commander. The squadron XO monitors the operations of the rear area. An example of a rear CP configuration is shown in Figure 2-4.

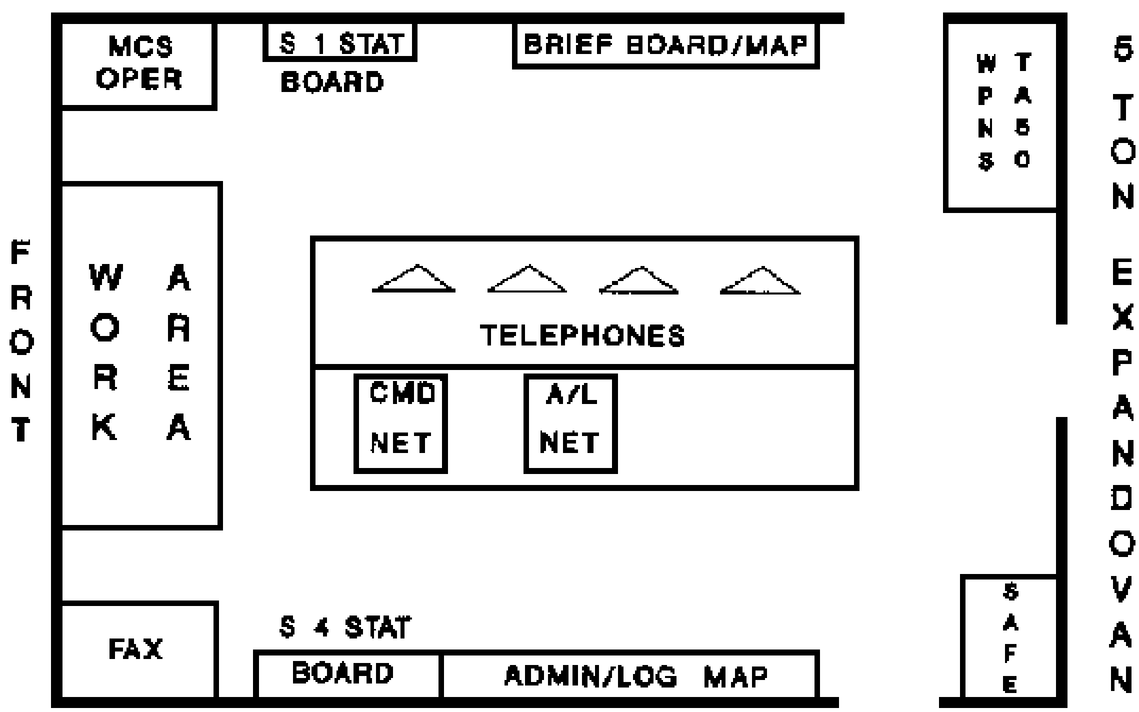


Figure 2-4. Example of a rear CP configuration.

(3) The three air cavalry troops and two attack helicopter troops of the RAS are located near the TOC in a loosely dispersed assembly area. This arrangement allows rapid reaction to

mission requirements and provides limited security for the TOC. An example of an assembly area configuration is shown in Figure 2-5. The squadron administrative and logistics center serves as the rear CP and consists of HHT support elements, the assault helicopter troop, and the AVUM troop. These elements compose the squadron field trains and are disposed to the rear of the TOC. Although its actual location depends on METT-T, the rear CP is usually collocated with a higher support area. Under some circumstances, the RAS HHT commander can control the squadron field trains and rear CP.

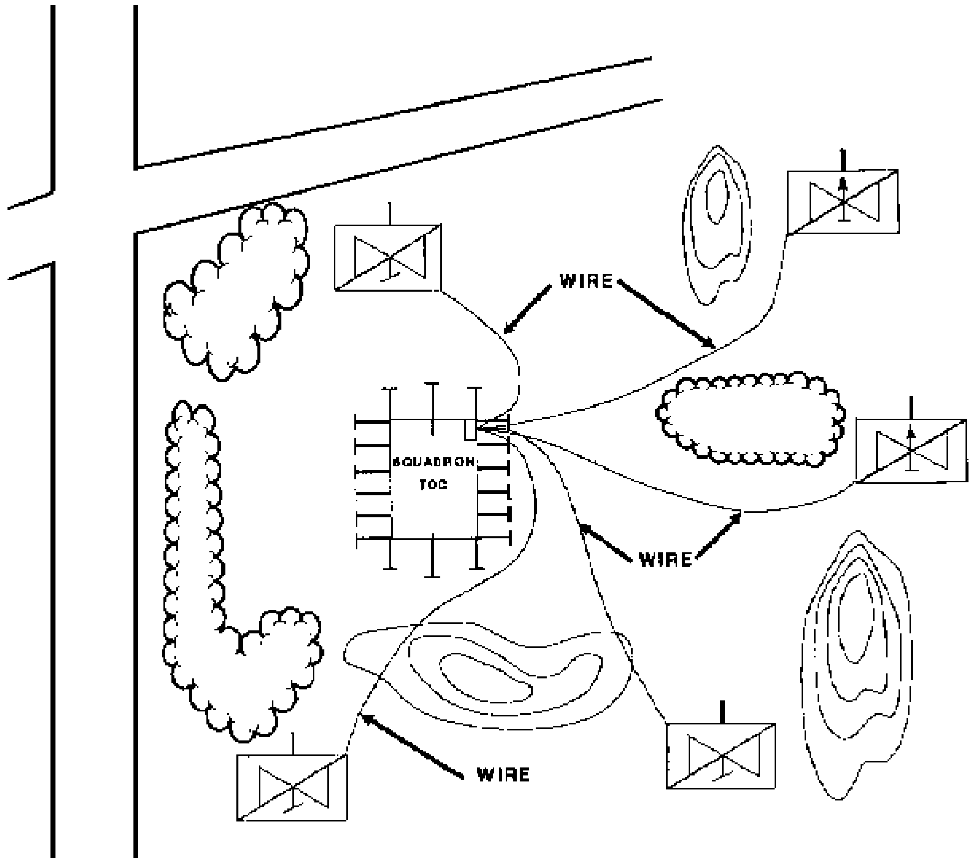


Figure 2-5. Example of an assembly area configuration.

(4) The HHT, along with the AHT, establishes FARPs in forward assembly areas to support combat operations. The location of the FARPs also depends on METT-T. The squadron XO is responsible for coordinating the location, status, and displacement of the FARPs. Normally, the FARPs consist of Class III/V support, maintenance support, and medical teams. FM 1-104 discusses FARPs in detail.

2-6. COMMUNICATIONS

a. Communications are essential to the accomplishment of the RAS's mission. The primary means of communications within the squadron is FM(S) radio. Aircraft UHF and VHF radios may help reduce the load on FM radios. The RAS commander normally communicates from his

OH-58 aircraft on the regimental command net and on the RAS or ACR intelligence net by FM(S) radio. When his aircraft is airborne, the commander may direct his troop commanders on FM(S), UHF, or VHF radio. The HHT and AVUM troop commanders are required to communicate on two separate FM nets: the command net and the administrative and logistics net. Therefore, the squadron commander may communicate with the HHT or AVUM troop commander on either of those FM nets.

b. The RAS has a limited wire-laying capability. When possible, the squadron establishes an internal wire communications network at the TOC and the rear CP. At the TOC, an internal wire communications network integrates the cavalry and attack helicopter troops and the TOC elements, as shown in Figure 2-6. Because ACTs and the TOC move frequently, they will rarely establish wire communications. However, the rear CP will normally establish an internal wire communications network, as shown in Figure 2-7.

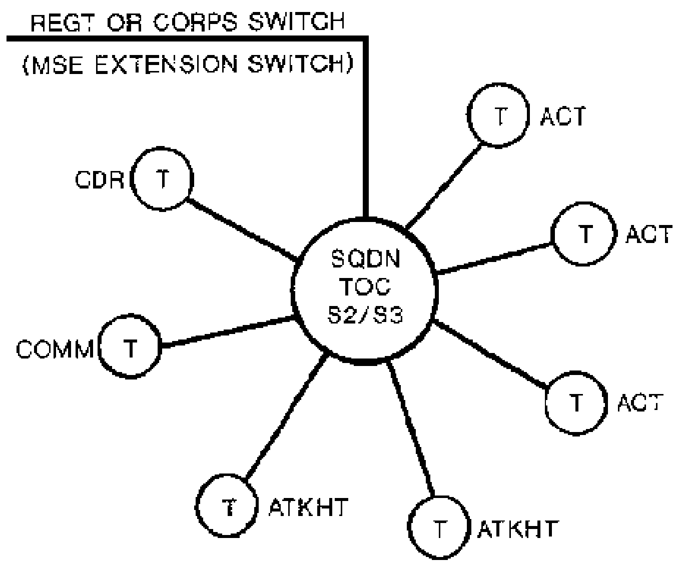


Figure 2-6. Internal wire communications network at the TOC.

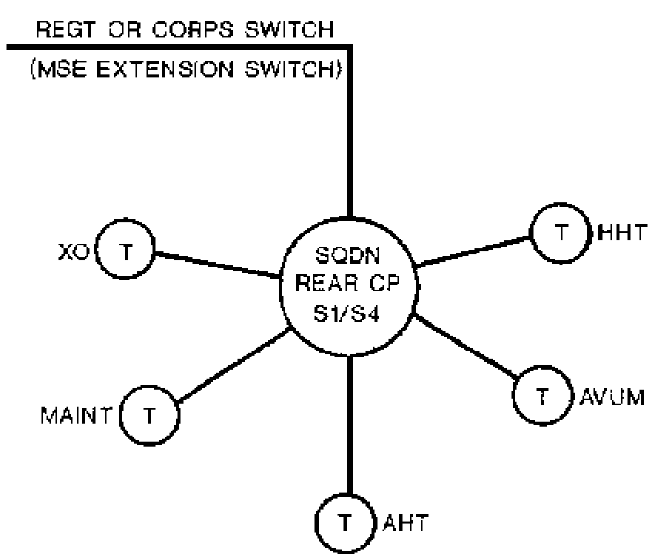


Figure 2-7. Internal wire communications network at the rear CP.

c. Internal radio nets for the RAS are established and maintained primarily with FM(S), UHF, and VHF radios. Normally, RAS personnel use FM(S) radio for air-to-ground and ground-to-air communications and FM(S), UHF, or VHF or all three radios for air-to-air communications. The squadron commander usually communicates with his troop commanders on the squadron command net, which is FM(S). Likewise, troop commanders operate their troop command nets using FM(S). Troop commanders may also operate another FM(S) radio, if available, for the squadron O&I net. For air-to-air operations, the commander may use UHF and VHF radios as well as the FM(S) radio to communicate with subordinate air elements. UHF and VHF radios are also used as backups for the FM(S) radio. The TOC uses the FM(S) radio to communicate with FARP elements and the squadron trains through the squadron administrative and logistics net. Figure 2-8 illustrates the RAS's internal radio nets.

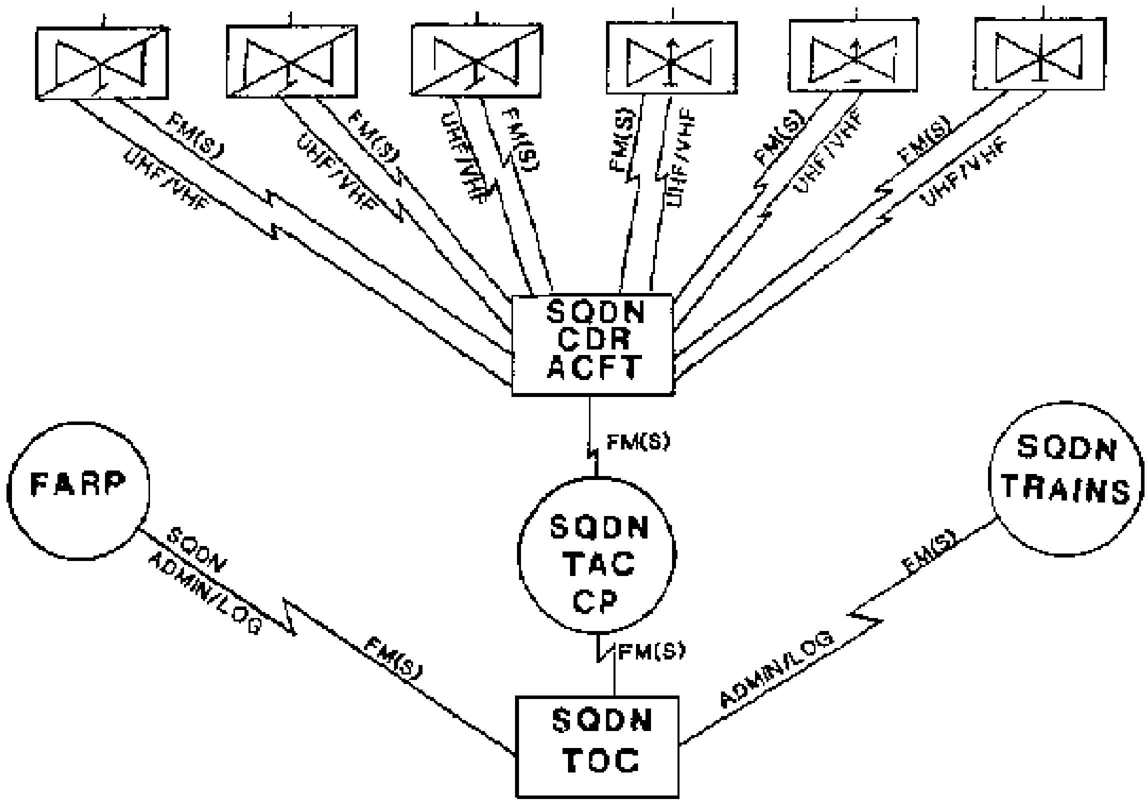


Figure 2-8. RAS internal radio nets.

d. The RAS is normally employed by the regimental commander. The squadron TOC is primarily responsible for maintaining communications with adjacent and subordinate units. When deployed, the squadron tactical CP may communicate directly with these units. If the situation or terrain prohibits direct contact by the tactical CP, the TOC may act as a communications relay. When his aircraft is airborne, the squadron commander may communicate directly with higher headquarters, adjacent units, and subordinate elements. Again, the primary means of communication is FM(S) radio. The TOC, tactical CP (if deployed), and squadron commander normally operate command and O&I nets with higher headquarters. RATT and HF radios are also used for communications with higher headquarters. Other external radio nets may be established with supporting elements such as field artillery, A^2C^2, and forces participating in JAAT operations. Figure 2-9 illustrates the external radio nets required of the

RAS.

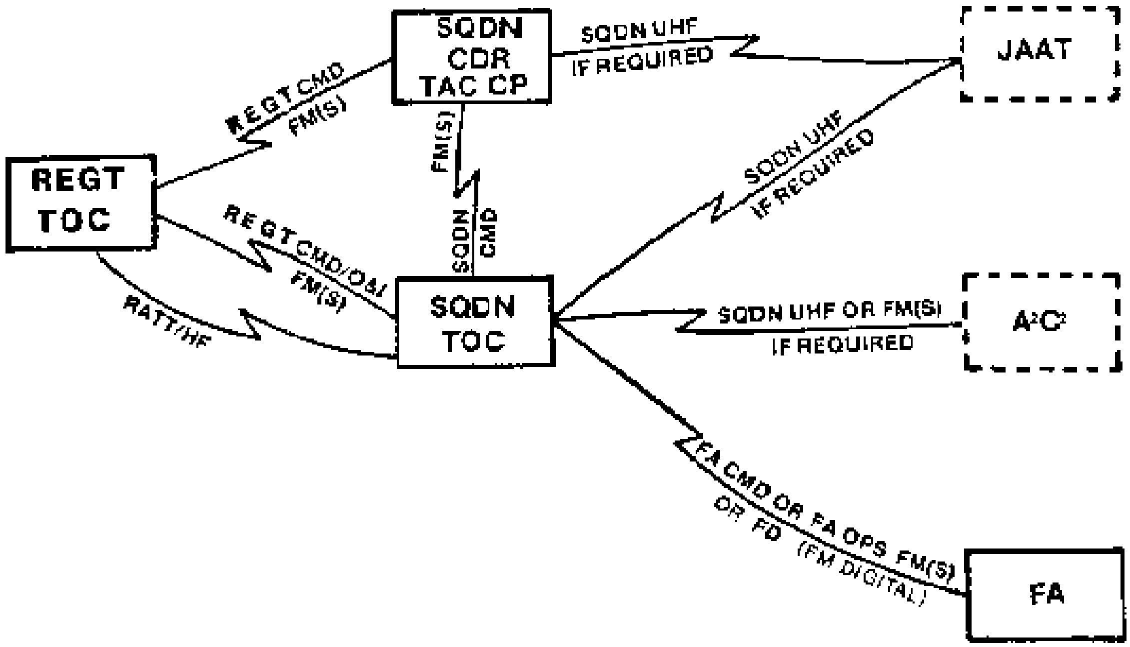


Figure 2-9. RAS external radio nets.

e. The mobile subscriber equipment system is the area common-user voice communications system in the corps area of operations. It is the backbone of the corps communications system and provides voice and data communications from the corps rear boundary forward to the division maneuver battalions' main CP. This includes the RAS. The MSE integrates the functions of transmission, switching, control, communications security, and terminal equipment (voice and data) into one system. This equipment provides the user with a switched telecommunications system extended by mobile radiotelephone and wire access. Users can communicate throughout the battlefield in either a mobile or static situation. The MSE consists of five functional areas: area coverage, wire subscriber access, mobile subscriber access, subscriber terminals, and system control.

(1) The corps MSE system typically covers an area of 37,500 square kilometers (15,000 square miles). Node centers make up the backbone of the system and provide connectivity to extension switches and radio access units. Extension switches allow wire line terminal subscribers (telephone, facsimile, and data) of major CPs to enter the total area communications system. Radio access units provide mobile radiotelephone users, down to squadron level, an interface to the MSE system through an NCS to communicate with other mobile and wire telephone users. The system control center provides the capability to conduct overall network management. Figure 2-10 shows the MSE network as integrated within the corps or regimental force structure.

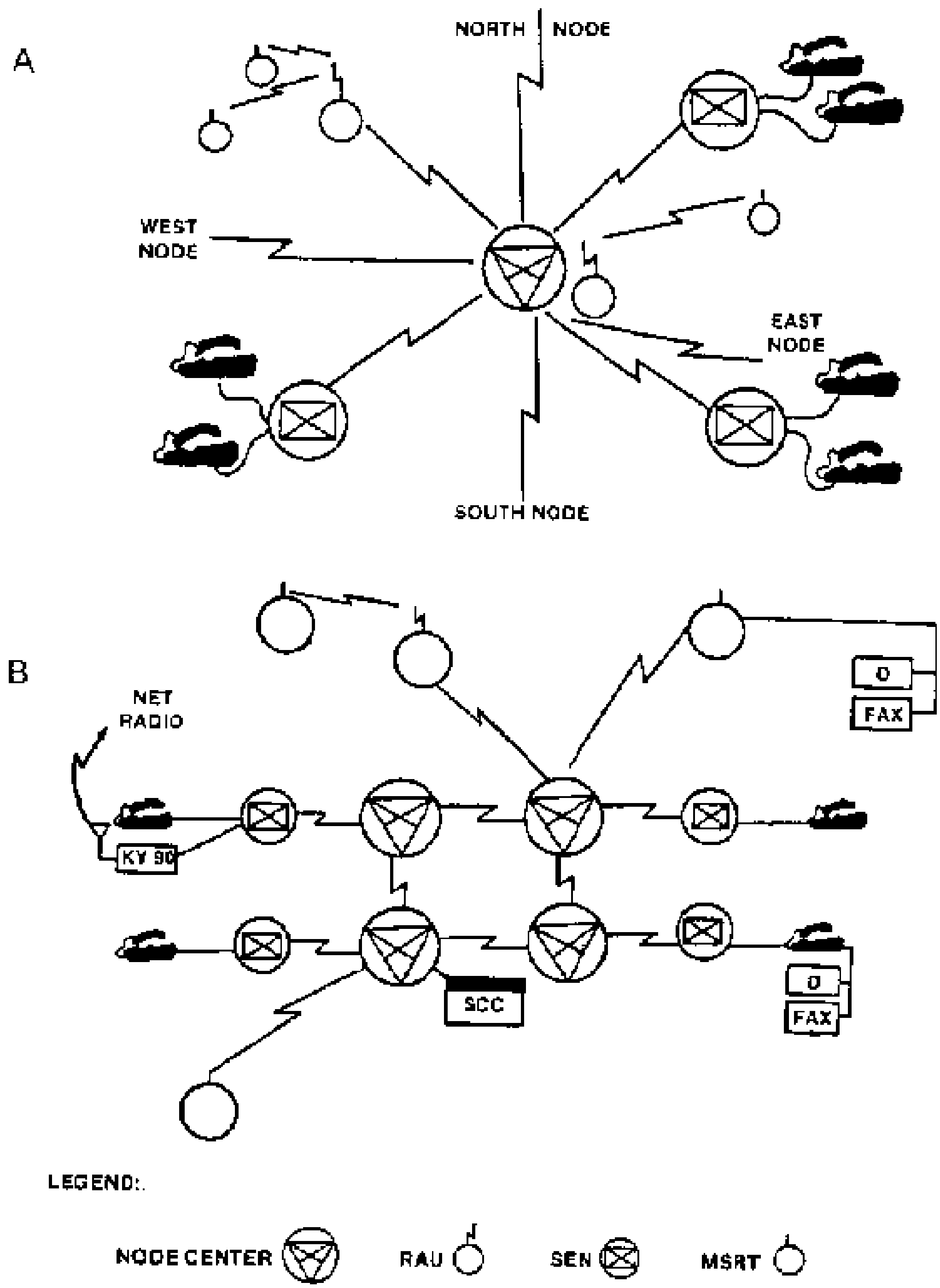


Figure 2-10. MSE network as integrated within the corps or regimental force structure.

(2) The MSE architecture supports area common-user communication requirements on a dynamic and integrated battlefield for corps users, including the regiment, regardless of their location in the corps area. Requirements include network survivability under damage and

overload conditions and self-adjusting routing during both rapidly changing load patterns and subscriber locations. Figure 2-11 shows the MSE architecture.

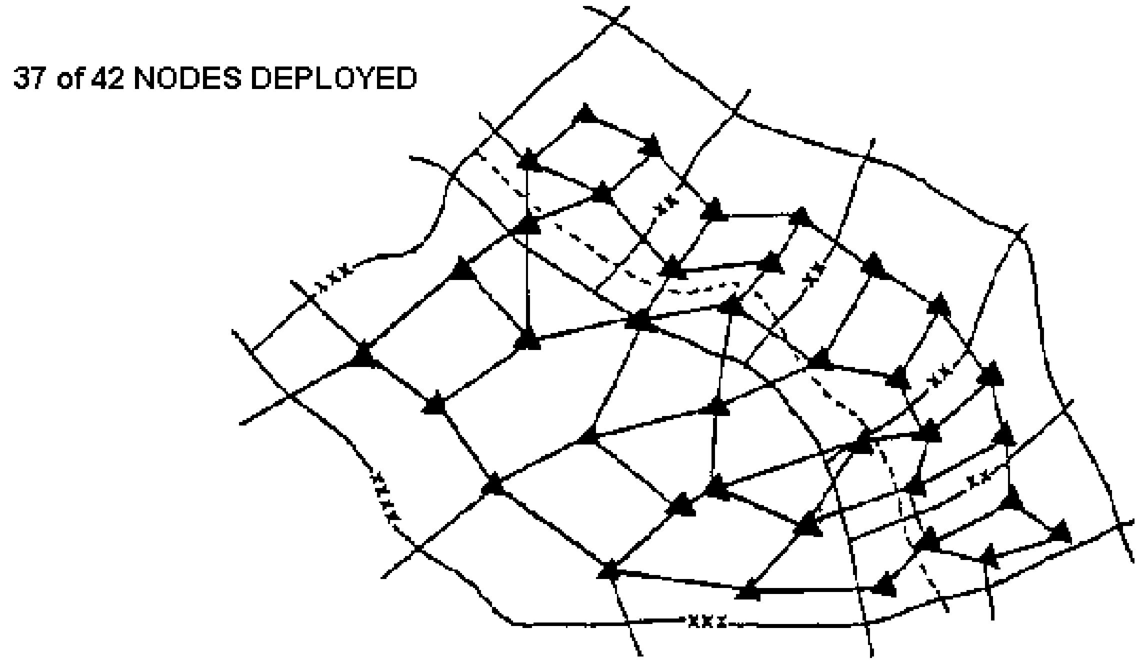


Figure 2-11. MSE architecture in support of the corps.

(3) The MSE furnishes mobile radiotelephone service for high-priority users forward into the maneuver area. It enhances CP movement by providing continuous telephone-like service to users with mobile subscriber radiotelephones during movement. The times for CP setup and teardown are greatly reduced because wire and cable requirements are lowered. The RAU provides radio connectivity by MSRT through an NC to the area communications system when the CP relocates. The regiment may be allocated two small extension node switches; one will be used in the regimental headquarters and one in the regimental support area. The regimental headquarters is authorized seven MSRT terminals. The subordinate squadron-size elements are authorized three MSRTs each. The MSRTs are allocated at the commander's discretion. The currently fielded communications system without MSE technology cannot respond to the fluid battlefield in today's threat environment. However, MSE provides continuous and in-depth communications, particularly during force and CP movement.

Figure 2-12 shows the communications provided by MSE during force and CP movement.

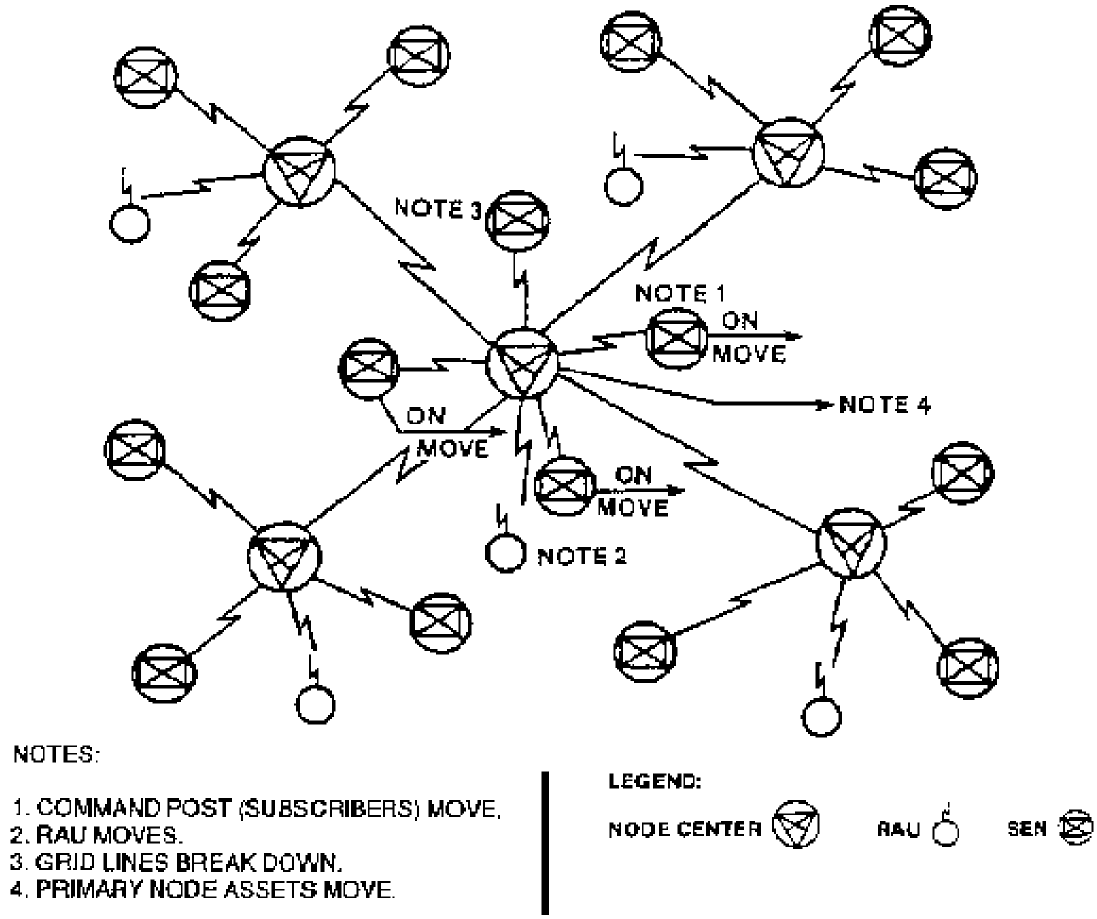


Figure 2-12. Communications provided by MSE during force and CP movement.

Figure 2-13 shows a typical MSE system deployed at regimental level.

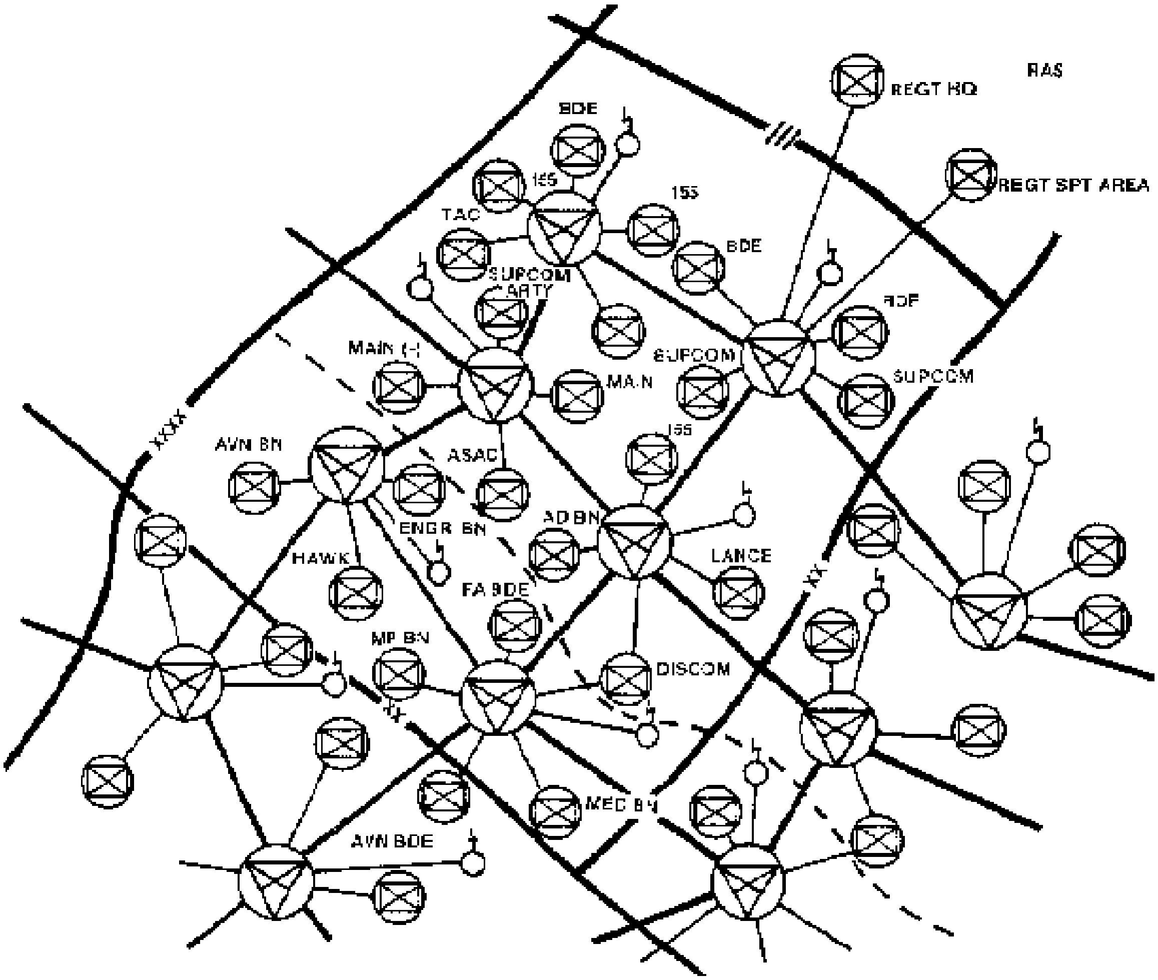


Figure 2-13. Typical MSE system deployed at regimental level.

2-7. OPERATIONS SECURITY

Operations security can be defined as those measures taken to deny the enemy information about friendly forces and operations. The OPSEC concept includes all security measures that allow units to achieve and maintain surprise. OPSEC consists of physical security, information security, signals security, deception (to include camouflage), and countersurveillance. Because these categories are interrelated, the RAS commander normally chooses to use more than one technique to counter a threat. In addition, he can use SIGSEC programs such as EW and SIGINT. The RAS commander can counter specific hostile intelligence efforts by analyzing them and their vulnerabilities, employing OPSEC countermeasures, and surveying the effectiveness of countermeasures. FMs 1-100 and 1-111 describe aviation operations security in detail.

2-8. REPORTING PROCEDURES

All intelligence and combat information gained as a result of squadron operations must be reported quickly to the appropriate personnel. Unit SOPs establish the method or procedure for reporting and the personnel to whom the information is reported. However, special or unusual circumstances may preclude the use of standard reporting procedures. For example, if the regimental or corps commander's priority intelligence requirements dictate immediate notification of a particular activity, squadron assets may initially report to the commander, G2/S2, or G3/S3. A troop commander may need to communicate directly with the regiment or corps before notifying the squadron commander. This situation also applies to an adjacent unit that may need to know the intelligence immediately. If the affected commander has a higher priority, a subordinate element of the squadron may report directly. In other words, if unit operations are affected by a particular enemy activity, the unit receives the information first. If and when the situation allows, the squadron may resume standard reporting procedures.

CHAPTER 3
EMPLOYMENT

This chapter implements portions of STANAGs 2019, 2112, 2404, and 2904.

This chapter describes the employment of the regimental aviation squadron in the execution of its primary missions: reconnaissance and screening operations. When properly augmented and task-organized, the RAS conducts other security operations such as guard and cover. Troop-level organizations within the RAS accomplish these missions. The ACTs advance aggressively to provide reconnaissance, conduct target handover to other maneuver forces, and provide security to the forces through screening missions. The ATKHTs destroy or fix bypassed enemy forces and deny the enemy key terrain. The AHT conducts air movement and air assault operations. In addition to conducting reconnaissance and screening operations, the RAS enhances C^3I and conducts special-purpose, joint air attack team, and air combat operations. It also assists in the passage of lines. The squadron conducts these operations in support of the ACR's mission.

Section I
TASK ORGANIZATION

3-1. REGIMENTAL AVIATION SQUADRON

a. The RAS operates under the control of the regiment and, in special situations, could be placed under OPCON of corps headquarters. It is normally employed at the squadron level but may be assigned missions below squadron for specific operations and periods.

b. The RAS commander task-organizes the squadron for employment as required for combat operations. Reorganization may be based on METT-T. The RAS is normally employed with organic assets but may receive and operationally control other combined arms assets. Figure 3-1 shows an example of the RAS configured as a task force.

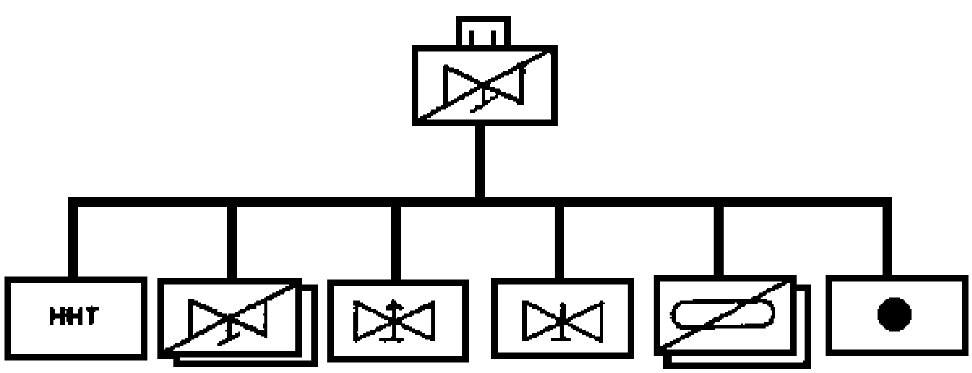


Figure 3-1. Example of the RAS configured as a task force.

3-2. AIR CAVALRY TROOP

a. In the ACTs, the commander commands from an observation helicopter and is positioned forward where he can effectively control his unit and see the battlefield. For tactical planning purposes, the ACT normally sustains a minimum of five observation and three attack aircraft. This equates to three scout-weapons teams for operations. The commander maintains troop integrity to accomplish his assigned mission. Through planning, he ensures that no more than one SWT is at the FARP at any one time. This enables a continuous troop presence in the area of operations.

b. The ACTs may task-organize differently for each mission, depending on METT-T and the commander's intent. When enemy contact is not likely, the attack helicopters may be held in an assembly area while the aeroscouts conduct operations. Figure 3-2 shows the ACT when enemy contact is not likely.

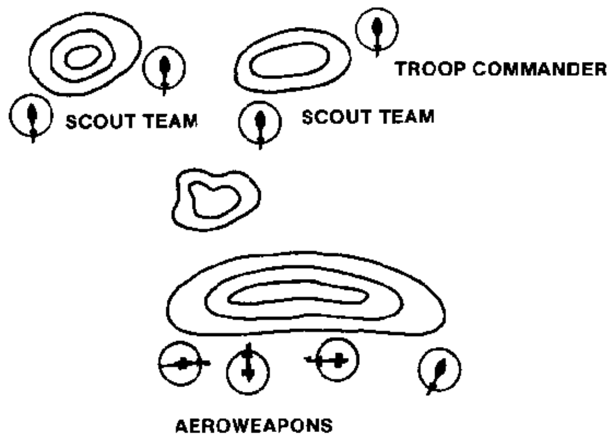


Figure 3-2. ACT when enemy contact is not likely.

If all troop assets are required for a limited time in narrow maneuver space, three SWTs may be employed simultaneously, as shown in Figure 3-3.

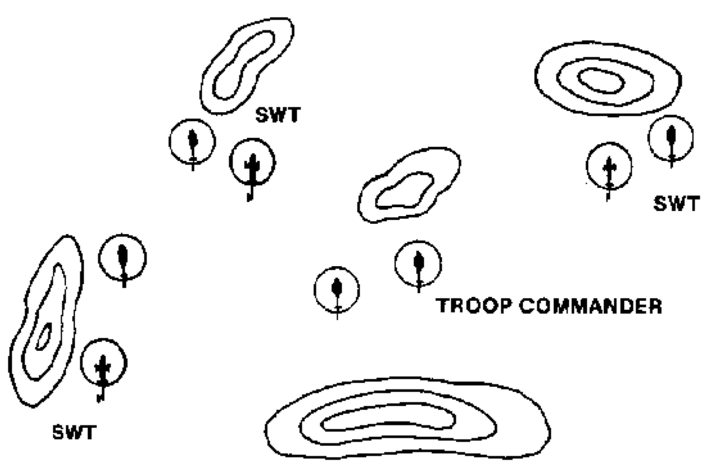


Figure 3-3. ACT with three SWTs employed simultaneously.

When SWTs are employed, an additional scout may be available to assist the commander and to provide continuity in command and control. Assistance to the commander may include receiving and transmitting intelligence and coordinating fire support. When the troop commander is not forward with the SWTs, the senior platoon leader assumes responsibility for operations until the commander returns. However, when continuous operations are anticipated with the normal complement of troop assets for reconnaissance and screening operations, the recommended task organization is three SWTs.

Figure 3-4 shows the ACT with three SWTs employed. When this particular technique is used, the third SWT is at a FARP or in an assembly area prepared to relieve the SWTs on station. The troop commander and the additional scout may provide more security to forward elements during operations.

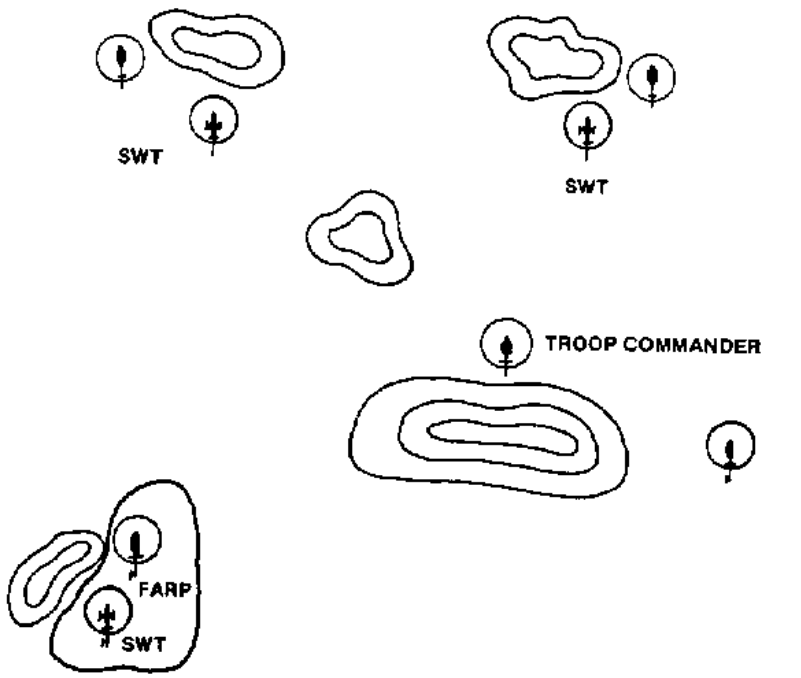


Figure 3-4. ACT with three SWTs employed (one SWT at the FARP).

3-3. ATTACK HELICOPTER TROOP

a. In the ATKHTs, the commander normally commands from an observation helicopter and is positioned forward where he can effectively control his unit and see the battlefield. Battle damage and maintenance requirements may preclude the fielding of a full 4:7 troop mix. Because a 3:5 mix (three scout to five attack aircraft) is common, it is used to describe ATKHT operations in this publication. The ATKHT normally operates with two platoons for ease of command and control. The heavy platoon consists of one scout and three attack aircraft under the direction of the attack helicopter platoon leader. The light platoon consists of one scout and two attack aircraft under the control of the aeroscout platoon leader. The ATKHT commander flies the third scout aircraft and has overall responsibility for the employment of his troop. Figure 3-5 shows an example of the task organization of the ATKHT.

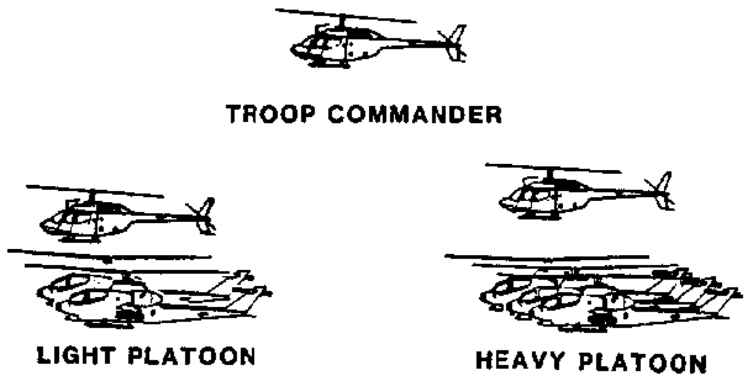


Figure 3-5. ATKHT task-organized with two platoons.

b. Before an engagement, the ATKHT commander or his representative conducts final coordination with the air/ground commander or S3. If time allows, face-to-face coordination is preferable. The attack aircraft remain in a holding area while the scout aircraft reconnoiter battle positions and identify tentative firing positions.

Figure 3-6 shows the ATKHT before an engagement. After battle positions have been confirmed, the scouts guide the attack aircraft into the battle positions. The scouts provide local security, primarily early warning, while the attack aircraft engage targets.

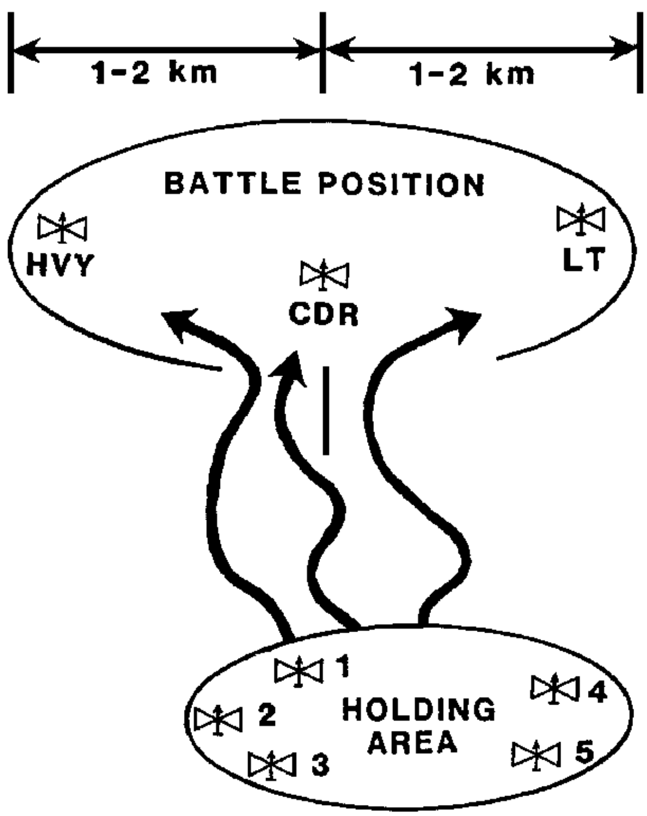


Figure 3-6. ATKHT before an engagement.

c. The ATKHT performs its attack mission in the same way as the attack helicopter company in an attack helicopter battalion, as discussed in FM 1-112. Movement techniques and distances between scout and attack aircraft normally depend on METT-T.

3-4. ASSAULT HELICOPTER TROOP

The AHT organizes its assets for employment on a mission-by-mission basis. Rarely will the entire troop operate as a whole. Normally, the troop is tailored to accomplish assigned missions. The AHT's primary mission is air movement of personnel, equipment, and supplies using internal or external loading. (FM 90-4 provides detailed information on external loading.) The AHT repositions critical classes of supplies around the battlefield. When required, the AHT conducts air assault operations with dismounted ground forces. These air assault operations require task organizing with scout and attack assets to provide reconnaissance and security for the assault forces.

Section II
RECONNAISSANCE OPERATIONS

3-5. PURPOSE

a. Reconnaissance is the primary mission of the RAS. If reconnaissance is not stated specifically in mission orders, it is always an implied task for the unit. The main purpose of reconnaissance is to gain information of tactical importance about the enemy, weather, or terrain. Terrain information includes terrain features, trafficability, natural and man-made obstacles, and other aspects of the environment. The attitudes, activities, conditions, strengths, and locations of significant numbers of civilians can also be determined through reconnaissance.

b. During reconnaissance operations, the RAS provides reconnaissance intelligence to the regimental commander. The commander uses this information as a basis for plans and orders. The intelligence-gathering efforts may be used to verify the IPB and any assumptions made during the planning phase. The RAS may be assigned a route, a zone, or an area reconnaissance mission. A reconnaissance mission is not complete until dominant terrain that provides line of sight to an observer is also reconnoitered. If required, the RAS fights to gain information to support the mission. If target engagement is necessary, reconnaissance forces employ teamwork to defeat or delay the enemy without degrading the primary mission. A reconnaissance may be conducted as a separate mission or as part of another operation.

c. The ACTs of the RAS normally have a habitual relationship with a certain armored cavalry squadron. This relationship enables the armored cavalry squadron commander to obtain immediate reconnaissance information from the supporting ACT. The ACT normally is still under RAS control unless the ACR commander places it under OPCON of the armored cavalry squadron. Under most circumstances, the ACT receives its logistical support from the RAS.

3-6. FUNDAMENTALS

The RAS conducts reconnaissance according to six fundamentals. They are described below.

a. Orient on the Location or Movement of the Reconnaissance Objective. The objective may be a terrain feature, a locality, or an enemy force. In each case, the RAS must focus on the reconnaissance objective while retaining freedom of action.

b. Ensure Maximum Reconnaissance Forces Forward. The maximum number of intelligence-gathering assets and their capabilities are involved in the reconnaissance effort. However, the commander must ensure that the sustainment of operations is not jeopardized or sacrificed.

c. 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 submitted quickly for information to be used effectively. Incomplete information reported promptly may be more valuable than detailed information reported too late. Reconnaissance reports relay who, how many, when, where, any enemy activity, and action taken. They may also include specific or primary intelligence requirements. These requirements specify particular units, systems, or vehicles employed with special equipment such as reactive armor. This information is usually sent in the form of a spot report.

d. Retain Freedom to Maneuver. Reconnaissance forces normally keep moving and avoid decisive engagements to survive. An awareness of the tactical situation, maneuver, and use of proper overwatch techniques help prevent decisive engagements.

e. Gain and Maintain Enemy Contact. Squadron elements actively seek and maintain contact, by surveillance or fire and maneuver, to reduce the enemy's ability to use surprise. The RAS may be the first friendly element to establish contact with the enemy. Once made, contact should not be voluntarily broken without specific orders.

f. Develop the Situation Rapidly. Reconnaissance forces deploy immediately upon gaining contact. They aggressively scout the enemy for gaps, flanks, weapon sites, commander locations, and obstacles. Using fire and maneuver, elements are directed onto known, probable, and suspected enemy locations to force the enemy to disclose its disposition and strength.

3-7. TECHNIQUES

The RAS uses four basic techniques to conduct a reconnaissance mission. These techniques are observation, movement, overwatch, and reporting.

a. Observation. Observation is used to detect, identify, locate, and report information of tactical significance. The ACTs use terrain flight and visual scanning techniques to observe large areas and to cover great distances in a short time. They seek to find and observe the enemy without being detected. They also observe significant adverse weather conditions en route to and at the objective and report them routinely.

b. Movement. The movement technique is governed by the likelihood of enemy contact, availability of cover and concealment, and responsiveness of the overwatch element. The three movement techniques are traveling, traveling overwatch, and bounding overwatch.

(1) Traveling. Traveling is the fastest but least secure movement technique. It is used when speed is important and enemy contact is not likely. In this technique, the lead and trail elements move simultaneously and continuously. The elements maintain interval and dispersion as the terrain and weather permit. Elements repositioning from an assembly area

to another area of operations frequently use the traveling technique.

(2) Traveling overwatch. Traveling overwatch is used when enemy contact is possible but speed is desirable. The lead element moves at a constant rate along the best covered and concealed routes for protection from possible enemy observation and direct fire. The trail element moves at variable speeds, constantly overwatching and maintaining visual contact with the lead element. It remains far enough away that maneuvering by the lead element does not restrict the delivery of suppressive fires during enemy direct fire engagements. The trail element normally remains a terrain feature behind the lead element or at a distance where indirect fires delivered on the lead element do not restrict its movement. Traveling overwatch is often used when elements conduct screening operations for a moving body.

(3) Bounding overwatch. Bounding overwatch is used when enemy contact is suspected or the situation is unknown. While one element moves, another is in position to provide support. Bounding overwatch is the slowest but most secure movement technique and provides for immediate, direct suppressive fire. Figure 3-7 shows the ACT using bounding overwatch as part of an armored cavalry squadron's zone reconnaissance. Bounding overwatch can be conducted by successive or alternate bounds.

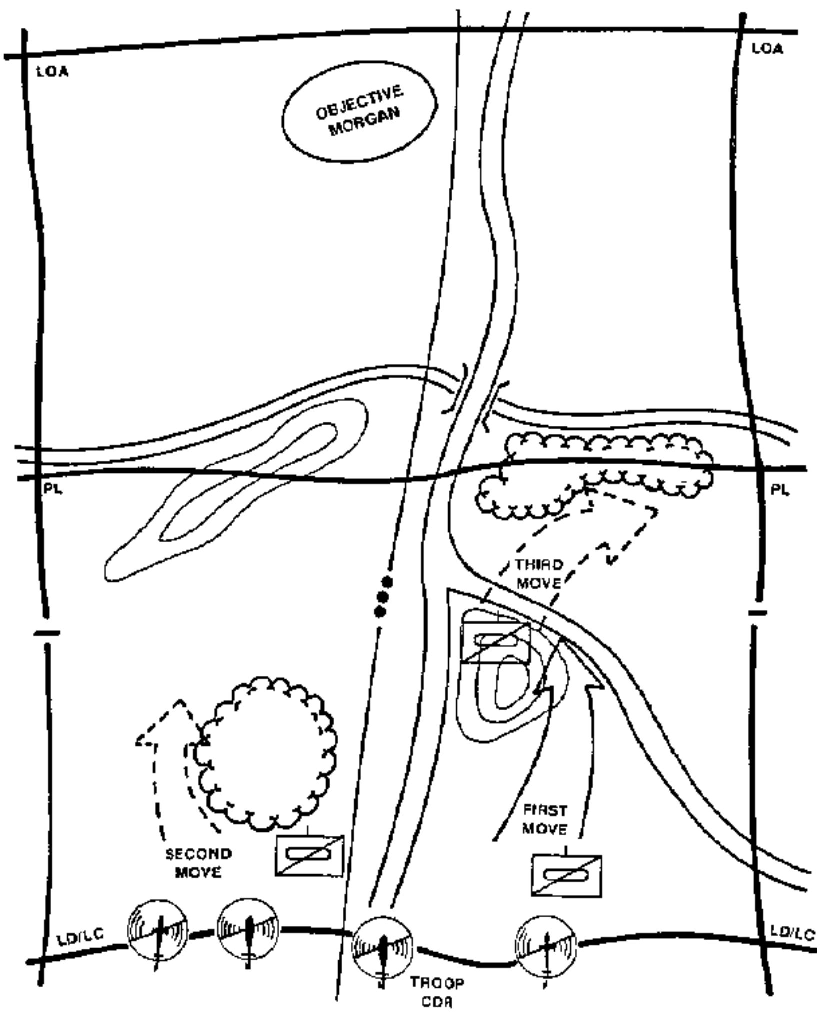


Figure 3-7. ACT in bounding overwatch as part of a squadron zone reconnaissance.

(a) Successive bounds. In bounding overwatch by successive bounds, the lead element advances to a point (first move) where it can support the advance of the rear element. On signal, the rear element moves forward to a position abreast of the lead element (second move) and halts to overwatch the next advance of the lead element (third move). Each element uses cover and concealment to mask movement from likely enemy positions. The ACTs frequently use this type of bounding overwatch so that the attack aircraft can provide continuous security for the scout. The scout provides security through surveillance for the attack element as it repositions.

(b) Alternate bounds. In bounding overwatch by alternate bounds, the lead element moves to the next vantage point (first move) overwatched by the trail element. After the lead element is in position, the trail element advances past the lead element to a new vantage point (second move). The original lead element then advances past the trail element to a new position. The lead and trail elements change roles after each move. All reconnaissance assets may use this technique, particularly at the troop level, when bounding by platoons.

c. Overwatch. Overwatch includes both observation and suppression, and it plays a vital role in movement techniques. The overwatching element, in its stationary and concealed position, continues to observe both the area and the bounding element. The overwatching element enhances the survivability of the bounding element by alerting or warning the bounding element of suspected or known enemy activity. If enemy contact is made, the overwatching element provides suppressive fire, if necessary, to cover the bounding element's deployment. The reconnaissance force develops the situation, maintains contact, and makes immediate reports.

d. Reporting. Reports of direct visual observation are the most important and timely intelligence the commander can receive. Standard reporting procedures, such as the SALUTE format, ensure accurate and concise reports in minimum time and with minimum confusion. Proper radio procedures are key to intelligence gathering. Normally, spot reports are consolidated at troop level and sent to the squadron by the commander or a designated representative through the O&I net. However, individual crews may be required to send spot reports directly to the RAS S2, depending on METT-T.

3-8. ROUTE RECONNAISSANCE

a. The purpose of a route reconnaissance is to obtain detailed information about a specific route and all adjacent terrain from which the enemy could influence movement along the route. The reconnaissance may be oriented on a road, an axis, an air route, or a general direction of advance or attack. It is normally the fastest type of reconnaissance because effort is concentrated along the route and not widely spread. A route reconnaissance may also be conducted to--

- Identify bypass locations.
- Support movement of supplies.
- Determine the trafficability of a route or lateral routes.
- Reconnoiter defiles along the route for possible ambush sites.
- Obtain information about an enemy force moving along a specific route.
- Locate sites for constructing hasty obstacles to impede enemy movement.

- Inspect and classify bridges and overpasses, to include overhead clearance.
- Inspect and classify road surfaces, to include width, slope, and composition.
- Reconnoiter dominant terrain features and built-up areas adjacent to the route which could influence its use.
- Determine fording sites, to include stream depth and velocity of streams and rivers adjacent to the route, if applicable.

b. Before conducting a route reconnaissance, the air cavalry element must know certain information about the route. This information includes the--

- Route location.
- Enemy situation.
- Fire support available.
- Start and release points.
- Applicable control measures.
- Departure time or completion time or both.
- When, where, and how to report the information.
- Expected weather conditions for the time of movement.
- Type of unit or vehicles expected to use the route, if applicable.
- Time of day or night the route is expected to be used, if applicable.
- Any other specific information desired by the commander requesting the reconnaissance.
- Actions after completion of the mission.

c. The RAS normally does not conduct a route reconnaissance. It usually obtains route information as part of a zone reconnaissance by assigning the mission to a troop. Only one major route should be assigned per troop, especially when enemy contact is expected. However, if directed to conduct a route reconnaissance, the RAS should not be assigned more than three major routes if enemy contact is expected. When assigned a route reconnaissance, the RAS or its troop conducts a detailed route reconnaissance. It gathers information about the designated route and all adjacent terrain from which an enemy could engage friendly forces with direct fires. The ACT cannot always perform a detailed ground inspection of the entire route, but aircrews periodically dismount to physically inspect key terrain if the situation allows. Figure 3-8 shows an air cavalry troop and a ground cavalry troop performing a route reconnaissance. Normally, the ACR task-organizes its organic ground and air assets to perform a detailed route reconnaissance. Air cavalry assets reconnoiter the adjacent terrain and provide overwatch of the ground cavalry while they classify the route. SWTs begin the operation and reconnoiter adjacent terrain to the front, flanks, and rear of the advancing ground reconnaissance elements. They provide early warning, uncover ambushes, and provide overwatch so that the ground elements can concentrate on conducting a detailed reconnaissance of the route. Control measures, such as phase lines, may be established during a route reconnaissance. These control measures allow for security of reconnoitered terrain while assets are rotated. Figure 3-9 illustrates the RAS task-organized to conduct a reconnaissance of three separate routes in the regimental area.

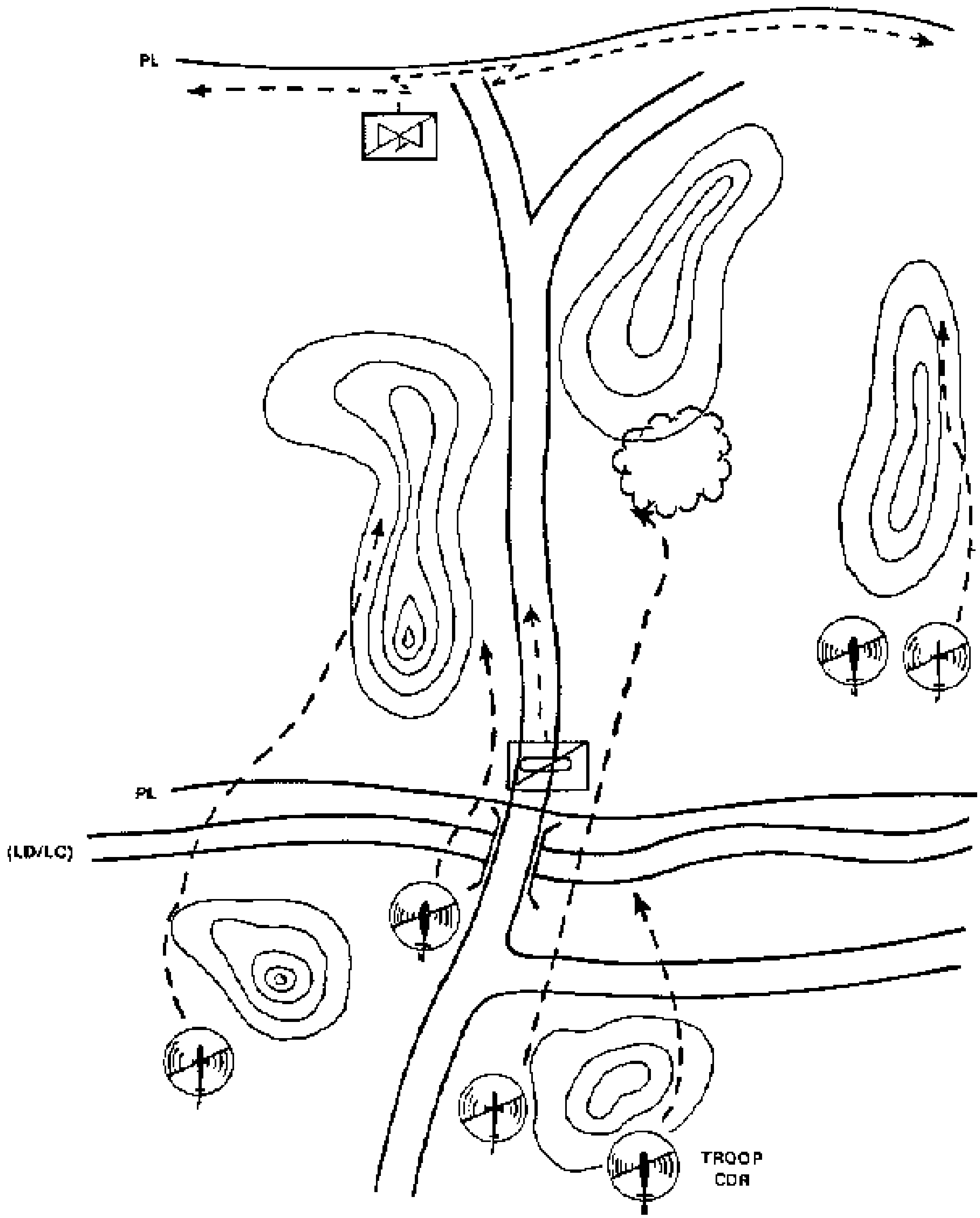


Figure 3-8. ACT and a ground cavalry troop performing a route reconnaissance.

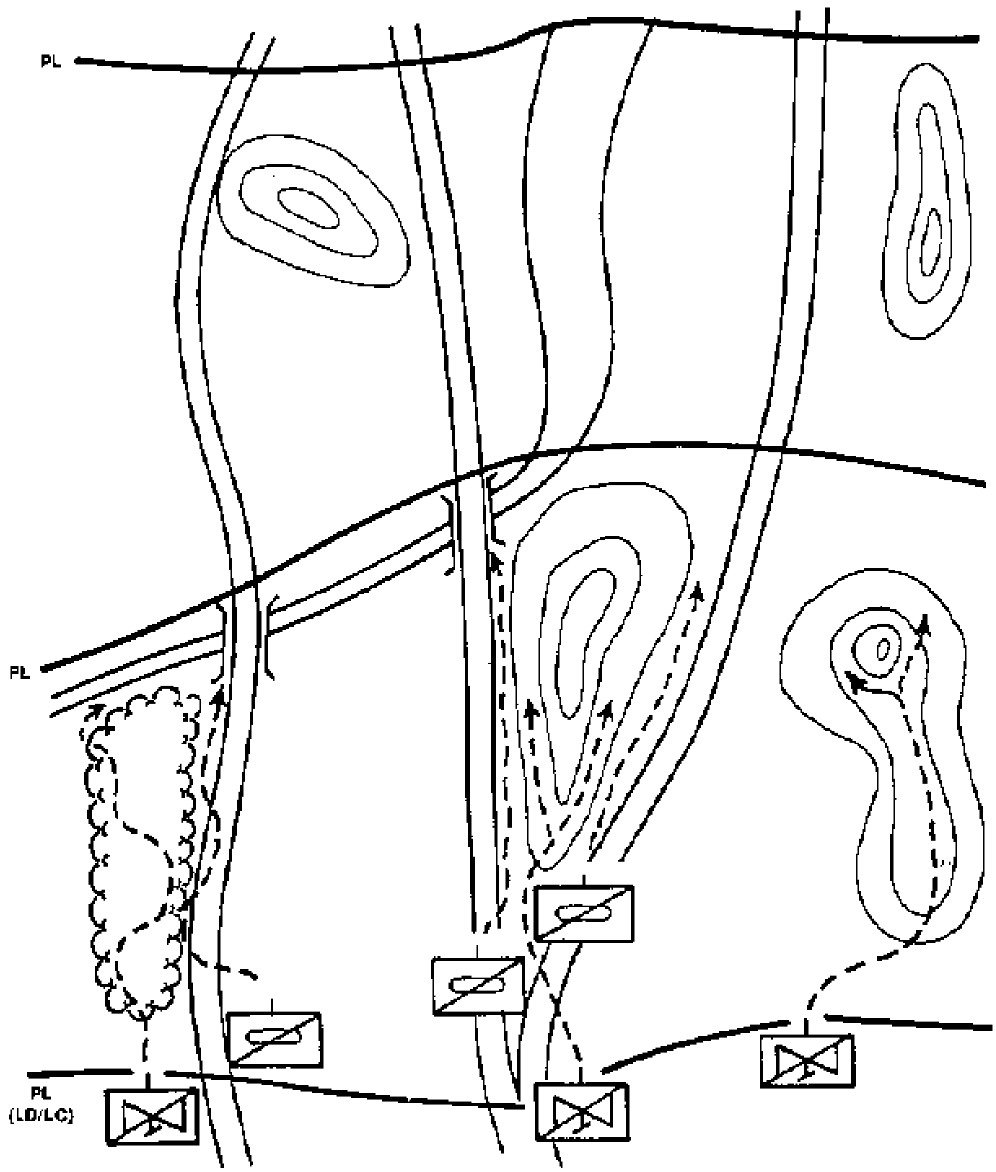


Figure 3-9. RAS and ground cavalry troops conducting a reconnaissance of three separate routes.

d. When enough time is not available or the mission does not require detailed information, reconnaissance assets may have to conduct a hasty route reconnaissance. In this case, information gathering is limited to the type of route (X--unlimited or all weather, Y--limited or fair weather, or Z--poor weather) and obstacle limitations (maximum weight, height, and width).

e. Accurate reporting is essential. Reconnaissance forces should keep detailed records on all routes reconnoitered. Several methods are acceptable for recording this information. One method is to assign each key terrain feature (bridge, fording site, bypass site) a number on the map and detail the intelligence information on a separate work sheet. This method ensures completeness and simplicity and reduces map clutter. Further information on route reconnaissance is in FM 5-36.

3-9. ZONE RECONNAISSANCE

a. 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 usually more thorough and more time-consuming than a route or an area reconnaissance. The purpose may be to find the enemy or suitable avenues of approach for the main body. A zone reconnaissance is normally conducted when information on cross-country trafficability is desired or when the enemy situation is in doubt. Every route within the zone must be reconnoitered unless otherwise directed. The zone to be reconnoitered is defined by lateral boundaries, an LD, and an objective. The objective is a termination point for the mission. It may or may not be occupied by the enemy. A phase line also may be used as a termination point and, in this case, is called a line of advance. Critical tasks associated with a zone reconnaissance include--

- Locating and determining the composition, disposition, and activity of enemy forces.
- Finding suitable covered and concealed avenues of approach.
- Reconnoitering all routes and key terrain within the zone.
- Determining cross-country trafficability within the zone.
- Locating suitable bypass routes for friendly forces.
- Finding the flanks of enemy forces encountered.
- Determining significant adverse weather.

b. The RAS normally conducts a zone reconnaissance in concert with the ground armored cavalry squadrons. The ACTs work with the armored cavalry squadrons, and the ATKHTs are held in reserve. The RAS may be held as a regimental or corps reserve, but this is highly unlikely. At times, depending on METT-T, the RAS conducts a zone reconnaissance by itself. The reserve, if any, develops the situation rapidly, maintains forward momentum, and assists reconnoitering elements in maintaining freedom of maneuver. A unit's lateral limits of responsibility during zone reconnaissance are normally a forward extension of boundaries of the headquarters assigning the mission. The commander assigns boundaries between elements to specify zones of responsibility. These zones, which are squadron sectors for the armored cavalry squadrons, are called troop sectors for the ACTs. Sectors should be near easily recognizable terrain features such as roads, streams, and prominent structures. When assigning sectors, the commander should distribute tasks equally among the units. This does not necessarily mean that equal frontages should be assigned but rather that taskings should allow all elements to advance generally at an equal rate.

c. After establishing sectors, the unit designates an LD and specifies a crossing time. This ensures a simultaneous advance across the ACR's or RAS's front. Phase lines, contact points, coordination points, and checkpoints ease essential coordination between adjacent elements. Phase lines are established as needed to control and coordinate forward movement. Failure to keep reconnaissance elements abreast may result in the bypass of enemy elements, envelopment by enemy forces, or engagement of friendly forces. Like boundaries, PLs should generally follow features that are easy to recognize, particularly for night operations or periods of limited visibility (smoke, haze, fog). Contact points are designated on boundaries to ensure physical coordination between adjacent elements. Contact points are designated at--

- Points that ensure proper coverage of the zone.
- Critical points (for example, a route crossing from one troop sector into another).
- Contingency points (for example, a contact point may be designated a coordinating point if a defense is required). LI> Points that ease movement, lateral coordination of fires or positions, passage of lines, or logistical support.

d. Troops report crossing PLs but do not stop unless ordered to do so. Once the operation begins, the enemy may be alerted. Forward momentum should be maintained to gain and maintain enemy contact and to keep the enemy off balance. The zone is systematically reconnoitered from the LD to the objective or LOA. Figure 3-10 shows the RAS conducting a zone reconnaissance.

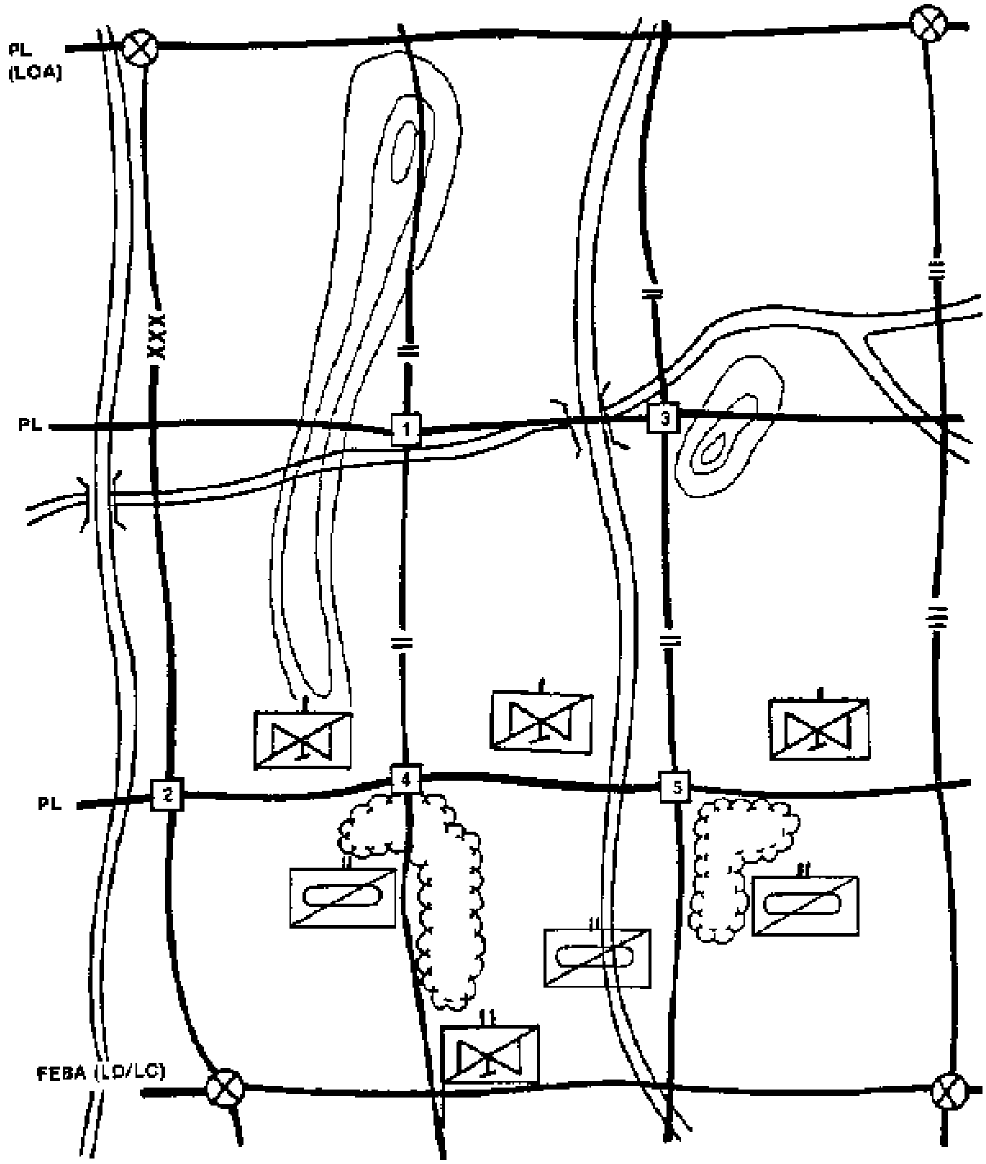


Figure 3-10. RAS conducting a zone reconnaissance.

e. If enemy contact is made, ACTs develop the situation rapidly, maintain contact, and report. Reconnaissance forces may be instructed to bypass, engage and destroy, or maintain contact until an attack helicopter or ground maneuver unit arrives to engage. The RAS may be employed in this counterreconnaissance role with the implied or otherwise specified task in the OPORD. To ensure continuity of effort, the ACR or RAS designates a PL or an objective to stop the operation and tells each element what to do after mission completion. If the RAS is not given a follow-on mission, the ACTs should be assigned objectives on dominant terrain. In addition to reporting significant activities in the zone, the ACTs report all appropriate control measures (PLs, checkpoints, contact points).

3-10. AREA RECONNAISSANCE

a. The purpose of an area reconnaissance is to gather intelligence or to conduct surveillance of a specified area. The target may be key terrain, a farm, a bridge, a ridgeline, a wooded area, a proposed assembly area, a PZ, an LZ, or other features that may be critical to the operation. As part of rear operations, the RAS may conduct an area reconnaissance of possible LZs likely to be used by enemy forces during rear incursions. The specified area to be reconnoitered is designated by a boundary line enclosing the area. The factors of METT-T determine the movement technique the reconnaissance element will use to reach the area. Once the reconnaissance element reaches the area, it uses zone reconnaissance techniques to systematically reconnoiter the area. The reconnaissance element also reconnoiters dominant terrain outside the specified area from which the enemy can influence friendly operations.

b. The main difference between a zone and an area reconnaissance is movement to and from the area. The RAS may move to and reconnoiter one large area or several small, dispersed areas. It may also assign this mission to one or more ACTs. An area reconnaissance may be performed behind friendly lines or deep behind enemy lines. Emphasis is normally placed on reaching the objective area quickly. The RAS usually moves over several routes to reduce closing times. Enemy contacts encountered en route are developed only to the extent that enables reconnaissance elements to bypass.

c. The RAS may perform an area reconnaissance as part of a zone reconnaissance. When assigned an area reconnaissance, the RAS commander first considers METT-T. Then he develops a concept that includes the force needed and whether movement will be by a single route or multiple routes. Rapid movement to the objective is important, but the main consideration is usually security. Avoidance of known enemy locations and enemy surveillance elements is imperative. Primary and alternate routes to the objective area are therefore selected based on security and speed. When possible, the RAS uses multiple routes to reduce travel time and gain greater flexibility. Elements use terrain flight techniques to move to the area. An element moving on a route blocked or threatened by the enemy shifts to another route. Enemy forces encountered during movement to the objective are reported and bypassed if possible. If required to reconnoiter several separate areas, the RAS commander assigns the troop or troops to one or more areas and routes or avenues of approach.

d. The commander may divide the area into troop sectors with designated objectives for each respective unit. The flanks of the overall objective area are secured first; reconnaissance efforts may then be focused inward. Air cavalry elements may establish a screen on the flank to provide security for the surveillance or reconnaissance forces. ACTs may have to dismount and physically reconnoiter a specific area (for example, a bridge or built-up area). Figure 3-11 shows the RAS and a ground cavalry troop conducting an area reconnaissance.

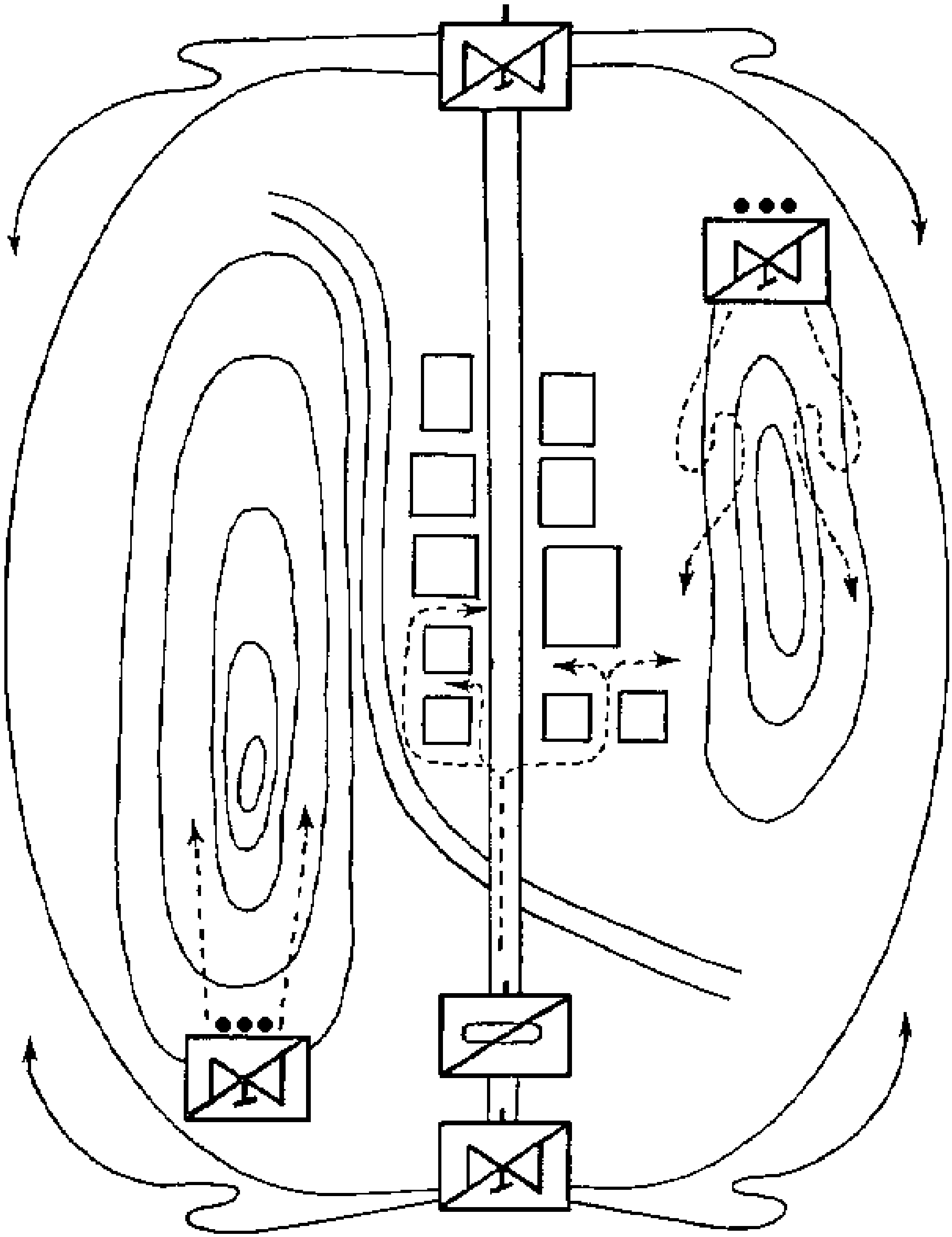


Figure 3-11. RAS and ground cavalry troop conducting an area reconnaissance.

e. When the RAS relocates its assets or participates in air assault operations, reconnaissance elements are frequently tasked to reconnoiter the projected LZs or PZs and possibly the assault objective. Any tasks required for a route or zone reconnaissance may also be required for an area reconnaissance. The information required by the RAS commander determines the tasks to be accomplished. The RAS commander provides specific guidance concerning the intended use of the area, and the ACTs orient reconnaissance efforts to accomplish the mission.

3-11. NBC RECONNAISSANCE

The RAS 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. Normally, the entire squadron does not conduct NBC reconnaissance; ACTs are assigned this mission. NBC reconnaissance operations are resource-intensive and require extensive planning, to include the decontamination of aircrews and aircraft.

a. Chemical Agent Detection.

(1) Chemical agent detection will probably be the most frequent NBC reconnaissance task required of the RAS. Before moving into or occupying an area, unit commanders are always concerned with determining enemy activity and the presence of chemical hazards. The RAS is specifically tailored to do both tasks simultaneously. When determining the presence or absence of chemical agents, the RAS 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?

(2) 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.

(3) During NBC reconnaissance planning, the squadron or 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.

(4) 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 3-12 shows a sample of a completed DA Form 1971-2-R for monitoring.

b. <u>Radiological Monitoring</u>. The RAS 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 3-13 shows a sample of a completed DA Form 1971-R.

c. <u>Radiological Reconnaissance</u>. The RAS 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.

CHEMICAL DATA SHEET — MONITORING ~~OR SURVEY~~ For use of this form, see FM 3-3; proponent of this form is TRADOC.	DATE 14 Jul 90	PAGE NO. 1	NO. OF PAGES 1

UNIT B Co 2/31 Inf.	MONITOR OR SURVEY TEAM MEMBER (Print Name) SGT Kingston
MONITOR OR SURVEY TEAM NUMBER #82	
MAP USED Karlsbadt	

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.

REMARKS

DA FORM 1971-2-R, SEP 88

SAMPLE

Figure 3-12. Completed DA Form 1971-2-R.

RADIOLOGICAL DATA SHEET – MONITORING ~~OR POINT TECHNIQUE~~
For use of this form see FM 3-3; proponent of this form is TRADOC.

DATE	PAGE NO	NO OF PAGES
10 Jan '90	1	

SURVEY PARTY OR MONITORING UNIT DESIGNATION: Co. B/1-11 INF.
MONITOR (Print name): PFC I. M. Observer
MAP USED: SERIES V259 1:50,000
TYPE OF VEHICLE OR OTHER SHIELDING: Foxhole
INSTRUMENT TYPE: IM-174 B/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		[illegible]	10	
5		0700	0 (3)		20		1015	10	
6		0715	0		21		1020	9	
7		0730	[illegible]		22		1025	10	
8		0745	[illegible]		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
$CF = \frac{180}{9} = 20$

(DO NOT USE. For correlation only)

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

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

NOTES:

1. A nuclear weapon was detonated. Continuous monitoring is initiated. Monitor awaits arrival of fallout in open areas.
2. Fallout arrives. Monitor reads 1 cGyph, 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.

(1)Aerial radiological reconnaissance. The RAS works closely with the regiment or corps NBC center in conducting an aerial radiological reconnaissance. An ACT may be assigned this mission. The ACT 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 ACT 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 ACT locates the edge of the area. Once the ACT 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.

(2) 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 RAS 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 3-14 illustrates this process. Unless otherwise instructed, the ground elements mark the outer boundaries of the contaminated area. (The ground element of the RAS 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.

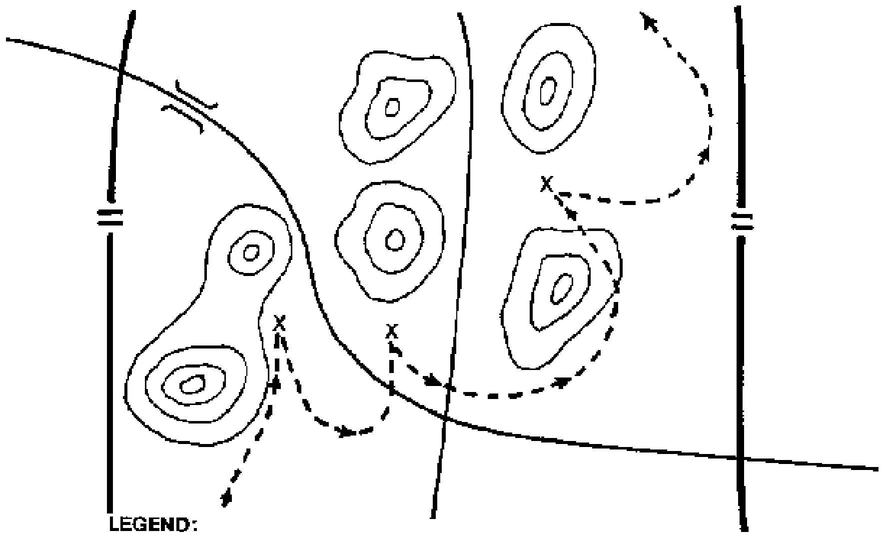


Figure 3-14. In-and-out technique used during a ground radiological reconnaissance.

d. 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 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 and the regiment coordinate 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. A brief discussion of both types of surveys follows. FM 3-3 describes each in detail.

(1) 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, the course leg technique, and the 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.

(2) 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 (as described in (1) above) 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 RAS normally will not conduct ground surveys. However, if required to conduct ground surveys, RAS ground elements frequently will use the route technique. Recording and reporting are accomplished as described in a (4) above.

Section III
SECURITY OPERATIONS

3-12. SCREENING OPERATIONS

a. Purpose.

(1) Screening operations are conducted to maintain surveillance and provide early warning of contact with enemy forces. The RAS screens forward, to the flanks, or to the rear of a moving or stationary main body. It must impede and harass the enemy with organic and supporting fires and, within its capabilities, destroy or repel enemy reconnaissance elements without becoming decisively engaged.

(2) To exploit enemy vulnerabilities and weaknesses, the RAS may maneuver to the flanks and rear of the enemy to obtain engagements. It may also use this employment principle to perform other security tasks as well as special-purpose and JAAT operations. The RAS conducts counterreconnaissance operations in the role of destroying or repelling enemy reconnaissance forces. Counterreconnaissance is always an implied task for the RAS when it conducts screening operations. The intent is to prevent the enemy from conducting surveillance and gathering intelligence about friendly operations.

(3) The RAS usually conducts screening operations on broad fronts forward of the main body's front or to the flanks and rear. It may conduct screening operations as part of the commander's rear security plan. The specific tasks of a squadron conducting a screening mission are to--

- Provide early warning of enemy approach or, in the case of an advance screen, the size and location of enemy defensive positions.
- Gain and maintain enemy contact and report enemy activity.
- Destroy, repel, or suppress enemy reconnaissance units without becoming decisively engaged.
- Impede and harass the enemy with indirect fires.
- Guide reaction forces.

(4) The RAS is seldom reinforced. Exceptions are when engineers are needed for specific tasks or when artillery is required to permit forces to operate beyond the range of the main body's artillery. A commander assigning a screening mission expects only early warning and a counter to enemy reconnaissance activities.

b. Fundamentals. The RAS conducts screening operations according to the five security fundamentals. These fundamentals are briefly discussed below.

(1) Orient on the main body. The security force operates between the main body and known or suspected enemy units. The security force commander must know the main body's scheme of maneuver and must position himself between the enemy and the main body.

(2) Perform continuous reconnaissance. A security force performs continuous, aggressive reconnaissance to gain all information possible about the terrain and enemy.

(3) Provide early and accurate warning. Early warning of enemy activity, to include accurate reporting, provides the main body commander the time and information needed to retain the tactical initiative. It also allows him to choose the time and place to concentrate fires against the enemy.

(4) Provide reaction time and maneuver space. A security force operates as far from the main body as possible, consistent with METT-T. It provides adequate time and space for the main body to respond to the enemy.

(5) Maintain enemy contact. Once the security force gains contact, it maintains contact unless otherwise instructed.

c. Planning Considerations.

(1) The RAS commander follows general planning principles in preparing for a screening mission and determines the troop or troops required to perform the mission. The main body commander specifies the general trace of the screen and the time the screen must be effectively established with battalion-size avenues of approach into the identified area. The general trace should provide enough distance for the main body to react in minimal time. Thus the RAS cannot establish its initial screen line close to the main body. It establishes the initial screen line beyond the general trace of the screen but within range of the main body artillery. The initial screen line also follows advantageous terrain for observation of avenues of approach. It is delineated by a PL and is located behind critical control measures such as CFLs and FSCLs. Passage points and routes through stationary units are established.

(2) The main body commander determines which units will be screened and establishes a PL for the rear boundary between the main body and screening force. In addition, he determines who assumes responsibility for the area between the screening force and screened units. The width of the assigned area requires all reconnaissance elements involved to be well dispersed on the screen line. The RAS may initially assume responsibility for the area between the main body and the screening force. It may conduct a zone reconnaissance from the main body to the initial screen line and maintain surveillance between the screening force and the screened units. Units screened may be required to conduct patrols or establish OPs near their positions. Screening units must carefully plan and coordinate their subsequent rearward move and passage of lines.

d. Stationary Screen.

(1) Successive screen lines. A stationary screen is accomplished by establishing successive screen lines. These lines enable the screening element to observe the identified avenues of approach throughout the RAS's area of operations. Avenues of approach are not split between units. The air cavalry troop should be assigned no more than three battalion-size avenues of approach. A screen line may consist of OPs placed along a PL overwatching

avenues of approach into an area. Figure 3-15 shows the graphics of a screen line for the RAS. OPs may be mounted or dismounted from both air and ground assets. If the factors of METT-T dictate, ground scouts of the regiment may dismount from their vehicles and establish OPs, using AHT assets. If OPs are used, air and ground reconnaissance forces actively patrol between them. Patrols reconnoiter areas that cannot be observed from an OP.

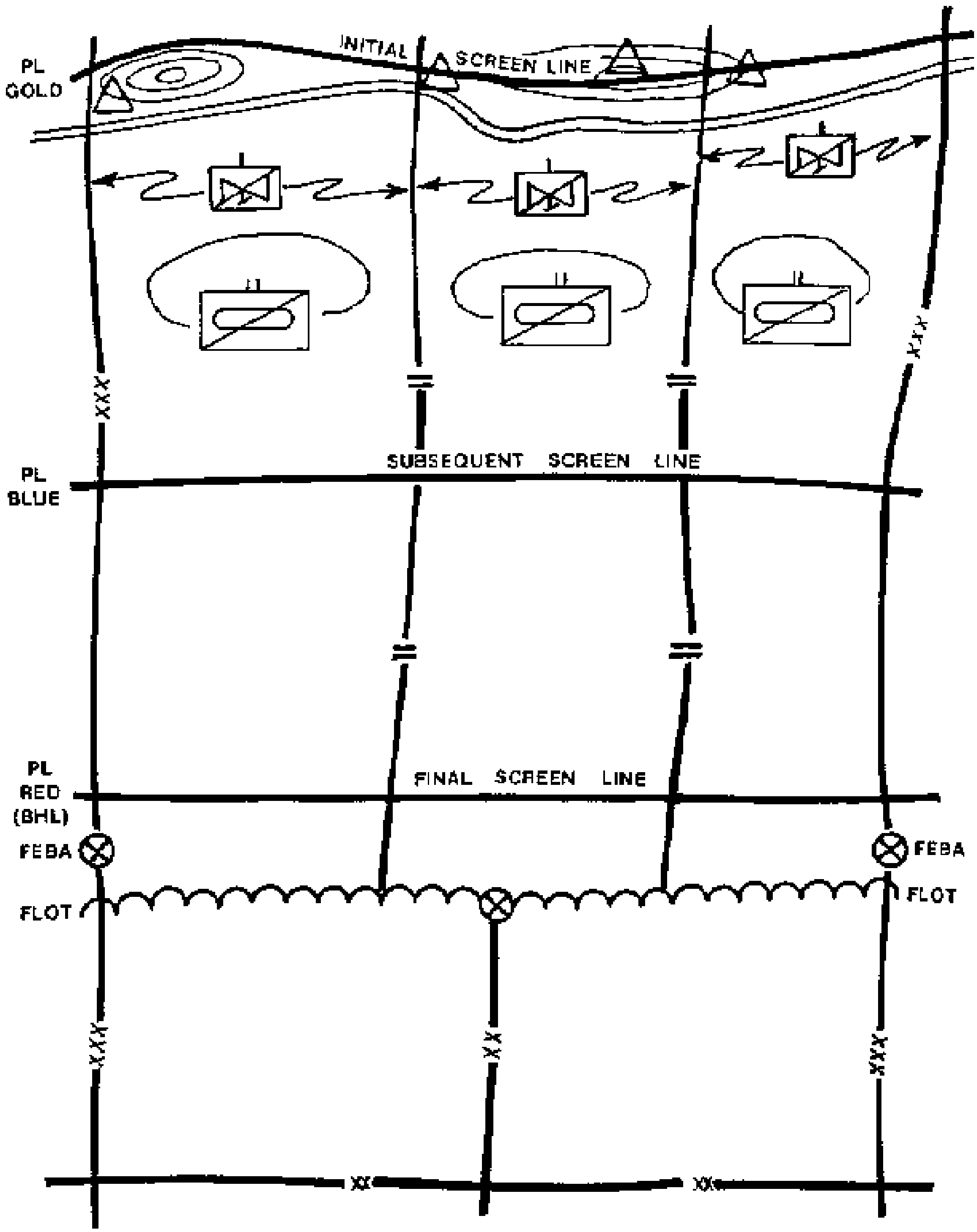


Figure 3-15. RAS stationary screen graphics.

(2) Initial screen line.

(a) The most secure method of establishing an initial screen line is to conduct a zone reconnaissance from the rear boundary to the initial screen line. When squadron units reach the general trace of the screen line, they reconnoiter and refine it. They also select positions for good observation and fields of fire. Reconnaissance elements seek to remain undetected while reporting enemy forces and engaging them with indirect fires at maximum range. Fires are planned along with both natural and man-made obstacles to impede the enemy's advance. The combination of obstacles and coordinated fires allows the RAS to impede enemy lead elements, maintain contact, and avoid decisive engagement. This gives the main body time and maneuver space to effectively engage the enemy. The RAS may also probe forward to identify enemy second echelon and follow-on forces. Upon contact, the RAS focuses its efforts on the destruction of enemy reconnaissance elements by direct and indirect fires before the enemy can penetrate the initial screen line.

(b) As enemy pressure threatens the security of the screening force, the RAS or troops report and request to move to the next screen line. Reconnaissance elements rapidly move from a screen line while maintaining visual contact with the enemy. Staggered movement off the screen line allows the commander to identify the flanks and rear of attacking forces. This procedure ensures that gaps occurring during movement are quickly closed. The procedure is repeated as necessary. Figure 3-15 also illustrates the RAS in the execution of screening operations of a stationary force. The screening force commander decides when to move from a screen line. However, the main body commander decides when the screening force may move behind the rear boundary PL. Prompt, accurate reporting is essential to prevent decisive engagement and to keep units from being overrun, bypassed, or cut off. Maximum use is made of surveillance, target acquisition, and night observation equipment.

e. Mobile Screen. A mobile screen is conducted when the main body is moving either in the attack or in retrograde. The RAS commander determines the technique of screening a moving force based on METT-T, the maneuver force commander's intent, and the RAS's orientation. The maneuver force commander assigning the screening mission provides a general trace of the screen line and the times and locations the screen is to be established. He also identifies the unit or units to be screened and provides the higher headquarters graphics (operations overlay and control measures). The three types of mobile screens are forward, flank, and rear.

(1) Forward screen. Air cavalry elements screening forward of a moving force normally screen with three elements abreast as in a zone reconnaissance. They provide early warning about the location, type, and degree of resistance encountered. However, the elements cannot provide detailed information about the terrain or routes. When the RAS encounters enemy reconnaissance elements, it reports and engages with indirect fires as when screening for a stationary force. The RAS must also be prepared to assist the passage of follow-on units of the main body. The speed of the advancing screen depends on the type of movement, mode of transportation, and speed of the main body.

(2) Flank screen.

(a) The mobile flank screen is the most difficult screening mission. Reconnaissance elements screening on the flank of a moving force move on a route parallel to the axis of the main body movement. The planning process is the same as for any other screening mission. The RAS commander defines the general trace and determines the initial screen line and subsequent screen lines. He designates the last line as the squadron rear boundary. Squadron elements may occupy a series of OPs on the screen line parallel to the route of advance. The forward element maintains contact with the rear of the lead elements on the near flank of the main body. The main body and the screening unit must maintain contact at all times.

(b) Movement along the flank screen line may be controlled using one of three methods: traveling, traveling overwatch, and bounding overwatch. Using the traveling method, the entire screen moves forward continuously, as shown in Figure 3-16. When conducting a flank screen, ACTs or subordinate elements use traveling overwatch in an accordion-like manner. They move forward one at a time, as illustrated in Figure 3-17. Bounding overwatch is executed in a leapfrog manner, as shown in Figure 3-18.

(3) Rear screen. A rear screen of a moving force occupies preplanned successive screen lines as in a screen for a stationary force. The main body is not constantly moving rearward. The RAS or troops establish a screen line and maintain contact with the main body. The RAS commander refines the general trace to make the initial screen line as he does in a stationary screen. He establishes subsequent screen lines after considering such factors as the terrain, time, and distance from the main body. Sectors and responsibilities are assigned as in the stationary screen. In a rear screen, a unit may move to subsequent screen lines without enemy pressure as long as it remains within friendly artillery range and can effectively screen the rear. If enemy contact is made, the RAS executes the screen mission the same as a stationary screen.

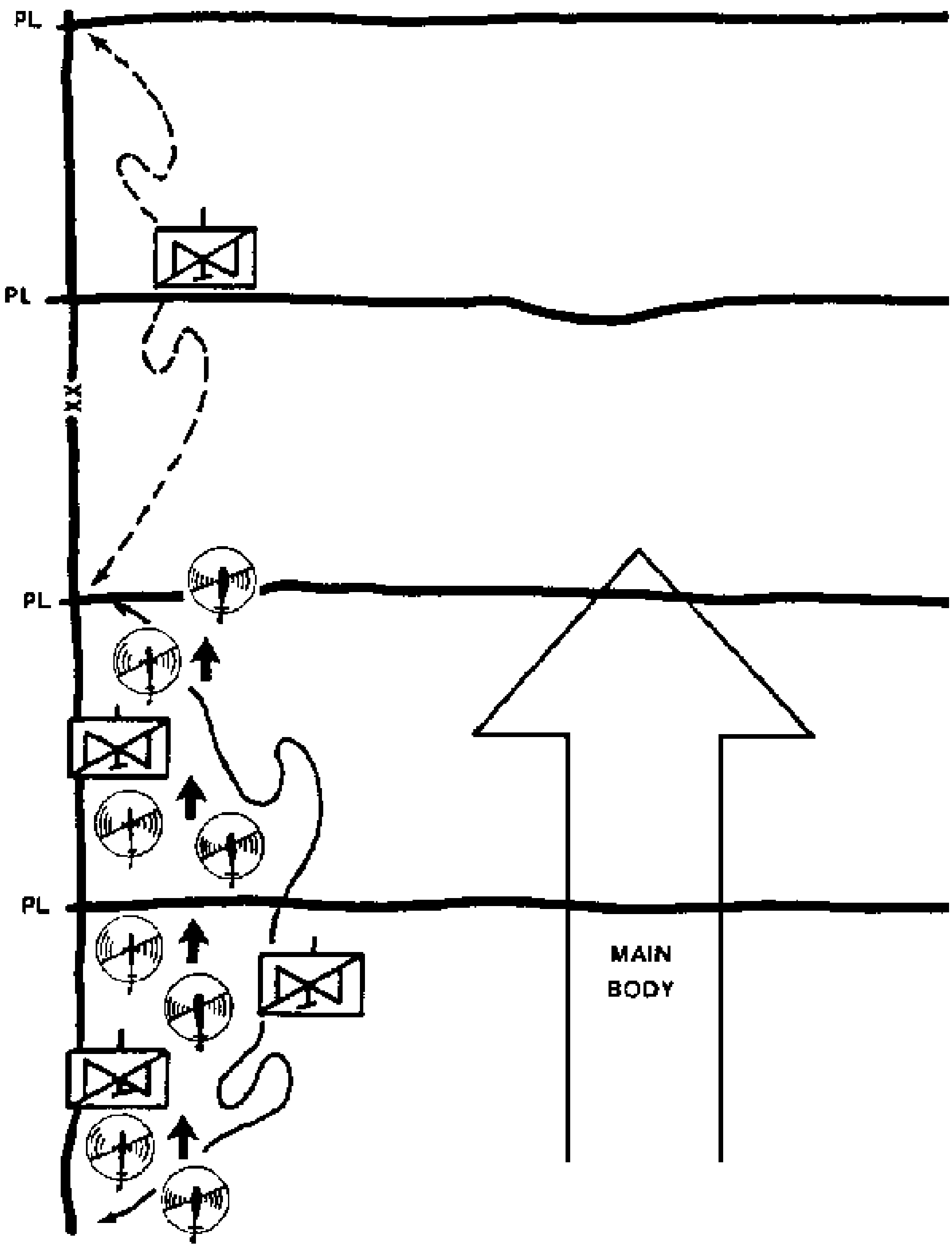


Figure 3-16. RAS moving forward continuously.

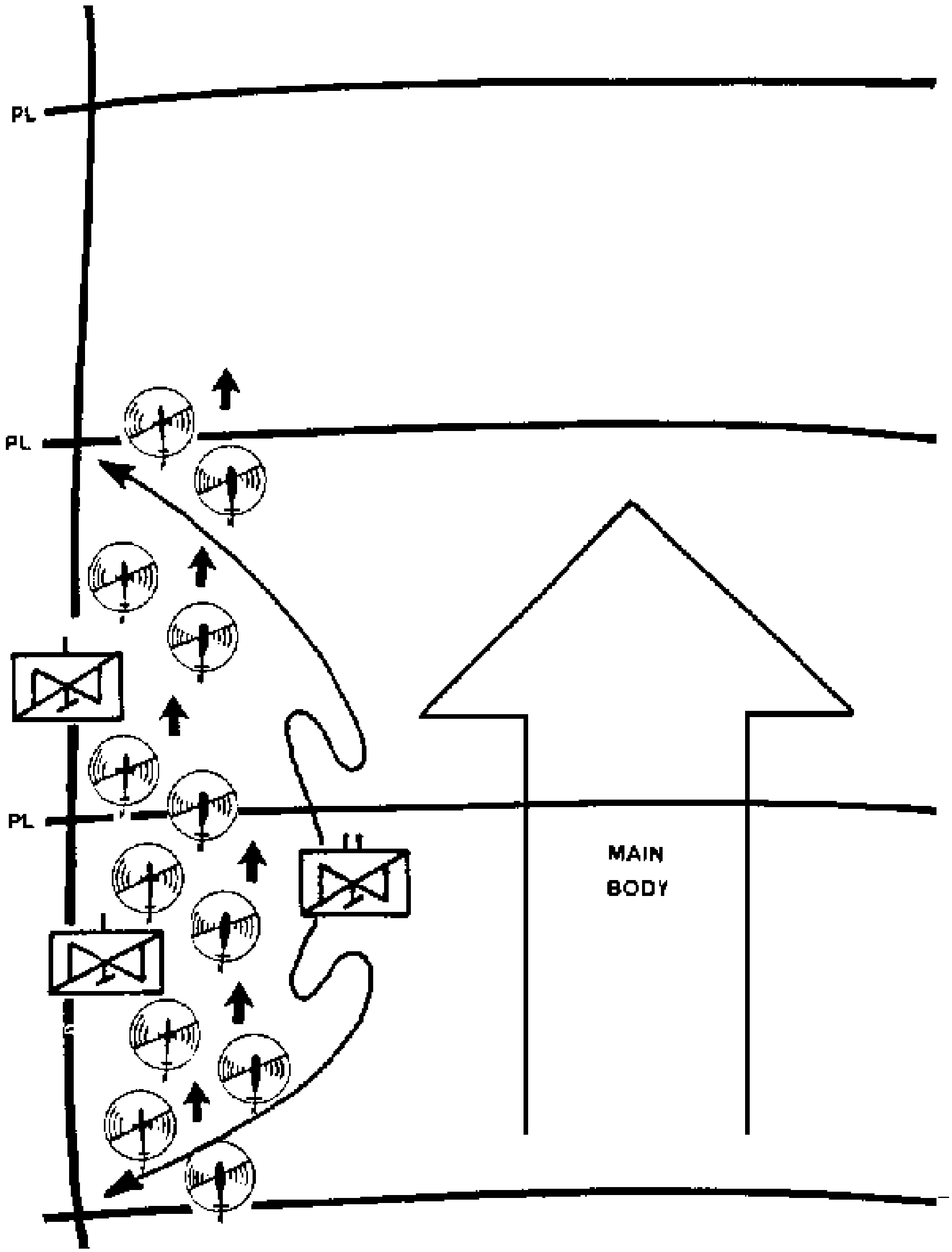


Figure 3-17. RAS moving forward in an accordion-like manner.

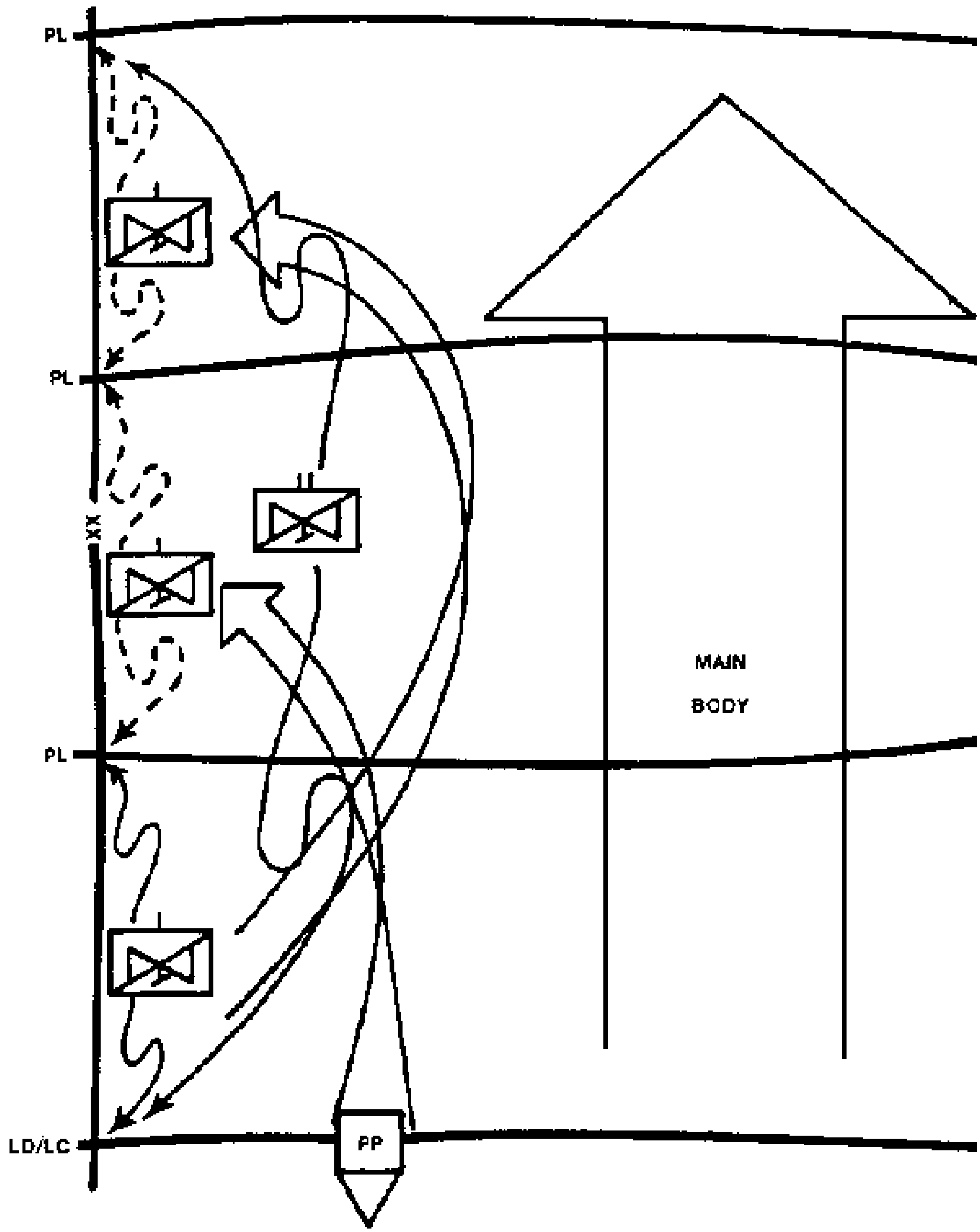


Figure 3-18. ACTs in bounding overwatch as part of a squadron screen.

f. Rear Area Operations Screen. During rear area incursions conducted by enemy forces, squadron elements may conduct a screen. The purpose of this operation is to maintain contact with and contain the enemy while friendly units maneuver to engage and destroy the rear threat. In this role, squadron forces may guide friendly quick-reaction forces. Figure 3-19 shows the RAS conducting a screen during a rear area operation.

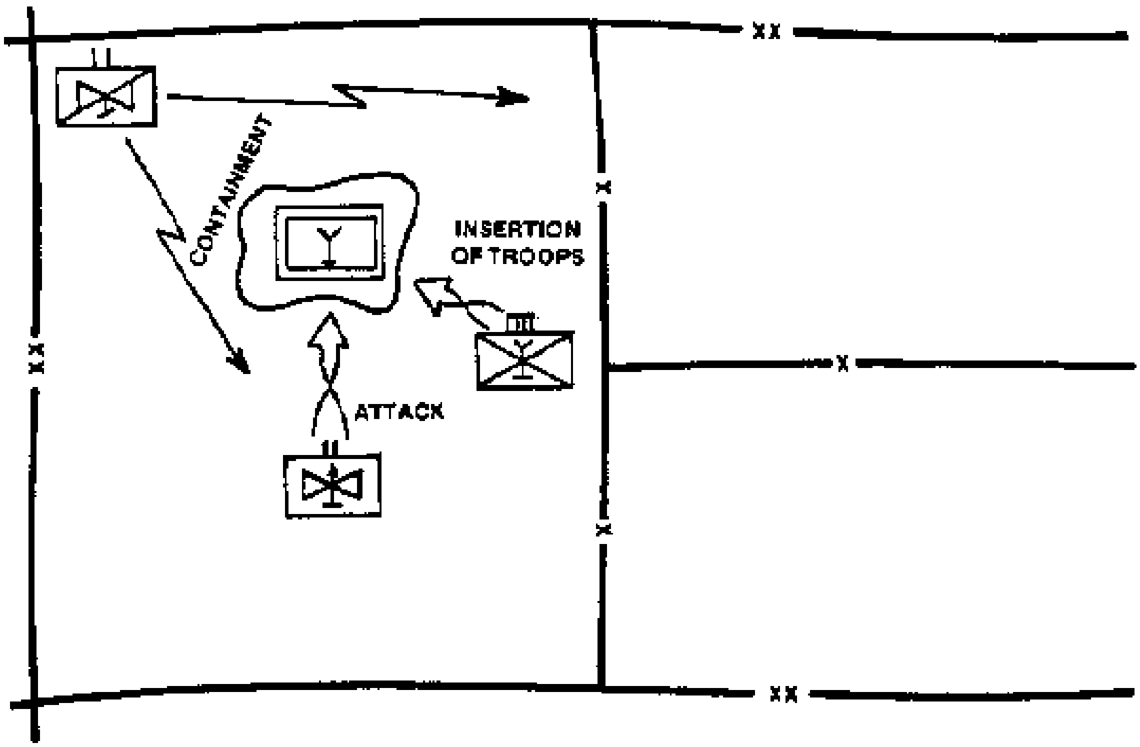


Figure 3-19. RAS conducting a screen as a part of a rear operation.

3-13. GUARD OPERATIONS

a. Purpose. A guard operation protects the main body from enemy ground observation, direct fire, and surprise attack. The ground force attacks, defends, or delays to destroy enemy reconnaissance elements and to disrupt the deployment of enemy first echelon forces. It provides early warning, reaction time, and maneuver space for the main body and protects the main body from premature deployment. A guard operation is normally conducted within the range of friendly artillery. The RAS normally does not perform guard missions without augmentation from the regiment or corps. METT-T and the degree of protection desired determine the RAS's augmentation requirements. The RAS may serve as the guard task force headquarters, or it may operate under a maneuver headquarters. A unit may conduct a guard mission to the front, rear, or flanks of the main body.

b. Missions. The three types of guard missions are advance, flank, and rear. Each is discussed below.

(1) Advance guard. An advance guard force is offensive in nature. It finds and defeats enemy units along the axis or route of advance and prevents surprise and premature deployment of the main body. As a member of an advance guard, the RAS deploys forward in a zone or a route reconnaissance.

(2) Flank guard. A flank guard protects a flank of the main body from ground observation, direct fire, and surprise. A flank guard for a moving force deploys to the flanks and establishes a series of BPs parallel to the main body's axis of advance. The guard force orients on enemy avenues of approach. It occupies successive BPs as the main body

advances. Normally, the RAS's role in a flank guard is to conduct screening operations, reconnoiter subsequent BPs, and provide security during the occupation of the BPs.

(3) Rear guard. During the advance of the main body, the rear guard detects and defeats enemy units that threaten the rear of the protected force. It conducts a delay without contact at a distance prescribed by the main body commander. The delay operation is normally within friendly artillery range and is oriented away from the main body's rear on the same axis of advance. The RAS's primary role is to screen the guard force as it delays while the main body advances.

c. Planning Considerations. The commander assigning the guard mission must indicate the type and level of protection required. Because guard forces are expected to force and disrupt enemy deployment, they normally operate on narrower fronts than screening forces. A commander directing a guard mission must consider the requirement to clear the area between the main body and the units' guard-designated positions. The guard force may need additional assets to clear this area while keeping enough combat power forward to protect the main body. Guard units may have an FA unit in direct support or first priorities of fires from designated FA units. This assistance depends on the amount of FA support available and the type and level of protection required by the commander who assigns the guard mission. Normally, guard units occupy BPs across the most likely avenues of approach. They do not withdraw to successive positions without the permission of the main body commander. The screening force commander may direct movement to successive screen lines. Troops within the RAS will often have different missions. For example, one troop may screen a less vulnerable zone while the remaining troops guard an area with critical avenues of approach. The RAS usually does not conduct guard operations. Instead, it acts as a screening force.

d. Stationary Guard. A stationary guard is performed when the main body is not moving. It may be conducted to the front, rear, or flanks of the main body but is normally conducted to the front. As part of a stationary guard, the RAS deploys forward of a designated PL, usually within friendly artillery range, and conducts reconnaissance and screening operations. The main guard force does not displace behind the designated PL without the permission of the main body commander. A PL designating the rear of the RAS's area is farther from the main body than the effective range of enemy direct fire weapons (roughly 4,000 meters). The RAS conducts a zone reconnaissance from the rear to the BPs, reconnoiters the BPs, and establishes a screen line. It provides reaction time for the main guard force and, consequently, the main body. The RAS determines the enemy's disposition, destroys enemy reconnaissance elements, and assists the main guard unit in forcing the enemy to deploy. It also disrupts the enemy's forced deployment and guides main body reaction forces for the counterattack.

Figure 3-20 shows the task organization of an armored cavalry squadron augmented as a guard force.

```
          A TROOP                         B TROOP
              C TROOP                 D COMPANY
                     SQUADRON CONTROL
                           ACT
                          ATKHT
                           AHT
                         HOW BTRY
                       ENGINEER PLT
                      AIR DEFENSE PLT
```

Figure 3-20. Task Organization for a guard force with an armored cavalry squadron as the controlling headquarters

e. Mobile Guard. Mobile guard operations are conducted when the main body is moving either in the attack or retrograde. Mobile guard operations also may be conducted to the front, flank, and rear of the main body.

(1) Advance guard. An advance guard for a moving force develops the situation to the front along specific routes or axes to prevent surprise or premature deployment of the main body. It plans and fights as in a zone or route reconnaissance. An advance guard must have artillery coverage. The main body is normally in a movement to contact. The advance guard develops the enemy situation by fighting to gain intelligence.

(2) Flank guard. As a flank guard, the RAS performs the same tasks for a moving force as it does for a stationary force. However, the flank guard for a moving force advances systematically to a series of BPs. It moves along a designated route parallel to the main body's axis of advance and clears the area between its route of advance and the main body. Flank guard activities are primarily reconnaissance-oriented. Figure 3-21 shows the RAS with augmentation conducting a flank guard for a moving force.

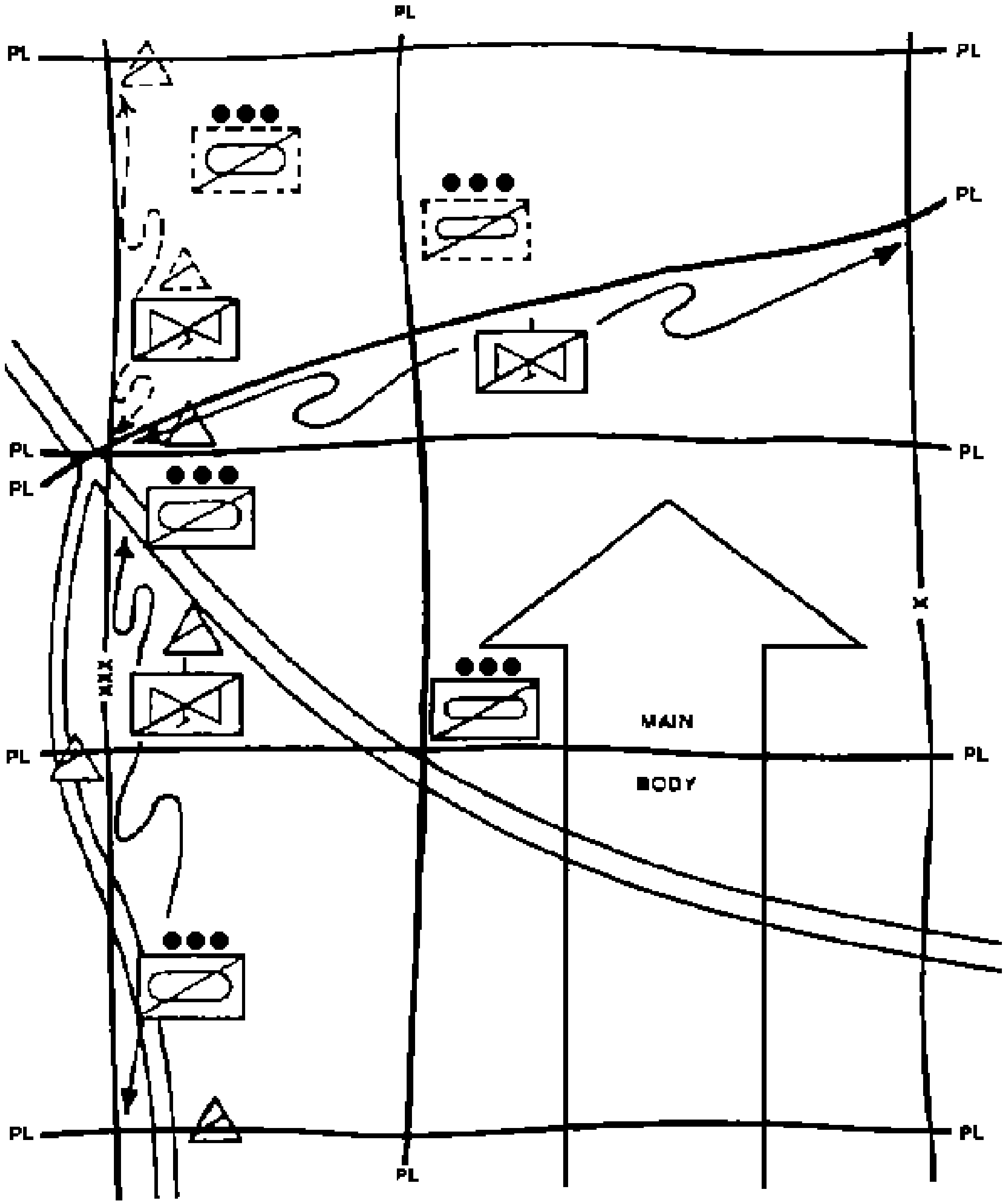


Figure 3-21. RAS with augmentation conducting a flank guard for a moving force.

(3) Rear guard. As part of a rear guard, the RAS performs the same tasks for a moving force as it does for a stationary force. However, it must periodically displace rearward to stay within the range of the main body's artillery.

3-14. COVERING FORCE OPERATIONS

a. Purpose. The RAS is an integral part of the ACR's covering force operations. On the nonlinear battlefield, a successful covering force may continue attacks into vulnerable enemy flanks and rear areas in one sector while the battle is handed over in another sector. The RAS is well suited for raids into enemy rear areas to disrupt follow-on forces, facilitating the complete destruction of the enemy's first echelon. The covering force operation is conducted as a zone reconnaissance to fully develop the situation. The RAS is tailored to augment the ACR and accomplish this task. It may be required to destroy enemy reconnaissance and advance guard units and to force enemy first echelon elements to deploy. The covering force also locates and breaches the defenses of a deploying or deployed enemy force. The covering force may not bypass an enemy force without the permission of the covering force commander. Adequate close support for the covering force is one FA battalion per maneuver squadron or task force. Organic FA assets consist of one FA battery per armored cavalry squadron. The covering force develops situations earlier, fights larger enemy forces longer, and defeats more enemy forces than a guard force. The four basic types of covering forces are advance (offensive), defensive, flank, and rear.

(1) Advance (offensive) covering force.

(a) The RAS's role as part of an advance covering force is to conduct a zone reconnaissance in concert with the armored cavalry squadrons to develop and influence the situation. The RAS will augment the armored cavalry squadrons in the reconnaissance and will conduct a screen. The RAS, as an integral part of the covering force, assists in locating and penetrating the security and forward defensive zones of an enemy force deployed or deploying to defend. It also assists the covering force in destroying enemy reconnaissance and advance guard units and in forcing first echelon regiments of a moving enemy force to deploy. As the covering force headquarters, the ACR is reinforced with such assets as attack helicopters, air assault forces, FA, tactical air support, engineers, air defense, task forces, and CS units. An advance covering force moves to contact boldly on a broad front. The distance it operates forward of the main body depends on the intentions and instructions of the main body commander. This distance also depends on the terrain, the enemy's location and strength, the main body's rate of march, and the ACR's advance.

(b) While conducting covering force operations, the ACR normally retains a reserve. The reserve force may be attached infantry or tank assets and may include elements of the RAS. The reserve force may be centrally located, ready to deploy anywhere in the squadron zone, or located in the most dangerous part of the zone. It may be positioned to support the commander's tactical scheme of maneuver by executing a mission such as attacking a vulnerable flank identified earlier by an ACT. The reserve must be prepared to attack, counterattack, or occupy battle positions. When the covering force can advance no farther, the reserve defends and assists in the main body units' passage of lines. Enemy flanks and gaps are actively sought and immediately reported and exploited. The RAS may guide main body units as they attack through and around the covering force. Figure 3-22 shows the RAS as part of a covering force.

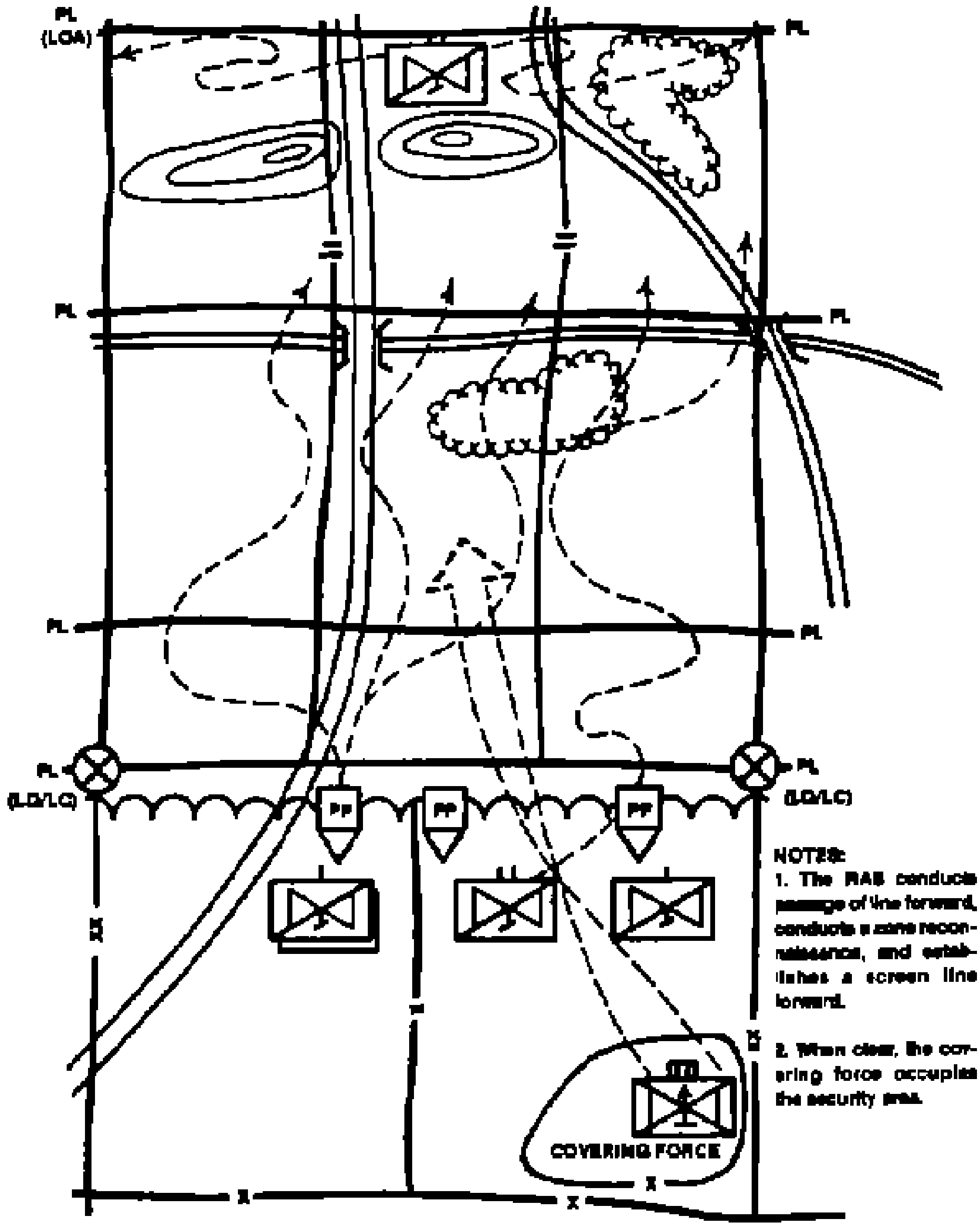


Figure 3-22. RAS conducting a zone reconnaissance with armored cavalry squadrons and a screening operation as part of a covering force.

(2) Defensive covering force. A defensive covering force operates forward of the main body. The RAS is not well suited as a controlling headquarters; too many assets would be required for augmentation and the RAS lacks a continuous operations capability. As part of a defensive covering force, the RAS may conduct reconnaissance and screening operations and act as a rapid-reaction force for counterattacks and reinforcements. A defensive covering force--

- Forces the enemy to deploy into attack formations.
- Identifies, disrupts, and destroys enemy follow-on forces.
- Deceives the enemy about the location of the FLOT or FEBA.
- Destroys air defense elements of enemy first echelon forces.
- Determines the strength of the enemy and the location of its main attack.
- Destroys enemy reconnaissance, advance guard, and first echelon elements.
- Reinforces the terrain with barriers and obstacles to slow the enemy's advance.

(3) Flank covering force. The flank covering force normally covers only one flank of the main body. As a flank participant, the RAS operates the same as when conducting a flank guard for a moving force. Tasks differ in the scope of operations and the distance from the main body. The main body commander specifies how and when a covering force will assume a flank covering force mission. As part of a flank covering force operation, the RAS may conduct flank screening or guard operations (when augmented).

(4) Rear covering force. A rear covering force for a unit moving away from the enemy first deploys behind forward maneuver units of the main body. Then it defends or delays. This line may be behind the main body's forward brigades or divisions, depending on available space and whether the main body is already disengaged. Usually, the RAS deploys behind forward brigades or divisions. Troops establish passage points; assist with the withdrawal of the main body, if necessary; and prepare to reorient in any direction.

b. Objectives. Covering forces are used in both offensive and defensive operations. The objectives are as described below.

(1) Offensive operations. In offensive operations, covering forces to the front and flanks prevent surprise and establish contact with the enemy. They also protect the main body from detection or engagement by enemy security forces bent on stopping the momentum of the attack. To achieve these objectives, covering forces--

- Deny the enemy information about the size, strength, composition, and objectives of the main body.
- Develop the enemy situation to determine enemy strengths and disposition.
- Destroy enemy reconnaissance and security forces.

(2) Defensive operations. In defensive operations, covering forces make the enemy deploy, confirm the direction and strength of the enemy attack, and provide time for the main body to deploy. To achieve these objectives, covering forces--

- Determine the size, direction, strength, and composition of enemy maneuver units and supporting field artillery and air defense forces.

- Deceive the enemy and force it to deploy first and second echelon elements prematurely.
- Destroy enemy reconnaissance, advance guard, and first echelon units.

3-15. AIR ASSAULT SECURITY OPERATIONS

a. 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, seizing and holding key terrain, and disrupting enemy command and control. They are also used to obtain information about enemy installations, units, and activities and to force the enemy to concentrate in more than one area. The RAS will almost never conduct air assault operations because the ACR has no air assault assets. The RAS is a key element in air assault operations if the regiment is task-organized to conduct an air assault or the RAS is attached to a corps unit. The ground commander, therefore, must integrate the RAS into his combat planning and operations. Further information on air assault operations is in FM 90-4.

b. Phases. The RAS or its 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.

(1) Staging phase. The RAS 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, the RAS may conduct special-purpose operations, such as feints or demonstrations, away from the staging areas or PZs.

(2) Loading phase. The ACTs reconnoiter PZs before the arrival of assault helicopters. Once the PZ is cleared, squadron elements may screen a vulnerable flank or likely avenues of approach. Figure 3-23 shows the RAS employed in the first two phases of an air assault operation.

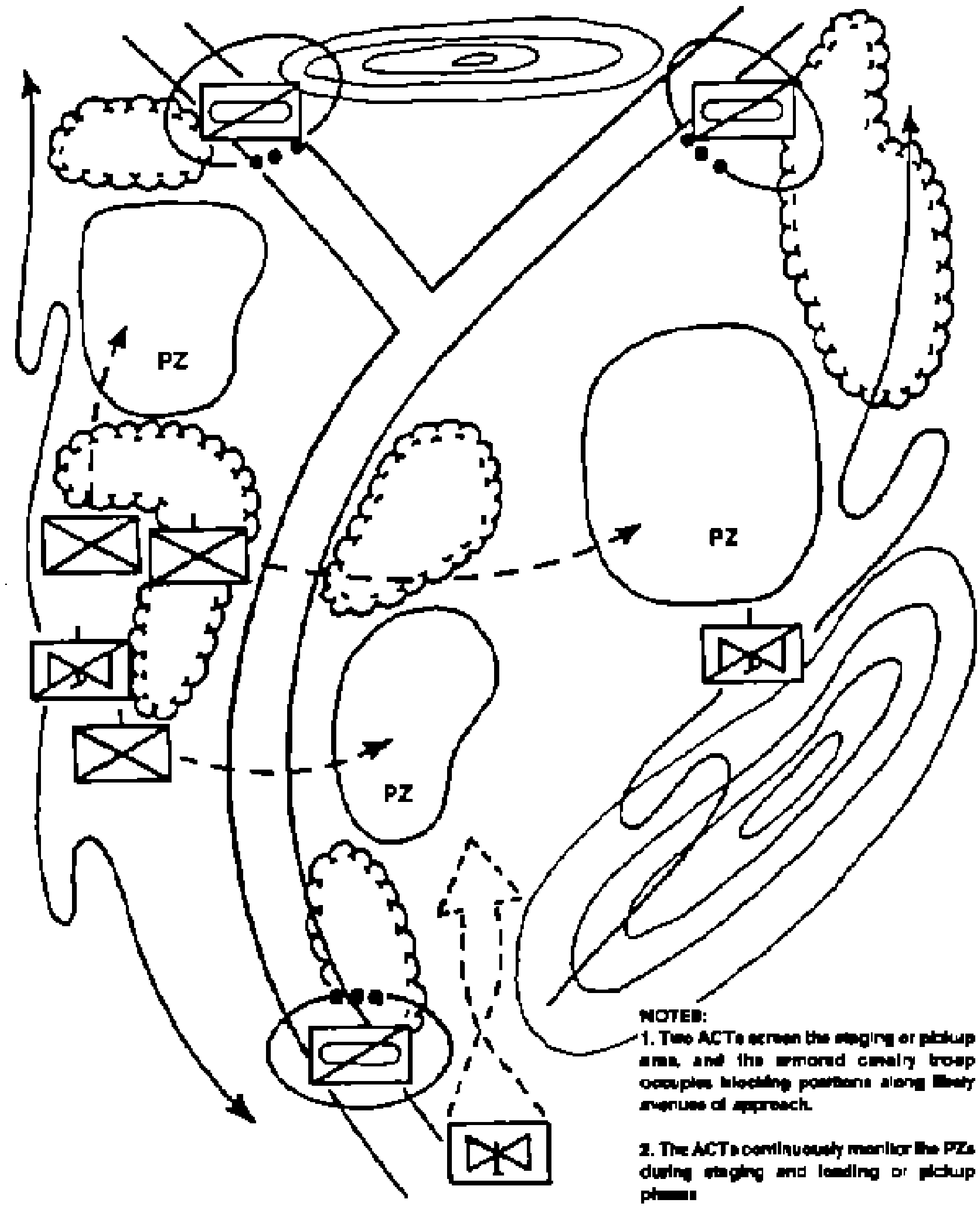


Figure 3-23. RAS employed in the staging and loading or pickup phases of an air assault operation.

(3) Air movement phase. Squadron 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 cavalry 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. The RAS also provides

pertinent information about a route that poses a threat to flight, including all natural and man-made obstacles. The RAS normally provides en route security or overwatch. To accomplish this task, it conducts a moving advance or flank screen or occupies successive BPs along the route. Air cavalry forces provide early warning of the enemy's approach and engage the enemy with organic fires. Squadron elements may assume responsibility for downed aircrew recovery operations for all aviation assets involved. The AHT may provide recovery aircraft, maintenance recovery teams with the AVUM troop, and limited medical evacuation. The AHT may also augment the assault helicopter forces. However, this role is neither a common occurrence nor a normal mission for the AHT.

(4) Landing phase. The RAS performs the same tasks during the landing phase as it does during the loading phase. The ACTs may occupy BPs to overwatch the LZ as well as the objective.

(5) Ground tactical phase. As the ground force moves to and seizes its objective, squadron elements may again conduct reconnaissance and screening operations. Squadron 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. Attack helicopters perform this task until they are relieved on station or the mission is completed. The RAS may be tasked to provide overwatching fires during the extraction sequence. Figure 3-24 shows RAS employment during the air movement, landing, and ground tactical phases of an air assault operation.

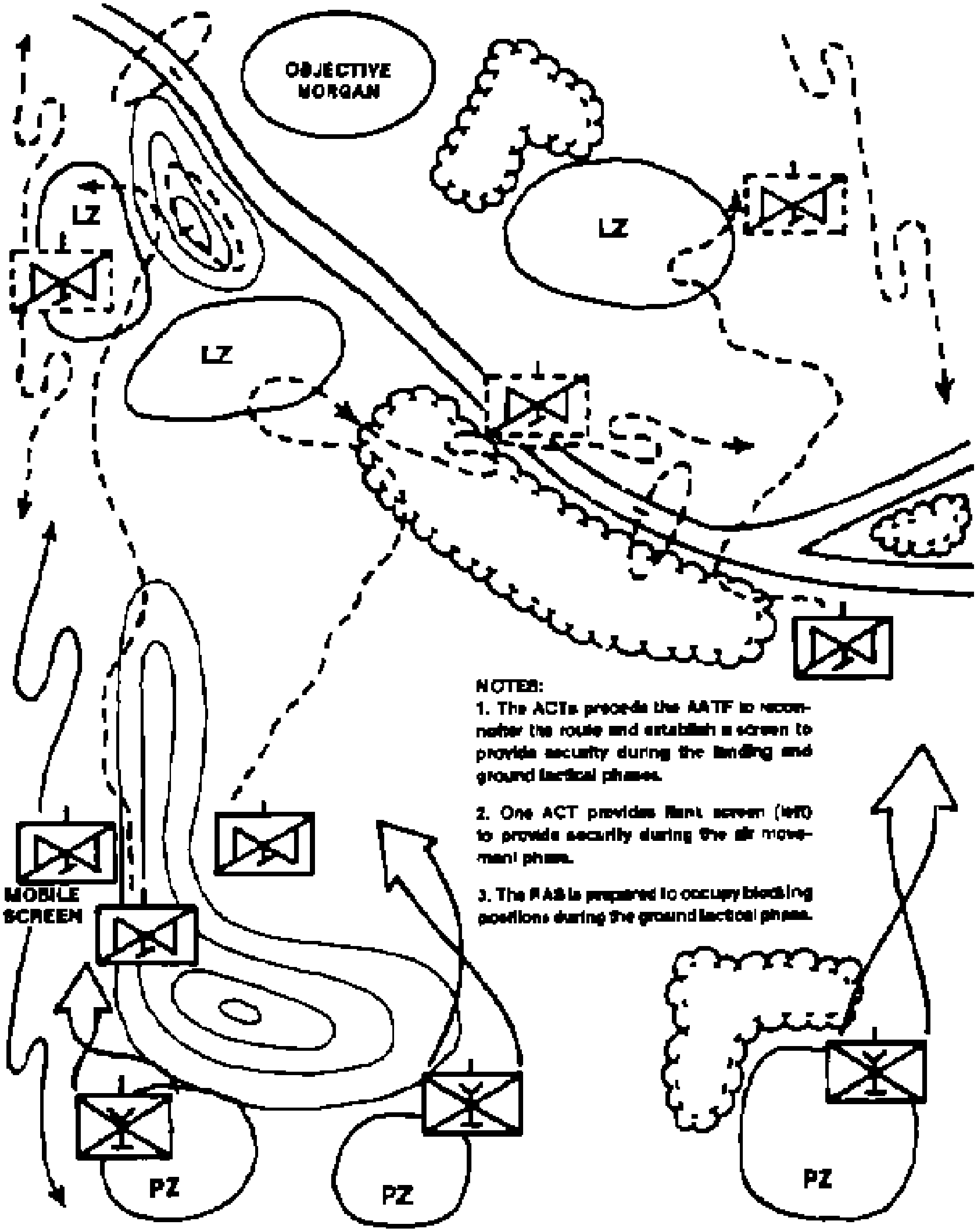


Figure 3-24. RAS employed in the air movement, landing and ground tactical phases of an air assault operation.

c. Fire Support.

(1) Supporting 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 throughout the entire route. 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.

(2) All available fire support is used to suppress or neutralize enemy weapon systems. 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 suppressing enemy air defense systems. On-call fires are planned along the flight route to ensure rapid adjustment on targets of opportunity. Requests for fire support are made to indirect fire support units through the FSO, who operates from a squadron aircraft. If an ALO or a TAC(A) is available (on station), the request for TACAIR may be made directly. This type of fire support request is frequently of an immediate nature. Chapter 4 and the 6-20-series field manuals describe immediate and planned requests for fire support and TACAIR.

Section IV
COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE ENHANCEMENT

3-16. LINES OF COMMUNICATION

The RAS provides reconnaissance and surveillance of lines of communication to ensure their security. Lines of communication include roads, supply routes, relay and retransmission sites, critical signal nodes, microwave facilities, and telephone wire structures and systems. The RAS may conduct reconnaissance operations before the establishment of a communications site. Squadron elements may also maintain surveillance of the area or provide a security screen during establishment of the site. The RAS conducts route reconnaissance missions to maintain surveillance of specified roads and supply routes. It conducts surveillance on a periodic basis or for a specified time to keep the route open and update information about the route. The RAS performs the same type of surveillance for telephone or power line structures to prohibit or decrease the likelihood of sabotage.

3-17. MESSAGE AND DOCUMENT DELIVERY

The electronic transmission of messages and documents may not be possible because of nuclear weapons or munitions employment or enemy jamming operations. The RAS may be used to deliver messages and documents in these cases or when radio listening silence is imposed or equipment is inoperable. Messages include combat plans and orders, written coordination and control measures, and graphics. Documents delivered include critical reports or reports essential for sustaining combat operations. They also include public affairs materials required to sustain public understanding and support for the Army's continued operations.

3-18. PERSONNEL AND EQUIPMENT TRANSPORTATION

a. When necessary, squadron elements provide transportation for commanders so that they can easily see the battlefield and thus more effectively control their units. Squadron elements usually perform this task in conjunction with normal squadron operations. The RAS can help effect vital liaison between the units. Squadron elements may be employed to verify unit locations or even their existence. For example, if the regimental commander loses communications with a subordinate squadron, he may ask the RAS commander to verify the squadron's location and status. The RAS can also serve as an additional supervisory link for the execution of plans and orders. Thus the RAS is a critical asset that can enhance the C^2 process of the regiment or corps. Most of the C^3I enhancement discussed above is done by command aviation assets of the regiment or corps. However, because the RAS frequently operates forward and is familiar with the area, it may often be tasked with C^3I enhancement functions.

b. RAS aircraft may carry retransmission equipment or relay equipment or both. Aircrews can also perform the retransmission or relay mission with onboard equipment while airborne. In this role, the RAS is integrated to facilitate movement of the main tactical CP for the regiment or corps. During a CP move or as a contingency, the RAS may provide alternate TOC or CP facilities for the regiment or corps.

Section V
SPECIAL-PURPOSE OPERATIONS

3-19. RECONNAISSANCE IN FORCE

a. A reconnaissance in force is a limited-objective operation. It is conducted by a larger force to obtain information and to locate and test the enemy's disposition, strength, and reaction. As the name implies, a reconnaissance in force is an action to develop battlefield intelligence and to reduce uncertainties about the enemy. Initially, as part of the force, the RAS conducts a zone reconnaissance to update the force commander. The RAS may also screen the movement of the force. If enemy contact is made, squadron assets probe to find weaknesses or to develop the situation. The augmenting forces must have the firepower, mobility, and agility required for this role.

b. The command and control function for a reconnaissance in force is similar to that for any other operation. However, a reconnaissance in force is characterized by violent, high-tempo actions that are integrated and coordinated throughout the entire effort. Engineer assets in a mobility role may augment squadron elements. Armor, infantry, and cavalry units make up the main force, and field artillery assets provide flexible direct support to the force. Air defense assets may also augment squadron forces to enhance the overall air defense effort of the force. When enemy contact is established, squadron elements direct and secure movement of the main force. They call for and adjust fires and assist engineer and air defense forces in support of the main force.

3-20. FEINT

A feint is an offensive operation intended to draw the enemy's attention away from the area of the main attack and thus cause the enemy to move its reserves or shift its fire support. 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 reveal its defensive posture and disrupt its decision-making cycle. These feints reduce the resistance that the attacking force will encounter. The RAS normally conducts reconnaissance and screening operations during a feint. However, the situation may require the RAS to engage targets more aggressively than normal with or without augmentation. The squadron may have to develop the situation more thoroughly in the objective area to compensate for the lack of reinforcements. The RAS screens the flanks and rear of the force conducting the feint, or it moves to join operations in the main attack area. The RAS can assist in feint operations by having the AHT execute false insertions. However, the force commander must assess the risks and determine whether reconnaissance assets will be employed in this role.

3-21. DEMONSTRATION

A demonstration serves the same purpose as a feint, but it 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 RAS's principal role in a demonstration may be to be seen and heard conducting operations in a given area. The AHT, together with ACTs, may simulate an air assault operation. The squadron as a whole seldom conducts a demonstration. The force commander should assess the risks for this operation as he would for a feint.

3-22. 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 cavalry forces seldom accompany a ground force as it moves to the objective. These units usually link up at the objective. Air cavalry missions during a raid include--

- Reconnoitering air routes for raiding aircraft.
- Screening air assault elements en route to objectives.
- Screening PZs while air assault forces board aircraft for the withdrawal.
- Controlling preparatory fires on objectives before air assault forces arrive.
- 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 VI
JOINT AIR ATTACK TEAM OPERATIONS

3-23. MISSION

A JAAT operation is a synchronized attack by attack helicopters, CAS aircraft, and field artillery against the same enemy target. The RAS is frequently called upon to form a JAAT while conducting its assigned mission. The JAAT mission can be assigned when the RAS is conducting a screen to destroy enemy reconnaissance elements. It can also be assigned when the RAS is acting as part of a guard force to destroy an enemy force that is attacking the main body. The JAAT may operate as an integrated part of the combined arms team, as a reinforcement for ground maneuver units, or as an independent force. In any case, it is used throughout the battlefield to support the commander's ground maneuver plan.

3-24. COMPOSITION

a. Scout and Attack Helicopters. The attack helicopter portion of the JAAT consists of either ACT or ATKHT attack aircraft and aeroscouts. The ACT or ATKHT conducts the mission as it normally would except for the additional planning and coordination required for joint operations. During JAAT operations, the RAS staff or one of its troop commanders is responsible for planning the JAAT, coordinating attacks in the engagement area, and suppressing enemy air defense systems.

b. TACAIR. TACAIR fighters that normally provide CAS include the A-10, A-7, F-4, and F-16. The A-10 offers several advantages over other aircraft assigned the CAS mission. The A-10 was designed specifically for CAS missions, and A-10 pilots routinely train with Army pilots on JAAT exercises. The relatively low operational speed of the aircraft enables the pilot to visually acquire and discriminate among ground targets. An A-10 can loiter for extended periods, make multiple attack passes, and react quickly to a changing attack plan. While the A-10 is the predominant CAS aircraft used in JAAT operations, A-7s, F-4s, F-16s, and possibly F-111s can also be used. These aircraft operate at much higher speeds than the A-10. Therefore, visual target acquisition and recognition will be proportionally degraded. However, these aircraft also bring advanced fire control systems and laserguided munition capabilities to the battlefield. Because these aircraft have much shorter loiter times than the A-10, more coordination is required between the ACT or ATKHT commander and the Air Force TAC(A) to ensure a successful JAAT operation.

c. Fire support.

(1) Fire support is normally used in conjunction with the attack. It suppresses or neutralizes enemy air defenses, forces armored vehicles to "button up" and reduces their visibility, and creates confusion within the command and control of the element under fire. Field artillery support for a JAAT may come from a battalion or battery assigned a tactical mission to support the JAAT.

(2) Fire support planning is accomplished by the fire support cell at the echelon responsible for planning and coordinating the JAAT mission. Normally, the squadron FSO supports the ACT or ATKHT involved in the JAAT. The FSO works closely with the Air Force TACP to

ensure that the fire support plan is integrated into the overall plan. The TACP may be located at a ground maneuver squadron, a regiment, or a corps headquarters. Once the JAAT operation is under way, the ACT or ATKHT commander or aeroscout works directly with the FSO to coordinate continuous fire support. When the ACT or ATKHT commander cannot contact the FSO directly, the squadron FSO may request an aerial fire support team from the division or corps and attach it to the JAAT organization to assist the FSO. The squadron FSO may also directly contact a field artillery unit that is supporting the JAAT mission. If the RAS is conducting operations with a ground force, the ACT or ATKHT commander can use a maneuver company's FSO to control artillery fires and to add the fires of the ground unit's mortars as well.

3-25. PLANNING CONSIDERATIONS

Each element of the JAAT retains its own system of command and control. Therefore, mission planning must be a coordinated effort between all members of the JAAT. Although the ground tactical commander normally has overall responsibility for requesting a JAAT, constant coordination is required between the ground maneuver commander; aviation commander; TACAIR flight leader, TAC(A), or TACP; and FSO. As elements of the mission change, all members must be informed so that they can adjust their plans accordingly. The team's success depends on how well the members understand the operation and on how well their actions are synchronized.

3-26. EXECUTION

a. JAAT operations can be preplanned or immediate. A preplanned JAAT is used when time is available to request CAS. The formal preplanned request is submitted usually 36 to 48 hours in advance. The FSO, in coordination with the TACP, drafts the request and passes it through Army channels to the TACC at the tactical air force headquarters. TACC personnel process the request according to priorities established by the joint force commander.

b. An immediate request for TACAIR is sent through Air Force channels when less than 36 hours are available to execute the mission. The Air Force TACP sends the request directly to the corps ASOC, using the Air Force radio request net. TACPs at intermediate level headquarters monitor the transmissions and advise the intermediate level Army commander of the request. The intermediate level commander may have other assets available or may choose not to honor the request. If so, he uses the TACP to relay his disapproval to the ASOC and the requesting subordinate units over the Air Force radio net. Silence on the part of intermediate level commanders is considered as approval at corps level. After the corps TOC validates the requirement, the ASOC fulfills the support request by using assets held in reserve or by diverting aircraft from other missions. In preplanned or immediate operations, all JAAT members should be notified as soon as possible so that they can begin the planning and coordination process.

3-27. EMPLOYMENT METHODS AND CONTROL

a. Employment. Employment of the JAAT depends on METT-T, and the method of employment is decided as early as possible to coordinate the attacking assets. The basic employment methods are sector attacks and combined attacks.

(1) Sector attacks. During sector simultaneous attacks, each JAAT element maneuvers within its assigned sector to engage targets simultaneously with other JAAT elements. All aircrews must coordinate ordnance fans to ensure fragmentation avoidance. In sector sequential attacks, each element maneuvers within its assigned sector to attack in a predetermined sequence. The sequence interval may range from seconds to several minutes. Sequencing the attacks reduces the ordnance fan coordination problem and facilitates covering fire for each preceding element. During sector random attacks, each element maneuvers within its assigned sector and engages targets at will. Again, ordnance fan coordination is necessary to ensure fragmentation avoidance because attacks may inadvertently become simultaneous.

(2) Combined attacks. During combined simultaneous attacks, all JAAT elements engage targets in the same sector and attack simultaneously. Each element must coordinate its ordnance fans and ensure fragmentation avoidance. In combined sequential attacks, all elements engage targets in the same sector and attack in a predetermined sequence. The sequence interval may range from seconds to several minutes. Combined sequential attacks reduce the ordnance fan coordination problem and facilitate covering fire for each preceding element. During combined random attacks, al elements engage targets in the same sector and attack at will. Ordnance fan coordination is necessary for random attacks because these attacks also may inadvertently become simultaneous.

b. Control. A successful JAAT operation requires constant coordination and control of all members of the JAAT at the point of attack. Otherwise, targets of opportunity may be missed, fires may be inadequate or ineffective, and enemy air defense assets may not be effectively suppressed. Although the ground maneuver commander who requested the JAAT operation has overall command responsibility, the ACT or ATKHT commander must orchestrate the elements of the JAAT into an effective weapon. He does this by coordinating with the different JAAT members: the ALO, FSO or AFST, aeroscouts, and attack platoon leader. In this way, each element retains its own command and control while operating as part of a larger force.

Section VII
AIR COMBAT OPERATIONS

3-28. 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. The RAS conducts air combat operations in the close, deep, and rear operational areas of the battlefield. The objectives of air combat operations are to provide self-defense, protect the force, and augment ground air defense efforts. 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 normally will be an implied mission. The RAS plans for and conducts 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.

3-29. PLANNING CONSIDERATIONS

Normally, the RAS 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 METT-T and the operational area (close, deep, or rear). METT-T and other factors are discussed below.

a. 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 be diverted from their primary mission by a chance air encounter. The RAS should plan to protect itself and members of the combined arms team regardless of the mission. All or part of the RAS 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 RAS's efforts with those of the combined arms team.

b. Enemy.

(1) When planning and executing air combat operations, the squadron must consider the size, training level, 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.

(2) The viability of a specific course of action will depend on the relative combat power of the two forces. The squadron element may not have the option of choosing which action to take because of the unit's mission or prescribed actions on contact.

c. Terrain and Weather.

(1) Terrain. Although terrain does not hinder helicopter maneuverability, it does enhance helicopter 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. FM 34-130 gives additional information on the IPB process.

(2) Weather. The weather affects equipment, terrain, and troops. Poor visibility degrades all aviation operations. Although some attackaircraft have "near all-weather" capability, poor

visibility degrades the speed and ease with which operations can be executed. The weather may also limit the amount of airspace available for air combat maneuvering. Low ceilings and poor 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 enemy fixed-wing aircraft operating above the cloud layer and complicate acquisition and engagement by fighters operating below the ceiling. More information on the effects of weather on military operations is in FM 34-81.

d. Troops. Troops available include all types of forces--air defense, CAS, attack, assault, artillery, armor, and infantry--as well as the RAS. While planning and allocating combat power, regimental and corps commanders will decide, based on METT-T, whether to assign a specified air combat mission to the RAS.

e. 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.

f. 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 command and control of their subordinate elements and the timely flow of intelligence. Plans must include the armament and fuel loads required for the mission. The numbers 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. In an air defense role, the rules of engagement, hostile criteria, and current weapons control status and air defense warnings are necessary considerations. While rules of engagement and hostile criteria vary from theater to theater, the weapons control status and air defense warnings are transmitted over the command radio net or can be requested from the air battle management operations center.

(1) Weapons control status.

(a) Hold--do not fire except in self-defense or in response to a formal order.

(b) Tight--fire only at aircraft identified as hostile according to prevailing hostile criteria.

(c) Free--fire at any aircraft not positively identified as friendly.

(2) Air defense warnings.

(a) Red--attack by hostile aircraft or missiles is imminent or in progress.

(b) Yellow--attack by hostile aircraft or missiles is probable.

(c) White--attack by hostile aircraft or missiles is improbable.

NOTE: Under rules of engagement, self-defense is never denied.

3-30. 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 that every available asset operates in concert to defeat the enemy. Potential participants in air combat operations are discussed below.

a. <u>Air Defense</u>. 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, regiment, and squadron is the forward area air defense C^2I. The 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 RAS and aviation brigade commanders and staffs must ensure that communication links are established with the air defense ABMOC of the regiment or corps.

b. <u>Armor and Infantry</u>. Armor and infantry units occupy the ground under which air combat may be conducted in close operations. Therefore, coordination of routes, corridors, and engagement areas is vital. The effects of air combat weapons on ground forces should be minimized when possible. Ground force fires should be coordinated in the air battle to increase effectiveness and reduce fratricide. To do 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, cal signs, and frequencies should be disseminated to aviation units operating in the area.

c. <u>Artillery</u>. Artillery coordination includes preplanning targets for SEAD, suppressing critical air threat nodes, and denying enemy helicopter standoff firing positions.

d. <u>Close Air Support</u>. 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 Air Force TAC(A) may enable some of the CAS aircraft to assist aviation forces in destroying or disengaging from the air threat.

e. <u>Other Support Measures</u>. Coordination with regiment, corps, and joint assets to jam the enemy's aerial C^3 can enhance the success of air combat operations. Sensor and surveillance systems are coordinated to assist in the detection, acquisition, and identification of enemy aircraft.

3-31. EMPLOYMENT CONSIDERATIONS

a. <u>Air Combat Techniques</u>.

(1) The increasing threat from enemy helicopters may cause modifications to existing techniques and procedures used by the RAS. The ATAS may further change the way the RAS operates to maximize the use of this system. When faced with an air threat, aviators must incorporate air combat techniques into their missions.

(2) Various air combat techniques have been distilled from many years of fixed-wing combat experience. Some of these techniques, which are 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.

(a) Avoid detection. Aircrews can avoid detection by frequently altering heading, varying airspeed, flying at the most concealed altitude, and avoiding abrupt maneuvers. Reducing shadows and using camouflage and free formations also aid in avoiding detection.

(b) 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.

(c) Recognize the air 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 altitude, direction of flight, armament, and number of aircraft in the flight.

(d) Decide whether to engage. The commander's decision to engage is based on whether engagement will enhance mission accomplishment. 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 the enemy aircraft armed?
- Can friendly aircraft engage at standoff ranges?
- Are other combined arms team fires available?

(e) 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.

b. Scout-Attack Roles.

(1) Fielding of the ATAS will be first to scout aircraft and then to attack aircraft. A situation where scouts are ATAS-equipped and attack aircraft are not may force the RAS to modify the air combat techniques it uses. Commanders may be advised to consider a nontraditional task organization when employing forces in air combat. Teams or platoons 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.

(2) When performing reconnaissance missions with a high rotary-wing threat, scouts with the ATAS are mutually supportive and may overwatch other scout-attack teams. Tests have shown that scouts are vulnerable to enemy 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. The result may be poor reaction times for the engagement of enemy aircraft and thus the enemy may be able to close within gun and rocket system ranges. Another problem is the limited effectiveness of the AH-1 weapon system. 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 and its lookout capability is increased. This should shorten detection time and permit ATAS engagement before the enemy helicopter can engage the overwatched element with its gun and rocket systems.

(a) Providing air assault security. When providing air assault security, the RAS or its 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 air 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.

(b) Destroying the air threat. If ordered to destroy the air 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 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 fire and maneuver elements to provide "close in" mutual support during the attack. Fire and maneuver elements retain the flexibility to adjust to unexpected enemy actions.

(c) Delaying the air threat. If ordered to delay the air 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.

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

(e) Engaging the air threat. The decision to engage the air 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.

Section VIII
PASSAGE OF LINES

3-32. PURPOSE

a. 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. It may be conducted at any level from a team up to and including a division-size force. If a unit must pass laterally through another unit, movement is conducted as a forward passage. The RAS normally assists in the passage of lines of the covering force, either forward to establish or rearward to disengage. 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.

b. The RAS frequently conducts a passage of lines as a part of reconnaissance, screening, and air assault security operations. It may coordinate and assist the regimental passage of lines.

3-33. PLANNING CONSIDERATIONS

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

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

b. 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.

c. Security. Squadron elements 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 reconnaissance squadron may occupy a screen line or serve as the controlling element for a divisional or brigade passage of lines.

d. 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.

3-34. CONTROL MEASURES

The time, conditions, or circumstances when responsibility for the zone or sector is transferred are planned in advance. The control measures are understood by the squadron commander and the passing unit commander, or they 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 made easier 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.

a. 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.

b. Battle Handover Line. The BHL is the place 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.

c. 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.

d. 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.

e. Passage Point. A passage point is the point where one unit will pass through another, either in an advance or in 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 on 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 crossing 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.

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

g. 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.

h. 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.

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

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

3-35. FIRE CONTROL

In a rearward passage, the stationary unit assumes control of fire support. In a forward passage, the passing unit assumes control and integrates into its fire support plan that of the stationary unit. Assets and control facilities are collocated to provide coordinated and responsive support. Although the RAS normally does not have organic indirect fire support, artillery (battery to battalion) may be placed in DS of the RAS for a particular operation.

3-36. LIAISON AND COORDINATION

a. Liaison. Liaison involves the exchange of information that may be necessary for the conduct of the passage of lines. Usually, the squadron XO or S3 conducts the initial liaison for all squadron passages. Liaison information includes--

- Routes.
- Fire support.
- Enemy situation.
- SOP information.
- Passage points and lanes.
- Airspace control measures.
- Obstacle locations and types.
- 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 or attack positions or both.
- CS and CSS locations for emergency support.
- Designated location of the passage PL. (This may be a BHL.)

b. Coordination. When the RAS 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--

- Airspace control measures.
- Period of time required for the passage.
- Time or event that triggers the battle handover.
- 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 aircraft 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.

3-37. FORWARD AND REARWARD PASSAGES

a. Forward Passage. Forward passages are normally executed during offensive operations to continue an attack; to conduct a penetration, an envelopment, or a pursuit; or to pass another unit. In the defense, a forward passage may be used to counterattack one unit through another. Normally, the squadron XO coordinates a rearward passage and the commander coordinates the forward passage. Initially, the commander coordinates with the passing unit at a designated contact point.

(1) During an air assault operation, coordination may be accomplished at the air mission briefing. After coordination, the commander begins troop-leading procedures, issues orders, and allows time for subordinate planning and preparation. Command and control elements participating in the passage may also be collocated for more effective coordination. In an air assault, collocation will not be possible. During a divisional passage of lines, the squadron may reconnoiter the passage lanes or points, initiate and maintain liaison, and conduct screening operations. These actions provide early warning and security for the operation. Figure 3-25 shows the RAS as part of a regimental passage of lines. During reconnaissance operations in preparation for a forward passage of lines, the RAS covers routes to, through, and beyond the area of passage. It also covers existing unit locations and proposed positions. Care must be taken not to compromise unit locations and intentions during the passage.

(2) The squadron commander establishes the contact points, passage points, and passage lanes if they are not specified in the corps or regimental order. If routes or lanes are not prescribed, the squadron provides guides for or escorts the passing unit at the contact point and leads the unit to the passage point. The stationary force enters and, as a minimum, monitors the passing units' communication nets. Stationary elements also provide local security by overwatching direct and indirect fires and assist the passing force as required. The FSO of the passing force may collocate with the stationary force. If the division has naval gunfire support, the squadron may be given an air and naval gunfire liaison company, which is described in Chapter 4. Normally, the battle or operation is considered to be handed over when passing forces gain direct fire contact with the enemy or exit the passage lane. When reconnaissance units are passed forward, the handover occurs when those units exit the

passage lane.

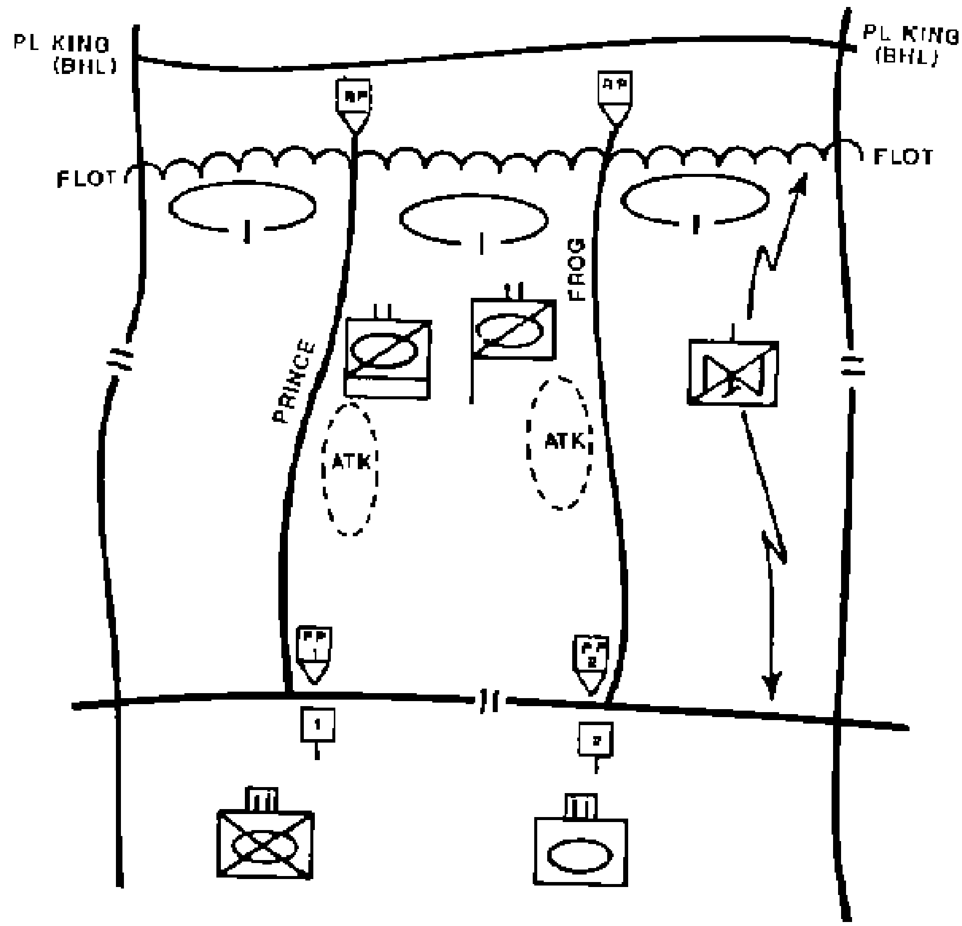


Figure 3-25. RAS as part of a regimental forward passage of lines.

b. Rearward Passage.

(1) When the RAS returns from a reconnaissance or security mission, it performs a rearward passage of lines in the same manner as other maneuver units. The RAS seldom assists other units in a rearward passage of lines, but it may be tasked to do so. The RAS must ensure that contact is maintained with the enemy during a rearward passage of lines. Contact points should be located along the designated passage PL. This allows the stationary unit to provide overwatching direct fires. Contact points should also be at easily identifiable locations such as road junctions or towns. Liaison parties from the stationary and passing units meet at the specified time.

(2) Either at the contact point or at the stationary unit's TOC, stationary unit personnel brief passing unit personnel on the information listed in paragraph 3-36. After this exchange, the RAS liaison party returns and briefs the XO and S3. Security for respective sectors or zones is coordinated and contact is established and maintained throughout the passage of lines. The RAS's plan of how the passage will occur is exchanged at this time if it has not already been delivered or electronically transmitted. The RAS normally passes CSS assets first and CS, TOC, and combat forces last.

(3) Once contact is made between the first squadron elements and forward friendly elements,

recognition signals are displayed. Stationary units are then notified that contact has been made and the passage has begun. All commanders and subordinate leaders must observe this passage. The only time the stationary element fires is when positive enemy identification is made.

(4) Squadron elements are responsible for organic overwatch of the designated PL. This overwatch is essential so that elements do not get cutoff. Once past the passage PL, forces are essentially funneled into the passage point and movement is continued as rapidly as possible. Disabled vehicles are recovered by self-recovery methods or by unit recovery vehicles. The stationary unit provides medical assistance, POL, and maintenance as far forward as possible. As a minimum, the stationary unit should provide medical support. Figure 3-26 shows the RAS conducting a rearward passage of lines.

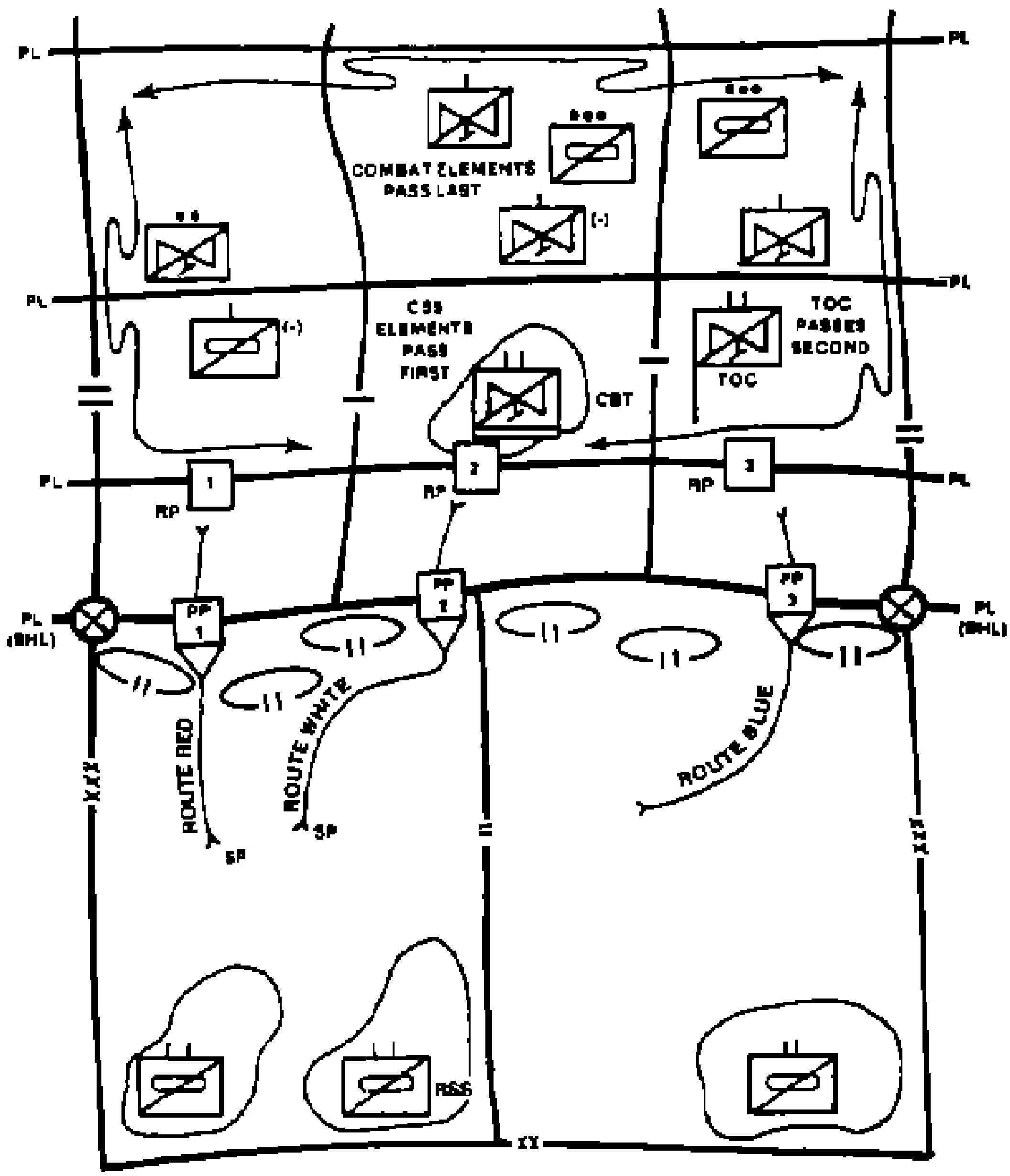


Figure 3-26. RAS conducting a rearward passage of lines.

Section IX
OPERATIONS

3-38. PURPOSE

a. A retrograde operation is an organized movement to the rear or away from the enemy. It may be forced by the enemy or voluntarily made. 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.

b. 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.

3-39. DELAY

a. A delay is normally conducted as part of a defensive battle. Integration of air troops is crucial to a successful delay operation. Air troops can 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; 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.

b. The air troops accomplish several of the tasks 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.

c. The air troops complement 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.

d. 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.

3-40. WITHDRAWAL

a. 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.

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

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

b. Air troops perform the same missions during a withdrawal as they would in a delay. 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 close air support.

3-41. 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. FM 17-95 contains further details on retrograde operations.

CHAPTER 4
COMBAT SUPPORT

This chapter implements portions of STANAG 3805.

A significant amount of combat support is required to enhance the RAS's reconnaissance and screening capabilities. The regiment or corps provides this support in the form of DS, GS, or attachment relationships. When the RAS performs reconnaissance and screening operations for the ACR, logistics is normally provided by the regimental support squadron and is coordinated through the RSS S3. Support relationships are coordinated in the OPLAN. The support may come from a unit within the regiment or corps that is located near the RAS's area of operations and can best support the mission. Combat support elements multiply the effects of combat power by increasing the unit's mobility and resource efficiency without adding combat units. Combat multipliers include fire support; CAS; engineer support; signal support; air defense; intelligence, EW support, and counterintelligence; A^2C^2; ATS; and chemical support. This chapter describes these assets and their application to the RAS.

Section I
FIRE SUPPORT

4-1. FIELD ARTILLERY

Traditionally, artillery has three functions: close support, attack at depth, and counterfire. SEAD is conducted and coordinated to neutralize, destroy, or temporarily degrade or disrupt enemy air defense systems and thus enable the conduct of successful air operations. The RAS normally does not receive DS artillery; however, it should have at least an FA battalion in direct support for a mission that requires SEAD. The RAS may receive priority of fires from the GS battalion or battery for a specified time, a specified mission, or both. If the RAS is under OPCON of a brigade, it may receive fire support from the artillery battalion in DS of the brigade. The RAS may also receive fire support from the closest artillery unit adjacent to or within its area of operations.

a. Fire Support Planning and Coordination.

(1) The fire support plan is developed concurrently with the maneuver plan. The RAS FSO is the fire support coordinator and, as such, plans and coordinates fire support for the squadron. The RAS FSO--

- Prepares the fire support plan for the squadron OPORD.
- Plans for the integration of AFST assets, when available, into the fire support plan.

- Establishes and supervises an FSE in the RAS TOC. (The FSE deploys forward with the tactical CP.)
- Plans and coordinates fire support request nets (quick-fire nets), available fire support, priority of fires, artillery unit locations, and fire control measures with regimental or corps artillery units for the RAS or its troops.

(2) To ensure that the fire support plan supports his operations, the RAS commander plans maneuver and fire support concurrently. He plans fire support to--

- Provide covering fires.
- Provide screening smoke.
- Support contingency plans.
- Provide immediate responsive fires.
- Suppress known or suspected enemy locations.
- Attack deep, close, and rear targets with massed fires.
- Suppress enemy air defense and indirect fire positions.

(3) Fire support coordination consists of implementing the fire support plan and managing fire support assets. Fire support planning is continuous and flexible to allow rapid changes and rapid response to unexpected situations in combat. Fire support planning is also closely coordinated with the scheme of maneuver and obstacle support planning. The many situations occurring in battle require different responses or actions. Planning actions are established in unit SOPs and FRAGOs. To cover al situations, the FSO accomplishes two types of fire support planning: formal and informal. In either case, fire support planning is continuous and concurrent at all levels.

(a) Formal planning. Formal planning goes from higher to lower echelons. The RAS commander and FSO must know the availability of artillery assets and the capabilities of the unit. The FSO advises the commander on asset allocation for close support, counterfire, and SEAD; priority targeting; and intelligence collection. He also advises the commander on damage guidelines (when to suppress, neutralize, or destroy) and employment guidelines for target acquisition assets. The formal plan is simple and flexible. It includes the commander's guidance and specific instructions regarding the integration of maneuver and fire support. The commander provides guidance for the establishment of priority of fires and fire support coordination and control measures. He also designates priority targets and target areas and specifies communication and coordination procedures. The formal plan informs troop commanders of what fire support is available and allocates priorities. It also provides coordinating instructions for counterfire, SEAD, and control measures. The plan establishes the direction of intelligence and target acquisition efforts and desired damage guidelines. The effects that the commander may require on a target are expressed as suppression, neutralization, and destruction. Suppression limits the ability of enemy personnel in the target area to do their jobs and usually lasts only as long as fires are continued. Neutralization puts a target out of action temporarily. (Normally, casualties of 10 percent or more will neutralize the target.) Destruction puts a target out of action permanently. (Casualties of 30 percent or more normally render the unit permanently ineffective.) Some munitions only suppress while others destroy. The FSO advises the commander on the effectiveness of munitions.

(b) Informal planning. Informal plans usually are not written. They are more dynamic than formal plans and change continuously because of rapidly changing situations on the battlefield. Informal fire support planning goes from lower to higher echelons and is accomplished by the RAS FSO.

b. Suppression of Enemy Air Defenses.

(1) SEAD is an essential part of all operations employing Army and Air Force assets. It increases the probability of success and reduces the loss of friendly air power. Before a CAS request is submitted, the benefits of the support are weighed against the SEAD effort required to accomplish the request. In some cases, SEAD may take priority over RAS close support artillery missions.

(a) Suppressive fires. SEAD requires an integrated air and land force effort to locate and suppress enemy surface-to-air defenses. The location and detection effort is continuous and is emphasized during actual attacks on a critical portion of the enemy's air defense systems. When air support operations take place close to the FLOT, suppression is achieved primarily by fires from division direct and indirect fire systems. Threat combat formations are characterized by a high density of first echelon air defense units and SHORAD systems. HIMAD systems are not located near the FLOT, but they are able to cover this area. HIMAD systems are a threat to friendly aircraft that must climb to higher altitudes to deliver their ordnance.

(b) Planned fires. Specific fire support units are designated to engage preplanned air defense targets. These are allocated on a firstpriority basis for a limited time. Suppressive fires are routinely planned against known and suspected SA-6, SA-8, and SA-11 air defense sites. Planned targets may be scheduled (fire is delivered according to a time schedule), or they may be on call. Planned enemy air defense targets may be engaged as part of preparations or counterpreparations, groups of targets, and series of targets. They may also be engaged to support a coordinated air-to-ground operation. In the latter case, the FSO plans and schedules artillery fires. The FSO considers the type of mission to be flown, the tactics to be used by the aircrew, and the locations of enemy air defense systems. He also considers the terrain and weather, which will influence the capabilities of friendly weapons.

(c) Immediate fires. Because the exact location of every enemy air defense weapon cannot be known, some suppression assets should be immediately available to pilots or observers. Units to support this effort are designated before the operation begins. First priority of fires for these predesignated units will change to immediate SEAD fires when aircraft are used in the area.

(2) Normal fire request channels are used for the engagement of targets of opportunity. Because of the mobility and small size of most air defense targets, aircrews use observed fire techniques and engage targets immediately upon detection. Fire is adjusted on these targets by forward observers or AFSTs, attack or scout helicopter pilots, and USAF pilots either directly or through the TAC(A). Commanders may order the forward observer to locate and bring under attack enemy air defense systems in the vicinity of the target just before the arrival of friendly aircraft.

(3) The potential of fire support as a combat multiplier can be realized only through meticulous planning and thorough coordination at all levels. This is especially true of SEAD operations in which the RAS's FSE must continually plan to use any and all available assets in a fire support role. With coordinated SEAD operations, the commander can protect his assets and fully exploit the capabilities of the RAS.

c. Fire Support Coordination Measures. The RAS commander enhances the coordination of fire support by using fire support coordination measures. These measures are depicted on maps, charts, and overlays either to reduce requirements for coordination or to restrict firing into certain areas. Restrictive measures are those that restrict or prohibit firing into an area. Permissive measures are those that reduce requirements for coordination and thereby expedite the attack of targets When a restrictive or permissive measure is used, the graphic display contains the title (abbreviation) of the measure, the establishing headquarters, and an effective date-time group. Figure 4-1 shows restrictive fire support coordination measures; Figure 4-2 shows permissive fire support coordination measures.

(1) Restrictive fire area. An RFA is an area in which specific restrictions are imposed. Fires that exceed those restrictions will not be delivered into the area without coordination with the establishing headquarters. All fires into an RFA are regulated according to the stated restrictions. The RFA is established by the ground commander responsible for the area. It is located on identifiable terrain by a grid or a radius (in meters) from the center point. The RFA location is disseminated through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units.

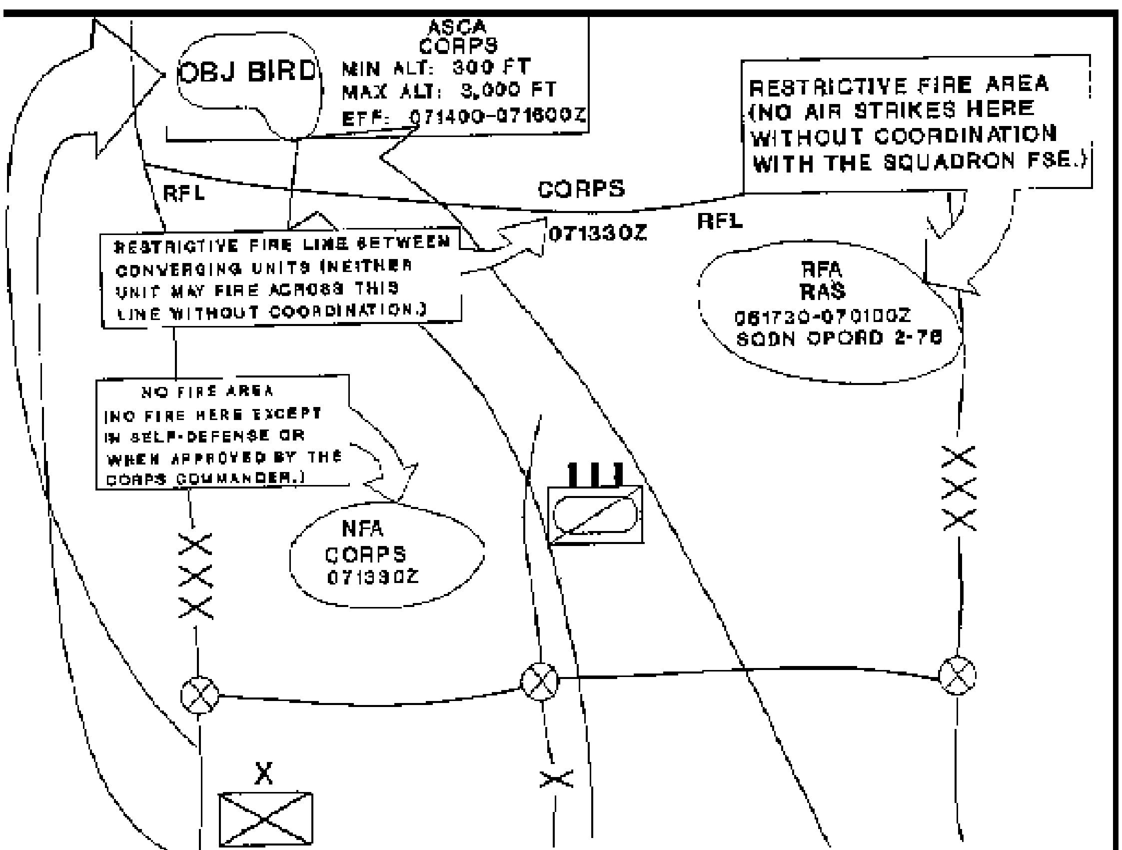


Figure 4-1. Restrictive fire support coordination measures.

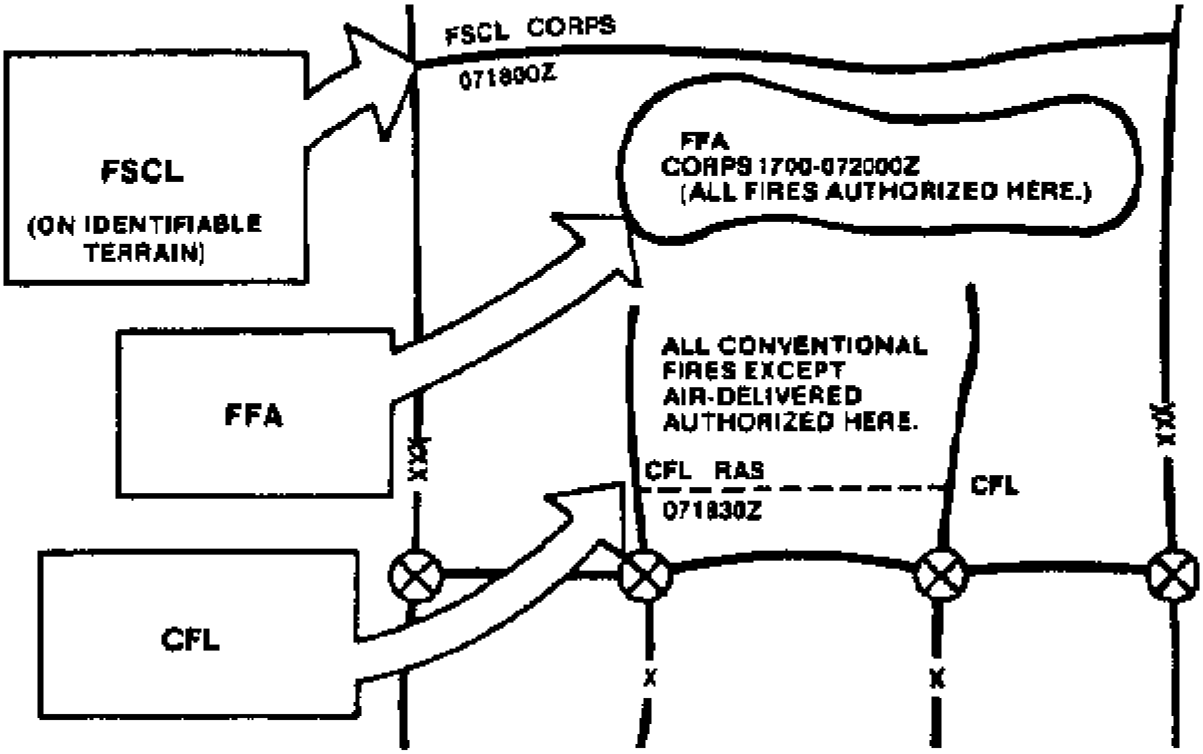


Figure 4-2. Permissive fire support coordination measures.

(2) No-fire area. The NFA is an area in which no fires or effects of fires are allowed with two exceptions. One exception is when the establishing headquarters approves fires (temporarily) within the NFA on a mission basis. The other exception is when an enemy force within the NFA engages a friendly force. In that case, the commander may engage the enemy to defend his force. All fires or their effects into an NFA are prohibited unless prior clearance is received. The NFA is established by the regiment or corps in concert with the host nation. It is located on identifiable terrain by a grid or a radius (in meters) from the center point. The NFA location is disseminated through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units.

(3) Restrictive fire line. The RFL is established between converging friendly forces (one or both may be moving). Fires or effects of fires across the RFL are prohibited unless coordinated with the affected force. The RFL prevents interference between converging friendly forces and is established by the common commander of the converging forces. It is located on identifiable terrain usually closer to the stationary force than the moving force. The RFL location is disseminated through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units.

(4) Airspace coordination area. The ASCA is a block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. It may occasionally be a formal measure--a three-dimensional box in the sky. Normally, it will be informal; for example, to keep the FA and naval gunfire north of Green River and to keep CAS to the south. The ASCA is established by the regimental or a higher-level commander. It is located above the target as recommended by the ALO. The size of the area is dictated by the type of aircraft and ordnance employed. Its location is disseminated through maneuver, fire support,

and A²C² channels to higher, lower, and adjacent headquarters and supporting units. Information about the ASCA includes minimum and maximum altitudes, length (two coordinates), width, and effective date-time group.

(5) Coordinated fire line. The CFL is a line beyond which conventional or improved conventional indirect fire means may fire at any time within the zone of the establishing headquarters without additional coordination. It expedites the attack of targets beyond the line. Usually, the CFL is established by a regiment or a corps, but it may be established by a maneuver squadron. It is located as close to the establishing unit as possible, without interfering with maneuver forces, to open up the area beyond to fire support. Regimental CFLs may be consolidated at corps level as a corps CFL designated for the corps' zone of action. If modifications to regimental CFLs are considered, they must be coordinated with the regiment to ensure that they are compatible with battle plans. Normally, regimental commanders establish CFLs and corps commanders consolidate them and designate a corps CFL. The CFL is graphically portrayed by a dashed black line with "CFL" followed by the establishing headquarters in parentheses above the line and a date-time group below the line. Locations for CFLs are disseminated by message or overlay through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units.

(6) Fire support coordination line.

(a) An FSCL may be established by the corps within its area of operations to support its concept of the operation. It must be coordinated with the appropriate tactical air commander and other supporting elements. The FSCL allows the corps and its subordinate supporting units to expeditiously attack targets of opportunity beyond the FSCL. The attack of targets beyond the FSCL by Army assets must be coordinated with the supporting tactical air. This required coordination is defined as informing or consulting with the supporting tactical air. However, the inability to effect this coordination will not preclude the attack of targets beyond the FSCL. The interface within the fire support cell between the various fire support representatives provides an excellent means of initially coordinating the attack of targets in this area. Targets of opportunity beyond the FSCL may be attacked by a unit. However, the attacks must support the operations of the attack unit, the higher headquarters of that unit, or a headquarters supported by that unit.

(b) Certain conditions should be met before an FSCL is established by the corps. First, a portion of the corps' deep operations area should not require selective targeting to shape the deep operations fight. Next, the expeditious attack of targets beyond the FSCL should support the operations of the corps, the attacking unit, or the higher headquarters of the attacking unit. Finally, the corps and its supporting units must be willing to accept the duplication of effort that may result from dual targeting beyond the FSCL.

(c) If an FSCL is established, it should be located beyond the area in which the corps intends to shape its deep operations fight. The deep operations fight is shaped by restricting the movement of enemy follow-on forces to influence the time and location of their arrival into the close operations area. This usually requires selective targeting and coordination of fires in the area where shaping is to occur. The FSCL normally is established well beyond the range of cannon and multiple-rocket FA systems. This provides sufficient depth to shape the fight against a Soviet-type echeloned attack. In this case, only corps missile systems, tactical air support, and possibly attack helicopters will have the range capabilities to attack targets beyond the FSCL.

(d) The corps' deep operations concept may not seek to shape the fight but may only focus on maximizing the destruction of enemy units or systems. If so, the corps should establish the FSCL as close as possible to its close operations area. Doing so will increase the number of fire support systems that can fire beyond the FSCL. An RFL or NFA can be used to protect key facilities or terrain features beyond the FSCL. This would still permit an FSCL short of the facility or terrain feature that must be protected.

(e) Whether attacking or defending, the corps will usually designate an initial FSCL and plan for a series of on-order FSCLs. A change of FSCL location is usually transmitted in advance to higher, lower, adjacent, and supporting headquarters. FM 100-26 states, "Areas on the battlefield should never be considered the absolute province of either USA or USAF commanders. Both component commanders will have a continuing interest in the enemy regardless of depth. They will want to collect intelligence and attack--or cause to be attacked--targets that will affect their future operations. The planning to attack targets in the second echelon should be coordinated among components, concurrence sought, and if not obtained, the matter should be referred to the next higher headquarters."

(f) Considerations for FSCL employment include the type of operation and the nature and location of the threat. They also include target acquisition capabilities, air support allocations, and future operations.

(7) Free-fire area. An FFA is a specific, designated area into which any weapon system may fire without additional coordination with the establishing headquarters. It expedites fires and facilitates the jettison of CAS munitions that aircrews are unable to drop on the target. The FFA is established by the commander, usually division or higher, in coordination with the host nation. It is located on identifiable terrain when possible. However, the FFA may be identified by grid designation. An FFA location is disseminated through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units and the host nation.

d. Aerial Fire Support Team. Depending on METT-T and the regimental or corps commander's intent, the RAS may receive AFSTs. The RAS will most likely receive these assets during reconnaissance and screening operations for a specified mission or a specified time or both. The RAS commander may elect to retain these assets at the squadron or place them under OPCON of the ACTs. Aerial fire support teams provide a direct link to fire support assets and increase responsiveness and accuracy.

4-2. MORTARS

Mortars are indirect fire weapons organic to the maneuver squadrons. Although maneuver squadrons control mortars, the regimental FSO normally is responsible for integrating mortars into the overall regimental fire support plan. Mortars provide a responsive and accurate indirect fire capability. They are ideal weapons for attacking targets on reverse slopes, in narrow ravines, and in other areas difficult to strike with low-angle fires. Mortars are also ideal weapons against dismounted troops in the open. They are most effective in suppression, smoke or obscuration, and illumination missions. Suppression missions force the enemy to button up or move to less advantageous positions. Obscuration missions can place smoke directly on the enemy to obscure its vision or between the enemy and friendly forces to conceal movement. During illumination missions, special rounds are used to illuminate the enemy. This illumination allows a daytime engagement capability during periods of limited visibility. Mortar support for the RAS will often be required on short notice or in an immediate reaction situation.

a. Planning. Mortar fires are planned in the same manner as field artillery. They are planned on all known or suspected enemy locations. These locations include areas in front of the objective, on the objective, and beyond the objective. Targets are also planned along the most likely enemy avenues of approach. If time allows, planning is detailed, closely coordinated, and disseminated.

b. Coordination. The RAS commander or S3 and the regimental FSO normally accomplish coordination. The situation may dictate that the RAS coordinate directly with the nearest ground cavalry troop that can provide the mortar support. Fire support coordination measures and a communications net are established during the coordination process. A quick-fire net is also established to allow the troops to directly request and adjust immediate fire support.

c. Employment. Mortars are best employed to support a squadron operation with immediate suppression or immediate smoke or both. These employment roles will most likely occur during reconnaissance and screening operations. Factors to consider during employment are the locations of the mortars and the locations of squadron assets conducting these operations. Range limitations may frequently preclude the use of mortars for the needed fire support. However, mortars should always be considered if available and within range.

4-3. NAVAL GUNFIRE

Naval gunfire is long-range, rapid fire. It can be a highly effective means of fire support when the RAS operates near a coastline and support ships are within range. Ships can be repositioned to provide support as the battle changes. Advisors who represent the supporting ships are available at all levels to facilitate NGF support. Naval gunfire weapons include 5-inch, 8-inch, and 16-inch guns. Significant advantages of NGF are mobility, accuracy, weapon and ammunition variety, high firing rate, high muzzle velocity, and narrow deflection spreads. Limitations include flat trajectory, range dispersion, hydrographic constraints, and vulnerability to threat air or naval counteraction. Also, some US Army tactical radios are not compatible with US Navy air and NGF liaison company radios.

a. Gunnery Team. The NGF gunnery team consists of naval gunfire FCTs, the shipboard gunfire control center, and firing batteries on NGF support ships. Naval gunfire, like CAS, involves technical and procedural considerations that require close coordination with Army fire support and maneuver users. The RAS is not likely to receive NGF support unless it is augmented with a gunnery team.

b. Target Acquisition. Targets for NGF are acquired by maneuver and fire support personnel and their acquisition assets. The naval gunfire FCT with the RAS also acquires targets and then calls for and adjusts fires.

c. Command and Control.

(1) Command of NGF assets is retained by the US Navy. The naval commander assigns the naval liaison representatives who are located with the supported ground forces. The naval commander also controls NGF support through his ANGLICO representatives with maneuver forces and supporting ships. The NGF liaison team is assigned at regimental level. It is headed by an NGF liaison officer who is a senior company grade or field grade marine officer. The team works in the regimental FSE. It advises the regimental commander on the use of naval gunfire and air support and coordinates their use in support of regiment and subordinate unit operations. The SALT, which is located at RAS level, consists of an NGF liaison team and two naval gunfire FCTs. The SALT air officer assists the RAS. The NGF liaison team is located in the RAS, and the naval gunfire FCTs are normally located with the troops. The primary function of FCTs is to request and adjust naval gunfire and air support in the same manner as the forward observer adjusts artillery. The liaison officer advises the commander and his staff on naval gunfire and air support and coordinates their employment in support of operations.

(2) RAS requests for naval gunfire and air support are normally sent through regimental fire support channels to the AFSCOORD. The AFSCOORD directs the division NGO to coordinate the mission with the general support ship. He then ensures that the RAS is properly linked with the appropriate ship. If required, RAS assets may call directly for NGF. (FM 6-30 shows an example of a call for naval gunfire.)

(3) The ANGLICO has the personnel framework to effect NGF support only as high as division level. (No NGF support channel exists above division level.) The Navy fire support group commander assigns tactical missions to NGF support ships based on the division commander's needs. The division commander, advised by his FSCOORD and division or NGF observer, recommends the best mission to the Navy fire support group commander. NGF ships provide either direct or general support. Ships with direct support missions are for a specific unit, normally a maneuver battalion. Other units can get naval gunfire as directed by the Navy fire support group commander, the division NGO, or the regimental naval gunfire liaison officer.

Section II
CLOSE AIR SUPPORT

4-4. MISSIONS

Close air support missions are air strikes against hostile targets that are close to friendly forces. These missions require detailed integration with the fire and maneuver of supported forces to increase effectiveness and avoid fratricide. They are flown at the request of ground forces and can be initiated at any level of command. The USAF plans, directs, and controls CAS missions through the tactical air control system. CAS missions are executed based on preplanned or immediate requests. Requests should be preplanned if at all possible so that the delivery system and ordnance can be matched with the target. The firepower of both surface-based weapons and CAS aircraft should be integrated effectively to achieve the desired concentration of fire on targets. Augmentation of the firepower of surface forces by CAS can be decisive during breakthroughs, counterattacks, assaults, and surprise attacks.

a. Preplanned Requests.

(1) Preplanned requests are those for which a requirement can be foreseen. They permit detailed planning, integration, and coordination with the ground tactical plan. Preplanned requests are most desirable from the standpoint of efficient use. Munitions can be tailored precisely to the target, and complete mission planning can be accomplished.

(2) Preplanned requests are transmitted through Army unit channels. Requests that originate at troop level are forwarded to the RAS TOC over the command net or by other means. When a request is received at the TOC, the S3, FSO, and ALO review it to determine the suitability of the target for air attack and to consider potential airspace conflicts. The S3 may recommend that the target be attacked with another system. As a minimum, he will integrate the request with the RAS fire support plan. The S3 adds the request to the file of preplanned requests, eliminates duplications, consolidates remaining requests, and assigns priorities. He then forwards the consolidated requests to the aviation S3 air or corps G3 air over the O&I net or RATT communications. The evaluation and integration process is repeated at the corps TOC. From there, the targets are assigned to the USAF.

b. Immediate Requests.

(1) Immediate requests are requests from supported ground commanders to fulfill urgent, unforeseen requirements. Details of the mission are generally coordinated while aircraft are held on airstrip alert or are airborne.

(2) Immediate requests are processed primarily through USAF channels. Immediate requests originating at troop level are forwarded to the RAS TOC over the command net or by other means. The RAS S3 evaluates each request and then passes it to the regiment or corps for execution. The regimental TACP transmits the request directly to the ASOC at the corps TOC over the USAF air request net. The TACP at each intermediate Army echelon monitors the transmission. Each intermediate TACP coordinates the request with the S3 or G3 and the FSCOORD at their level to determine approval or disapproval of the request. Silence by an intermediate TACP indicates approval by the associated Army echelon unless a disapproval is transmitted within a specified time stated in the unit SOP. (Normally, the time is ten minutes.) If any echelon above the initiating level disapproves the request, the TACP at that echelon notifies the ASOC and the initiating TACP, giving the reason for the disapproval. The ASOC passes a copy of the request to the corps G3 air, who is collocated in the tactical air support element, for coordination with the FSCOORD. When the request is approved, the ASOC orders the mission flown. Response to immediate requests may involve launching general alert aircraft, using ground or air alert sorties, or diverting airborne aircraft from other missions.

4-5. GROUND AND AIR ALERTS

Either a ground or an air alert may be requested, using planned or immediate communication channels. Planning for either of these options can improve the responsiveness of tactical air to the needs of the ground commander. CAS assets on air alert close behind the FEBA may be able to respond to a preplanned request within 5 minutes. Conversely, even in response to an immediate request, diverted aircraft or aircraft on ground alert may require 30 to 60 minutes for launch and transit. The specific tactical situation, including the type of CAS aircraft available, will dictate the best option. Commanders must be aware that immediate CAS requests will not necessarily provide the most timely response.

4-6. TARGET ACQUISITION AND TARGETING

a. Target Acquisition. Tactical air coordinators (airborne) and fighter pilots can acquire targets as well as control or attack Army-acquired targets. RAS S3 personnel must work closely with the ALO to ensure that USAF-acquired targets not suitable for air attack are attacked by other means if appropriate.

b. Targeting. To be effective, CAS must be employed against targets that present the most immediate threat to the supported force. Almost any threat encountered inside the FSCL and near the FLOT may be suitable for CAS targeting, but the indiscriminate use of CAS may needlessly increase the attrition of attack aircraft. No single category of targets is most suitable for CAS application. Mobile massed armor formations, however, present the most immediate threat to friendly ground forces and thus are prime candidates for air attack.

4-7. CAPABILITIES AND LIMITATIONS

a. Capabilities. CAS capabilities include high-speed and long-range support, versatile weapon and ammunition mixes, and accurate delivery. Also, A-7, A-10, and F-16 pilots have an excellent air-to-ground communications capability and can strike moving targets.

b. Limitations. CAS aircraft are limited by resource scarcity and delivery restrictions caused by limited visibility and adverse weather or the proximity of friendly forces. Also, CAS flight restrictions caused by enemy air defenses may impose delayed response and short loiter times.

4-8. COORDINATION AND CONTROL

a. A TACP advises the ground commander and his staff on the integration of CAS with ground operations. The TACP also coordinates and directs close air strikes. It includes an ALO and a TAC(A). The RAS normally should be supported by either an ALO or a TAC(A).

b. A tactical air strike is normally controlled by a TAC(A), but it may be controlled by a qualified tactical air command and control specialist (USAF enlisted person). In an emergency, an air strike may be controlled by a qualified Army person designated by the supported ground commander. When this occurs, the ground commander must assume responsibility for the safety of the troops. The person controlling the air strike locates and describes the target and identifies friendly positions. The commander then relays this information to the pilots using any means available. Although most fighter aircraft have FM capability, the ground commander may have to relay this information through an Army aircraft that has both FM and UHF capabilities.

4-9. SUPPRESSION OF ENEMY AIR DEFENSES

a. Tactical fixed-wing and rotary-wing aircraft may be threatened by highly active and accurate threat air defenses. Air defense suppression sorties and EW missions are conducted to enhance the survivability of tactical aircraft. The RAS must give high priority to SEAD when the squadron is being supported by tactical aircraft. SEAD is initiated when the RAS calls for FA suppressive fires.

b. Priority targets for SEAD should be enemy air defense systems or sites in the immediate target area. The RAS commander's area of responsibility extends from his FLOT to the limits of observed fire. During the actual air strike, an artillery check-fire need not be imposed. Instead, the ALO, TAC(A), or individual controlling the strike can ascertain the intended attack track of the aircraft. He can then impose an airspace coordination area or shift fires to suspected or actual enemy air defense sites. The weapons control status for AD systems should be changed to at least weapons tight during the air strike to reduce the probability of attack by friendly AD fire. Direct fire of organic weapons on the enemy generally will not affect the attack of the target by friendly aircraft.

Section III
ENGINEER SUPPORT

4-10. PLANNING CONSIDERATIONS

Combat engineer assets are not organic to the RAS. Engineer support is normally provided by the regimental engineer company or corps engineer battalion (mechanized). Usually, the RAS will receive a platoon for engineer support for a specified mission or time. The RAS usually receives this support during route reconnaissances, covering force operations, or guard operations. The engineer platoon leader serves as the RAS engineer and advises the commander on the use of engineers and their equipment. When planning engineer support, the commander should consider that the engineers will accompany the lead elements and will be employed as far forward as possible. Therefore, engineers can help the commander see the battlefield. Obstacles must be planned in advance because large quantities of materiel and transportation assets are required to emplace them.

4-11. FUNCTIONS

When required, engineer units provide the RAS with countermobility, survivability, and sustainment engineer support. Engineer units can also perform infantry combat missions if necessary. The RAS's air mobility negates the need for much ground mobility engineer support.

a. Countermobility Engineer Support. Countermobility engineer support enhances and complements the effectiveness of the SWTs. Part of the countermobility task is to disrupt enemy attackers or turn them into selected areas such as engagement areas. These operations canalize the enemy into killing zones, degrade its ground mobility, and increase its time in the killing zone. They also ensure that maximum combat power is massed on enemy concentrations.

b. Survivability Engineer Support. Engineer survivability operations protect semifixed positions of the RAS from enemy observation and direct and indirect fires. The engineers provide this protection for the CPs, FARPs, and maintenance facilities. They can also build revetments for helicopters.

c. Sustainment Engineer Support. Engineer units provide sustainment engineer support in the regiment and corps rear areas. They are rarely attached to the RAS. Regimental or mechanized corps engineers normally are not involved in sustainment engineering tasks. Engineer combat battalions or engineer combat battalions (heavy) from the corps or theater army are primarily responsible for sustainment engineering. In the offense, sustainment engineering tasks include clearing bypassed minefields, maintaining MSRs, developing logistical support areas, and replacing tactical bridging with semipermanent fixed bridges. In the defense, sustainment engineering tasks include maintaining or constructing LOC and constructing or repairing support facilities.

d. Infantry Combat Mission. When engineers perform infantry combat missions, their ability to accomplish specialized missions is significantly degraded. The infantry mission is one of last resort. The RAS must provide its own perimeter defense; perimeter defense is not an engineer function. FM 5-100 contains detailed information about engineer combat operations.

Section IV
SIGNAL SUPPORT

4-12. COMMUNICATION REQUIREMENTS

The RAS has its own signal platoon; however, because of the need to communicate over extended ranges, the RAS does require significant signal assistance from regimental or corps assets. Within the regiment or corps, communications are not limited to radio and wire; they also include tactical satellite communications and an area messenger service. The RAS may augment its internal net for communications across a wide frontage by using retransmission teams from supporting signal units.

4-13. COMMUNICATION FACILITIES

Each signal center at the regimental and corps level provides facilities to enhance communications. These facilities include a voice switching center, wire sections, and FM and RATT stations.

a. Voice Switching Center. A voice switching center provides a patching and switchboard telephone service. This service is provided for the signal center, the supported installation or unit, and adjacent units.

b. Wire Sections. One or more wire teams are provided at each signal center. These teams install and maintain the wire system connecting the installations of the signal center and the supported unit to the voice switching center.

c. FM and RATT Stations. The signal center may operate or monitor designated FM and RATT stations for hard-copy communications. In addition, each signal center provides a radio-wire integration station. When units operate beyond the range of FM radios, this facility may establish and maintain FM communications. Command and staff personnel operating from mobile CPs can also use the facility to contact division and corps units.

Section V
AIR DEFENSE

4-14. ACTIVE AND PASSIVE MEASURES

The RAS must be protected from threat air assets. The threat will control some of the airspace above the battlefield some of the time. The RAS will attempt to engage and destroy threat aircraft with their air-to-air systems, vehicular-mounted weapons, and small arms and supporting air defense systems. This direct engagement and destruction of threat aircraft is known as active air defense. At the same time, the RAS must take measures to avoid observation by threat pilots. The measures taken to avoid detection are known as passive air defense.

a. Active Air Defense. The RAS has a limited air defense capability. The small arms of the RAS can destroy an attacking aircraft or disrupt its attack. FM 44-8 explains the use of small arms in the air defense role.

b. Passive Air Defense. Target detection from the air is difficult. Threat pilots may or may not be required to see and identify a target to attack it. However, the effectiveness of high-performance aircraft is greatly reduced when units take advantage of terrain for cover and concealment.

(1) When a unit is stopped, it should--

- Occupy positions that offer cover and concealment.
- Wipe out vehicle track marks around stationary positions just after movement.
- Avoid silhouetting vehicles against the skyline or against an area of a different color.
- Rotate air guards frequently because scanning for long periods dulls visual perception skills.
- Disperse vehicles. (Dispersion not only makes detection difficult but ensures that a single aircraft on a single pass can attack only one vehicle.)
- Post air guards in dismounted positions to provide warning of approaching aircraft. (Air warning signals, visual and audible, must be specified in the unit SOP.)
- Place camouflaged coverings on the windshields and headlights of ground vehicles and on the canopies of aircraft. (Exposed vehicles should be thoroughly camouflaged.)

(2) When a unit is moving, it should--

- Maintain communications security.
- Use covered and concealed routes when available.
- Rotate air guards frequently because scanning for long periods dulls visual perception skills.
- Post air guards on vehicles to provide warning of approaching aircraft. (Air

warning signals, visual and audible, must be specified in the unit SOP.)

- Turn vehicles 90 degrees to the direction of attack if attacked. (Aircraft normally attack parallel to the movement of the convoy, and this countermeasure will quickly get vehicles out of the line of fire.)

4-15. PRIORITY CONSIDERATIONS

The RAS commander establishes priorities for air defense within the RAS's area of responsibility. If the RAS is augmented with attached air defense assets, the senior air defense officer or NCO will be the RAS air defense officer or NCO. The commander will analyze his area of operations, the terrain, and the probable numbers and types of enemy aircraft to be expected. He will designate likely attack helicopter avenues of approach leading into his area of operations. The commander must balance his analysis of the threat against the available air defense weapons supporting his unit. After the commander establishes the priorities, the air defense officer and the S3 determine the specifics of air defense weapon allocation and what positions will be occupied. The S3 continues to coordinate and supervise the activities of the supporting air defense force throughout the operation.

Section VI
INTELLIGENCE, ELECTRONIC WARFARE SUPPORT, AND COUNTERINTELLIGENCE

4-16. INTELLIGENCE

Intelligence enables the commander to see the battlefield. The commander's ability to visualize the battlefield directly influences the effectiveness of maneuver and fire support and the protection of the force. Properly analyzed intelligence will aid in graphically depicting the enemy, weather, and terrain to support the timely and effective employment of CS assets.

a. The RAS S2 is the expert on the enemy, weather, and terrain. Accurate intelligence, sound assessments, and target development can reduce many uncertainties about the battlefield. The IPB process is the principal tool the S2 uses to analyze the enemy, weather, and terrain. FM 34-130 contains detailed information on the IPB process. Figure 4-3 shows a few products of the IPB process and their applications to the RAS. Direct support engineer topographic teams, directed by the corps G2, provide the terrain products. The weather team, attached to the regiment, provides the weather products. The RAS can overcome terrain obstacles, but the weather can adversely affect RAS operations. Therefore, direct weather support is required at the regiment. The regiment then relays weather information to the RAS. The weather team can reduce many of the uncertainties in planning combat operations. This team is more critical to aviation maneuver forces than any other force on the battlefield. The forward area limited observation program, pilot reports, and forward observers are other sources of observed weather information.

PRODUCTS (COMBINED OBSTACLES OVERLAY)	APPLICATIONS
COMBINED OBSTACLES (WET AND DRY)	FRIENDLY OR ENEMY AVENUES OF APPROACH
SOIL	LZ AND DZ SELECTION
VEGETATION	CONCEALMENT DURING NOE FLIGHT
LOS ANALYSIS*	EW, COMMUNICATIONS, NOE ROUTES, AND SURVEILLANCE
OBSTACLES TO NOE FLIGHT*	NOE ROUTES AND NOE FLIGHT
LINES OF COMMUNICATIONS*	MSR SELECTION
TERRAIN-INFLUENCED WIND OVERLAYS*	AVIATION AND NBC OPERATIONS
CLOUD COVERAGE*	AIR AVENUES AND TARGET ACQUISITION
FOG*	AIR AVENUES, FIELDS OF FIRE, RADAR INTERVISIBILITY, AND LOS
SEVERE WEATHER	AVIATION AND GROUND OPERATIONS
INFRARED CHANGEOVER	FLIR AND NAVIGATION OPERATIONS
*Denotes key products for RAS elements.	

Figure 4-3. Products and appliciation of the IPB process

b. The S2 section of the RAS provides graphic displays of doctrinal, situational, event, and decision support templates. The decision support template is important because it translates intelligence estimates and the OPLAN into graphic form. While the S2 may be responsible for coordinating the development of the decision support template, the S3 has overall responsibility for the template. This template is a total staff effort to assist the commander in synchronizing assets and making timely decisions through the war-gaming of friendly and enemy courses of action. The commander can use the template to exploit assailable enemy flanks and select high-value targets for engagement. He can also interdict critical points that will force the enemy to abandon a course of action. Further explanation of the decision support template is in FM 34-130.

c. Collection management by the S2 is based on intelligence requirements not answered by the IPB process. Reconnaissance and surveillance planning must be thorough. The plan must be continuously updated as the situation changes. The great distances traveled by RAS aircraft require the S2 to continuously interface with the regimental S2 and the support element in the corps TOC. The S2 can then better predict enemy actions in selected areas of interest. Periodic reconnaissance and surveillance adjustment of high-value targets will ultimately give the commander a time-phased picture of the battlefield. It will also give him viable options for using critical assets in a timely manner.

4-17. ELECTRONIC WARFARE

a. Electronic warfare employs electromagnetic energy to determine, exploit, reduce, or prevent hostile use of the electromagnetic spectrum while retaining its use for friendly forces. Both friendly and enemy forces depend on electronic devices and are vulnerable to actions that adversely affect their use of these devices. Electronic warfare techniques also locate critical enemy units and CPs by identifying communication and noncommunication emitters. Successful integration of electronic deception or jamming can enable the commander to degrade, influence, or possibly destroy the enemy's C^2 systems at critical times and places.

b. The RAS may receive EH-60 (Quick Fix) assets on a mission basis to perform the deception or jamming task. The EH-60 is effective against communication devices but not against radar systems. When CEWI platoon assets are employed, mission profiles vary from far forward at low altitudes to standoff locations at high altitudes. The exact altitude and standoff ranges will vary, depending on the mission and the air defense threat. The CEWI platoon is frequently employed in a direction-finding or an electronic countermeasure role. An air assault operation across the FLOT is an ideal opportunity to integrate CEWI assets with RAS elements. Screening operations may require the use of EW aircraft along with reconnaissance forces. The three functional areas of EW are electronic warfare support measures, electronic countermeasures, and electronic counter-countermeasures.

(1) <u>Electronic warfare support measures</u>. These support measures involve the interception, location, and identification of enemy forces. The CEWI platoon provides combat information for the S2 to meet the commander's requirements for fire support, maneuver, and force security. Electronic warfare support measures are the primary sources for ECM actions by the S3. The S2 must establish priorities for ESM plans, orders, and requests. He continuously coordinates the operations of regimental military intelligence resources through the regimental tactical operations center support element and the battlefield information control center. Two examples of regimental ESM requests and taskings follow.

(a) <u>Example 1</u>. The RAS S2 submits the request to the regimental S2. The regimental S2 sends the request to the regimental tactical operations center support element. From there, it goes to the collection management and dissemination section, to the technical control and analysis element, and then to ESM assets.

(b) <u>Example 2</u>. The RAS S2 submits the request to the regimental S2. The regimental S2 sends the request to the RTOCSE who sends it to the collection management and dissemination section. This section sends it to the TCAE. The TCAE determines that regimental assets cannot execute the task and requests assistance from the corps TCAE. The corps TCAE tasks corps assets to provide ESM support to the ACR.

(2) <u>Electronic countermeasures</u>. These countermeasures involve actions taken to prevent or reduce the effective use of the electromagnetic spectrum by hostile forces. The RAS S3 plans and coordinates EW operations. He primarily directs ECM actions in jamming and deception roles. With the limited resources available, the S3 must extensively plan those necessary EGM targets. Along with the S2 and FSO, the S3 establishes target priorities. ECM actions are taken against targets that will degrade the enemy's ability to respond effectively. ECM taskings and requests are similar to those discussed in (1) above.

(3) <u>Electronic counter-countermeasures</u>. These actions are taken to retain effective friendly use of the electromagnetic spectrum. The S3 coordinates with the C-E officer in establishing the ECCM to protect friendly C-E operations. Training in the proper employment of the emitters and the emitter design is necessary for effective ECCM. FM 34-1 provides details about IEW.

4-18. COUNTERINTELLIGENCE

Counterintelligence supports those actions necessary to protect the force; for example, the OPSEC needs of the command. Counterintelligence will support actions that counter the hostile intelligence threat; safeguard the command from surprise; deceive enemy commanders; and counter enemy sabotage, subversive, and terrorist activities. FM 34-60 contains more information on counterintelligence.

Section VII
ARMY AIRSPACE COMMAND AND CONTROL

4-19. AIRSPACE USAGE

The RAS, along with other elements of the regiment or corps, must be aware of positive and procedural A^2C^2 measures. In addition, the RAS may frequently request implementation of A^2C^2 measures for its own use and protection. The RAS commander must plan, coordinate, and implement A^2C^2. To ensure minimum risk of engagement by friendly AD forces, the RAS must adhere to directed control procedures. Operations planning using available control measures will greatly enhance aircraft survivability and reduce interference with AD operations. The commander must ensure that a strong and ongoing communications link is established with A^2C^2 elements at the regiment and corps. This communications link will aid in rapid and accurate dissemination of information concerning airspace usage.

4-20. CONTROL MEASURES

a. Common Control Measures. Figure 4-4 shows some of the common airspace control measures. A description of each follows.

(1) High-density airspace control zone. The HIDACZ is a defined area of airspace that is requested by a commander, usually division level or higher. The commander of the HIDACZ reserves and controls airspace and determines which airspace users will have access to the zone. This authority allows the commander to restrict the airspace from users who are not involved with his operation. Aircraft operations within an activated HIDACZ are governed by the procedures established by the ACA and by the operation order, operation graphics, and control measures of the appropriate commander controlling the HIDACZ. The ACA is the commander designated to assume overall responsibility for the operation of the airspace control system in the airspace control area.

(2) Coordinating altitude. Coordinating altitude is a procedural method designed to separate fixed-wing and rotary-wing aircraft. It does not prohibit either type of aircraft from using the airspace above or below the coordinating altitude. However, penetration into airspace above or below the coordinating altitude requires notification to or coordination with the Army or Air Force controlling authority for that airspace. The coordinating altitude is specified by the theater ACA.

(3) Restricted operations area. An 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. An ROA is normally activated to support DZs, search and rescue operations, or SEMA orbits or to facilitate air defense operations. The commander requiring an ROA sends his request through the appropriate A^2C^2 facility to the ACA.

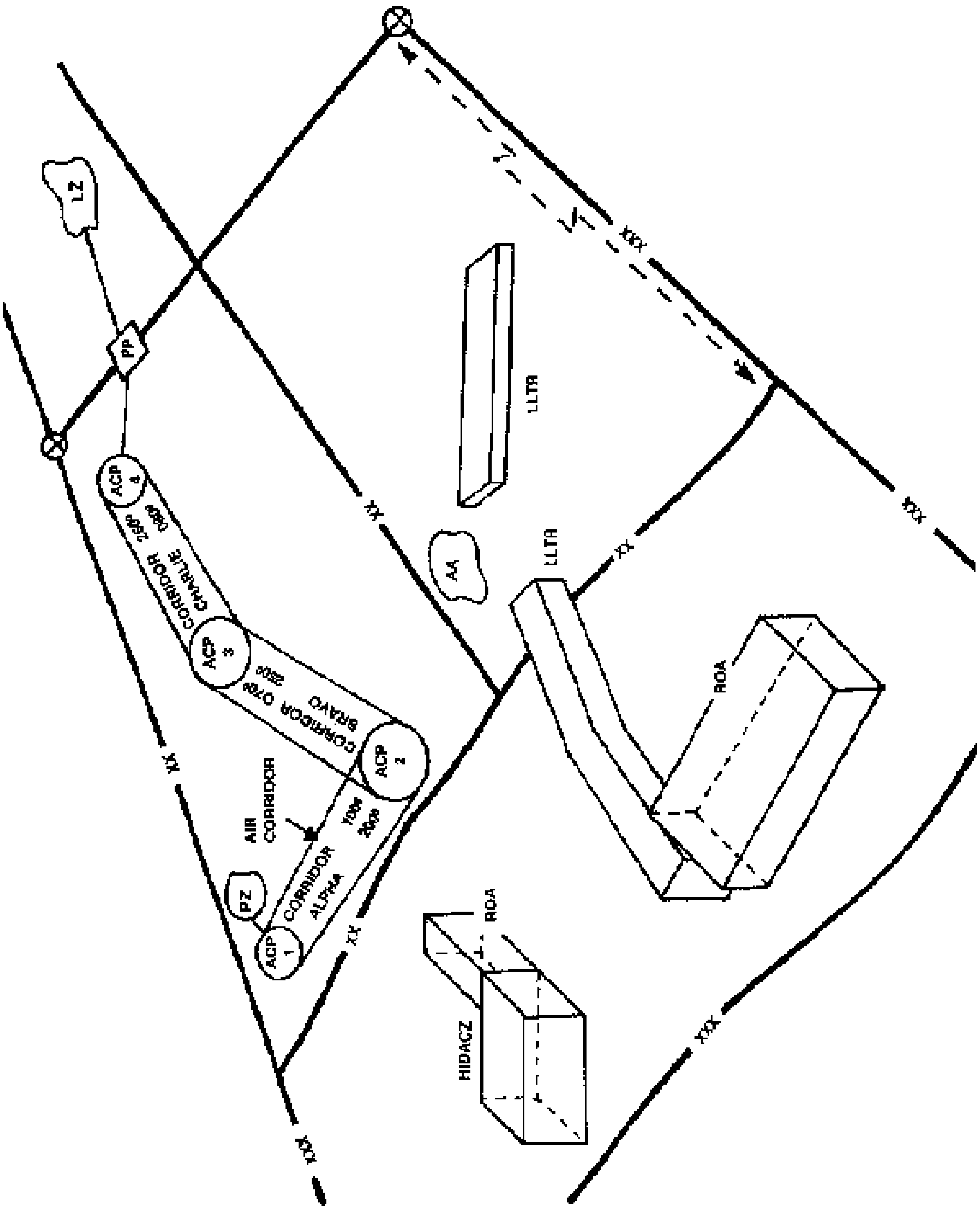


Figure 4-4. Army airspace control measures.

(4) Standard-use Army aircraft flight route. An SAAFR is a route established below the coordinating altitude to facilitate the movement of Army aviation assets. SAAFRs do not require joint approval and are normally located in corps and division rear areas. They are developed by the A^2C^2 element to safely route Army helicopters conducting CS and CSS missions in a terrain flight environment. The SAAFRs are intended for single aircraft or small flights of aircraft. The corps A^2C^2 element is responsible for developing the SAAFR structure for the corps rear area and for ensuring that the corps structure links to its subordinate division's SAAFR structure. The corps A^2C^2 element also ensures that adjacent division rear area structures are linked. Division A^2C^2 elements develop their own rear area structure.

(5) Low-level transit route. An LLTR is a temporary corridor, of defined dimensions, for the low-level passage of friendly aircraft through air defenses and controlled or restricted airspace. LLTRs are established to avoid concentrations of FA units, significant groups of fire support targets, LZs and DZs, FARPs, known enemy air defenses, and other planned or active special-use airspace. The exact dimensions of and the techniques for employing LLTRs are governed by the theater airspace control plan. LLTRs are normally bidirectional and activated for short periods. The ACA is the approving authority for an LLTR.

(6) Minimum risk route. A minimum risk route is a temporary flight route recommended for USAF use. It presents the minimum known hazards to low-level aircraft transiting the combat zone. A minimum risk route normally extends from the COMMZ through the theater army, corps, and division areas across the FLOT and ends near the FSCL. Only US forces use minimum risk routes and standard-use Army aircraft flight routes; other NATO forces do not use these types of control measures.

(7) Base defense zone. A 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. They have specified entry, exit, and IFF procedures that aircrews must follow. Establishment of a BDZ requires ACA approval.

(8) Weapons-free zone. A 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 their use before entering or transiting the zone. Air defense systems within the WFZ are normally maintained in a weapons-free control status. Establishment of WFZs also require ACA approval.

(9) Air corridor. An air corridor is a restricted air route of travel specified for friendly aircraft use. Air corridors are established to prevent the use of friendly fires against friendly aircraft. The ground trace of an air corridor is selected by the aviation liaison officer in coordination with the A^2C^2 element and is depicted graphically on the operation order overlay. Air corridors are Army operational procedures.

b. Other Control Measures. Other operational airspace control measures are the FSCL, air control point, initial point, and way points. A^2C^2 planning is part of the normal decision-making process. FM 100-103 discusses A^2C^2 in detail.

Section VIII. AIR TRAFFIC SERVICES

4-21. FUNCTIONS

The corps aviation brigade structure includes an air traffic services battalion which provides the personnel and equipment to establish, operate, and maintain ATC facilities. ATS elements interface with aircraft in flight and with A^2C^2 elements at command posts to provide air traffic services to aircrews that are conducting tactical operations. ATS support includes navigational assistance, flight-following assistance, air threat warnings, weather information, artillery advisories, and airfield and landing site terminal control. ATS units also interface with host nation airspace cells and sister services during joint and combined operations.

4-22. SYSTEM

ATS personnel operate a network of equipment located at flight operations centers, flight coordination centers, approach and departure control facilities, and airfield control towers. They also operate navigational aids to provide for the control and coordination of air traffic within the corps area. FM 100-103 explains the specific operation of these facilities.

4-23. REAR OPERATIONS

ATS units provide continuous ATC service in the rear operations area. They also provide emergency and routine weather and air-warning information to aircraft in flight. An FOC or one or more FCCs will be established to extend the communications coverage between the rear operations area and the aircraft handed over to other FCCs that provide support to the tactical operations area.

4-24. TACTICAL OPERATIONS

Restrictions and constraints will be kept to an absolute minimum. Freedom of movement by Army aircraft is necessary, based on mission requirements, throughout this area. The required flexibility and potential density of traffic make individual reporting neither feasible nor desirable. However, an FCC will be established and operated by ATS elements to coordinate information reflecting weapon intensity and aviation activity in the division areas. The division FCC provides ATC service for Army aircraft within the division area and serves as a point of access into the A^2C^2 system. It provides a primary communications link between the terminal facilities of the division airfields, other airfields, the division TOC, and the flight operations center. The FCC provides a liaison with associated air defense fire units that provide low altitude radar coverage over the division and beyond the FLOT. Through voice and data link, this information is forwarded via air defense, Army aviation, and Air Force systems to aircraft operating in and forward of the division area.

4-25. REGIMENTAL AND SQUADRON AIRSPACE MANAGEMENT

At regimental and squadron levels, ATS elements cannot manage airspace using positive control methods. They will use procedural control methods. At these levels, airspace management and fire support coordination functions are closely interwoven. These functions involve detailed coordination and integration of tactical fire and maneuver operations. Therefore, those individuals directly involved in the conduct of localized combat operations perform airspace management functions as part of the corps airspace control system. These individuals include squadron and troop commanders, fire support coordinators, air liaison officers, and forward air controllers. Although commanders will communicate directly with Army aviators to accomplish taskings and coordinate tactics and techniques, ATS elements will make every effort possible to provide advisory information or other needed assistance. For example, ATS elements may establish passive landing sites or nonprecision passive navigation systems.

Section IX.
CHEMICAL SUPPORT

4-26. FUNCTIONS

Chemical units reduce the effects of enemy NBC weapons on combat operations. These units focus on smoke, NBC reconnaissance, and decontamination operations. The regimental chemical officer advises the commander on NBC defense procedures, the employment of smoke and flame, reconnaissance, and decontamination assets.

4-27. CAPABILITIES

Chemical units can provide to the regiment nuclear, biological, and chemical reconnaissance; equipment decontamination; and smoke support. Chemical units--

- Provide NBC reconnaissance support.
- Provide hasty smoke to supported units.
- Conduct simultaneous decontamination and smoke operations.
- Operate hasty and deliberate decontamination sites for combat operations.

CHAPTER 5
COMBAT SERVICE SUPPORT

Combat service support is the support provided to sustain combat forces, primarily in the fields of administration and logistics. It may include administrative services, chaplain services, civil affairs, food service, finance, legal services, and medical services. It may also include maintenance, military police, supply, and transportation. The effectivenes of the RAS is directly proportional to the effectiveness of its weapon systems and the personnel who operate them. The RAS consumes large amounts of supplies and demands intensive and continuous maintenance. CSS is performed as far forward as resources and tactical situations permit. The RAS staff anticipates and coordinates CSS requirements for the RAS with higher headquarters. This chapter describes the CSS organization, planning considerations and coordination, and four functional areas (supply, maintenance, personnel services, and field services) necessary for CS sustainment operations.

5-1. SUPPORT METHODS

a. Combat service support for the RAS is normally organized in echelons. This echelonment usually consists of combat trains and field trains. Combat trains are located as far forward as METT-T will allow. They are generally close to the TOC and consist of FARP assets, maintenance support teams, and medical specialists. (For the purpose of terminology and graphic representation, a combat train is normally portrayed as a FARP.) The remaining CSS assets are located in the RAS's field trains (generally in the RAS's assembly area). The field trains are near the regimental or corps main support area. The S1 and S4, under the supervision of the RAS XO, plan and coordinate CSS operations for the RAS.

b. CSS operations are conducted primarily through the HHT, AVUM troop, and AHT. The regimental support squadron normally provides CSS for the RAS. The RAS may receive CSS directly from the COSCOM. More specifically, the RAS's CSS within the COSCOM is provided by a corps support battalion. The units of the corps personnel group and finance group are the primary providers of personnel service support for the RAS. Units include the personnel services company, finance support unit, replacement company, and postal company. The regimental support squadron of the ACR coordinates with these units for any support the RAS needs. Figure 5-1 shows a COSCOM support group. The COSCOM is tailored for flexibility and provides support consistent with the mission. FMs 1-111, 63-3J, and 100-10 describe COSCOM operations in detail.

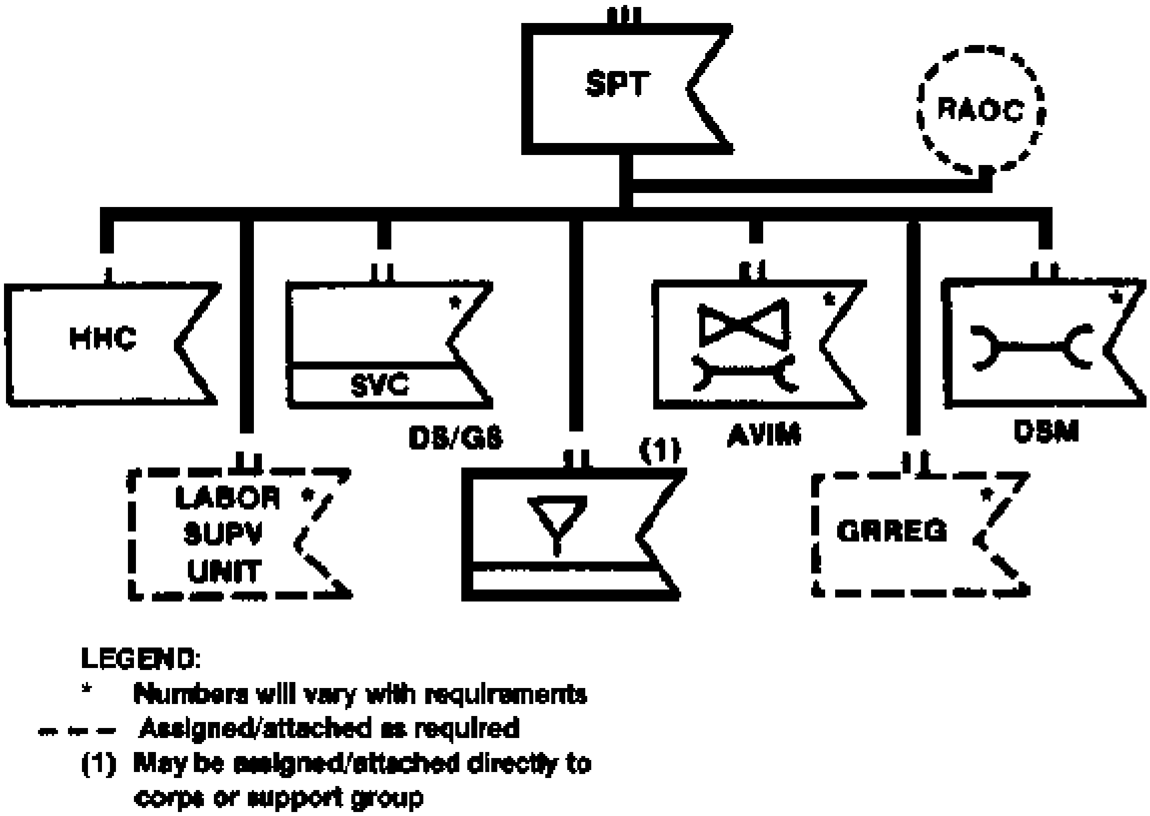


Figure 5-1. COSCOM support group.

5-2. SUPPORT ORGANIZATIONS

a. Regimental Support Squadron. The RSS has four major components. They are the RSS HHT, S&T troop, medical troop, and maintenance troop. The RSS provides all combat service support to an ACR, including all classes of supply, maintenance, medical, transportation, and dedicated direct support forward.

(1) RSS headquarters. The RSS HHT consists of the regimental materiel management center, RSS communications section, RSS staff, and organic maintenance and mess sections. The RSS commander, who represents the regimental commander in logistical matters, plans, organizes, and directs the actions of the RSS. The RSS commander normally collocates with the RSS in a regimental support area.

(2) Supply and transport troop. The S&T troop receives, stores, and issues all classes of supply, water, and unclassified maps as required. Exceptions include Classes VIII and IX, supplies peculiar to COMSEC equipment, rail mission equipment, airdrop equipment, aircraft, and approved operational project items. If augmented, the unit may provide clothing exchange and bath, GRREG, and water purification services.

(3) Medical troop. The medical troop provides Echelon (Level) II health service support equivalent to a division clearing station. The mission of this medical treatment facility includes--

- Treatment for patients with minor diseases.
- Triage of mass casualties.
- Initial resuscitation and stabilization.
- Advance trauma management.
- Preparation of sick, wounded, and injured patients for evacuation.
- Ground evacuation of patients from squadron aid stations.
- Emergency dental care.
- Emergency medical resupply to units operating in the maneuver squadron's area of operations.
- Medical laboratory and radiological services commensurate with division-level (Echelon or Level II) treatment.
- Mental health consultation services.
- Limited preventive medicine services.
- Patient holding for up to 20 patients who will be able to return to duty within 72 hours.
- Medical support on an area basis for units without organic medical support.
- Supervision of patient decontamination operations conducted by nonmedical personnel. (FM 8-285 contains additional information on the treatment of chemical agent casualties and conventional military chemical injuries.)

Medical evacuation support may be augmented with corps air and ground evacuation assets. These additional evacuation assets are normally collocated with the forward medical troop.

(4) Maintenance troop. This troop provides direct support maintenance and repair parts supply service for automotive, engineer, power generation, communications-electronics (less COMSEC), and fire control equipment. It also provides service and evacuation support for ground vehicles. The troop is structured with a missile maintenance support capability.

b. Ground Transport. Ground transportation requests are normally processed through the RSS S4. Approval is based on a priority system established by the regimental S3.

c. Aviation Maintenance Company. The AMCO, which is located in the corps rear area, furnishes AVIM support for nondivisional aircraft. It provides repair parts for all nondivisional aircraft, avionic equipment, and aircraft armament systems. The AMCO also furnishes repairable exchange services and aviation items. It provides organic mobile maintenance support teams for maintenance and technical assistance and aircraft recovery and evacuation. The AMCO maintains the ASL for Class IX(A) under an automated system, to include the receipt, storage, and issue of repair parts and the control and distribution of AIMI.

d. Regimental Materiel Management Center. The commander of the RMMC in the RSS is directly subordinate to and receives policy and operational guidance from the RSS commander. Most of the RMMC effort is devoted to maintenance support and the management of all classes of regimental supplies (except medical). FMs 54-23 and 63-2-2 describe the missions and responsibilities of the materiel management center.

5-3. PLANNING AND COORDINATION

a. Planning. Combat operations and CSS planning are conducted concurrently. The RAS commander relies on the S3 to employ the squadron and the Sl and S4 to support it. These staff officers, under the supervision of the RAS XO, coordinate closely to provide adequate CSS for the RAS's scheme of maneuver. Some of the more important considerations in planning CS operations are discussed below.

(1) Duration of RAS operations. The length of time RAS elements expect to be operating in a particular area influences other planning considerations. The RAS moves rapidly throughout the battlefield, remaining in one location only briefly. Future operations must be constantly considered and anticipated to sustain agility and flexibility.

(2) Movement of CSS assets. The continuing capability to perform the mission must be carefully balanced against the movement requirements of CSS assets. The AVUM troop should be moved as little as possible and only when AVIM unit locations are considered. Normally, only those assets that can be easily moved back should be moved forward.

(3) Changes in supply requirements. CSS planners must address the time required by the RAS XO and S4 to coordinate changes in supply requirements with all supporting agencies. Once supply requisitions have been coordinated, the staff schedules the time required to get the requested supplies and determines the location of the supplies and the method of receiving them.

(4) Transportation of essential Class III and V supplies. The RAS can move only a percentage of the available Class III and V (ground and air) supplies essential to support present tactical and future on-order missions. Therefore, additional transportation assets must be planned and scheduled for the movement of the remainder of Class III and V (ground and air) supplies needed by the RAS.

(5) Locations for rest and refit. CSS planners must identify the locations that RAS forces will use for routine AVUM, rest, and Class I activities. Normally, this location will be the RAS's field trains or assembly areas. The locations of inherent support requirements for the RAS, including Class IX (air and ground), aircraft and vehicle DSM, and Class III (packaged), must also be identified. These locations must be updated on a continuous basis. CSS planners must identify the location of CSS operators within the RAS who are required to interface with external support agencies. These include food service personnel for Class I and S4 supply clerks for Classes III and V. They also include maintenance personnel for Class VII, medical personnel for Class VIII, and PLL clerks for Class IX (air and ground).

(6) Location, type, and number of local CSS units. The number, type, and exact location of CSS units already in the area must be identified in the CSS plan. Planners must determine whether these local CSS units can support the RAS's air and ground assets.

b. Coordination. The RAS staff must forecast support requirements based on the expected duration of the mission or operation. Requirements are processed through the appropriate element (squadron to RSS to COSCOM), and coordination is continuous. Success or failure of the mission or operation depends on how well Classes III and V lair and ground), maintenance, air and ground recovery, and evacuation are integrated into the tactical plan. The RAS normally coordinates through the RSS for support. Combat service support for the RAS consists primarily of supply, maintenance, personnel services, and field services.

5-4. SUPPLY DISTRIBUTION METHOD

a. The RAS stocks some basic loads. The minimum stockage level is normally established by regiment, corps, or DA. The loads usually enable the RAS to sustain itself for limited periods or until resupply operations begin. The RAS obtains supplies by supply point distribution and unit distribution. Using organic transportation, squadron elements pick up supplies at the supply point. The RAS usually obtains Class II, IV, VI, VII, VIII, and IX supplies through supply point distribution. Supplies are also transported by throughput distribution to the RAS by transportation assets external to the RAS. Class I, III, and V supplies are normally provided by a combination of supply point and unit distribution.

b. The RAS S4 follows two rules concerning supply distribution: supplies are delivered so that they are immediately usable, or supplies are requested by unit distribution when they must come from outside the operations area. The S4 section processes supply requests, receives and issues supplies, and coordinates supply storage. The supply section may deliver supplies to the troops using organic transportation if available. The S3, based on the recommendations of the S4 and the operational requirements of the RAS, determines the distribution priorities for items in short supply. These supplies must be provided as far forward as the tactical situation permits.

5-5. SUPPLY CLASSES

a. Class I. The Army field feeding system is based on three basic rations. The MRE is the individual combat ration. It requires little or no preparation and can be heated or eaten as is. The MREs are the Class I basic load. The T-ration is a group feeding ration which requires only heating and serving. The B-ration is also for group feeding. Since B-rations must be cooked, they require a relatively stabilized environment. The Army field feeding system assumes the use of only MREs for the first several days of combat and the gradual transition to prepared T-rations and B-rations. A-rations (fresh foods) are introduced as the situation permits. The RAS normally carries a three-day supply of rations (MRE). T-rations are prepared by the RAS's food service section for pickup by the troops. Feeding frequency depends on the tactical situation. However, troops should receive one hot meal a day when possible.

(1) Requisition. The RAS S4 consolidates ration requests from subordinate troops and sends them to the regimental S&T troop. The S&T troop then consolidates all squadron requests and sends them to the RMMC. The RAS S4 requests replenishment of the Class I basic load through the RMMC.

(2) Distribution. Regimental food service personnel draw rations from the regimental S&T troop Class I point in the RSA using supply point distribution. The consolidation food service section in the squadron HHT then prepares and distributes the food according to unit SOP. Figure 5-2 shows the flow of Class I supplies.

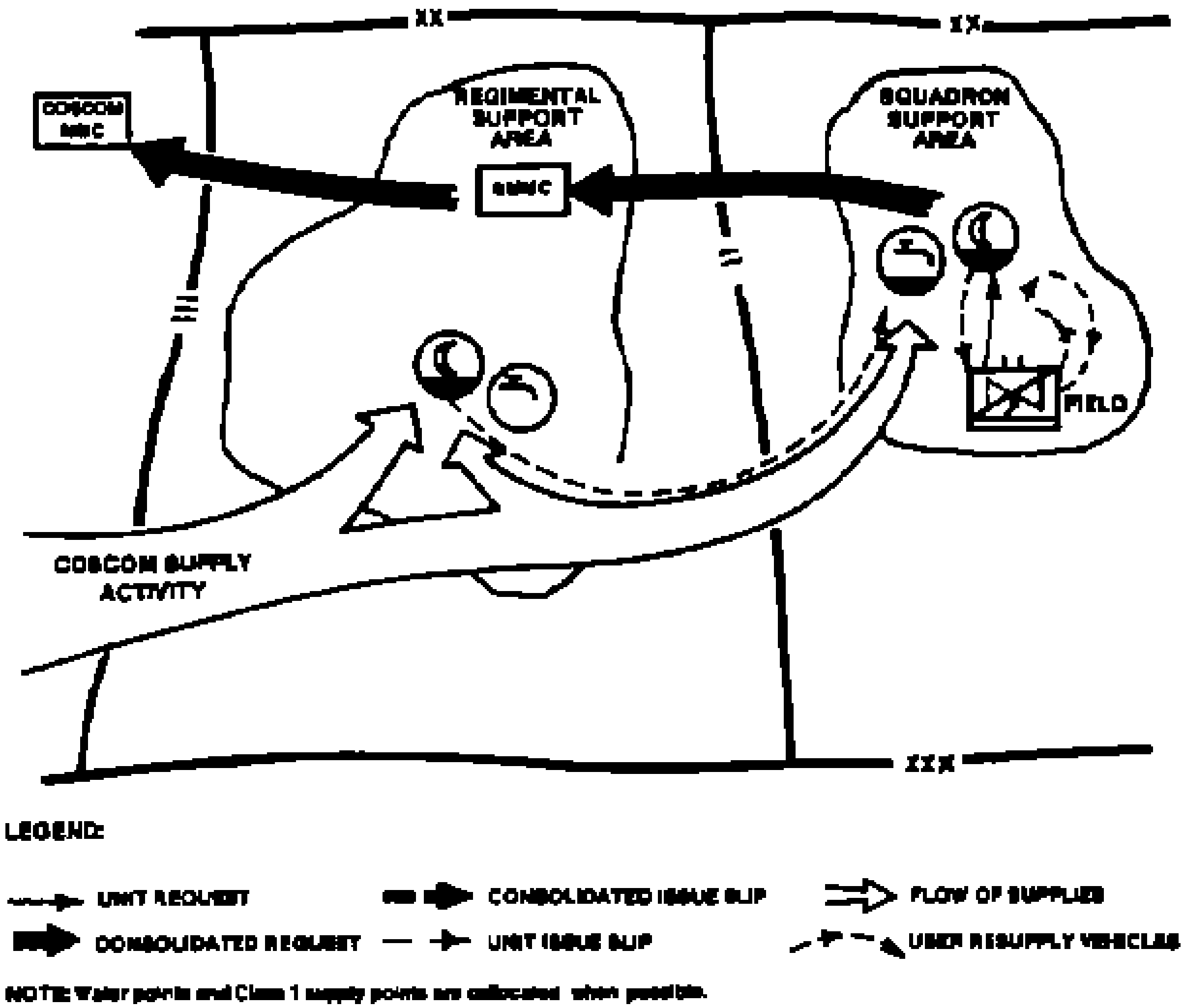


Figure 5-2. Flow of Class I supplies.

(3) Water source. Water is located at the Class I distribution point. When surface water sources are available, the ACR combat engineer company or corps engineer units will locate water; dig wells, if necessary; and perform any needed site improvement. Host nation water supplies may also be available. After the water site is established, the S&T troop is responsible for water potability and distribution, to include the establishment of water points. The medical troop provides test equipment and personnel to certify water as potable. The water points provide purification and distribution services at the approved water source or Class I supply point. When surface water sources are not available in the RSA, corps or theater resources consisting of transportation units or pipelines are used to move water to the RSA.

(4) Reserves. The RAS maintains a basic load of Class I MRE rations at the combat trains (FARPs) and field trains for contingency operations. The unit SOP normally specifies the appropriate stockage level for these rations.

b. Classes II, III (Packaged), IV, and VII. The RAS receives its Class II, III (packaged), IV, and VII supplies from the S&T troop.

(1) Requisition. Requirements for Class II, III (packaged), IV, and VII supplies, in the form of single-line requisitions, flow from the RAS through the RMMC to the COSCOM MMCs. Normally, RAS elements are forward and send requirements to the field trains (S4 section). Supply personnel, in turn, submit the requisitions to the RMMC.

(2) Distribution. The nature of the RAS's operations and the dispersion of forces require the use of the supply point distribution system. RAS supply personnel report to the S&T troop supply point or directly to the main supply point in the RSA. In some cases, corps or regimental support units may deliver critical items directly to the RAS. Normally, these supplies are requested and distributed before the start of a tactical operation. Upon receipt of the supplies, S4 personnel distribute them to subordinate troops.

(3) Reserves. Reserves of Classes II, III (packaged), and IV normally are not carried. A reserve is included as part of the ASL, which establishes minimum safe levels. The RAS commander is authorized and encouraged to institute operational and basic loads for these supplies consistent with operational needs. Class II and III (packaged) basic loads can be determined by studying the demand history of these supplies. Once operational and basic loads have been determined, the life of the product becomes critical. Products must be rotated out of the basic load to operational consumption to reduce waste. When possible, Class III (packaged) products are carried on aircraft and vehicles. Classes II, III (packaged), and IV for the RAS may be shipped to a forward RSA. However, the RAS must meet time requirements and remain static long enough to receive shipment. Figure 5-3 shows the supply flow for Classes II, III (packaged), IV, and VII.

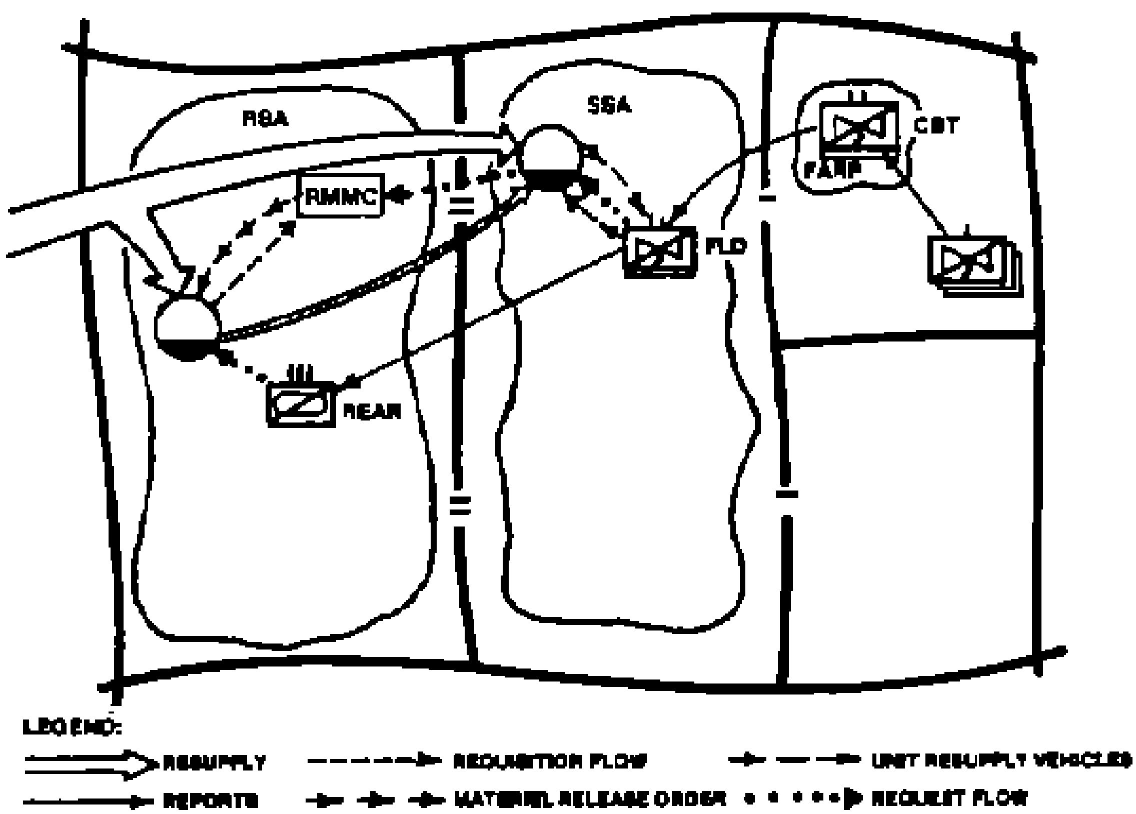


Figure 5-3. Supply flow of Classes II, III (packaged), IV and VII.

(4) Automation support. The RAS S4 will use the unit-level logistics system to request and manage Class II, III (packaged), IV, and VII supplies. This system will operate on ATCCS common hardware, which will interface with the Standard Army Retail Supply System at the supply support activity

c. Class III (Bulk). At regimental level, the S&T troop receives, temporarily stores, issues, and distributes Class III (bulk) fuel supplies. The petroleum storage and issue section of the S&T troop in the RSA operates Class III distribution points. At corps level, the petroleum supply battalion assigned to the COSCOM operates the bulk petroleum supply system.

(1) Requisition. The supply of bulk fuel is based on forecasted requirements developed at the RAS level and reported to the Class III section of the RMMC. To ensure adequate reaction time and availability, forecasts should cover the 72-hour period beyond the next day. When deployed forward, the RAS requests Class III (bulk) directly from the S&T troop located in the RSA.

(2) Distribution.

(a) The COSCOM provides all resupply of aviation fuel for corps or division aviation assets. The S&T troop delivers fuel to the RAS field trains or directly to transloading sites near FARPs. The RAS may use organic vehicles from the Class III/V platoon to receive aircraft fuel from the S&T troop supply point to resupply FARPs.

(b) The FARPs increase the total on-station time for RAS elements. Reducing the turnaround time associated with Class III(A) and V(A) activities gives the commander more time to perform continuous operations. FARP locations must be fluid because the size and composition of FARPs vary slightly, depending on METT-T. The FARP, which is flexible enough to self-deploy or to be aerially inserted, must be capable of meeting the Class III(A) and V(A) needs of the RAS. FARPs are normally employed when the tactical situation is such that the turnaround time at the field trains is too long. If the length of time the unit can be on station is critical, availability of the FARP will increase the time available for unit employment. Also, the commander may find it necessary to establish a FARP when operations are of a high tempo and the field trains cannot keep pace. Several guidelines determine the relocation of a FARP. When battle lines are changing rapidly or when the rear area is threatened, the FARP is moved more often. In a static situation, frequent movement of the FARP may not be necessary. Where air parity or threat air superiority exists, the FARP is moved frequently. Finally, the FARP is moved only after satisfying the support requirements of mission aircraft. Organic aircraft from the AHT may also be used to conduct aerial resupply of RAS FARPs. FM 1-104 describes FARP operations in detail.

(c) Unit distribution may be conducted as far forward as the RAS's combat trains, depending on the mission and location of the RAS. Resupply for diesel and motor gasoline is accomplished by supply point distribution, using organic vehicles. Figure 5-4 shows the supply flow for Class III (bulk), less JP8. Figure 5-5 shows the supply flow for JP8.

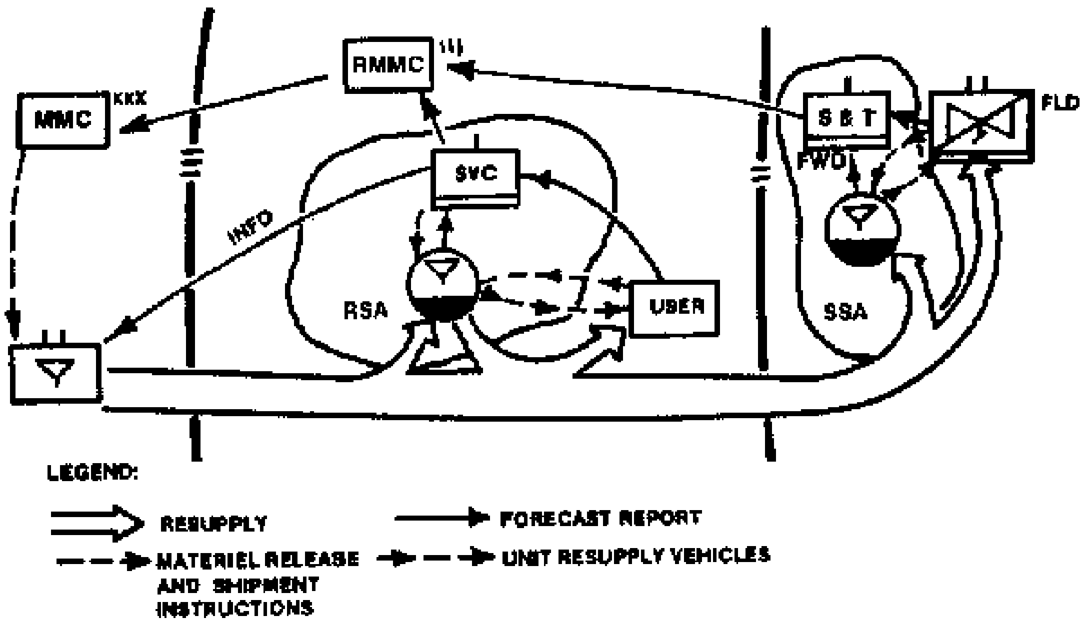


Figure 5-4. Supply flow of Class III (bulk), less JP8.

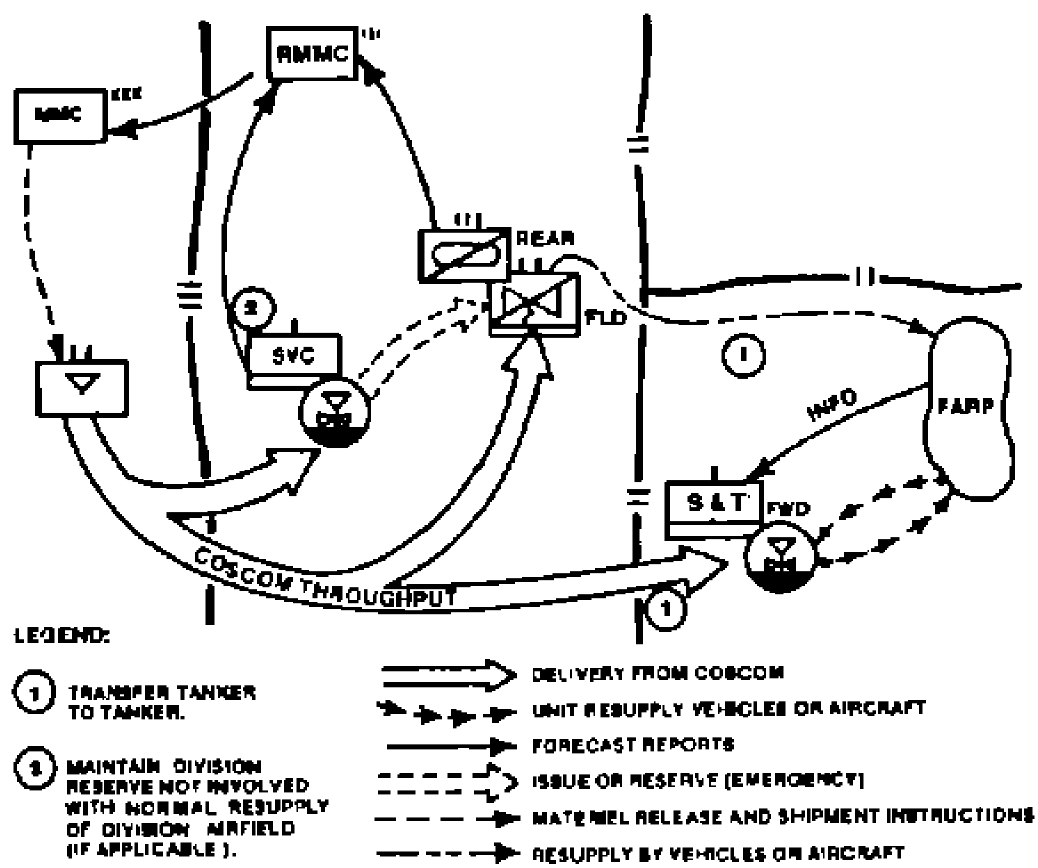


Figure 5-5. Supply flow of JP8.

(3) Reserves. The COSCOM maintains a reserve of JP8 at the petroleum supply battalion. Emergency fuel distribution is accomplished by air. Corps assets may deliver 500-gallon collapsible drums to the desired location.

d. Classes V and V(A). The regimental or corps ammunition officer, located in the appropriate MMC, is responsible for ammunition management. The ammunition officer authenticates ammunition requests, assists operational personnel in consolidating RSRs, and manages CSRs. The RSR is the estimated amount of ammunition, usually expressed in rounds per weapon per day, required to sustain operations without restriction for a specified period. Squadron commanders use the RSR at specified intervals to state their ammunition requirements for planned tactical operations. The RAS S3 develops the RSR and submits it through command channels. The CSR is the rate of ammunition consumption that can be supported, considering availability, facilities, and transportation, for a given period. For ammunition fired from weapons, the ammunition CSR is expressed in rounds per weapon per day. For other Class V items, the CSR is expressed in various units of measure for specific items; for example, a specific amount per day or week. The CSR for a given period may well be less than the RAS's RSR. The regimental or corps ammunition officer manages ammunition resupply by referring to CSRs for different types of ammunition.

(1) Requisition. The RAS S4 initiates Class V and V(A) requests on DA Form 581. The regimental or corps ammunition officer authenticates the request. This procedure ensures that ammunition requests do not exceed the CSR. Supply personnel take the authenticated request to the designated forward S&T troop ATP to draw the ammunition. The designated supporting ASP or ATP normally provides 100 percent of the ammunition requested. Emergency or surge requests are provided by the supporting ASP as determined by the regimental ammunition officer. If an emergency shortage of ammunition occurs, the corps can use stake and platform trailers to deliver ammunition by throughput distribution directly to the RAS's combat trains. It may also arrange for aerial resupply. Cross-leveling of Class V(A) supplies within the regiment may be necessary to meet emergency requirements.

(2) Distribution. Supply point distribution is the normal method of distributing ammunition for the RAS. The Class III/V platoon and the AHT are the primary RAS assets that handle and transport Class V. These assets return to the COSCOM ASP or the regimental ATP for ammunition resupply. Once the ammunition arrives at the FARP, ACTs and ATKHTs rotate through the FARP for resupply. Figure 5-6 charts the flow of ammunition for the RAS.

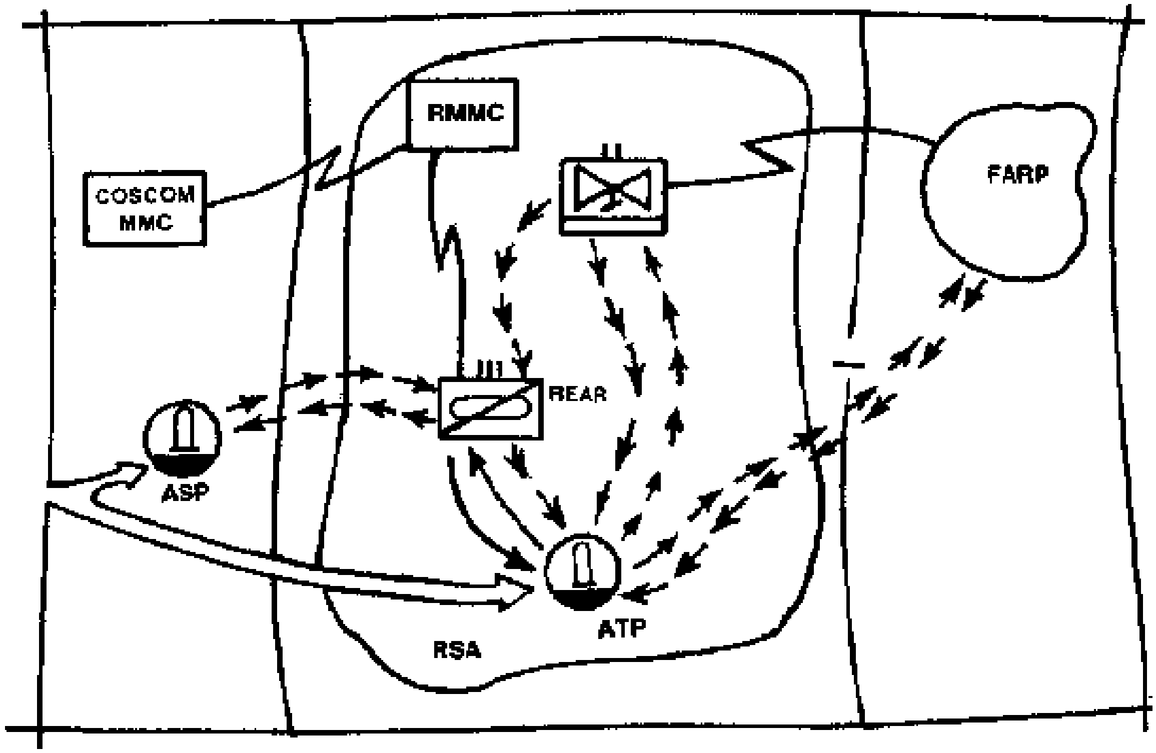


Figure 5-6. Primary flow of ammunition for the RAS.

(3) Reserves. Class V(A) reserves usually are not maintained except in static situations.

(4) Automation support. The S&T troop (ATP) and the regimental ammunition officer at the RMMC will use the SAAS-DAO to manage Class V supplies for the ACR. The SAAS-DAO will operate on the Tactical Army Combat Service Support Computer System; this system will interface with the ATCCS at the RAS S4 (unit-level logistics system S4).

e. Class VI. Class VI supplies consist of Army and Air Force Exchange Service items for sale to troops and other authorized individuals. The exchange service is normally established at the COSCOM. This class of supply should not be confused with the ration supplement (sundries) pack. The sundries pack contains items necessary for the health and welfare of troops such as essential toilet articles. It is made available in theaters of operation for issue through Class I channels, pending establishment of adequate service facilities. The S1 submits requests for support through administrative channels when an Army exchange facility is not available. FMs 101-10-1/2 and 704-28 describe Class VI supplies in detail.

f. Class VII (Major End Items). Major end items are issued on daily battle loss reports by formal requisition. The COSCOM may deliver large items to the RAS.

g. Class VIII. Medical material support is an integral part of the health services system. Units responsible for providing this support are under the command and control of the RSS at regimental level and the medical brigade or medical group in the corps. This support includes the requirements for medical supplies and equipment. It also includes biomedical equipment repair, optical fabrication, oxygen generation, resuscitation, fluids production, and blood processing storage and distribution.

(1) Requisition. Medical supplies and medical-peculiar repair parts are distributed through medical facilities. Normally, a medical supply distribution point is established at a site

accessible to ambulances from forward units such as the RAS. Requests are sent to the rear by ground or air assets or are transmitted by radio or telephone. Supplies are then dispatched forward.

(2) Distribution. The RAS medical treatment squad replenishes its supplies as discussed in (1) above. When medical vehicles or aircraft return to or depart the rear area, coordination may be effected to transport medical supplies to the RAS aid station. Figure 5-7 shows the flow of Class VIII supplies.

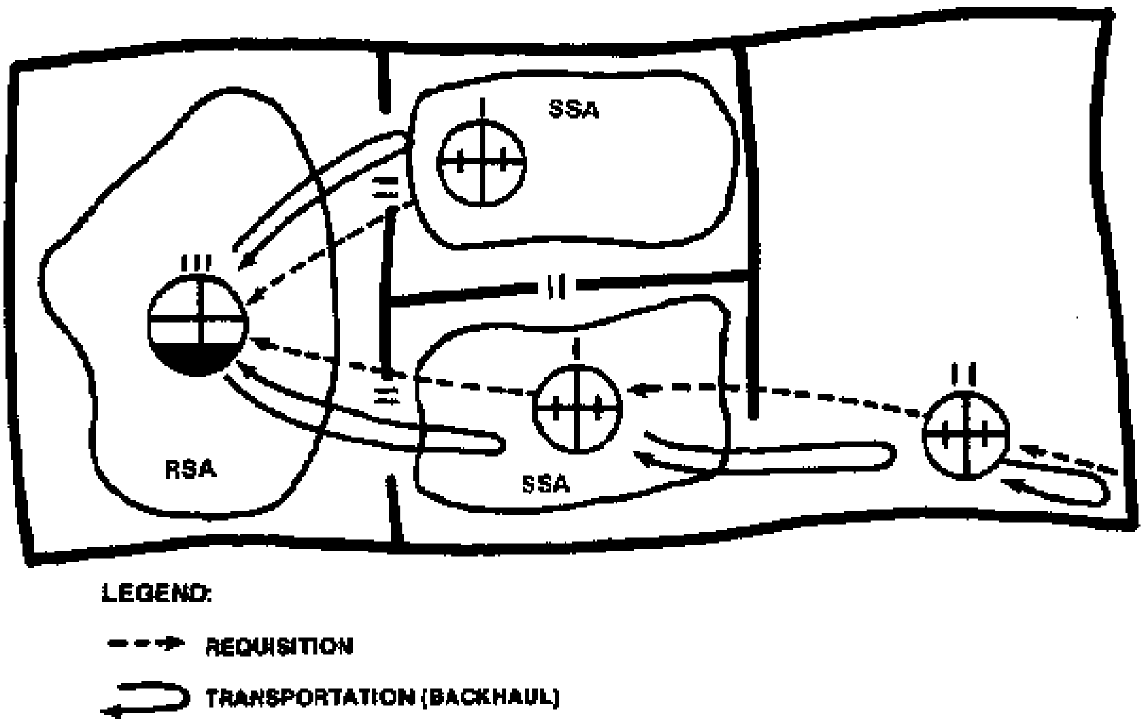


Figure 5-7. Flow of Class VIII supplies.

(3) Automation support. The medical troop and the RAS aid station will use The Army Medical Management Information System for Class VIII supply and maintenance management and patient accounting and reporting. This system will operate on ATCCS common hardware.

h. Class IX. Class IX supplies consist of those repairable and nonrepairable parts (less medical-peculiar repair parts) and components (including kits, assemblies, and subassemblies) that are required for maintaining equipment. The COSCOM or RMMC and the maintenance troop accomplish Class IX accounting. Class IX(A) requests may be submitted through the regimental S4. Requisitions not filled by the maintenance troop but forwarded to the RMMC for fill from the ASL must be earmarked according to the unit SOP. The regimental S4 earmarks parts for normal distribution to the appropriate supply support activity. This also applies to parts received from the MMC in the COSCOM. If the needed parts are not available at the RSA, a request can be sent to the rear area. The request is processed in the rear area, and the parts are shipped by the fastest means. The MMC, in coordination with the material officer, specifies the items and quantities of Class IX material to be located in the forward area. This precludes overstockage of Class IX items. Stockage levels are based on the RAS's PL and the immediate mobility requirements of the forward maintenance units. The appropriate maintenance operating unit maintains the remaining stocks of the Class IX ASL.

(1) Requisition. The RAS submits requests for common Class IX supplies through the maintenance troop.

(2) Distribution. Normally, Class IX supplies are received through supply point distribution. Figure 5-8 shows the supply flow for Class IX and IX(A) supplies.

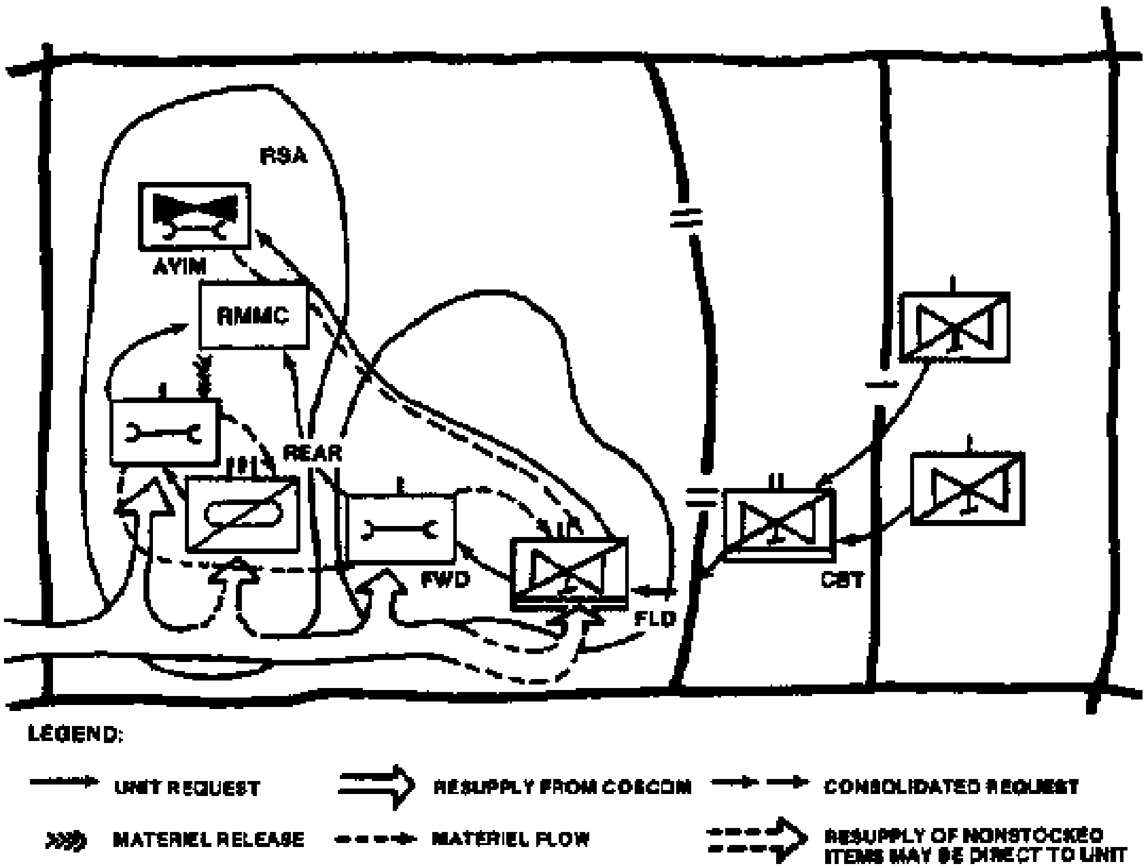


Figure 5-8. Flow of Class IX and IX (A) supplies.

(3) Automation support. The troop PLL clerks of the RAS will use the ULLS PLL. This software program will operate on ATCCS hardware. It will interface with the SARSS-1 and the SAMS-1 operated on the TACCS at the maintenance troop of the regimental support squadron.

5-6. MAP SUPPLIES

a. Unclassified Maps. The MMC maintains required stockage levels of unclassified maps. Unclassified maps are obtained from the COSCOM or supporting supply company DS. The S&T troop stores the maps. The MMC directs the issue of maps, using established automated procedures in Class II, III (packaged), and IV sections. Requirements are computed under the staff supervision of the G2, who establishes issue priorities.

b. Classified Maps. The RAS S2 submits classified map requirements through the regimental S2. The corps G2 consolidates the requirements and submits them to the appropriate map depot.

5-7. VEHICLE AND EQUIPMENT MAINTENANCE

The RAS has an organic unit maintenance element. However, the large number of aircraft, ground vehicles, and other critical pieces of equipment necessitates additional maintenance assistance from outside the RAS (for example, DS, GS, and depot support) to sustain operations. The maintenance allocation chart in the equipment manual assigns the maintenance functions. It tells which maintenance level performs which tasks. The MAC must always be referred to before a maintenance task is started. Maintenance functions include inspecting, testing, servicing, repairing, requisitioning, rebuilding, recovering, and evacuating equipment. Repair and recovery are accomplished as far forward as possible at the lowest capable echelon. When equipment cannot be repaired on site, it is moved only as far as necessary for repair. This concept ensures timely repairs and keeps the maximum amount of equipment operational. The RAS uses the principles of flexible unit structure, direct support, and general support to implement this concept.

a. Ground Maintenance.

(1) Unit maintenance. This level of maintenance is performed by the operator/crew and organizational maintenance personnel. It includes scheduled and unscheduled unit-level maintenance repair and PMCS according to the PMCS table in the equipment manual. The table specifies when and under what condition each preventive maintenance check and service is performed. As a rule of thumb, the operator/crew or using unit is primarily responsible for performing PMCS. The purpose of PMCS is to improve the operational readiness of equipment by preventive maintenance and early diagnosis of problems.

(2) Direct support maintenance. DS maintenance units provide one-stop maintenance services for the supported units. They provide extensive maintenance support to the RAS, including component repair and repair parts supply support. DS maintenance for the RAS is furnished by the maintenance troop of the RSS or in the corps support group or battalion.

(3) General support maintenance. GS maintenance is characterized by an extensive component repair capability. It supports the supply system within the theater by repairing damaged systems for issue through the supply system as Class II, VII, or IX items. This level of maintenance is normally found at theater army level.

(4) Depot maintenance. Army Materiel Command depots or activities, contractors, and host nation support personnel perform depot maintenance in support of the supply system. Depot tasks are outlined in AR 750-1 and also in a memorandum of understanding when they are performed in the theater of operations. Depot maintenance is performed in fixed facilities in CONUS and the theater of operations and is production-line-oriented. Repair parts supply support for depot maintenance is limited to items to support assigned maintenance missions.

b. Ground Support Equipment Maintenance.

(1) Commanders should be aware of the readiness status of their GSE at all times because it assists maintenance personnel in performing maintenance tasks. Poorly maintained equipment may be the result of untrained personnel repairing and operating the equipment. Commanders and maintenance personnel should watch for signs of equipment neglect. Some indicators are--

- Dirty equipment.
- Leaks and missing parts.

- Overdue inspection dates.
- Missing maintenance records.
- Little or no stockage of repair parts.
- Storage of end items for long periods.
- Improperly marked or painted equipment.
- Missing or malfunctioning basic issue items.

(2) Though not all-inclusive, the indicators listed above will provide the commander and maintenance personnel with a general idea of the status of the unit's GSE. Frequently, equipment continues to be in a nonmission-capable status because parts are difficult to obtain. Supervisory personnel must ensure that this does not result from poor supply requisition procedures and uncontrolled cannibalization. All personnel should be aware of the importance of GSE to the overall mission and should ensure that it is properly operated and maintained.

5-8. BATTLE DAMAGE ASSESSMENT AND REPAIR

Battle damage assessment and repair procedures are designed for battlefield environments. They should be used in situations where standard maintenance procedures are impractical. These procedures are not meant to replace standard maintenance practices but rather to supplement them in a battlefield environment. They are used only at the direction of the commander. BDAR procedures are listed in equipment manuals.

5-9. VEHICLE AND EQUIPMENT RECOVERY PROCEDURES

The recovery manager coordinates recovery operations with the overall repair effort to best support the commander's priorities and the tactical situation. The goal is timely return of equipment to operation with the least expenditure of resources. FM 20-22 describes the technical aspects of vehicle recovery operations.

a. Recovery Principles. Recovery operations are normally conducted according to certain general principles. These principles are discussed below.

(1) The RAS is responsible for the recovery of its disabled equipment. When the RAS lacks the physical means to recover an item, it requests assistance from the supporting maintenance element.

(2) Management of recovery operations is centralized at RAS level when possible.

(3) The commander organizes recovery resources to best support the unit's mission. Changes in the type and quantity of supported equipment, as well as the tactical situation, may require the reorganization of recovery assets.

(4) Recovery operations are coordinated with the maintenance effort. Maintenance personnel repair equipment as far forward as the limits of the tactical situation, amount of damage, and availability of resources permit. Maintenance time guidelines are used for making repair or recovery decisions. The estimated repair time helps to determine the maintenance activity to

which the item should be recovered.

(5) A 24-hour recovery capability is required. Both peacetime and wartime operations require continuous and responsive recovery support. Where applicable, roadside breakdown responsibility is rotated on an area basis among maintenance units. This provides recovery support beyond a using unit's capability.

(6) The proper recovery equipment is used for the recovery mission. Wreckers are normally used to recover wheeled vehicles. Selection of the proper recovery vehicle for the mission becomes critical as the work load increases.

(7) Recovery vehicles do not return equipment farther to the rear than necessary for accomplishing repairs. Usually, equipment is recovered to the maintenance collection point of the supporting maintenance unit. This practice keeps recovery vehicles available in the forward areas where they are most needed. Direct support units use heavy equipment transporters to evacuate heavy items.

(8) Accurate location information is provided to the recovery manager and crews. Ground guides may be required when specific location information is not available or when the tactical situation is not well defined.

(9) Multiple recovery involves towing more than one disabled vehicle at a time. Careful route selection for multiple-vehicle towing is important. Safe operation requires that the combined load not exceed the braking capacity of the recovery vehicle on a steep grade.

(10) Recovery missions that might interfere with combat operations or compromise security are coordinated with the tactical commander concerned.

(11) When recovery assets are limited, the commander establishes recovery priorities. These priorities depend on the tactical situation and the commander's need for the item. The type of equipment disability also affects the priority when two or more like items must be recovered. Combat vehicles are usually recovered before tactical vehicles.

b. Priority Sequence. The priority sequence usually provides the maximum return for the recovery effort expended. Classified items normally are recovered first, followed by terrain-stuck items. Items with failed or damaged components needing little repair are recovered next, followed by items requiring long recovery and repair times. Contaminated items, uneconomically repairable items, and enemy material are recovered last.

c. Alternatives. Local options are considered and tried before a recovery mission is initiated. Field-expedient repair and self-recovery or like-vehicle recovery may be possible, avoiding the necessity for a recovery vehicle.

d. Recovery Support. Recovery support is provided on a unit or an area basis. Using units normally provide support on a unit basis. Maintenance units may have an area support mission for using unit backup support for out-of-sector units operating in the area.

e. Recovery Initiation. Action to recover equipment begins at the place the item became disabled. When the equipment operator or crew member detects an inoperable condition, he assesses the damage and initiates action based on his analysis and the tactical situation. He then informs the appropriate authorities according to notification procedures in the unit SOP. These procedures vary based on the type of unit and equipment, availability of communications, tactical situation, and location of equipment. Combat or tactical vehicles usually have radio communications;

administrative vehicles normally do not. Lack of communication for out-of-sector equipment requires the operator or crew member to initiate independent action. He may have to coordinate directly with other units in the area or with the supporting maintenance unit for repair or recovery support.

5-10. AVIATION MAINTENANCE CATEGORIES

On the modern battlefield, aviation maintenance operations continue around the clock. The governing concept is to "replace forward, repair rear" to enable the RAS to rapidly return aircraft to the battle. Damaged or inoperable aircraft that require time-consuming repairs are handled in more secure areas toward the rear. TM 55-1500-204-25/1 outlines general aircraft maintenance procedures. Aviation maintenance functions are divided into two categories: scheduled and unscheduled. A brief discussion of each category follows. Detailed information on The Army Maintenance Management System-- Aviation is in DA Pamphlet 738-751.

a. Scheduled Maintenance. Scheduled maintenance includes predetermined cyclic inspections of aircraft systems and component replacement. These events are scheduled either on a calendar or flying-hour basis. The established frequency of inspections or replacements is listed in the appropriate aircraft technical manuals. The intervals stated in these manuals are maximum times and cannot be exceeded except during critical combat operations when authorized by the unit commander. Comprehensive airframe and subsystem inspections are performed (in varying depths) at daily and phased intervals. The exact calendar or flying-hour scheduled maintenance intervals may differ by type of aircraft. Grounding aircraft or overflying scheduled maintenance during critical battlefield situations is a potential problem. This problem is avoided by completing scheduled maintenance before aircraft deploy or enter into surge operations. Guidelines, standards, and limitations for these actions are included in SOPs governing the specific operation.

b. Unscheduled Maintenance. Unscheduled maintenance is required when an aircraft system or component malfunctions or fails prematurely or unexpectedly. It is also required to correct damage incurred as a result of improper operation or battlefield activity. Because unscheduled maintenance cannot be predicted, units are doctrinally and organizationally prepared to make unscheduled repairs as needed.

5-11. AVIATION SUPPORT SYSTEM STRUCTURE

The support system comprises a three-level structure: aviation unit maintenance, aviation intermediate maintenance, and depot maintenance. Depot maintenance is coordinated at the AVIM level or higher and is discussed in FM 1-500. The AVUM and AMB (AVIM) organizations are those found on the battlefield and are the ones addressed in maintenance allocation charts. Specific organizational structures vary somewhat, depending on whether they are in a division (light or heavy) or corps. However, the basic concepts of aircraft maintenance discussed below are generally applicable in all organizations. These include task responsibilities and procedures within AVUM and AMB (AVIM) organizations and AVUM-AMB unit interface. Specific maintenance tasks assigned to each level are found in the maintenance allocation charts in the repair manual for each aircraft.

a. Aviation Unit Maintenance. All operational aviation units are responsible for AVUM. The objective of unit maintenance operations is to ensure that the maximum number of fully mission-capable aircraft is available to the battlefield commander. The general concept is for crew chiefs assigned to specific aircraft to perform daily servicing and inspections. Crew chiefs also perform common remove-and-replace aircraft repairs. Scheduled maintenance (other than daily inspections) and the more time-consuming operator-level repairs are normally done by the AVUM troop organic to the RAS. The AVUM troop must be prepared to accept aircraft from the battle area for immediate repair or make on-site repairs. On-site repairs are made by contact teams. The teams are equipped with special tools and necessary repair parts and hardware to operate forward. The AVUM troop element located with the aircraft in the battle area assesses the damage. It normally recommends whether to evacuate the damaged or unserviceable aircraft to the supporting AMCO or the AVUM troop or to repair the aircraft on site. Assessment and repair are accomplished with support through ACM/BDR teams. If the repairs are minor and require no specialized skills, only repair parts are brought forward. Repair time is a major factor in determining whether evacuation is necessary. Maintenance support teams may be able to make on-site repairs faster than the aircraft can be evacuated.

(1) In addition to AVUM support teams from the rear area, available ACM/BDR teams from the AMB can also be used. The AVUM troop commander coordinates and schedules maintenance at the forward location of the AVUM troop. For this reason, members of the forward element must be able to assess aircraft damage or serviceability rapidly and accurately. Maintenance support team operations follow these principles:

- Teams are used to the maximum extent possible.
- Teams may be used for aircraft, component, avionic, or armament repair.
- Teams are transported by the fastest organic means available (normally aircraft).
- Teams sent forward from the AVUM support troop are oriented and equipped for special tasks.
- Aircraft are repaired on site rather than evacuated for maintenance when the time and situation allow.

(2) Most of the AVUM troop is located in the RSA. The bulk of the troop's mission is scheduled maintenance, component repair, repair part requisition and storage, and major unscheduled repair. The AVUM technician maintains close contact with the forward element of the AVUM troop to ensure that the unit's aircraft maintenance posture is coordinated and accurately understood. The AVUM troop must maintain the highest degree of mobility and ensure continuous AMCO (AVIM) support. Some considerations for aircraft maintenance at the AVUM troop location are as follows:

- Each major repair must be evaluated for evacuation to the AMB based on work load and mobility.
- Operational substitution is a key element in maintaining the maximum number of mission-capable aircraft.
- Priorities for repairs are based on the type of aircraft and battlefield requirements for the aircraft.
- Quality control and technical inspection requirements are based on minimum acceptable standards rather than on "like new" repairs.

- Intensive maintenance management is necessary to overcome shortages of personnel, repair parts, and aircraft resulting from RAS operations.

(3) Shortages of repair parts, particularly an aviation intensive management item, may require the AVUM troop commander to use battle-damaged or unserviceable aircraft as a source for repair parts during combat operations. The intensity of combat, need for operational aircraft, and availability of the repair parts requisition system will dictate the extent to which operational substitution is necessary.

b. Aviation Intermediate Maintenance. Aviation maintenance battalions (AVIM) provide intermediate-level maintenance for AVUM and operating organizations. AMBs are nondivisional. In terms of maintenance responsibility, they serve as the bridge between units that own and operate aircraft on the battlefield and production line and overhaul depots located away from the battlefield. The goal of AMBs in combat is the same as that of AVUM units; that is, to provide the battlefield commander with the maximum possible number of fully mission-capable aircraft.

(1) Nondivisional AMCOs (AVIM), normally located in the corps area, provide support for corps nondivisional aviation assets. They also provide backup for the divisional AMCOs (AVIM). The nondivisional AMCOs (AVIM) are assigned to an aviation maintenance battalion, which is assigned to a corps area. The aviation maintenance battalion can control a minimum of two and a maximum of eight nondivisional AMCOs (AVIM). The number of AMCOs assigned to the aviation maintenance battalion is determined by the number of aircraft requiring support in the battalion's area of responsibility. Technical personnel assigned to both divisional and nondivisional AMCOs possess the same level of skill and proficiency. However, the reduced mobility and security constraints associated with the more rearward location of nondivisional AMCOs make it easier to perform more extensive repairs. The nondivisional AMCO (AVIM) provides the full scope of support services to nondivisional aviation units. In its backup role and as the need arises, the nondivisional AMCO (AVIM) also performs functions normally tasked to the divisional AMCOs (AVIM) in support of their aviation brigades. This includes ACM/BDR team maintenance and recovery actions. The aviation maintenance battalion manages the cross-leveling of nondivisional work. The concepts of divisional AMCO employment may also apply to nondivisional AMCOs. However, differences exist in the organizational and battlefield placements of divisional and nondivisional AMCOs (AVIM); that is, divisional in the DISCOM and nondivisional in the corps.

(2) A divisional AMCO (AVIM) is assigned as a separate company organic to the DISCOM. It is structured to support the specific aircraft assigned to the division (normally observation, utility, and attack helicopters). FM 1-500 describes base maintenance and forward team maintenance in detail.

(a) The AMCO maintains a component repair capability and maintains and manages ORF assets. It provides repair parts to supported units by maintaining the Class IX(A) ASL, an extensive and responsive RX program, and mobile and responsive one-stop maintenance support. The AMCO recovers damaged aircraft when repairs exceed AVUM capability and provides maintenance support teams to the AVUM sites in the division area and in the MBA. It also repairs aircraft, avionic equipment, and aircraft armament systems for return to the user or the supply system.

(b) To reduce transit times for aircraft and components, AMCO ACM/BDR teams are used in the DSA, at the AVUM troop location, or forward in the MBA. Aircraft or components needing repairs that exceed AVUM capabilities or that require extensive AVUM work hours should be considered for immediate evacuation to the DSA. AVUM personnel must prepare the aircraft system or component for repair before the AMCO ACM/BDR team arrives.

5-12. AIRCRAFT RECOVERY OPERATIONS

Combat operations result in a greater demand for operational aircraft and a large increase in the number of flying hours. These increased requirements will be complicated by higher attrition and battle damage rates, which create shortages of repair parts and replacement aircraft. To offset these shortages and to maintain an effective combat aviation force, the rapid recovery and repair of Army aircraft systems and components are essential. Aircraft recovery operations are those that move inoperative aircraft systems or components from the battlefield to a maintenance facility. Recovery may require the on-site repair of an aircraft for a one-time flight. It may also require the preparation of an aircraft for movement directly to the nearest appropriate maintenance activity by aerial or surface means. In some cases, only portions of inoperative aircraft may be recovered.

a. Aircraft Recovery Responsibility. The owning aviation unit is responsible for aircraft recovery. It uses its AVUM troop within the limits of the unit's organic lift capability. A successful recovery operation is a highly coordinated effort between the owning organization, its supporting AMCO, and the ground element where the operation is to take place. The operation also must be coordinated with any organization that may provide aircraft or vehicle assets to complete the recovery. The AVUM troop will have organic rigging equipment for aircraft recovery. The recovery team must be trained in rigging a damaged aircraft and in conducting recovery operations. If the recovery is beyond the AVUM team's lift capability, AMCO support is requested. Divisional and nondivisional AMCOs (AVIM) have limited organic rigging equipment. The AVUM commander coordinates with the AMCO commander to conduct the recovery. The AMCO commander coordinates with the division or corps aviation brigade to provide aircraft and equipment if necessary.

b. Recovery Team. The AVUM troop provides the recovery teams. Each team usually includes an aircraft maintenance officer, a forward repair and recovery team chief, a technical inspector and damage assessor, and a trained aircraft recovery crew. The recovery team is formed from AVUM troop assets located at the combat trains (FARPs). If the AHT cannot provide recovery aircraft, the AMCO coordinates with aviation units of higher echelons for support aircraft. Support aircraft should be equipped with rigging equipment for each type of aircraft in the unit. Also, quick-fix battle damage repair kits (tools; hardware; POL products; repair parts, as required; and technical manuals) should be included. Crash rescue equipment, including such items as a chain saw and metal-cutting saw, should be on board the recovery aircraft.

(1) The maintenance and recovery team must consider several factors in determining the best course of action. These factors include the location of the downed aircraft, amount of damage, tactical situation, and proximity to the enemy. Another factor to consider is the time available for AVUM preparation and rigging (usually 30 to 60 minutes). The time required for the recovery will be influenced by the weather and the availability of recovery assets.

(2) After evaluating the above factors, the team determines a course of action. The team may opt to defer further maintenance, make combat repairs, or return the aircraft to service. It may also opt to make sufficient repairs to fly the aircraft to an appropriate maintenance area, rig the aircraft for recovery, or arrange for motor transport. A final option is to selectively cannibalize, destroy, or abandon the aircraft according to SOPs or approving authorities.

c. Class IX (Aircraft Repair Parts). The AMCO provides repair parts supply for all nondivisional aircraft, avionic equipment, and aircraft armament systems. In addition, it maintains the ASL for Class IX(A).

(1) Requisition. When RAS field trains are located in the RSA, requests are submitted to the AMCO representative located in the RSA. However, automation may speed the requisitioning of Class IX(A) repair parts through the forward direct support maintenance company.

(2) Distribution. The AVUM troop commander selects PLL items available forward at the combat trains (FARPs) for quick-fix repairs. Usage of these items must be reported to the PLL clerk so that the items can be replenished. Items required forward that are in the unit's PLL or AIMI are reported to the regimental rear CP before they are transported forward. In emergencies, the AVUM troop commander uses organic aircraft to secure parts from the rear. (The Class IX(A) supply flow is shown in Figure 5-8 .)

5-13. SPECIAL MAINTENANCE CONSIDERATIONS

a. Night.

(1) Sustained operations. AirLand Battle doctrine requires around-the-clock operations. This, in turn, requires a fully productive, around-the-clock maintenance capability. Working on aircraft or vehicles day and night appreciably shortens calendar repair time for those aircraft or vehicles undergoing major maintenance. Moreover, completion of required maintenance during the night on aircraft that have flown all day allows those same aircraft to be assigned to missions early the next day.

(2) Noise and light discipline. Noise and light discipline is crucial to night maintenance activities on the battlefield. The closer to the FLOT a unit operates, the more restrictive noise and light discipline must become. When units are operating close to the FLOT, maintenance personnel perform most maintenance tasks at night. They work with self-powered light under lightweight, portable blackout enclosures that are easily moved from one aircraft or location to another.

(a) For units operating toward the rear, noise and light discipline requirements normally are less rigid because enemy detection is less likely. Rigid blackout provisions still apply to all "inside" white-light work, but certain tasks can be done outside using subdued lighting devices. The degree of detection avoidance on the battlefield is determined on a situational basis. Generally, units operating toward the rear perform maintenance functions. However, the high volume of tasks will require that some of the work load be accomplished outside available shelters.

(b) The terrain will influence how much night maintenance can be safely and effectively done in the open. The faintest light is visible from great distances in the open desert terrain of the Mideast. That same light is not detectable from a comparable distance in the forested, hilly European terrain.

(c) Certain tasks cannot be easily done at night when noise and light discipline is imposed. For example, maintenance tasks that require rotor blade turning or engine run (rotor track or fuel control adjustment) are done outside and generally require significant area lighting. For this reason, noise and light discipline may be imposed and these tasks delayed until daylight.

(3) Maintenance considerations. A single overall concept for night maintenance operations is not feasible. Each organization must establish and alter its plan for implementing night operations according to environmental conditions and changes in the threat. For example, a unit that moves forward into more open terrain will conduct night maintenance operations differently than when it moves rearward or into a more protected environment.

(4) Procedures and criteria. Commanders establish comprehensive, flexible procedures for conducting night maintenance operations. These procedures include human factors, light discipline criteria, production control adjustments, and quality control requirements. The main concerns in developing procedures and criteria are that safety-of-flight standards and unit security are the same at night as they are during the day.

b. Unusual Environments. Commanders are aware of the unique implications of performing maintenance in unusual environments. They must ensure that adequate preparations are made before units conduct operations in such areas. Maintenance procedures appropriate for one environment may not be appropriate for another. AirLand Battle operations may be conducted in the desert, jungles, mountains, or extremely cold climates. FM 1-500 lists the special considerations for aircraft operating in such areas. In general, commanders look at the impact of the environment on such factors as--

- Communication restrictions.
- Special shelter requirements.
- Specialized equipment and clothing requirements.
- Modification of scheduled and preventive maintenance checks.
- Noise and light discipline requirements for night operations.
- Mobility and transportation restrictions (mountains, heavy foliage, ice).
- Effect of altitude and excessive heat or cold on personnel and equipment performance.
- Increased stockage levels for filters, bearings, and seals when units operate in wind and sand environments.

5-14. PERSONNEL SERVICE SUPPORT

Personnel service support is the personnel-oriented CSS function that impacts on the manning and mission of a unit and the morale and welfare of soldiers. Normally, the RAS S1 coordinates personnel services. Personnel service support is divided into critical and essential personnel functions.

a. Critical Personnel Functions.

(1) Strength accounting. Strength accounting is the process of collecting, recording, and updating personnel strength data to manage the personnel combat power of the tactical force. Normally, the troops submit a daily strength report to the RAS S1. The S1 consolidates and forwards this information to the regimental S1 section. The S1 may also send an information copy to the supporting personnel service company.

(2) Replacement operations. These operations consist of assigning personnel to the appropriate units in the appropriate MOS slots consistent with the commander's priorities. When units are alerted to deploy to a theater of operations, they receive filler personnel to make up any personnel shortages. Filler personnel are individual replacements who are assigned directly to a deploying unit before it deploys. In addition, standby replacements are alerted for oversea movement when a theater of operations needs replacement personnel. Standby personnel are individuals who have been identified and alerted as potential replacements but who are not immediately needed in the theater of operations.

(3) Casualty reporting. Casualty reporting is the process of accounting for and reporting individuals who are killed, wounded, or missing on the battlefield. Soldiers having direct knowledge of the incident use DA Form 1155 to make their initial report. Troop commanders use DA Form 1156 to provide casualty information to the S1. The RAS PAC uses these reports to update the SIDPERS data base, battle rosters, and strength reports. The RAS PAC then forwards the DA Forms 1155 and 1156 to the personnel service company.

(4) Health services support. Medical support within the theater of operations is organized into four levels of health care that extend rearward throughout the theater. Each level is designed to meet the needs of the operational environment and plays a specific role in the progressive care of sick or wounded soldiers. Medical capabilities increase with each level of care. The treatment capability of each higher level of medical support includes the capabilities of lower levels. Evacuation, as well as treatment, is the inherent responsibility of each level of health services support. The four levels of health care and evacuation are discussed below.

(a) Level I. Level I medical support is primarily emergency medical care, routine outpatient (sick call) care, and preventive medicine activities. This level of care is normally provided by the organic medical resources of the unit. Units without organic medical resources receive their Level I care from the next higher level of medical support. The RAS receives Level I medical support from its organic medical squad. The medical platoon's base medical treatment element is the treatment squad. This squad consists of two identically equipped medical treatment teams and is normally employed in the combat trains (FARPs) with forward maintenance contact teams. The medical treatment teams may be employed separately for short periods when support requirements dictate. This is particularly true for widely dispersed operations, short-duration operations, or multiple FARP operations. The teams may also be separated when the combat trains (FARP) area is moved frequently and the medical squad echelons in teams to ensure continuity of, medical support.

(b) Level II. Level II medical support is provided by the medical troop of the RSS and may be provided by companies from the area support medical battalions at the corps. The medical troop is deployed in the RSA and with various areas of troop concentrations at the corps. The major emphasis is initial resuscitative treatment and continuing emergency care. Each medical troop has up to three medical treatment squads that can operate independently for short periods. The medical troop can reinforce or reconstitute Level I medical support elements with medical teams or squads and provide echelonment of Level II medical support. The RAS receives its Level II medical support from the medical troop of the RSS. When under the command and control of the corps, the RAS receives Level II support on an area basis from a medical company of the area support medical battalion at the corps. When under the command and control of the regiment, the RAS receives Level II support from the main support medical troop in the RSA. When the RAS operates independently (away from Level II medical support elements), additional medical support may be task-organized to augment the Level I capability with appropriate Level II treatment squads. Specific techniques and procedures for providing Level II medical support in these situations are addressed in the CSS portion of the OPLAN or OPORD. The RAS surgeon must coordinate Level II medical support with the regiment or corps medical planners to ensure that adequate medical support is provided.

(c) Levels III and IV. Levels III and IV medical support is provided by corps and COMMZ hospitals. The major emphasis at Level III is resuscitation, initial wound surgery, and postoperative treatment. The major emphasis at Level IV is general and specialized medical and surgical care and reconditioning and rehabilitation of return-to-duty soldiers.

(5) Evacuation. Evacuation of the sick and wounded is an integral part of the health services support and is as important as the treatment itself. It is equal in importance to surgical procedures and is essential to the eventual restoration of the soldier to duty. Patient evacuation is the timely, efficient movement and en route care of wounded, injured, or ill soldiers from the battlefield to the appropriate medical treatment facility. Evacuation begins at the place of injury or illness and continues as far rearward as the patient's condition dictates or the military situation permits. Soldiers are evacuated by the most expeditious means available, depending on their condition and assigned evacuation precedence. Ground ambulances are normally used for slightly wounded, ill, or injured soldiers while air ambulances are used for more seriously wounded, sick, or injured soldiers. The gaining level of medical support is responsible for evacuation from the lower level. Therefore, most medical support elements have an organic evacuation capability.

(a) The RAS has no organic ground evacuation capability in the medical squad of the HHT. Therefore, the RAS must rely on its Level II medical support for dedicated medical evacuation support. Medical evacuation resources may be requested and task-organized with the medical treatment squad of the HHT to provide Level I evacuation support. Air ambulance operations in direct support of the RAS may be provided when the situation dictates. In this case, the air ambulance element will normally collocate with the RAS's treatment squad.

(b) The ACTs, ATKHTs, and AHT do not have medical aidmen assigned to provide immediate medical care. These troops engage in independent, widely dispersed operations and have no immediate medical treatment capability. Therefore, organic aircraft may be used to transport a casualty from the point of injury to the RAS's medical squad for care. Transporting a casualty without en route medical care frequently poses a greater health risk. If ground medical personnel are at the site and the tactical situation permits, evacuation should be effected with dedicated aeromedical evacuation aircraft even if delays are encountered.

(c) Level II evacuation support is provided by the same medical units that provide Level II treatment support. The air component of the evacuation support is provided by air ambulance units of the medical evacuation battalion in the corps. Air ambulance units operate well forward in the combat zone in DS of a division and evacuate from as far forward as the tactical situation permits. Air ambulances operating forward of the RAS's combat trains (FARPs) may require protection or security to execute the mission. Aviation elements of the RAS may be required to augment the aeromedical capability during mass casualty situations. In determining whether to augment, commanders must weigh the risk of transporting casualties by nonmedical resources that do not have an en route medical care capability. Often, the best course is to leave the casualty in the care of ground medical personnel and delay movement until medical assets become available. The commander must also consider the impact on combat operations when diverting aviation assets from their primary mission.

b. Essential Personnel Functions.

(1) Administrative services. The RAS PAC provides a variety of administrative services. These services include processing personnel actions, awards, emergency leaves, efficiency reports, promotions, administrative eliminations, Uniform Code of Military Justice actions, and pay documents. The PAC also maintains blank forms and publications, provides limited typing support, and performs distribution services.

(2) Finance support. The degree of finance support varies with the tactical situation. In low-intensity conflicts, the soldier is paid a specified amount on an established payday by a Class A agent or by finance support personnel. In mid- and high-intensity conflicts, regularly scheduled paydays are suspended. Soldiers are paid or allowed to cash personal checks on dates specified by the unit commander. Finance support personnel disburse the payment as determined by the theater army commander. Commanders at regimental or equivalent level (06 or above) may establish an amount less than the theater maximum for their personnel.

(3) Postal services. Postal services are provided by a direct support postal platoon from the DS postal company of the personnel group. RAS mail clerks pick up mail from the platoon in the regimental support area. They separate the mail by troop and provide it to troop postal orderlies for delivery to addressees.

(4) Chaplain activities. The unit ministry team, consisting of at least one chaplain and one chaplain assistant, provides comprehensive religious support. The squadron UMT performs or provides sacraments, rites, ordinances, services, and pastoral care. It performs these tasks in keeping with the overall mission of nurturing the living, caring for casualties, and honoring the dead. (FM 16-1 contains religious support doctrine for the chaplain and chaplain assistant.) The UMT advises the commander on moral, ethical, and religious issues affecting the unit's mission.

(5) Legal service support. The legal specialist in the regimental S1 section, assisted by the division Staff Judge Advocate, provides legal service support. These officers provide legal advice to commanders, process claims for and against the government, and furnish personal legal assistance. They also interpret international laws, treaties, and status-of-forces

agreements.

(6) Morale and welfare support. Morale and welfare support activities include equal opportunity; alcohol and drug control; morale, welfare, and recreation; and bands. Because normal garrison facilities and personnel will no longer be available when units deploy, equal opportunity and alcohol and drug control will become the responsibility of the unit chain of command. Recreation opportunities will be limited during combat operations; however, recreation support should be provided when possible. Examples of recreation support are entertainment, field libraries, field service clubs, and organized athletics.

(7) Public affairs. Public affairs within the regiment is a collateral duty. This duty is normally performed by the S1. The regimental PAO coordinates the unit's command information requirements with higher headquarters PAOs. He informs higher headquarters PAOs of all contacts made by the news media and provides them with the information given to the news media. The regimental PAO also coordinates with higher headquarters PAOs any visits to the regiment by news media representatives.

5-15. FIELD SERVICE SUPPORT

a. Field services are logistic support functions that are not included in supply, maintenance, and transportation functions. These services include airdrop, GRREG, clothing exchange and bath, laundry and reimpregnation, bread baking, light textile and clothing renovation, and salvage.

b. Normally, the field service capability organic to the corps includes clothing exchange and bath, GRREG, and salvage. The COSCOM provides CEB services to the ACR. It designates a corps field service company or special team augmentation to perform this mission. The S&T troop establishes salvage collection points in or near maintenance collecting points. The sections running these points assume responsibility for items the maintenance troop discards as unserviceable or for which it is not responsible; they return items that are serviceable to supply channels and send items to salvage for scrap metal. The salvage point is not responsible for COMSEC or medical supplies, toxic agents, radioactive materials, contaminated equipment, aircraft, ammunition, or explosives. Salvage is transported by any method that does not affect mission accomplishment. The COSCOM provides the rest of the field service support for the regiment. The regiment receives its airdrop support from a quartermaster airdrop supply company, which is normally assigned to the COSCOM. Airdrop supply companies are organic to airborne and air assault divisions. They can rig loads for airdrop and low-altitude parachute extraction system operations conducted by USAF cargo aircraft.

c. All soldiers know, as an article of faith, that the Army will always take proper care of its dead. Thus the importance of GRREG operations cannot be overemphasized. The RAS is responsible for its own search, recovery, evacuation, burial, or transportation operations associated with GRREG until GRREG personnel arrive. Remains are identified and transported by backhaul to GRREG collection points in the RSA. These collection points are operated by the S&T troop. During peacetime, most units have only cadre GRREG personnel available. Upon mobilization and deployment, these units are augmented with GRREG sections and platoons from the reserves.

(1) The theater commander establishes one of three policies for GRREG operations. The policies are temporary burial in the theater, permanent burial in the theater, or return of the

body to CONUS.

(2) The combat situation may require that deceased personnel be buried by their fellow soldiers on or near the site of death; for example, NBC contaminated remains. When hasty burial is accomplished, the location of the burial site must be forwarded to the next higher headquarters.

(3) GRREG teams are formed in the units to search for, identify, and transport remains to GRREG collection points. Team members have a compass for determining azimuths, a map of the search area, and paper for sketching the recovery area. They are equipped with entrenching tools and paper tags with string or wire fasteners for tagging remains. Team members are also issued personal effects bags, human remains pouches (body bags), NBC agent tags, and appropriate GRREG forms.

(4) When loading remains on vehicles, GRREG personnel carry the remains feet first. Remains are accorded an attitude of reverence and respect at all times. They are loaded feet first on trucks and rotary-wing aircraft and head first on fixed-wing aircraft. Care is taken that no remains or litter touches another remains or litter. The vehicle transporting the remains is kept covered, and personal effects and identification tags are kept with the remains. An escort is sent with the remains during evacuation to guard against theft and unauthorized entry to the vehicle. When possible and practicable, the escort is composed of personnel who witnessed the circumstances surrounding the individual's death. Further details on GRREG operations are in FM 10-63.

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.

A-1. 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 commonsense 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.

A-2. 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.

a. <u>Commanders</u>. As in all other areas, commanders are responsible for the effective management of risk. To meet this responsibility, commanders--

(1) Seek optimum, not just adequate, performance.

(2) Select from risk reduction options provided by the staff.

(3) Accept or reject residual risk based on the benefit to be derived.

(4) Train and motivate leaders at all levels to effectively use risk management concepts.

b. <u>Staff</u>. The staff--

(1) Assists the commander in assessing risks and in developing risk reduction options.

(2) Integrates risk controls into plans and orders.

(3) Eliminates unnecessary safety restrictions that diminish training effectiveness.

c. Troop Leaders. Troop leaders--

(1) Develop a total commitment to mission accomplishment and the welfare of subordinates.

(2) Consistently apply effective risk management concepts and methods to operations they lead.

(3) Report risk issues beyond their control or authority to their superiors for resolution.

A-3. PROCESS

a. 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.

b. Step 2: Assess Risks. Determine the magnitude of risks by estimating loss probability and cost. 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.

(1) 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 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--

(a) Review each situation to ensure that all significant areas of concern are evaluated, even if they are not included in the matrices.

(b) Use the matrices to analyze the risk to target areas of concern for risk-reducing action.

(c) 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.)

(d) Keep in mind that Figure A-1 represents arbitrary weighted factors; modify these factors to fit particular missions and units.

(2) 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--

(a) Determine mission complexity and difficulty.

(b) Assess the enemy situation and identify specific hazards.

(c) Consider all aspects of the terrain as well as weather and visibility.

(d) Determine the supervision required and evaluate the experience, training, morale, and endurance of troops; also determine the availability of equipment.

(e) Determine the time available for planning and executing the mission.

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).

c. <u>Step 3: Make Decisions and Develop Controls</u>. 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.

(1) 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--

(a) Eliminate the hazard totally, if possible. Engineer out the hazard or design equipment to eliminate the hazard or incorporate failsafe devices.

(b) Guard or control the hazard. Use automatic monitoring or alarming devices. Provide containment or barriers.

(c) Change operational procedures to limit exposure. Modify operational procedures to minimize exposure (numbers and duration) consistent with mission needs.

(d) Train and educate personnel in hazard recognition and avoidance.

(e) Provide protective clothing or equipment that will minimize injury and damage potential.

(f) Use color coding and signs to alert personnel to hazards. Motivate personnel to use hazard avoidance actions.

(2) 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.

d. 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.

e. 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.

(1) 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--

(a) Avoid administrative intrusions and not get in the way.

(b) Go where the risks are and spend time at the heart of the action.

(c) Analyze and think through issues, not just watch.

(d) Work with key personnel to improve operational procedures after the action and not hesitate to address imminent danger issues on the spot.

(e) Fix systemic problems that are hindering field effectiveness.

(2) 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. They are--

(a) 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.

(b) 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.

(c) 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.

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. The Soviets will accomplish these actions using motorized rifle and tank formations supported by CS and CSS units. They 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 Soviet threat is essential to success on the European battlefield. Commanders and staffs who are well informed about the 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 the RAS may frequently encounter. FMs 100-2-1, 100-2-2, and 100-2-3 describe the threat in detail.

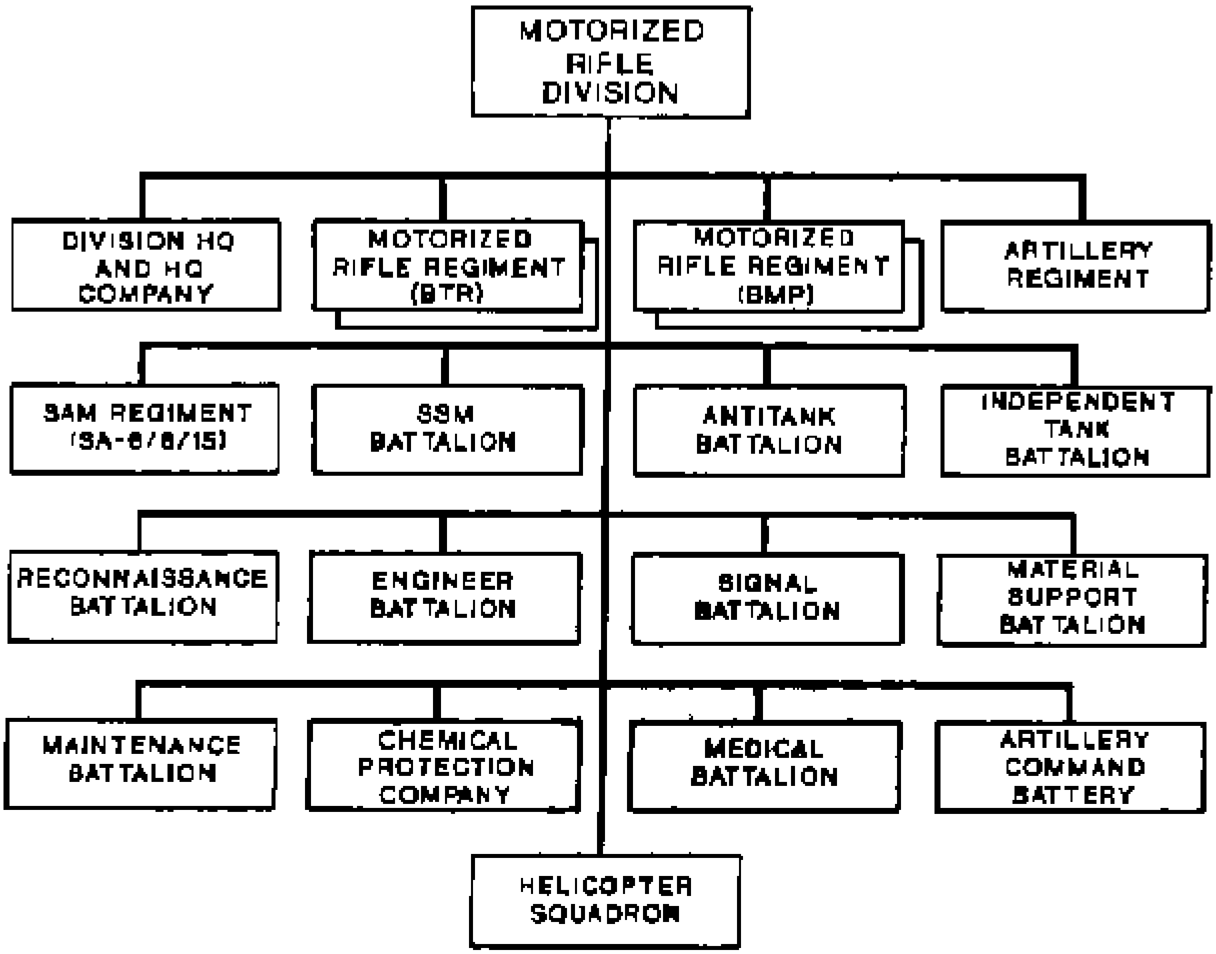
B-1. EUROPEAN THREAT FORCES

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.

a. Combined Arms Army and Tank Army. The army is the highest peacetime combined arms formation. While both armies are combined arms organizations, a Soviet CAA normally will have a greater number of motorized rifle divisions while a tank army will have a greater number of tank divisions. By altering the mix of motorized rifle and tank divisions and artillery and missile support in the army organization, the Soviets gain flexibility in either offensive or defensive roles. An army can operate in different geographical areas and under various operational constraints. Besides its complement of three to five maneuver divisions, a typical army of either type will normally have artillery, missile, air defense, aviation, engineer, chemical, signal, rear support, intelligence, and reconnaissance units.

b. Maneuver Divisions. The three types of maneuver divisions within the Soviet armed forces are motorized rifle, tank, and airborne. Personnel of the RAS must be able to recognize how these divisions will organize for combat. Thus, when squadron personnel observe threat formations, they can relay accurate information to the supported friendly force.

(1) Motorized rifle division. The MRD is organized around a six-regiment structure: one artillery regiment, one SAM regiment, and four motorized rifle regiments. Additional combat support is provided by an independent tank battalion, an SSM battalion, an antitank battalion, and a helicopter squadron. Other support elements include engineer and signal battalions, a chemical protection company, and an artillery command battery. CSS is limited but highly mobile. It is provided by material support, maintenance, and medical battalions. Figure B-1 shows a motorized rifle division.



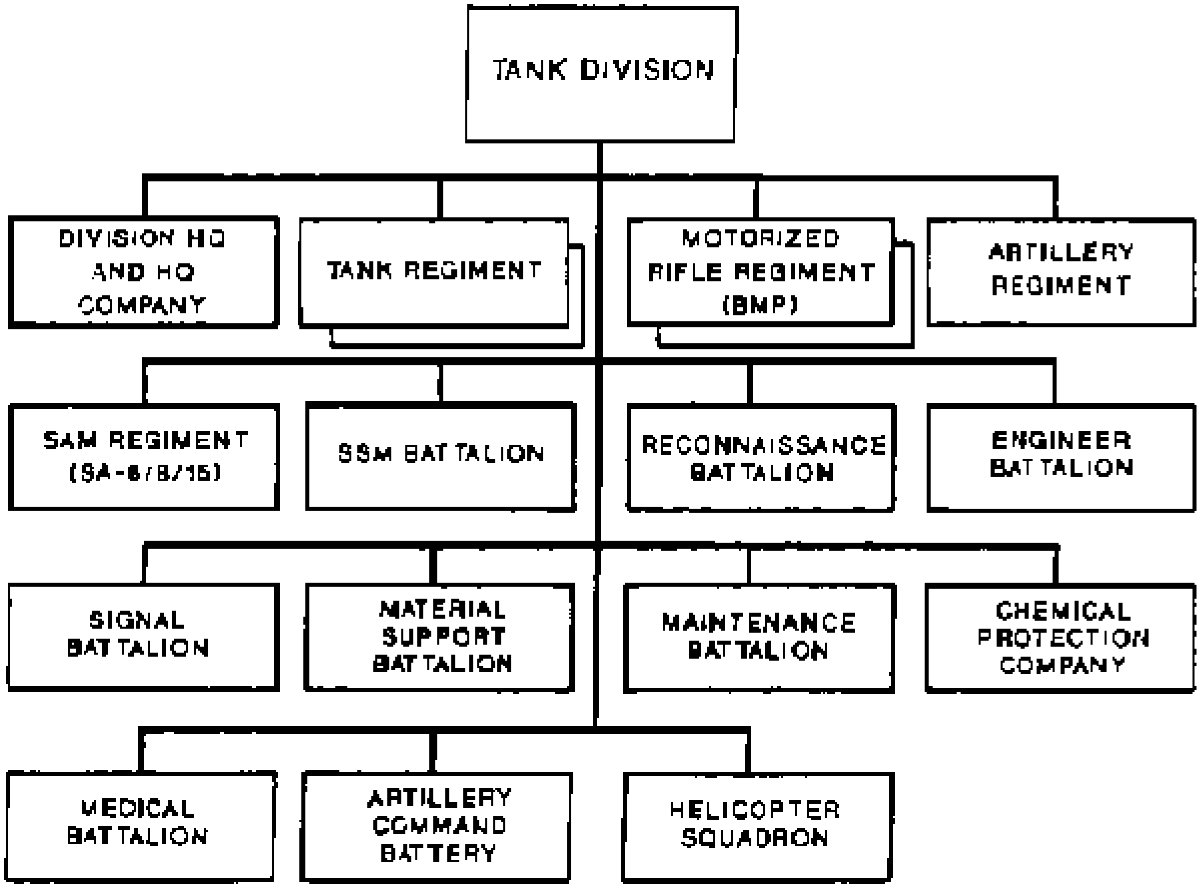
NOTES:

1. Instead of the SA-6 SAM regiment, the MRD may have an SA-8 SAM regiment or an antiaircraft artillery regiment equipped with the S-60 antiaircraft gun

2. Normally, two of the four MRRs in the MRD are BMP-equipped. The other two MRRs are BTR-equipped.

Figure B-1. Motorized rifle division.

(2) Tank division. The Soviet tank division is undergoing significant reorganization. It is gaining more combat equipment and personnel than the MRD, resulting in a more balanced combined arms formation. The TD is structured around six regiments: two motorized rifle regiments (BMP-equipped), one artillery regiment, one SAM regiment, and two tank regiments. Other elements of the TD are virtually identical to those of the MRD except the TD does not have an antitank battalion or an independent tank battalion. Figure B-2 shows a tank division.



NOTE: Instead of the SA-6 SAM regiment, the TD may have a SAM regiment equipped with the SA-8 SAM or an antiaircraft artillery regiment equipped with the S-60 antiaircraft gun.

Figure B-2. Tank division.

(3) Airborne division. The Soviet airborne division is almost fully equipped with motorized equipment. The division is believed to have the BMD amphibious airborne infantry combat vehicle in all three of its airborne (infantry) regiments. Essential combat support is provided by an artillery regiment, an assault gun battalion (ASU-85), and an antiaircraft battalion. The introduction of the 2S9 self-propelled howitzer as a replacement for towed artillery will increase mobility. Also, the airborne division has other CS and CSS units that provide backup support for combat operations. Figure B-3 shows an airborne division.

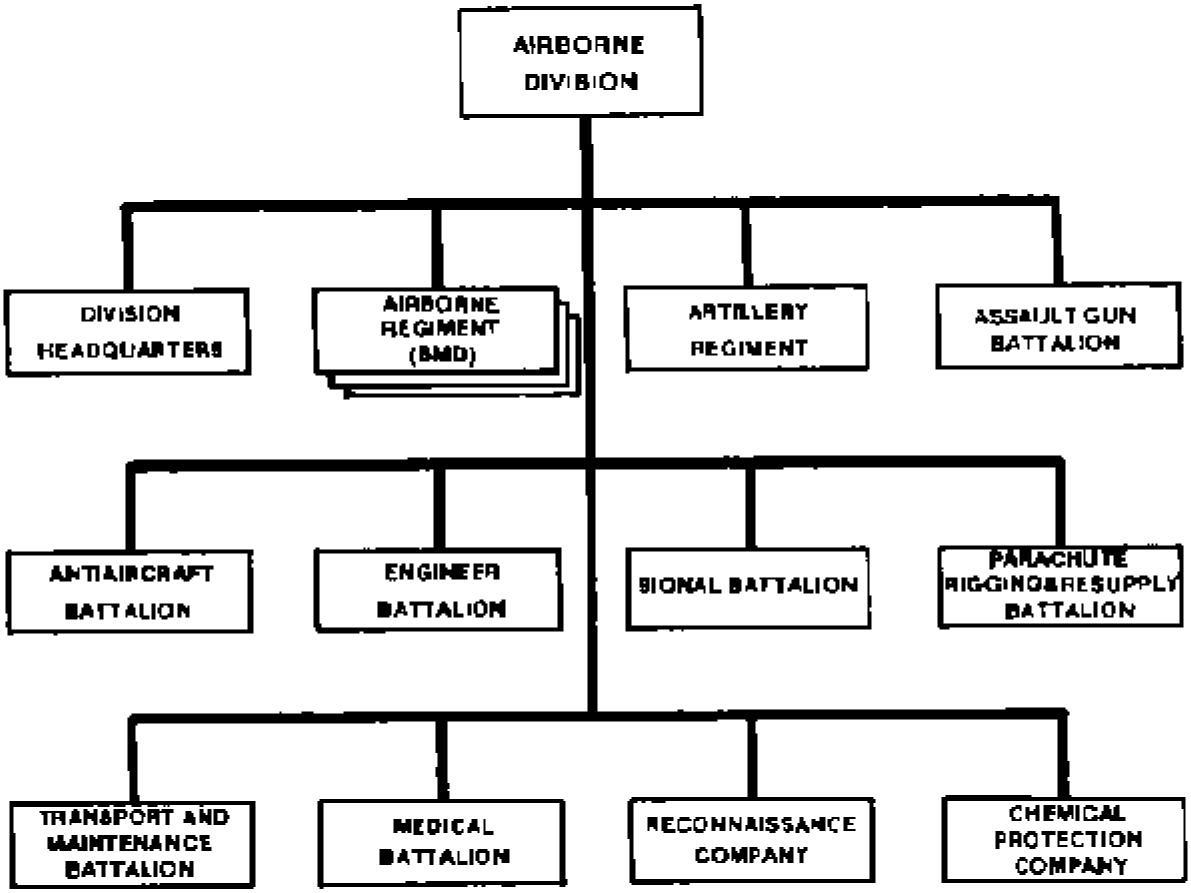


Figure B-3. Airborne division.

B-2. COMBAT ACTIONS

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

a. 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, and the pursuit (exploitation).

b. 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 offensive operations of their own. In most cases, the defense is a temporary measure leading to the resumption of offensive operations. The Soviets recognize two types of defense: in direct contact with the enemy and out of direct contact with the enemy. Figure B-4 shows a variant of a defensive operation.

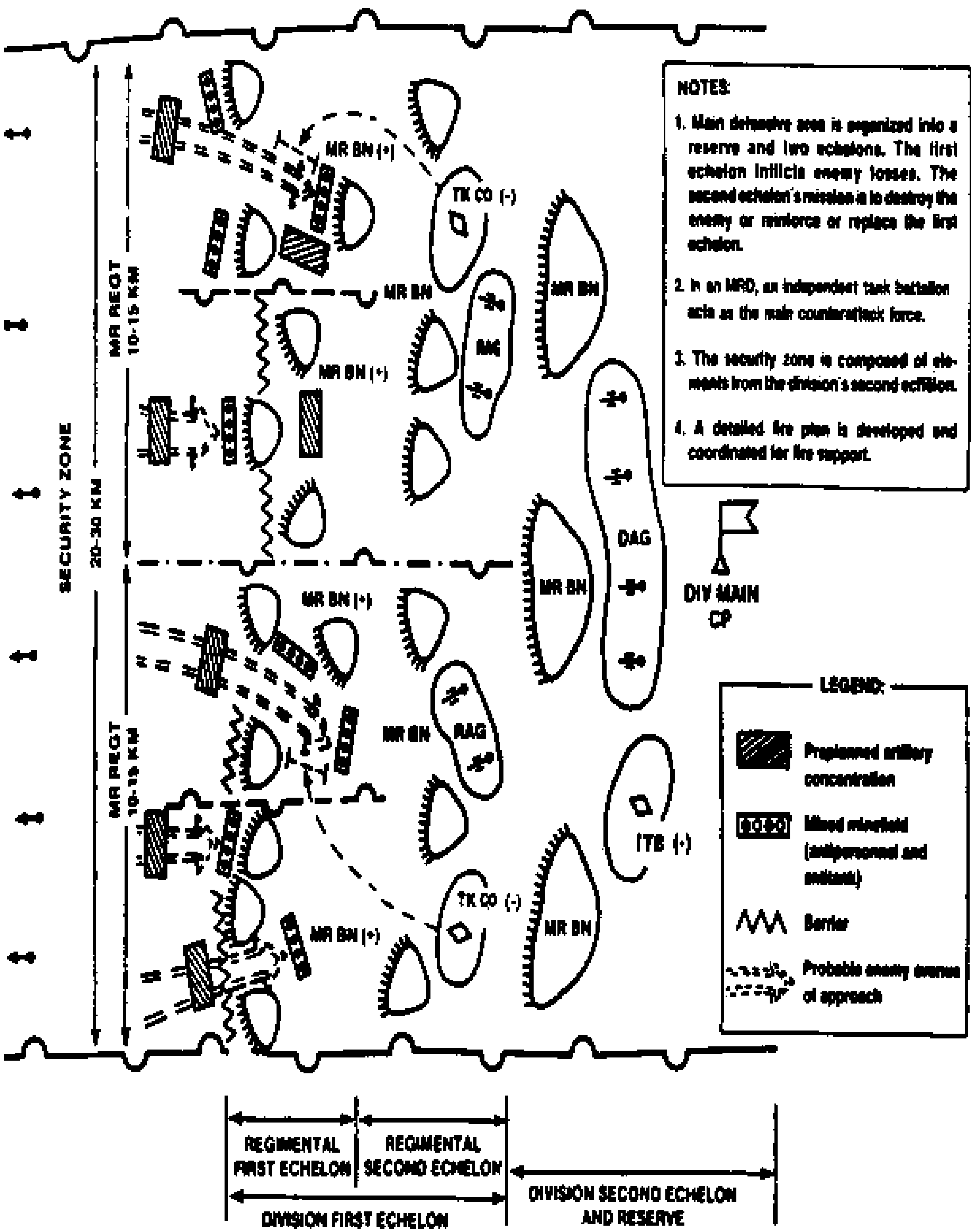


Figure B-4. Defense of a motorized rifle division (variant).

B-3. RECONNAISSANCE

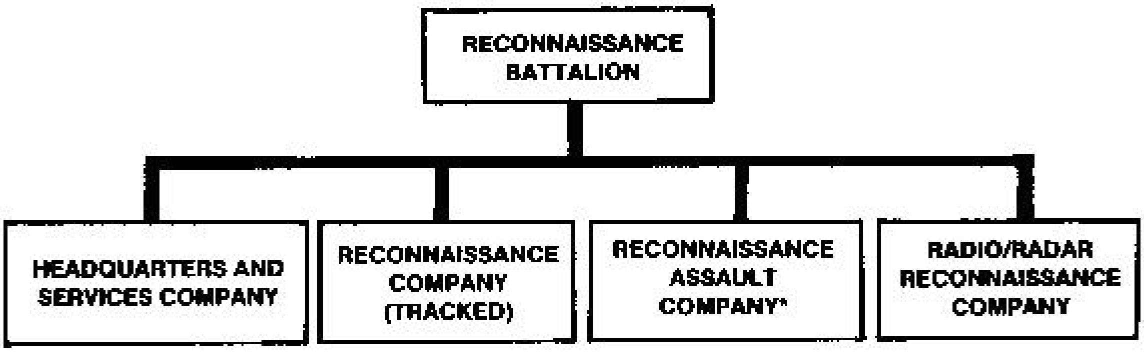
a. As defined by the Soviets, reconnaissance is the collection of information about the location, activity, disposition, composition, size, armament, combat readiness, and intentions of an enemy. The Soviets recognize that reconnaissance will be met by enemy countermeasures and deception. They employ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

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

(1) 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-5 shows a divisional reconnaissance battalion.

(2) Regimental reconnaissance company. 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. Figures B-6 , 7, 8, through B-9 show the headquarters and services company and three reconnaissance companies in the reconnaissance battalion of the MRD and TD.

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



PRINCIPAL ITEMS OF EQUIPMENT

Equipment	Total
ATGL, RPG-7V	13
5.45-mm LMG, RPK-74	19
AVC, BRDM-2U	1
ACV, BTR-60PA	2
ACV, Recon, BRM-1**	3
AICV, BMP-1/BMP-2	12
Medium Tank, T-64/72/80	6
ASC, BRDM-2 or APC, BTR-60/70/80	12
Truck, UAZ-69/469	5
Truck, GAZ-66	2
Truck, ZIL Series	5
Truck, Ural-375	4
Truck, Van, GAZ (Command)	4
Truck, Van, GAZ (Radio/Radar Recon)	13
Truck, Van, ZIL (Maintenance)	2
Truck, Van, ZIL	6
Truck, POL, ZIL/Ural/KrAZ	2
Truck, Ambulance, UAZ-450A/452	1
Trailer, Generator	2
Trailer, Water	1
Trailer, Kitchen	4
Trailer, POL	2
Chemical Recon Vehicle, BRDM-2rkh or RKhM	4
Radar, Battlefield Surveillance, TALL MIKE	3
Radar Direction Finder	3
Radio Direction Finder, HF/VHF/UHF	3
Intercept Receiver, VHF/UHF	9
Radios:	
HF, Manpack, Low-Power, R-104M	6
HF, Vehicle Mount, Medium-Power, R-130	4
HF/VHF, Vehicle Mount, Medium-Power	6
HF/VHF, Vehicle Mount, High-Power	2
VHF, Manpack, Low-Power, R-107	12
VHF, Vehicle Mount, Medium-Power, R-123	40
Radio Relay, VHF/UHF, R-401/405	1
Warning Receiver, R-311	5
Radio Telegraph	6

*The reconnaissance assault company is also called the long-range reconnaissance company or the airborne reconnaissance company.

**This vehicle includes the TALL MIKE radar, which is listed separately.

Figure B-5. Reconnaissance battalion, MRD and TD.

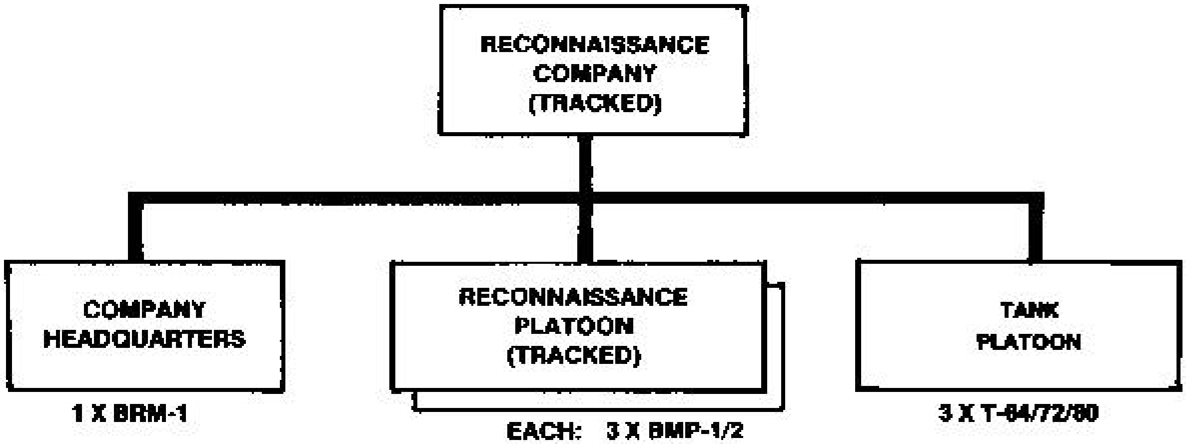
PRINCIPAL ITEMS OF EQUIPMENT

Equipment	Total
ACV, Recon, BRM-1*	1
ACV, BTR-60PA	2
Truck, UAZ-69/469	4
Truck, ZIL Series	5
Truck, Ural-375	4
Truck, Van, GAZ (Command)	2
Truck, Van, ZIL (Maintenance)	1
Truck, POL, ZIL/Ural/KrAZ	2
Truck, Ambulance, UAZ-450A/452	1
Trailer, POL	2
Trailer, Generator	2
Trailer, Water	1
Trailer, Kitchen	4

Equipment	Total
Radar, Battlefield Surveillance, TALL MIKE	1
Intercept Receiver, VHF/UHF	1
Radios:	
HF, Manpack, Low-Power, R-104M	2
HF, Vehicle Mount, Medium-Power, R-130	1
HF/VHF, Vehicle Mount, Medium-Power	2
HF/VHF, Vehicle Mount, High-Power	1
VHF, Manpack, Low-Power, R-107	2
VHF, Vehicle Mount, Medium-Power, R-123	3
Radio Relay, VHF/UHF, R-401/405	1
Warning Receiver, R-311	2
Radio Telegraph	6

*This vehicle includes the TALL MIKE radar, which is listed separately.

Figure B-6. Headquarters and services company, reconnaissance battalion, MRD and TD.

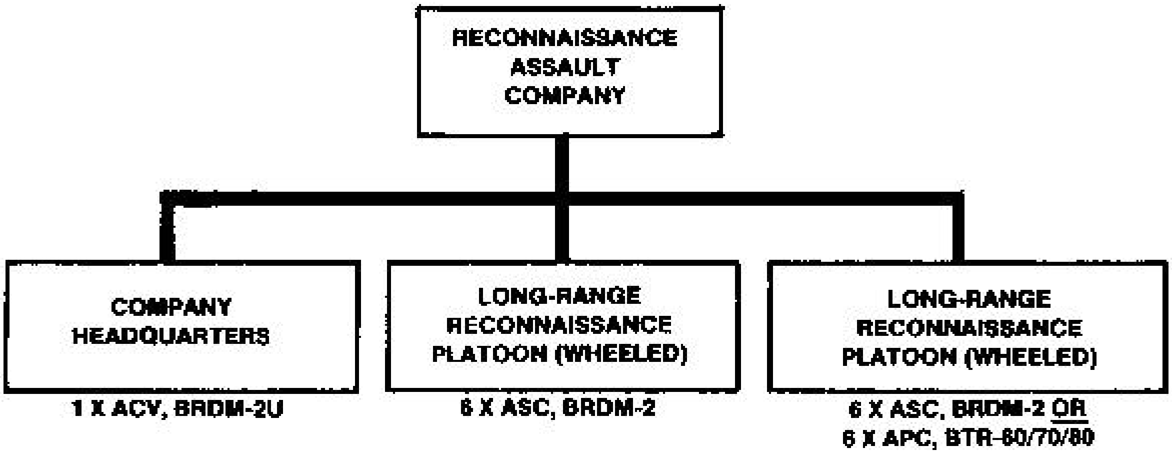


PRINCIPAL ITEMS OF EQUIPMENT

Equipment	Total	Equipment	Total
5.45-mm LMG, RPK-74	6	Radar, Battlefield Surveillance, TALL MIKE	1
ACV, Recon, BRM-1*	1	Radios:	
AICV, BMP-1/BMP-2	6	HF, Vehicle Mount, Medium-Power, R-130	1
Medium Tank, T-64/72/80	3	VHF, Vehicle Mount, Medium-Power, R-123	12
Truck, GAZ-66	1	Warning Receiver, R-311	1
Chemical Recon Vehicle, BRDM-2rkh or RKhM	2		

*This vehicle includes the TALL MIKE radar, which is listed separately.

Figure B-7. Reconnaissance company (tracked), reconnaissance battalion, MRD and TD.



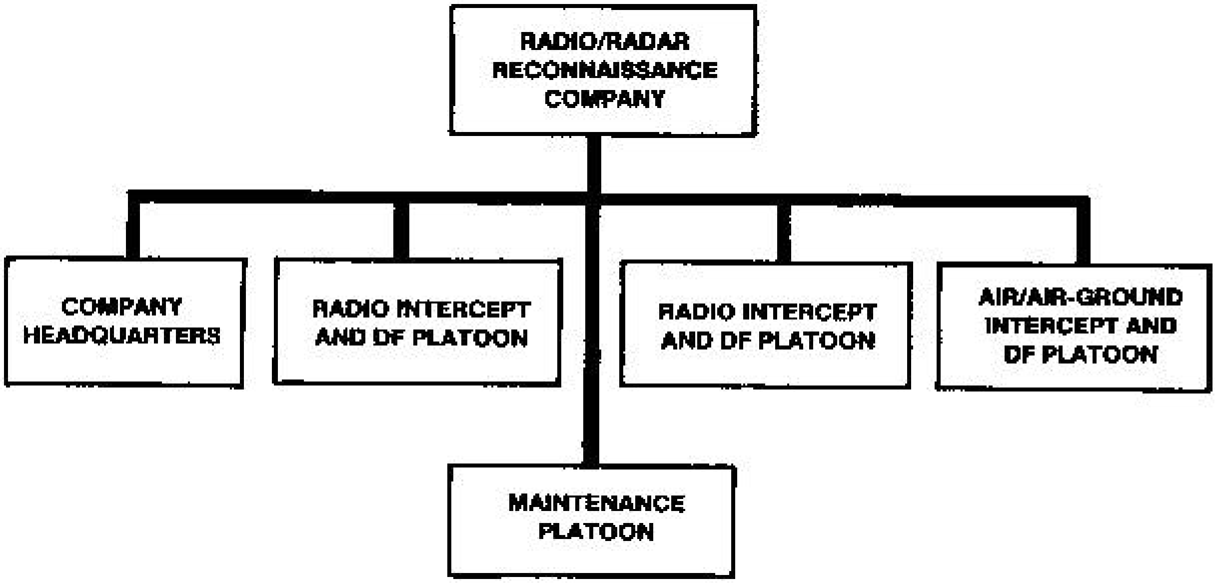
PRINCIPAL ITEMS OF EQUIPMENT

Equipment	Total
ATGL, RPG-7V	13
5.45-mm LMG, RPK-74	13
ACV, BRDM-2U	1
ASC, BRDM-2 or APC, BTR-60/70/80	12

Equipment	Total
Radios:	
HF, Vehicle Mount, Medium-Power, R-130	1
VHF, Manpack, Low-Power, R-107	3
VHF, Vehicle Mount, Medium-Power, R-123	13
Warning Receiver, R-311	1

NOTE: Personnel in the reconnaissance assault company (also called the long-range reconnaissance company) have parachute training. Small teams of five to six soldiers can enter the enemy rear area by parachute, helicopter, and vehicle or on foot. They can also land by transport helicopter (Mi-6A Hook or Mi-26 Halo A) along with their combat vehicles.

Figure B-8. Reconnaissance assault company, reconnaissance battalion, MRD and TD.



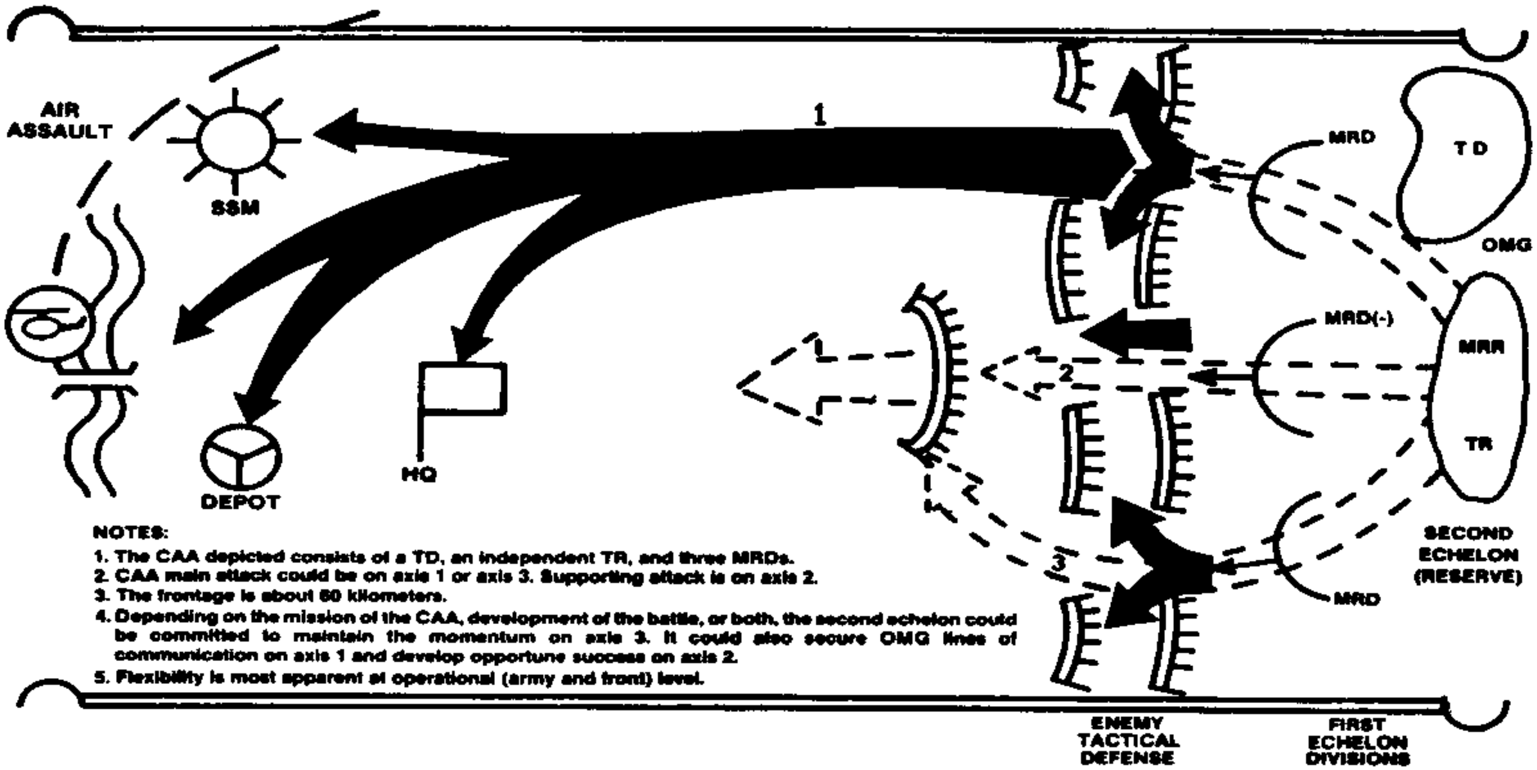
PRINCIPAL ITEMS OF EQUIPMENT

Equipment	Total	Equipment	Total
Truck, UAZ-69/469	1	Radar Direction Finder	3
Truck, Van, GAZ (Command)	2	Radios:	
Truck, Van, GAZ (Radio/Radar Recon)	13	HF, Manpack, Low-Power, R-104M	4
Truck, Van, ZIL (Maintenance)	1	HF/VHF, Vehicle Mount, Medium-Power	4
Truck, Van, ZIL	6	HF/VHF, Vehicle Mount, High-Power	1
Intercept Receiver, VHF/UHF	6	VHF, Manpack, Low-Power, R-107	7
Radio Direction Finder, HF/VHF/UHF	3	Warning Receiver, R-311	1

Figure B-9. Radio/radar reconnaissance company, reconnaissance battalion, MRD and TD.

B-4. DIVISIONAL COMBAT ORGANIZATION

Soviet divisions will attack as part of an army offensive. An army offensive frontage is normally 60 to 100 kilometers wide. One or more divisions in the first echelon will attack on a predetermined army main axis. Other first echelon divisions will conduct supporting attacks. A breakthrough of enemy defenses is the normal mission of forces conducting the main attack. Figure B-10 shows a variant of a Soviet army offensive operation.



NOTES:

1. The CAA depicted consists of a TD, an independent TR, and three MRDs.
2. CAA main attack could be on axis 1 or axis 3. Supporting attack is on axis 2.
3. The frontage is about 60 kilometers.
4. Depending on the mission of the CAA, development of the battle, or both, the second echelon could be committed to maintain the momentum on axis 3. It could also secure OMG lines of communication on axis 1 and develop opportune success on axis 2.
5. Flexibility is most apparent at operational (army and front) level.

Figure B-10. Soviet army offensive operation (variant).

a. The Soviets emphasize swift, efficient movement or transfer of combat power from one point on the battlefield to another. They accomplish this by rapid column movement in the march formation and successive deployment into prebattle and attack formations. These formations are designed for a rapid transition into combat while maintaining maximum security, speed, and firepower.

(1) March. The march is an organized troop movement conducted in column formation on roads or cross-country. In wartime, the march is governed by the possibility of enemy contact. A march formation normally consists of the advance guard; the main force; and reconnaissance, flank security, and rear security elements. In the march, the division normally organizes into attack echelons. The division is doctrinally organized into two echelons. Normal frontage for a division in a march is 15 to 25 kilometers.

(2) Prebattle formation. In a prebattle formation, a unit advances while dispersed laterally and in depth. The unit uses this formation when approaching the battlefield or moving into a defending enemy's rear area. It also uses a prebattle formation when attacking enemy defenses after preparatory fires have significantly reduced enemy resistance. Figure B-11 shows a prebattle formation of a motorized rifle company (BTR).

(3) Attack formation. Normally, platoons assume the attack formation immediately before combat by dispersing laterally into line formations. The battle formation for an MRR in the attack may be two tank-reinforced battalions in the first echelon and one in the second echelon. Figure B-12 shows company attack formations.

b. To carry out its assigned mission of gathering and reporting intelligence, the RAS must become familiar with Soviet formations. The information gathered by the squadron will help determine how its parent regiment or corps will fight on the battlefield.

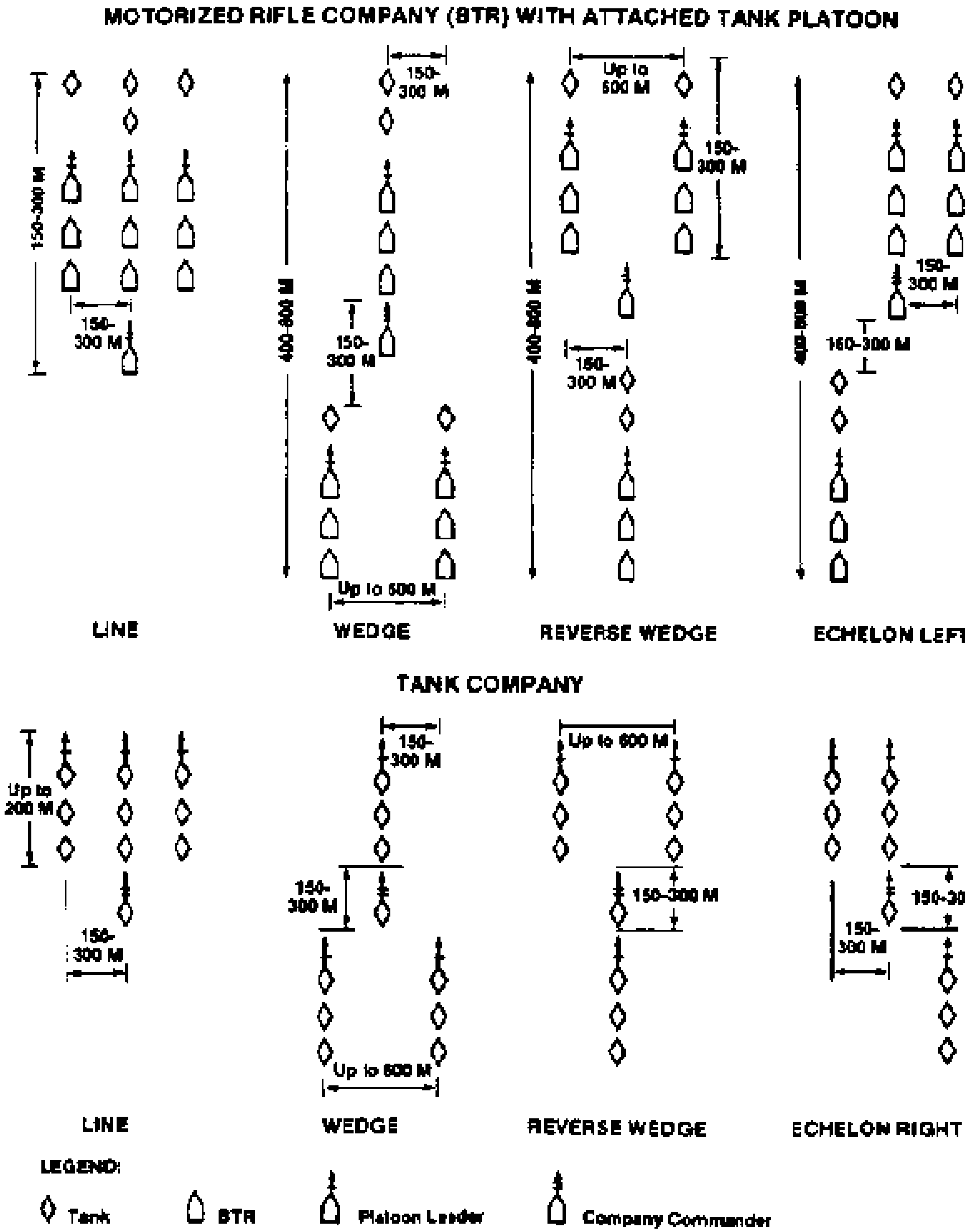


Figure B-11. Motorized rifle company (BTR) prebattle formation.

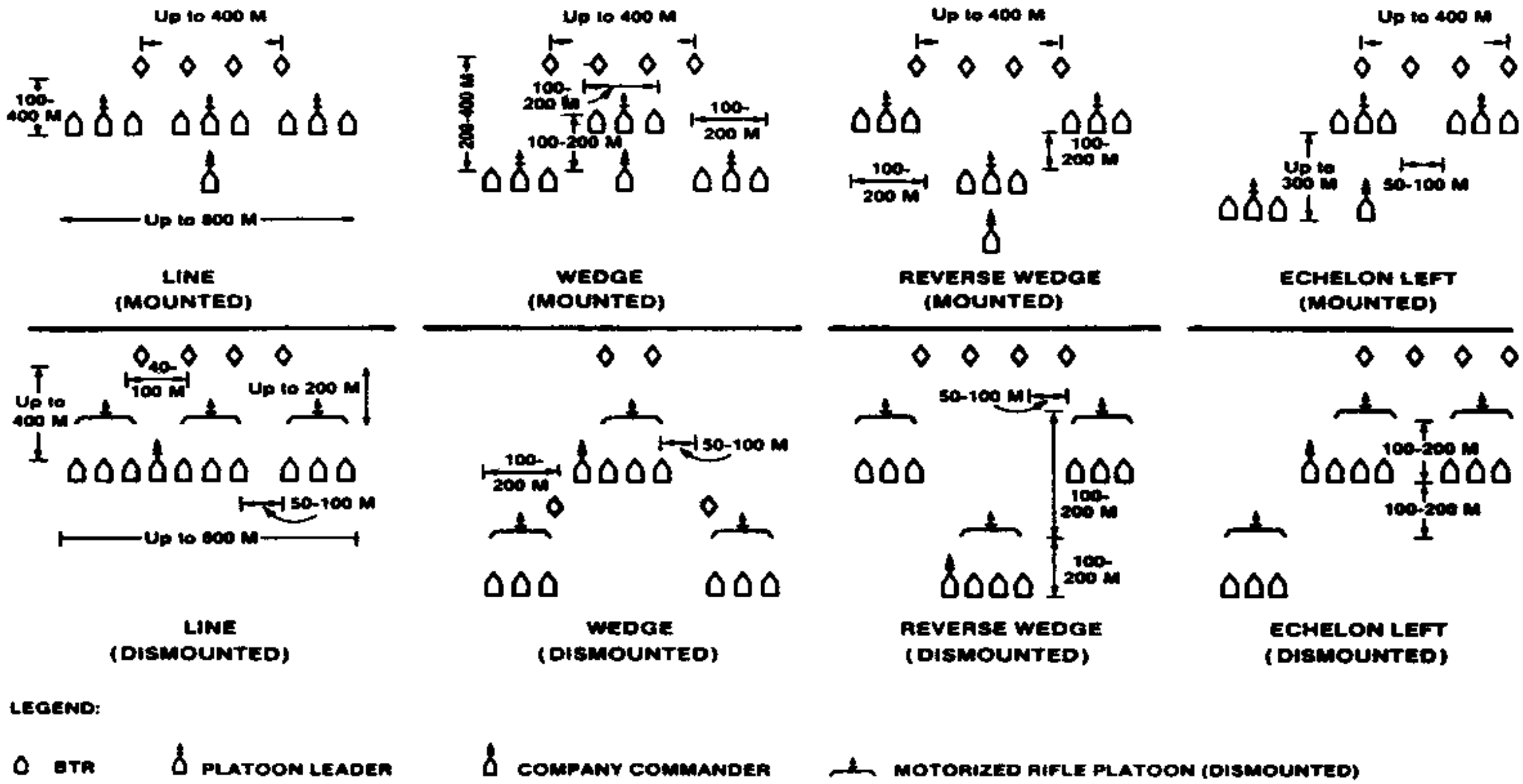


Figure B-12. Company attack formations.

B-5. REGIMENTAL COMBAT ORGANIZATION

A regiment is the smallest fully combined arms ground force. It is capable of limited independent action but normally attacks as a 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. Figure B-13 shows a march formation of a reinforced motorized rifle regiment (BTR).

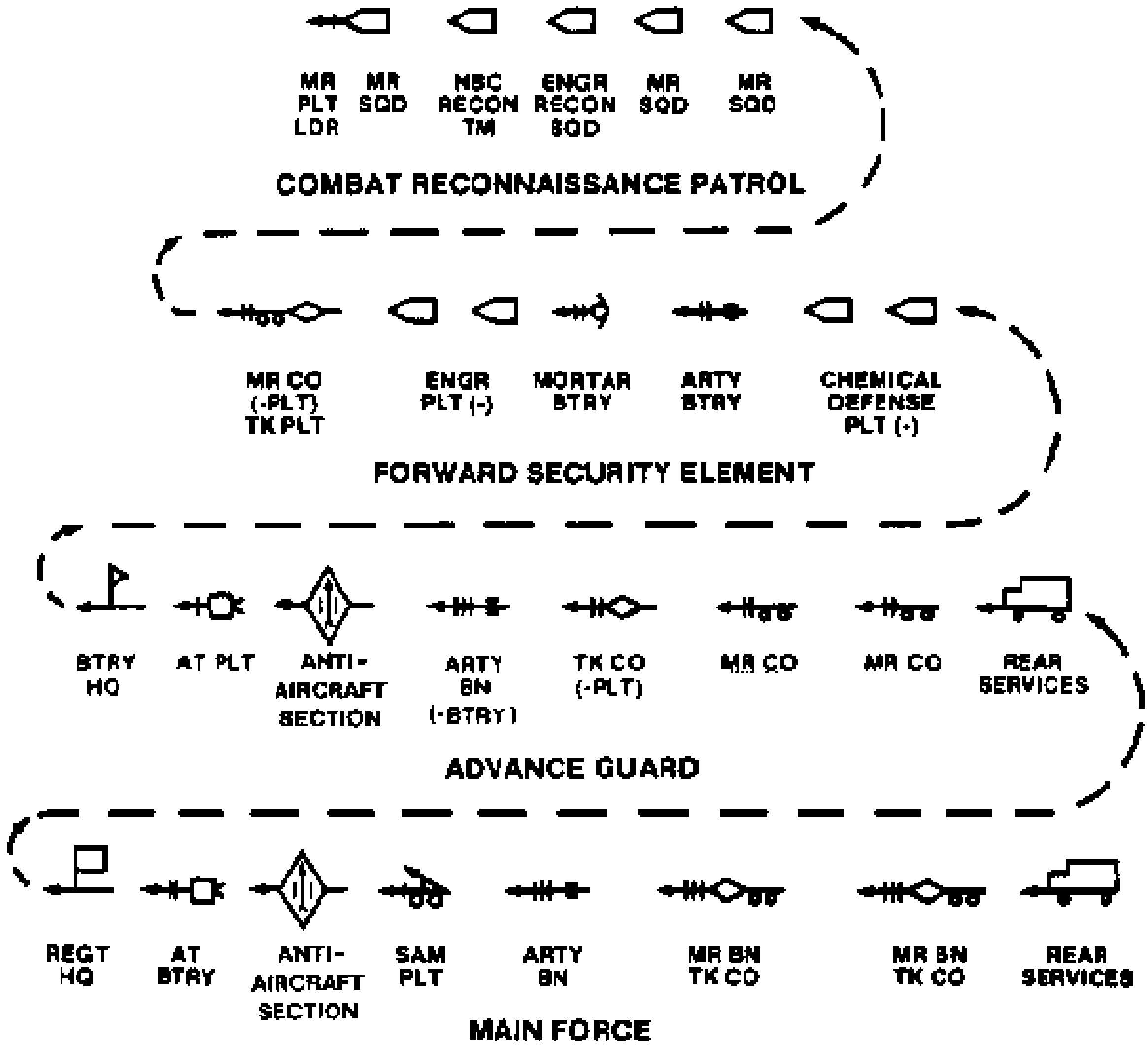


Figure B-13. Reinforced motorized rifle regiment (BTR) march formation.

a. 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.

(1) 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 opposing 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-14 shows the advance guard main body, and Figure B-15 shows elements of the march formation.

(2) 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-16 shows a forward security element.

(3) Combat reconnaissance patrol. The CRP is normally a reinforced rifle platoon. Its mission is to provide prompt information about the enemy's strength, composition, disposition, 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-17 shows a combat reconnaissance patrol.

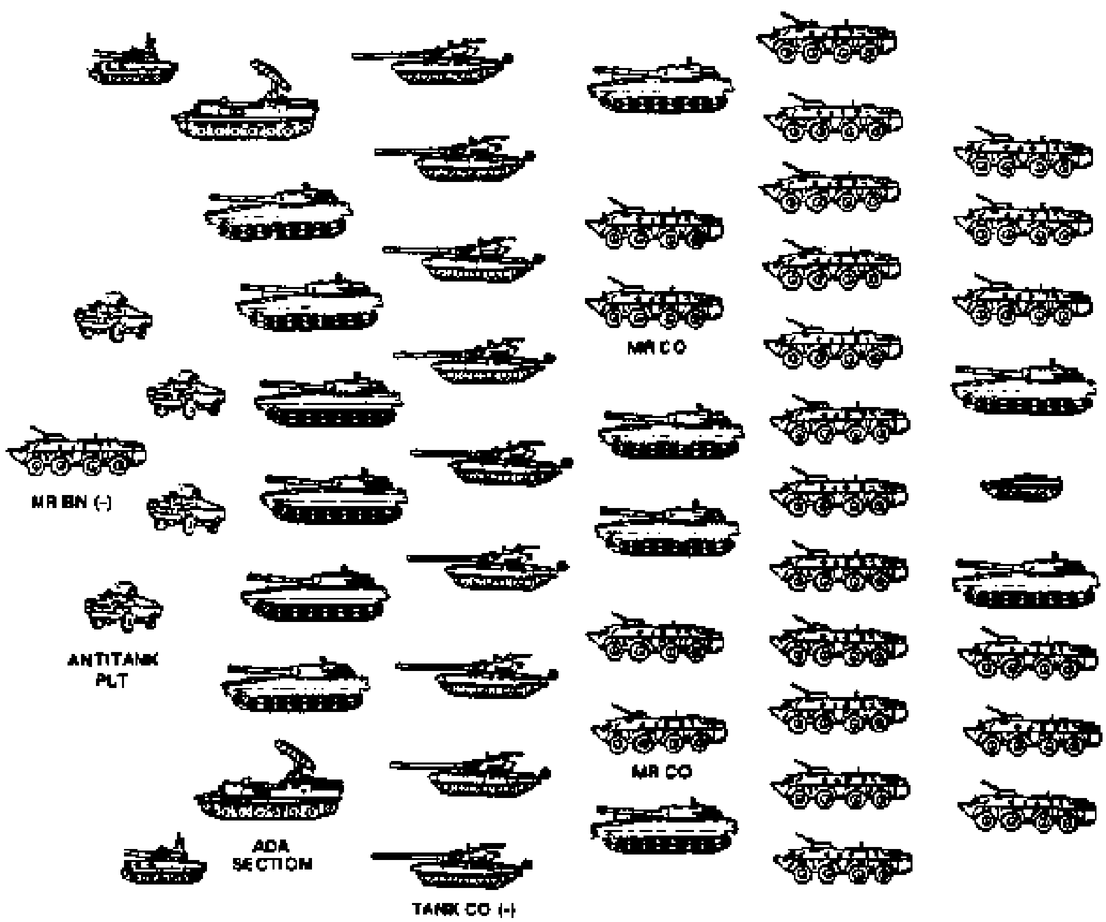


Figure B-14. Advance guard main body.

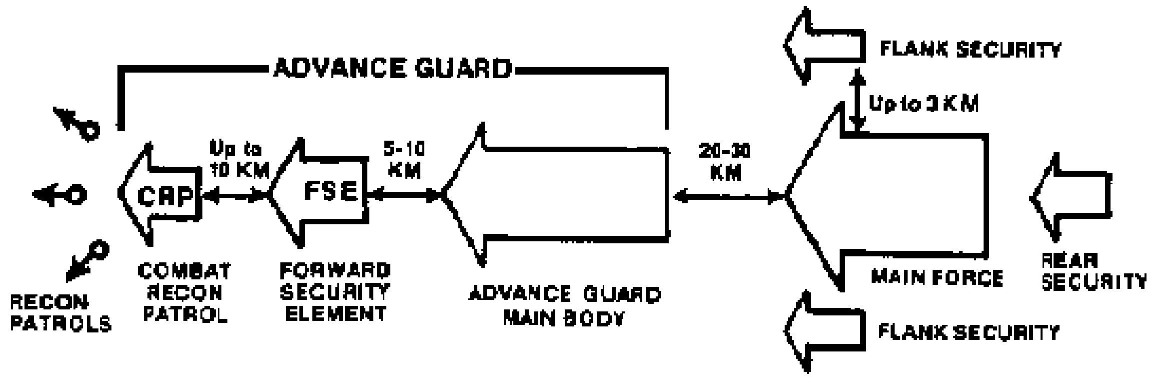


Figure B-15. March formation elements.

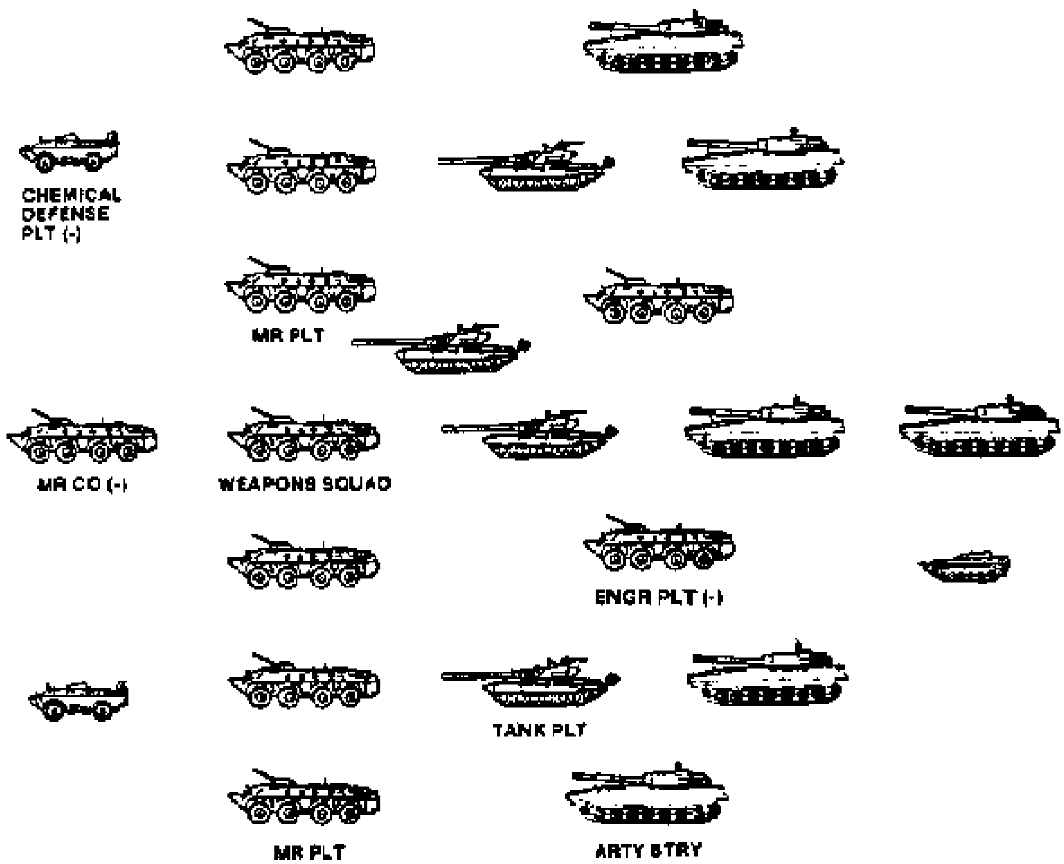


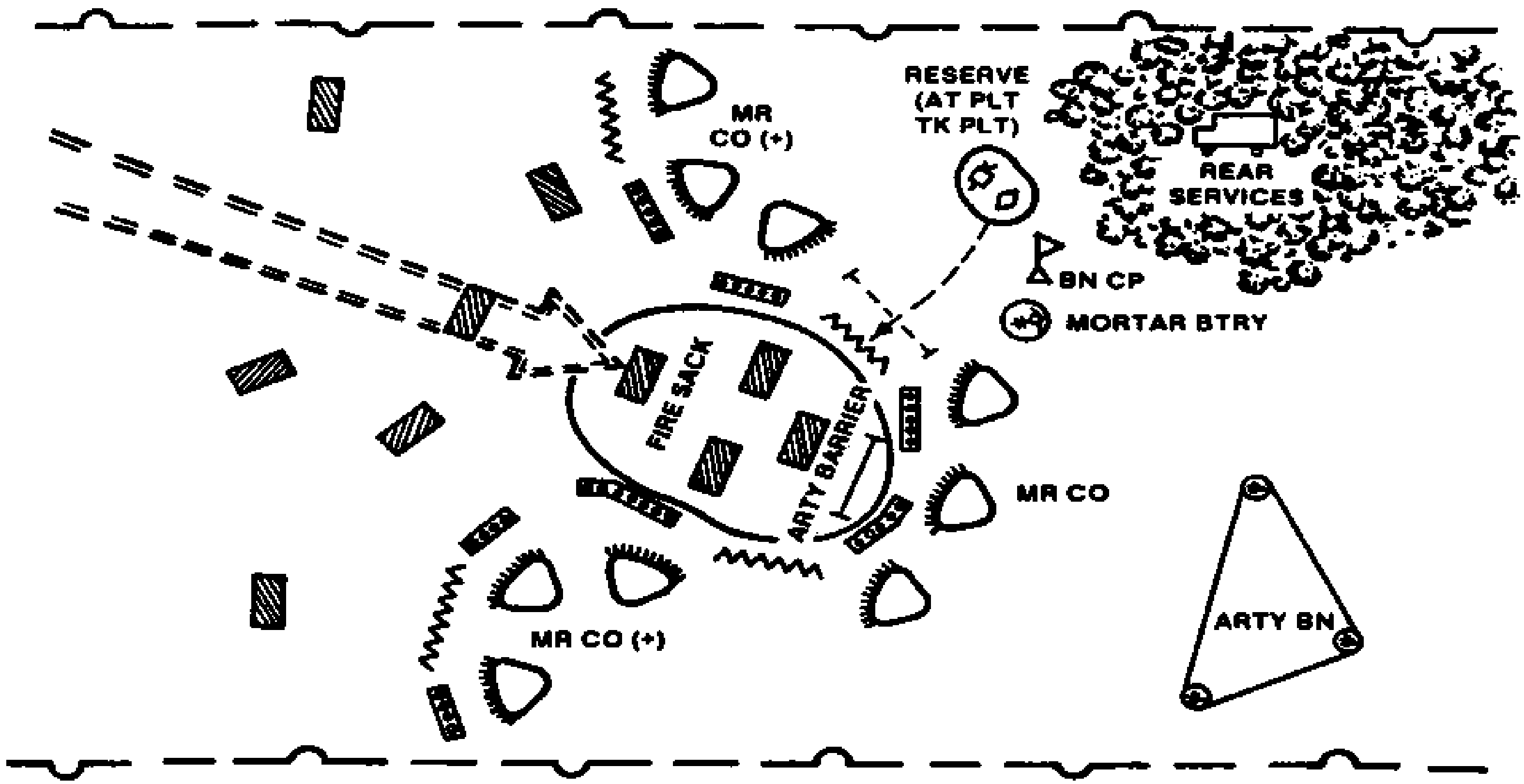
Figure B-16. Forward security element.

Figure B-17. Combat reconnaissance patrol.

b. 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. The RAS should not be surprised by the initial encounter with the CRP. Timely reporting of intelligence by the RAS will enable the regiment or 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.

B-6. 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 to a counterattack is to place a division on the defense to halt the attack while other divisions continue the advance. Figure B-18 shows a typical defense by a motorized rifle battalion (reinforced).



NOTE: A battalion usually defends in a single echelon in an area 3 to 5 kilometers wide and up to 2 kilometers deep. When defending a narrow frontage or if greater depth is required, it may deploy in two echelons as shown above. The distance between echelons can be up to 500 meters in depth. Reserves are located behind the second echelon.

LEGEND:

- Mixed minefield (antipersonnel and antitank)
- Barrier
- Preplanned artillery concentration
- Probable enemy avenue of approach

Figure B-18. Typical defense by a motorized rifle battalion (reinforced).

a. 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.

b. 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 MRRs.

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

B-7. AIRBORNE, AIR DEFENSE, AND AVIATION OPERATIONS

a. Airborne. Air assault and heliborne operations have been a part of Soviet doctrine since the 1960s. Theoretically, by day or night, the Soviets will insert heliborne units into enemy territory 50 kilometers or more beyond 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. Missions of particular interest to the RAS are seizure of airfields and key terrain, reconnaissance, and rear area and deception operations.

b. 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 trooplevel 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.

c. Aviation.

(1) 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.

(2) Division aviation. The division has a helicopter squadron with approximately 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.

B-8. SPECIAL-OPERATION FORCES

a. 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.

b. 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.

c. 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.

B-9. OTHER-NATION THREAT

The RAS may be required to conduct operations against nations other than the Soviet Union. These potential threats are located in all parts 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 RAS must be ready to support regimental 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 RAS will support these operations.

APPENDIX C
NBC OPERATIONS

This appendix implements portions of STANAGs 2398 and 3497.

The RAS 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 RAS 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 RAS 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 RAS commander and his staff may employ squadron forces in an NBC environment.

Section I
NBC THREAT

C-1. THREAT DOCTRINE AND PREPAREDNESS

a. The NBC threat can exist anywhere, including Third World countries that have an NBC capability. However, the RAS 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.

b. 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.

c. 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.

C-2. NUCLEAR WARFARE

a. 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.

b. Squadron elements are not directly targeted for a nuclear strike. However, the RAS's mission may place squadron elements in an area where they would become a target for nuclear weapons.

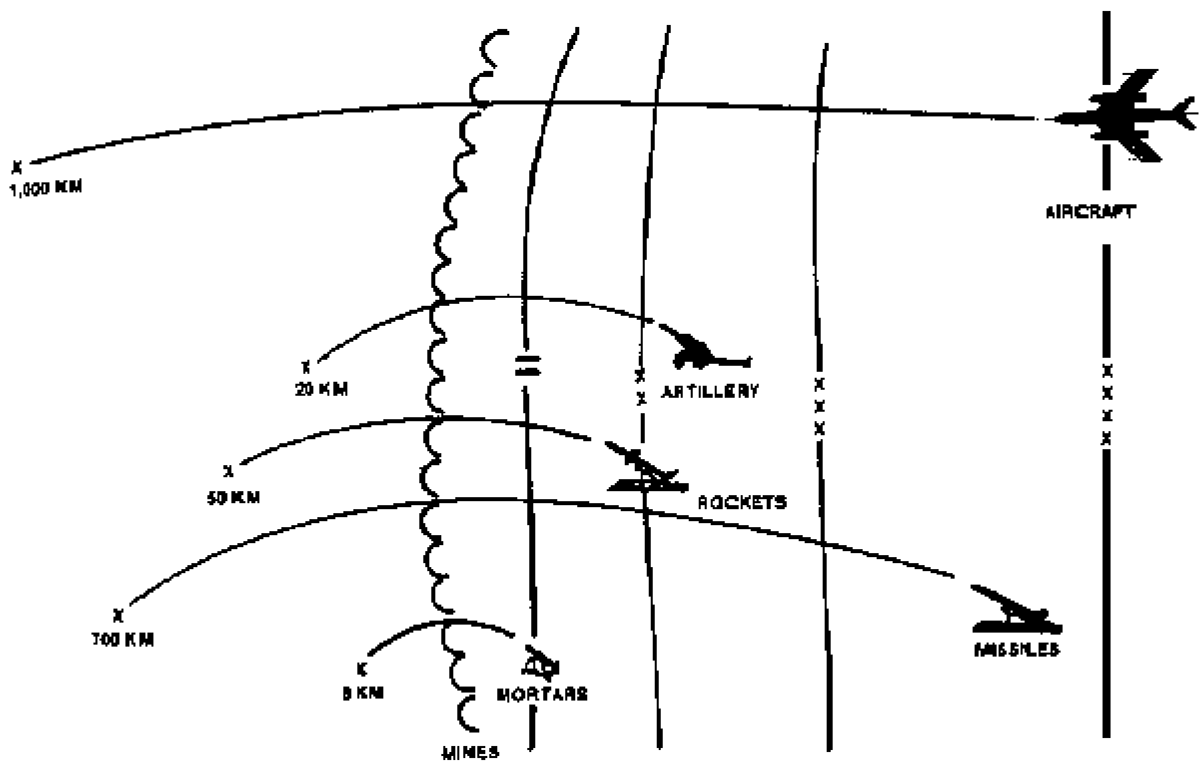


Figure C-1. Range of threat delivery systems.

C-3. BIOLOGICAL WARFARE

a. 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.

b. 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.

C-4. CHEMICAL WARFARE

a. 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.

b. 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 RAS, 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

C-5. 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.

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

(1) Skin burns.

(a) 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.

(b) 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.

(2) 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.

(3) 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.

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

(1) Flash blindness.

(a) 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.

(b) 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.

(2) 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.

C-6. 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.

a. Dynamic Pressure.

(1) 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.

(2) 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.

(3) 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.

(4) 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.

b. Static Overpressure.

(1) 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.

(2) 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.

(3) Airframe damage.

(a) 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.

(b) 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.

(c) 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.

C-7. 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.

a. 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.

b. 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.

(1) 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.

(2) 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.

c. Radiation Exposure and Sickness.

(1) 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 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.

(2) 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.

C-8. 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.

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 then 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

Table C-1. Expected response to radiation.

a. Component and Aircraft Systems Damage.

(1) 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.

(2) 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.

b. Communication Net Impairment. EMP will affect the command and control nets of the RAS. Because the RAS is highly mobile and dispersed over a wide area, 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

C-9. 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.

C-10. 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.

a. 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.

b. 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.

c. 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.

C-11. 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.

C-12. 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

C-13. NERVE AGENTS

a. Effects.

(1) 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.

(2) 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.

(3) 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.

(a) 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.

(b) 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.

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

b. Antidotes. The nerve agent antidote treatment available for soldiers is the nerve agent antidote kit. Each kit 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.

(1) 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.

(2) 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.

(3) 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.

C-14. BLOOD AGENTS

a. 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.

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

C-15. 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.

C-16. 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.

C-17. 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.

C-18. 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

C-19. 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 RAS uses the NBC warning and reporting system and survey monitoring to help locate contaminated areas.

a. <u>Contamination Transfer</u>.

(1) 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.

(2) 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.

b. <u>Principles</u>. 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.

(1) <u>Applying passive defensive measures</u>. 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.

(a) <u>Detection avoidance</u>. 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.

(b) 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.

(c) 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.

(2) 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 3-6-5 show report formats.

(a) 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 RAS. Units in attack or hazardous areas will forward monitoring reports.

(b) 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 RAS 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.

(c) 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.

(d) 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 3-6-5 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.

(3) Locating, identifying, and marking NBC hazards.

(a) 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.

(b) 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.

(c) 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.

(d) 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.

(4) Limiting the spread of contaminants.

(a) 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.

(b) 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.

(c) 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.

(d) 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.

(5) Avoiding contaminants.

(a) 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.

(b) Squadron and 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.

(c) 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.

C-20. 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.

a. Individual Protective Equipment and Clothing.

(1) 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.

(2) 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.

(3) 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.

(4) 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.

(5) 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.

(6) 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.

(7) Mask carrier.

(a) 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.

(b) 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.

(8) 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.

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

(10) 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.

(11) 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.

(12) 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.

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

b. 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.

(1) 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.

(2) 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.

c. 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.

(1) 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.

(2) 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.

d. 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 cavalry units 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.

e. Protective Actions.

(1) Aircraft Protection while parked.

(a) 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.

(b) 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 overpressure. Taping the windscreen may help, but it is not effective against higher pressures.

(2) Aircraft protection during terrain flight.

(a) 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.

(b) 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.

(c) 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.

(d) 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.

(3) 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.

(4) 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

C-21. DECONTAMINATION FUNDAMENTALS

a. 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.

b. 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.

C-22. 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.

C-23. AIRCRAFT DECONTAMINATION

The sensitivity of aircraft components to caustic solutions has necessitated the development of special decontamination procedures. ACT, 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.

a. <u>Decontaminants</u>.

(1) 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.

(2) 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.

(3) 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.

(4) 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.

(5) 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.

b. Decontamination Techniques.

(1) 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.

(2) 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.

(3) 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.

(4) 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.

c. Decontamination Operations.

(1) 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.

(2) 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.

(3) 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.

(4) Maintenance inspections. Personnel may conduct maintenance inspections before or after decontamination of the aircraft. Inspection crews use the decontamination techniques discussed in (2) and (3) above to avoid spreading contamination.

(5) 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.

(6) 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.

C-24. DECONTAMINATION SITES AND LAYOUT

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

a. 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 RAS. Tentative decontamination sites must be considered and integrated into the tactical plan as are tentative CP and FARP sites.

b. 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 RAS 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 RAS 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 RAS continues its mission.

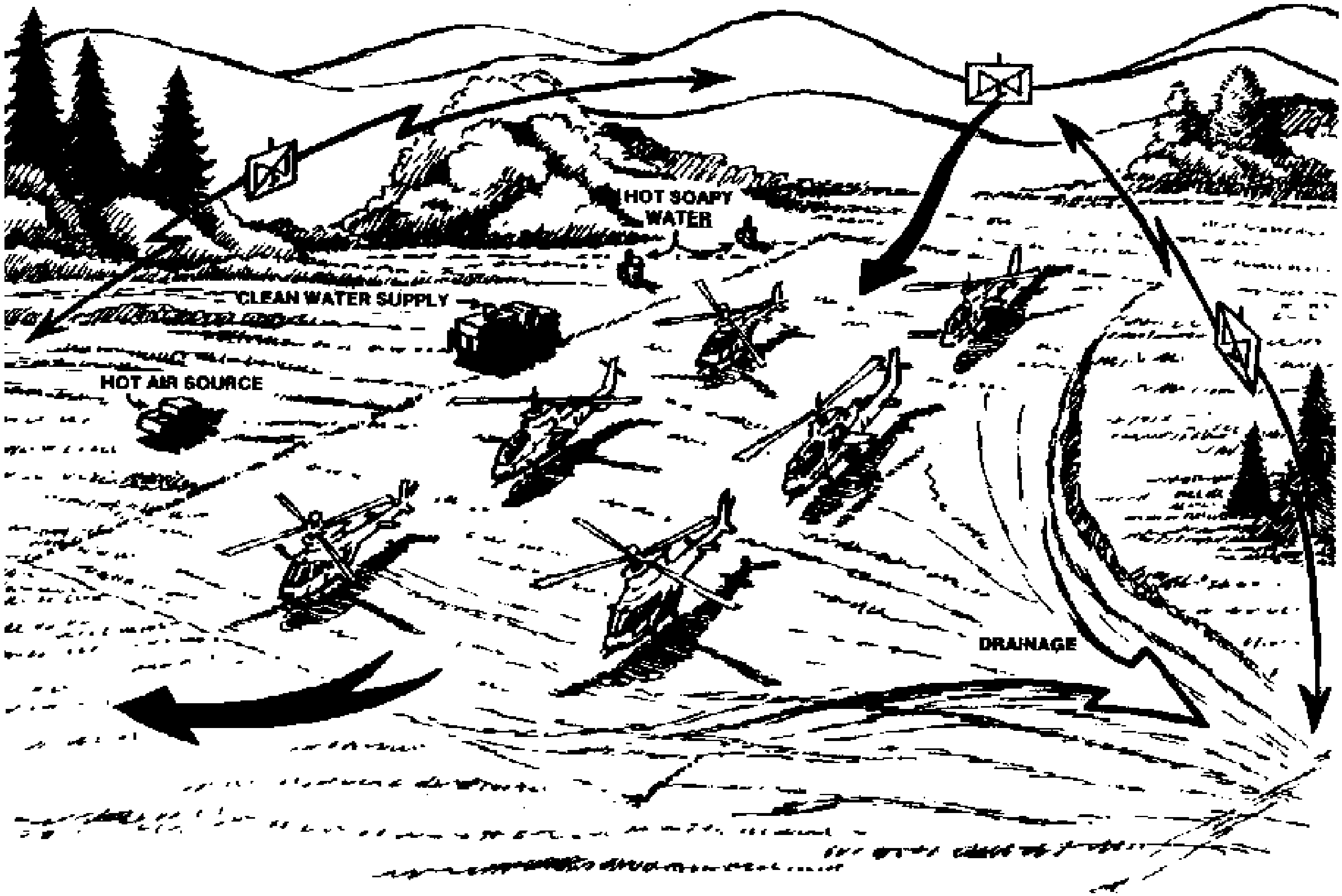
c. Safety Precautions.

(1) 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.

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

(3) 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.

d. 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 squadron operations, particularly decontamination operations. FM 3-5 contains examples of alternate site layouts.


HOT SOAPY
WATER
CLEAN WATER SUPPLY
HOT AIR SOURCE
DRAINAGE

Section VII
SUSTAINED OPERATIONS

C-25. FORWARD ARMING AND REFUELING POINTS

a. 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.

b. 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.

C-26. 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.

C-27. 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.

C-28. SURVIVABILITY

a. 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.

b. 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.

c. 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

C-29. 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 electrooptical systems.

a. 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.

b. 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.

c. 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.

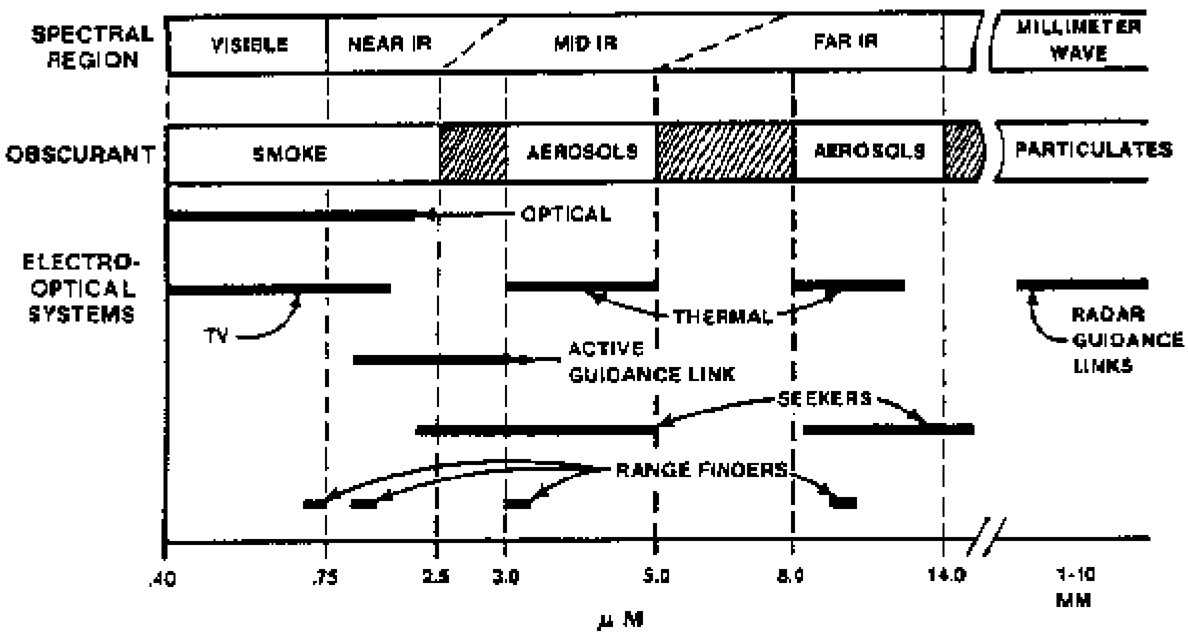


Figure C-4. Battlefield obscurants.

C-30. SMOKE EMPLOYMENT

a. 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.

b. US Employment.

(1) 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. FM 3-50 discusses deliberate smoke operations.

(2) When US forces employ smoke on enemy forces, their ability to observe and acquire 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

C-31. 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.

a. Ground Phase.

(1) 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.

(2) 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.

b. 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.

(1) 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.

(2) 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.

C-32. 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. A discussion of some of these factors follows.

a. 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.

b. 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.

c. 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
REPORTS AND ORDERS

This appendix implements portions of STANAGs 2003, 2014, 2020, 2022, and 2084.

The effectiveness of the RAS is directly attributable to the efficiency of its reporting procedures. Reports must be timely, complete, accurate, and concise. Information should be reported according to an established format. Except when negative information is of value, nonapplicable lines should be omitted. However, timely reports, especially those about enemy activity, are critical. Reports should not be delayed to ensure correct format.

D-1. REPORTING PROCEDURES

Each unit's reporting procedures are defined by its tactical SOP. Reports are tailored to the unit's needs and communications equipment within the following constraints:

a. External reports must conform to regimental or corps SOPs.

b. Reconnaissance units must conform to reports standardized by NATO agreements.

D-2. PERIODIC AND AS-REQUIRED REPORTS

Periodic reports relay the required information at the end of the prescribed period and include the events and changes since the previous report. These reports are compiled by the respective coordinating staff officer. As-required reports are submitted according to procedures established in SOPs or orders when a particular event or change in the situation occurs. Submission times are normally indicated in the report format.

D-3. REPORT CATEGORIES

Personnel, intelligence, operations, and logistic reports are recommended for use by the RAS. Personnel and logistic reports are described in FM 101-5. Intelligence and operations reports are described below.

a. <u>Intelligence Reports</u>. Intelligence reports pertain to the intelligence tactical situation. They are normally sent by radio on the O&I net. Intelligence reports are preceded by a "2." Subsequent numbers are the 21 Report (Spot Report), 22 Report (Patrol Report), 23 Report (MIJI Report), 24 Report (PW and Captured Material Report), 25 Report (Intelligence Summary Report), and 26 Report (Intelligence Report).

(1) <u>21 Report (Spot Report)</u>. A SPOTREP is used to report any known or suspected enemy activity. It is also used to report any characteristic of the area of operations likely to affect mission accomplishment. Enemy information is always sent in the clear. The observer reports

the center of mass of identical, closely grouped items or the multiple grids of traces. Spot reports take priority over all other routine radio traffic. If the observer engages the enemy or displaces before sending the report, he must announce the following over the net: "This is C10 (call sign), SPOTREP, wait, out." This alerts the observer's leader that enemy contact has been made and that a full SPOTREP will follow later. If the observer becomes a casualty, the leader will know that enemy contact was made possibly near the observer's last known location. Figure D-1 shows a suggested format for the 21 Report.

ALPHA: Who is observer or source? (Omit if calling station; use call signs or description otherwise.)

BRAVO: What is observed? (Use the SALUTE format.)

a. Size--the number of sighted personnel or vehicles or both.

b. Activity--what the enemy is doing.

c. Location--the grid or reference from a known point.

d. Unit--patches, signs, markings, or uniform.

e. Time--the time the activity was observed.

f. Equipment--the kind of equipment associated with the activity.

CHARLIE: What are the observer's actions or recommendations? (Frequently, this will be "continuing mission" or "continuing to observe.")

EXAMPLE: "This is G3F06. SPOTREP. Report one BRDM, believed to be conducting recon at MS289546, at 191206 Romeo. Continuing mission."

Figure D-1. Suggested format for the 21 Report (Spot Report).

(2) <u>22 Report (Patrol Report)</u>. Combat units normally submit SPOTREPs as events occur. The duration and activity of dismounted reconnaissance patrols make a debriefing desirable. In such cases, a debriefing report format helps ensure that all information obtained is reported by the patrol. The patrol report may be sent by radio or wire when required. Figure D-2 shows a suggested format for the 22 Report.

DESIGNATION OF PATROL (DATE)

TO: ______________________________

MAPS: ______________________________

A. SIZE AND COMPOSITION OF PATROL

B. MISSION

C. TIME OF DEPARTURE

D. TIME OF RETURN

E. ROUTES (out and back)

F. TERRAIN (dry, swampy, jungle, thickly wooded, high brush, rocky; deepness of ravines and draws; condition of bridges as to type, size, and strength; and effect on armored and wheeled vehicles)

G. ENEMY (strength, disposition, condition of defenses, equipment, weapons, attitude, morale, exact location, movement, and any shift in disposition, to include the time the activity was observed and coordinates where the activity occurred)

H. MAP CORRECTIONS

I. (NOT USED)

J. MISCELLANEOUS INFORMATION (including aspects of NBC warfare)

K. RESULTS OF ENCOUNTERS WITH ENEMY (enemy prisoners and disposition, identification, enemy casualties, and captured documents and equipment)

L. CONDITION OF PATROL (including disposition of any dead or wounded)

M. CONCLUSIONS AND RECOMMENDATIONS (including to what extent the task was accomplished and recommendations as to patrol equipment and tactics)

____________________	____________________	____________________
(Signature)	(Grade or Rank)	(Unit of Patrol Leader)

Figure D-2. Suggested format for the 22 Report (Patrol Report).

N. ADDITIONAL REMARKS BY INTERROGATOR

(Signature)	(Grade or Rank)	(Unit of Interrogator)	(Time)

O. DISTRIBUTION

Figure D-2. Suggested format for the 22 Report (Patrol Report) (continued).

(3) 23 Report (MIJI Report). The MIJI report is used to pass information from operators to their units about actual or suspected enemy attempts to interfere with, jam, or deceive voice, teletypewriter, or multichannel signals. The operator whose communication means is affected submits the report through the net control station (in the case of FM voice) to the unit's C-E officer. The C-E officer coordinates this report with the EW officer, the intelligence officer, and the supporting MI unit. MIJI reports may be transmitted; however, if the reports are transmitted over nonsecure equipment, they must be encrypted using the brevity list. FM 24-33 contains additional information on MIJI reports and brevity lists. Figure D-3 shows a suggested format for the 23 Report.

Line 1:	Type of report.
Line 2:	Affected station.
Line 3:	Station location or grid coordinates.
Line 4:	Frequency or channel affected.
Line 5:	Type of equipment affected.
Line 6:	Type of emission or audio characteristics of interference.
Line 7:	Strength of interference.
Line 8:	Time interference started.
Line 9:	Interference effectiveness.
Line 10:	Operator's name and rank.
Line 11:	Remarks.

Figure D-3. Suggested format for the 23 Report (MIJI Report).

(4) 24 Report (PW and Captured Material Report). Normally, PW and captured material are tagged immediately after capture. This action ensures that information of intelligence value (place, time, and circumstances of capture) is not lost during the evacuation of the prisoner or

material. Only information about PWs and material of immediate tactical importance is reported to the S2. Disposition instructions are provided when necessary. Figure D-4 shows a suggested format for the 24 Report.

Format to Report a PW

Line 1: Type of report.

Line 2: Prisoner captured.

Line 3: Date and time of capture.

Line 4: Place of capture (grid).

Line 5: Capturing unit (call sign).

Line 6: Brief circumstances of capture.

Format to Report Captured Material

Line 1: Type of report.

Line 2: Item captured.

Line 3: Type of document or equipment.

Line 4: Date and time of capture.

Line 5: Place of capture (grid).

Line 6: Capturing unit (call sign).

Line 7: Brief circumstances of capture.

Figure D-4. Suggested format for the 24 Report (PW and Captured Material Report).

(5) 25 Report (Intelligence Summary). An INTSUM contains significant information obtained by the squadron for a specific period. The S2 prepares and distributes the INTSUM to higher, lower, and adjacent units. Writing and sending this lengthy report by messenger is often better than transmitting it by radio. Figure D-5 shows a suggested format for the 25 Report.

Line 1:	Classification.
Line 2:	Set field name and exercise name.
Line 3:	Set field name, message title, and message serial number.
Line 4:	Set field name, date-time from, and date-time to.
Line 5:	Set field name and heading information.
Line 6:	Heading.
Line 7:	Data entry, context quantity, target type, equipment type, activity type, and location.
Line 8:	Amplifying details.
Line 9:	Amplifying details.
Line 10:	Heading.
Line 11:	Data entry and enemy unit designator.
Line 12:	Amplifying details.
Lines 13-14:	Set field name; location; radius, width, and elliptical area; location; location; location; location.
Lines 15-16:	Set field name and amplifying details.
Lines 17-18:	Set field name and amplifying details.
Line 19:	Set field name and heading information.
Line 20:	Heading.
Line 21:	Data entry, context quantity, country of sighting, aircraft name, activity type, activity day-time, and location.

Figure D-5. Suggested format for the 25 Report (Intelligence Summary Report).

Line 22:	Amplifying details.
Line 23:	Amplifying details.
Lines 24-26:	Set field name and narrative.
Line 27:	Set field name, country of sighting, airfield name, and location.

Figure D-5. Suggested format for the 25 Report (Intelligence Summary Report) (continued).

(6) 26 Report (Intelligence Report). The INTREP is a standardized report which, based on its importance, is disseminated without regard to a specific schedule. It is prepared at all echelons when facts influencing enemy capabilities have been observed or when a change in enemy capabilities has taken place. The INTREP is passed to higher, lower, and adjacent units at the discretion of the commander producing the report. It is sent as quickly as possible following receipt of the information. When time permits, the INTREP should include the originating office's interpretation of the information or intelligence being reported. The first word of the report must be INTREP. Otherwise, there is no prescribed format for this report. It is not used in lieu of the critical intelligence report. Figure D-6 shows a suggested format for the 26 Report.

C110:	Message identification number.
INTREP:	The first word of the report must be INTREP.
HEADING:	Addressee information and message center data.
TEXT:	Intelligence or information to be reported (should answer who, what, where, and how).
CONCLUSIONS:	When possible, the INTREP should include the originating office's interpretation of the information or intelligence being reported.

Figure D-6. Suggested format for the 26 Report (Intelligence Report).

b. Operations Reports. Operations reports pertain to the tactical command and control of the squadron. They normally are sent by radio on the command net. Operations reports are preceded by a "3." Subsequent numbers are the 31 Report (Situation Report), 32 Report (Splash Report), 33 Report (Route Reconnaissance Report), 34 Report (Bridge Report), 35 Report (Crossing Report), 36 Report (Minefield Report), and 37 Report (Closing Report).

(1) 31 Report (Situation Report). Subordinate units submit SITREPs to their higher headquarters to report their tactical situation and status. The SITREP is submitted daily as of 0600, after significant events, or as otherwise requested by the squadron commander. Updates give only changes to previous reports. Figure D-7 shows a suggested format for the

31 Report.

Line 1: Report as of DTG.

Line 2: Brief summary of enemy activity, casualties inflicted, and prisoners captured.

Line 3: Friendly location (encoded).

a. TOC locations.

b. Center of mass of all subordinate units (includes line c through line letter as required.

Line 4: Tactical vehicles operational.

a. HMMWV TOW.

b. HMMWV 25 millimeter.

c. Attack helicopter.

d. Scout helicopter.

e. Utility helicopter.

Line 5: Defensive obstacles (encoded).

a. Coordinates of minefields.

b. Coordinates of demolitions executed.

c. Coordinates of reserve demolition targets.

Figure D-7. Suggested format for the 31 Report (Situation Report).

```
Line 6:   Personnel strength.

          a.  Green (full strength, 90 percent or better on hand).

          b.  Amber (reduced strength, 80 to 89 percent on hand).

          c.  Red (reduced strength, 60 to 79 percent on hand mission
              capable).

          d.  Black (reduced strength, 59 percent or less on hand).

Line 7:   Classes III and V for combat vehicles.

          a.  Ammunition (green, amber, red, or black).

          b.  Fuel (green, amber, red, or black).

Line 8:   Summary of commander's tactical intentions.
```

Figure D-7. Suggested format for the 31 Report (Situation Report) (continued).

(2) 32 Report (Splash Report). This is a report of downed aircrew. Figure D-8 shows a suggested format for the 32 Report.

```
Line 1:   Call sign.

Line 2:   Aircraft data (type and status).

Line 3:   Pilot status.

          a.  Recovered good condition.

          b.  Recovered WIA.

          c.  Recovered KIA.

          d.  Unknown.
```

Figure D-8. Suggested format for the 32 Report (Splash Report).

(3) 33 Report (Route Reconnaissance Report). Figure D-9 shows a suggested format for the 33 Report.

ALPHA: From (encoded).

BRAVO: To (encoded).

CHARLIE: What.

a. Highway.

b. Road.

c. Trail.

d. Cross-country.

DELTA: Class of route.

a. All squadron vehicles.

b. Only tracked vehicles.

c. Only APC series.

d. Only wheeled vehicles.

ECHO: Type.

a. All weather (X).

b. Limited all weather (Y).

c. Fair weather (Z).

FOXTROT: Movement possible.

a. Fast.

b. Slow.

GOLF: Any critical points (encoded).

Figure D-9. Suggested format for the 33 Report (Route Reconnaissance Report).

(4) 34 Report (Bridge Report). Figure D-10 shows a suggested format for the 34 Report.

ALPHA:	Type and location.
BRAVO:	Overall length.
CHARLIE:	Width of roadway.
DELTA:	Height restriction.
ECHO:	Type and location.
FOXTROT:	Length of spans and number.
GOLF:	Computed class.
HOTEL:	Bypass (easy or difficult).

Figure D-10. Suggested format for the 34 Report (Bridge Report).

(5) 35 Report (Crossing Report). Figure D-11 shows a suggested format for the 35 Report.

ALPHA:	Type of location.
BRAVO:	Length of crossing.
CHARLIE:	Usable width.
DELTA:	Current in meters per second.
ECHO:	Maximum depth in meters.
FOXTROT:	Bottom material and condition.
GOLF:	Capacity in tons if ferry has existing equipment.

Figure D-11. Suggested format for the 35 Report (Crossing Report).

HOTEL:	Slope of entry bank.
INDIA:	Slope of far bank.
KILO:	Other comments.

Figure D-11. Suggested format for the 35 Report (Crossing Report) (continued).

(6) 36 Report (Minefield Report). Minefield reports are used when authorized or when units request authorization to emplace hasty protective minefields. They are also used to report the intention, initiation, and completion of laying a minefield, followed by DA Form 1355-1-R. (DA Form 1355-1-R is forwarded to the squadron TOC.) Nonapplicable lines are omitted. Figure D-12 shows a suggested format for the 36 Report.

36A (Intention to Lay Minefield)

ALPHA:	Type and number (normally "hasty protective," to include call sign and sequentially assigned number).
BRAVO:	Coordinates of extremities (encrypt).
CHARLIE:	Estimated DTG of start and completion (send both times; specify time zone).

36B (Initiation of Laying Minefield)

ALPHA:	Type and number (see MR-1, Alpha).
CHARLIE:	Actual DTG of start.

36C (Completion of Minefield)

ALPHA:	Type and number (see MR-1, Alpha).
CHARLIE:	Actual DTG of completion.

Figure D-12. Suggested format for the 36 Report (Minefield Report).

DELTA:	Changes to any information reported in MR-1 (encrypt any coordinates).
ECHO:	Total number of mines laid by type.
FOXTROT:	Method of laying (normally "hand surface" or "hand buried").
GOLF:	Details of lanes or gaps (specify locations of entrance and exit, azimuth, and type of marking; encrypt digits).
HOTEL:	Details of minefield marking (normally "under observation" or "single wire fence and signs").

Figure D-12. Suggested format for the 36 Report (Minefield Report) (continued).

(7) 37 Report (Closing Report). A closing report is submitted to indicate that the main body has arrived at the destination. A final closing report is submitted for trail parties and disabled vehicles. A unit submits a closing report to the squadron S3 when it completes a movement to a new location. A closing report is also submitted when the unit returns to a designated home base where it will remain for a period of over 24 hours. Figure D-13 shows a suggested format for the 37 Report.

ALPHA:	Unit designation of closing unit.
BRAVO:	Unit's new location (name of nearest local or major training area or home station) and phone number.
CHARLIE:	DTG the main body closed at new location.
DELTA:	Estimated date of return to home station. (This entry is not applicable upon the unit's return to home station.)
ECHO:	Unit's purpose at new location (ARTEP, CPX, FTX).
FOXTROT:	Explanation of accidents or incidents; that is, who, what, where, when, how, and additional information if applicable.

Figure D-13. Suggested format for the 37 Report (Closing Report).

GOLF:	Estimated date and arrival time of trail party or disabled vehicles or both.
HOTEL:	DTG sensitive items were accounted for. (This entry may be sent separately from the above entries so as not to delay reporting lines A and G.)

Figure D-13. Suggested format for the 37 Report (Closing Report) (continued).

D-4. WARNING ORDERS

Warning orders provide a preliminary notice of actions or orders that are to follow. They are usually brief written or oral messages that are critical to the overall planning and preparation phases of an operation. Figures D-14 and D-15 show an example of a written and an oral warning order recommended for use by the RAS.

FROM: CDR, 22d RAS

TO: XO, 22d RAS
CDR, HHT, N, O, P, Q, R, S
S1, 2, 3, 4

SUBJECT: Warning Order

22d RAS conducts air assault security for 2d Bde AATF operation commencing 240500 hrs, Jun 90; conducts air route reconnaissance of Route ARMSTRONG (SP: AB 80454677; RP: XZ 99721076) and screens right flank during air movement and landing phases. OPORD to be issued at sqdn TOC 240100 hrs, Jun 90.

OFFICIAL: ANDERSON
LTC

MORGAN
S3

Figure D-14. Example of a written warning order.

1. Warning Order

2. Situation

   a. Brief statement about enemy situation, friendly situation, or both.

   b. Attachments and detachments.

3. Mission (Who, What, When, Where, and Why)

4. Coordinating Instructions

   a. Specific mission or tasks for platoons, sections, and teams.

   b. Number of aircraft and crews required.

   c. Aircraft load, ammunition, fuel, and cargo or passengers.

   d. Special-mission equipment.

   e. MOPP.

   f. Earliest time of movement (crank-up and load-up).

   g. Changes to SOP.

5. Specific Instructions

   a. Chain of command.

   b. Weather (who gets).

   c. Flight plan (who files and when).

   d. Coordination, liaison, or special individual tasks.

6. Time and Place for Issuance of the OPORD

   a. Time is now ______________.

   b. What are your questions?

Figure D-15. Example of an oral warning order.

D-5. OPERATION ORDERS, FRAGMENTARY ORDERS, AND ORAL DEBRIEFINGS

a. Operation Orders. Operation orders are covered in greater detail in FM 101-5. Figure D-16 shows an example of an oral operation order. This format is designed for use by troop commanders. Many items will not apply to all units, nor are the checklists all-encompassing. Commanders must continue to develop and publish an SOP based on their unit's mission.

References: Maps and charts.

Time: __________.

Task Organization: Aircraft-aircrew mix, PCs or air mission commanders, chalk number, and light or heavy team.

1. Situation

   a. Enemy forces. Strength, composition, disposition, location, previous actions, and probable courses of action.

   b. Friendly forces.

      (1) Higher.

      (2) Adjacent.

      (3) Supported.

      (4) Supporting.

      (5) Other aviation elements in area of operations.

   c. Attachments and detachments.

   d. Weather.

      (1) Current weather and light data.

      (2) Forecast weather.

      (3) Special environmental considerations or hazards.

      (4) Published weather minimums for operation.

Figure D-16. Oral operation order.

2. Mission (Who, What, When, Where, and Why)

3. Execution

a. Concept of operation (overlay) (squadron commander's intent).

(1) Scheme of maneuver (ground and air).

(2) Fires and CAS.

(3) EW plan.

(4) Obstacle plan.

(5) Deception plan.

(6) Suppression of enemy air defenses.

b. Specific instructions to subordinate units.

c. Coordinating instructions.

(1) Essential elements of information.

(2) Actions on contact or rules of engagement.

(3) Times.

(a) Stand-to.

(b) Start.

(c) Communication.

(d) Lineup.

(e) Takeoff.

(f) On-station.

(g) Relief-on-station.

(4) Flight coordination.

(a) Air routes and corridors.

Figure D-16. Oral operation order (continued).

(b) Air control points, communication control points, rally points, and target index reference system.

(c) Holding areas, phase lines, and battle positions.

(d) Mode of flight, airspeed, and altitude.

(e) Movement technique or formation.

(f) Coordinating altitude and other airspace procedural control measures.

(g) Inadvertent IMC breakup procedures.

(h) Wire or bridge under flight.

(i) ATA procedures.

(j) Aircraft in-flight emergency procedures.

(k) Flight following.

(l) Survival, evasion, resistance, and escape (pilot pickup points, signals, and times).

(m) ATA actions on contact.

(5) Special-mission equipment.

(6) Aircraft load, ammunition, fuel, and cargo or passengers.

(7) MOPP.

(8) Time and place of debriefing.

(9) Inspections, rehearsals, or both.

4. Service Support

a. Supply.

(1) Class I.

Figure D-16. Oral operation order (continued).

(2) Configuration of Class III and V resupply rates.

(3) Location of FARPs (primary and alternate).

(4) Class IX.

(5) Other classes of supply.

(6) Water point and trash point.

b. Services and transportation.

(1) Location of AVUM platoon.

(2) Contact teams.

(3) Downed-aircraft recovery procedures.

(4) Road march and convoy procedures.

c. Medical and personnel services.

(1) Location of aid station.

(2) Air-ground medical evacuation procedures.

(3) Field sanitation.

(4) Decontamination site.

5. Command and Signal

a. Command.

(1) Chain of command.

(2) PC designation.

(3) Locations of flight operations center and squadron CPs.

(4) Proposed location for assembly area.

b. Signal.

(1) SOI in effect.

Figure D-16. Oral operation order (continued).

(2) Secure radio codes.

(3) IFF.

(4) Laser codes.

(5) Code words or passwords.

(6) Send-a-message system.

(7) MIJI and ECCM.

(8) Lost communication procedures.

(9) Tactical air and JAAT frequencies.

(10) Tactical beacons and navigational aids.

Time is now ____________________.

What are your questions?

Figure D-16. Oral operation order (continued).

b. Fragmentary Orders.

(1) FRAGOs are extracts from more detailed orders or are issued to change previous orders. Like warning orders, these are usually brief oral or written messages. Mission orders are a form of FRAGOs which provide experienced commanders with the essentials of an order (such as a new mission or a change to a previous mission).

(2) FRAGOs do not have a specified format; however, to ensure understanding, the OPORD format is useful. A FRAGO may be issued orally or in writing. Those elements found in a complete order are omitted when they have not changed, are not essential, or are incomplete at the time of issue. As a general rule, a FRAGO--

- Is addressed to each commander required to take action.
- Is addressed to higher and adjacent headquarters for information.
- Refers to a previous order.
- Indicates task organization changes.
- When necessary for clarity, includes a brief outline of the situation that generated

the requirement for a FRAGO, to include a statement of the mission, if changed.

- Provides brief and specific instructions without loss of clarity.
- Requests acknowledgment.
- Contains proper classification.

(3) With command approval, FRAGOs are prepared and issued by either coordinating or special staff officers. Figure D-17 shows an example of a FRAGO.

c. Oral Debriefings. Figure D-18 shows an example of an oral debriefing.

(Classification)

Copy no ___ of ___ copies
52d Mech Div
Zrayville (6271), Missouri
141300 5 January 1990
YZ55

Frag Order

References: OPORD 7
Map, Series V661, Sheet 7061, Edition 1, Scale 1:50,000

Task Organization: C/52 Avn OPCON 3d Bde
Eff 141400 5 Jan

1. Situation. Estimated enemy tank regt delaying advance of 1st Bde.

2. Mission. No change.

3. Execution.

a. Div continues attack, 3d Bde bypasses 1st Bde in north and attacks in zone to secure division objective. 1st Bde becomes reserve, follows 3d Bde. Priority of fires to 3rd Bde.

(Classification)

Figure D-17. Fragmentary order.

(Classification)

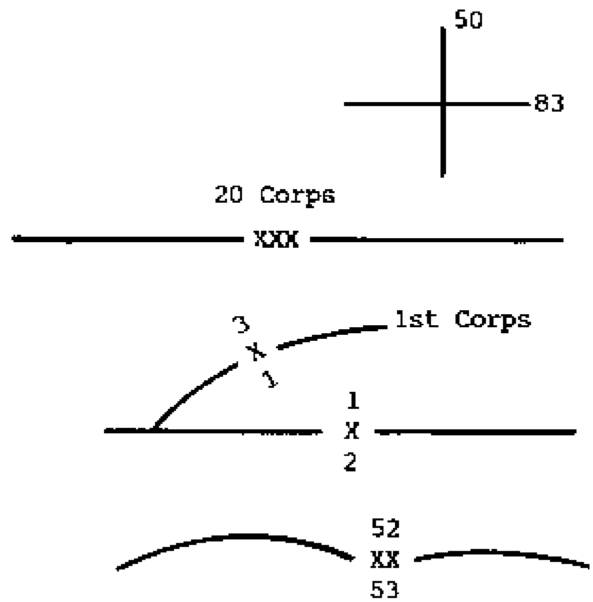
b. 1-42 FA DS 3d Bde.

c. 1-40 FA GSR 1-42 FA.

4. Service Support. No change.

5. Command and Signal.

Tac CP currently at 3067.



Acknowledge.

VON STEUBEN
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OFFICIAL:

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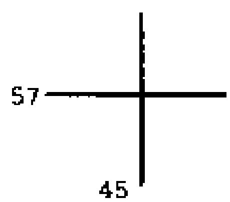


(Classification)

Figure D-17. Fragmentary order (continued).

1. Situation

    a. Enemy situation encountered.

        (1) Size and type.

        (2) Location (grid).

        (3) Weapons and vehicles.

        (4) Enemy aircraft.

        (5) Enemy actions on contact.

        (6) NBC activity and indicators.

        (7) EW and OPSEC activities.

        (8) Supply and logistic capabilities noted.

        (9) Strengths and weaknesses noted.

        (10) BDA.

    b. Terrain.

    c. Friendly forces encountered.

        (1) Size and type.

        (2) Location (grid).

        (3) USAF elements employed or encountered.

        (4) Effectiveness of air strikes and CAS (BDA).

    d. Weather and light data (significant changes from initial briefing).

2. Mission

    a. Mission completed as briefed?

    b. FRAGOs received.

Figure D-18. Oral defriefing.

3. Execution or Concept of Operation

a. Maneuver (general overview).

(1) Routes flown.

(2) Movement techniques used.

(3) Control measures used.

(4) Times of departure and return.

(5) Map corrections.

b. Fires.

(1) Artillery missions called (unit employed).

(2) Preplanned targets used.

(3) Artillery effectiveness (BDA).

(4) Friendly ADA positions noted.

(5) Friendly ADA status (free, hold, or tight).

(6) Significant problems noted.

c. Flight coordination.

(1) NBC posture for mission.

(2) Essential elements of information noted.

(3) Friendly aircraft downed.

(4) Crews recovered or probable pilot pickup points.

4. Service Support

a. FARPs used during the mission.

b. Status of FARPs in the area of operations, if known.

c. Class III consumed (gallons per FARP).

Figure D-18. Oral defriefing (continued).

d. Class V consumed (by type of ammunition).

e. Mission status of aircraft.

f. Immediate maintenance requirements.

g. Status of recovery operations for downed aircraft.

h. Crew status (injuries and endurance).

i. Location of injured crew members.

5. Command and Signal

a. Chain of command (location).

b. Locations of flight operations center and tactical operations center.

c. Aircraft and crew assignments.

d. Instructions for crews (premission planning).

6. Conclusions and Recommendations

Figure D-18. Oral defriefing (continued).

APPENDIX E
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

E-1. SYSTEM OVERVIEW

a. 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.

b. 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 E-1. A description of the system follows.

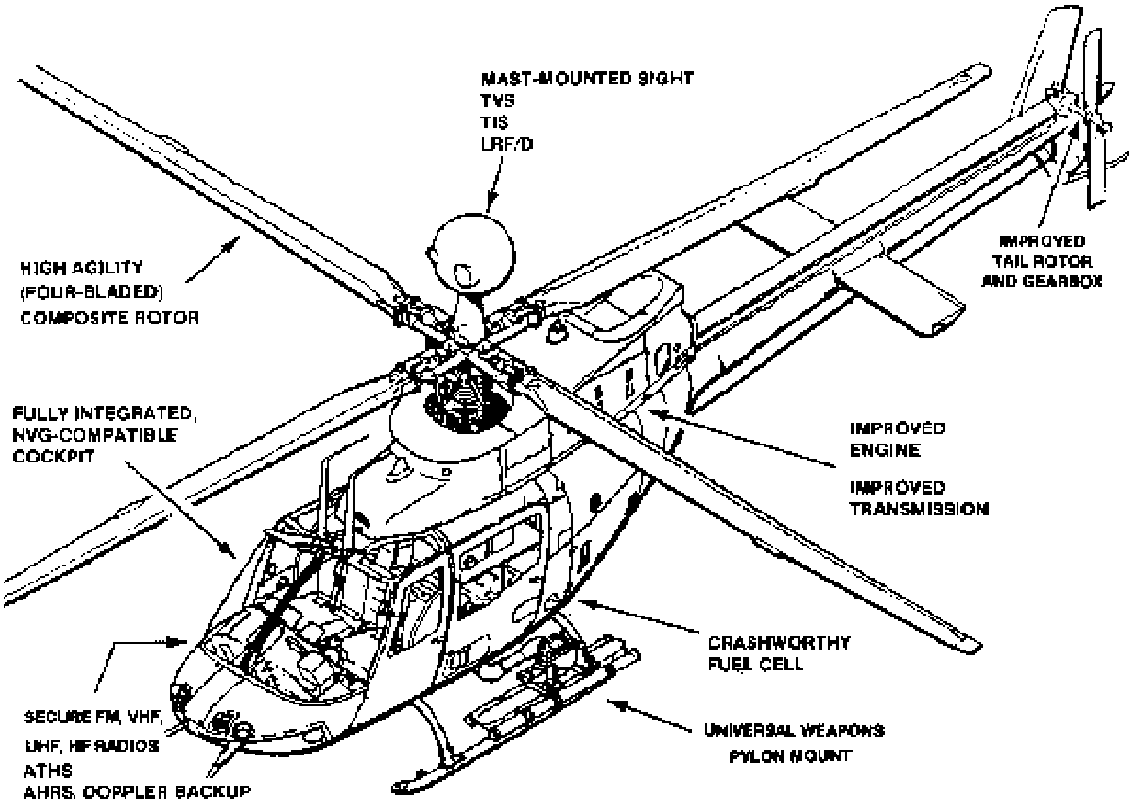


Figure E-1. Kiowa Warrior features.

(1) 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 airspeed--125 KIAS.
- Cruise airspeed--80 KIAS.
- Endurance--2 hours.
- Cargo hook capacity--2,000 pounds. *
- 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. *

(2) Mast-mounted sight.

- Thermal imaging sensor.
- Television sensor.
- Laser range finder/designator.
- Optical boresight system.

(3) Weapons.

- .50-caliber heavy machine gun. *
- 70-millimeter folding fin aerial rocket. *
- Air-to-air Stinger missile. *
- Hellfire modular missile system. *

(4) 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).

(5) Navigation equipment.

- Attitude and heading reference system (Litton LR-80 Inertial).
- AN/ASN-137 doppler.
- AN/ASN-43 directional gyro.

(6) 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. *

*Equipment installed on the armed Warrior only.

E-2. CREW INTERFACE AND SYSTEM CAPABILITIES AND LIMITATIONS

The Warrior crew interfaces with a fully integrated glass cockpit as shown in Figure E-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 E-3 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.

a. 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.

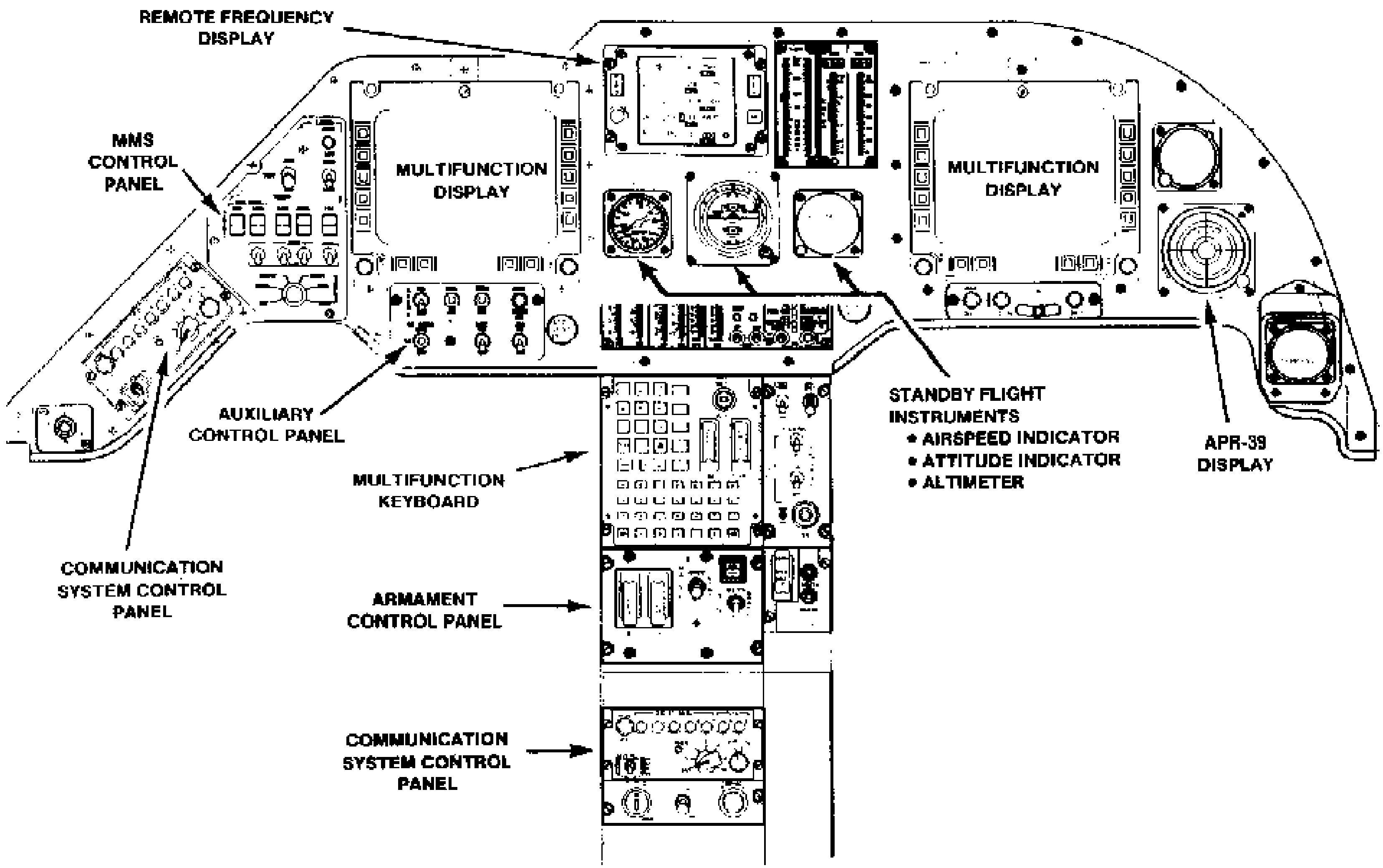
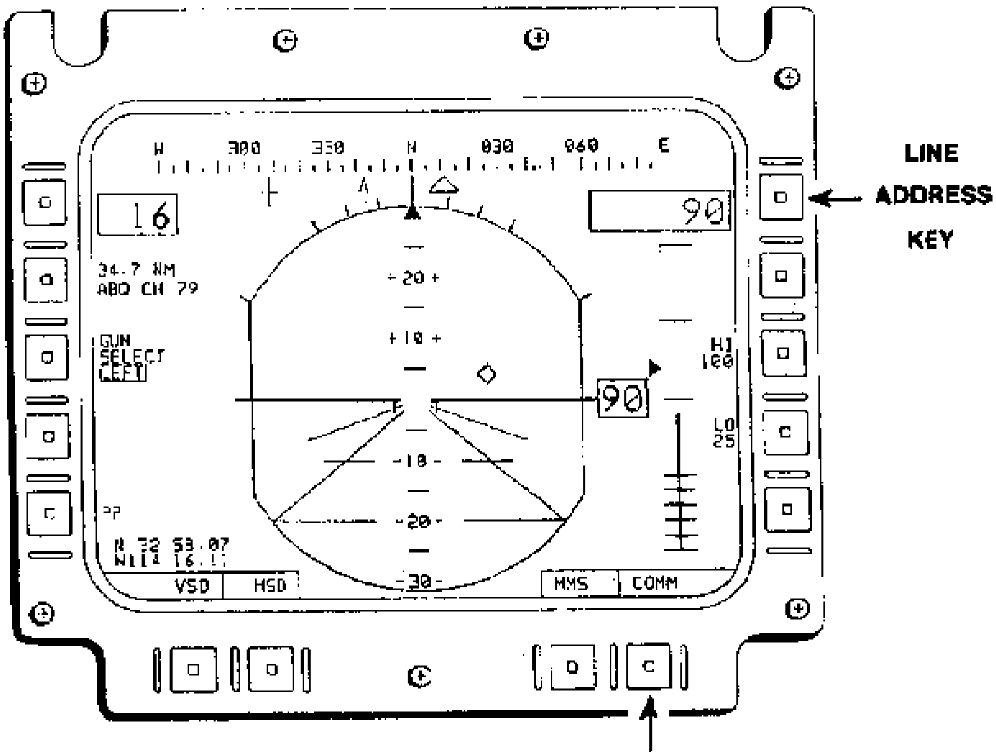
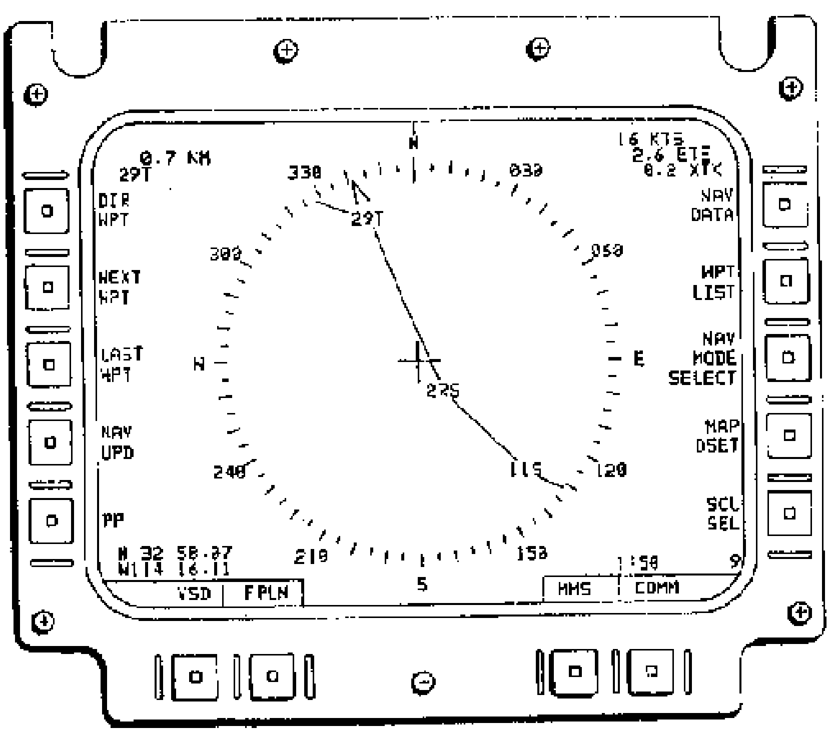


Figure E-2. Warrior instrument panel.



TYPICAL VSD



TYPICAL HSD

Figure E-3. Sample multifunction display pages.

b. Video Tape Recorder. The VTR is not integral to the mast-mounted sight, but its main function is to record mast-mounted sight video. The VTR is an 8-millimeter system and will record whichever page is selected on the left multifunction display. It 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 reconnaissance and security operations. It is also a useful training aid for mission debriefings.

c. 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.

d. 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.

(1) Operating modes.

(a) Preflight. The preflight mode is used to prepare the system for flight.

(b) 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.

(c) Forward. When this mode is selected, the MMS points straight ahead at zero degrees azimuth and elevation.

(d) Search. In the search mode, the sight will automatically repeat various scanning patterns as selected by the operator.

(e) Stow. In this mode, MMS data are stored in nonvolatile memory before the MMS is shut off.

(2) Tracking modes.

(a) 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.

(b) 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.

(c) 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.

e. 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 (-190øC). 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).

(1) 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.

(2) Fields of view. The TIS has four fields of view: wide, widedoubled (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.

(3) Frame freeze. The TIS has a frame freeze feature. When the FR FRZ button is depressed, it will freeze the TIS display at that instant. 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.

(4) 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.

(5) 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.

(6) 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.

(7) 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.

(a) 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.

(b) 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.

(c) 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.

(d) 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.

(8) TIS operational experience.

(a) 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.

(b) National Training Center. At the NTC, vehicles have been detected at 15 kilometers. ADA systems with rotating radars have been recognized at 7 kilometers.

(c) 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.

f. 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.

(1) Fields of view. The TVS has two fields of view: wide and narrow. Wide FOV is 6 1/4X, and narrow FOV is 25X.

(2) TVS operational experience.

(a) 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.

(b) 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.

(c) 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.

g. 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.

(1) Ranging. Laser ranging can be performed out to 9.99 kilometers (software limit).

(2) Navigation update. The navigation system can be updated by lasing a known point such as a water tower.

(3) 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.

(4) 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.

h. 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.

i. 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.

j. 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 E-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

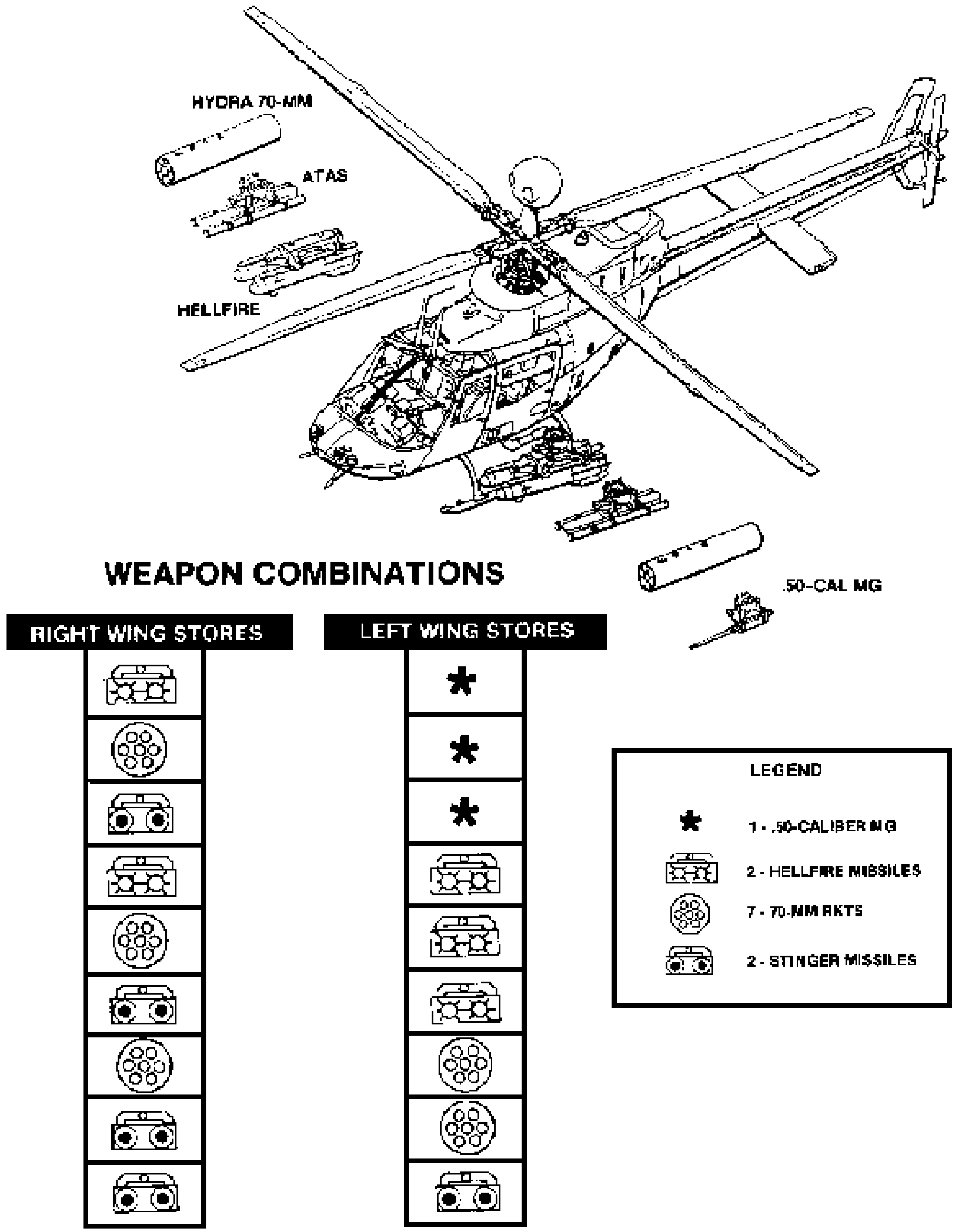


Figure E-4. Warrior weapon configurations.

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.

(1) .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.

(2) 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.

(a) 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.

(b) 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.

(c) 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.

(3) 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.

(4) Hellfire missiles. The Hellfire is a laser-guided, pointdetonating, 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.

(5) 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 cal 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.

k. 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.

(1) Airborne target handover system. The ATHS is a 10-pound, linereplaceable 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.

(2) 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.

(3) Retransmission. Retransmission can be accomplished between FM or HF radios. For example, the crew can receive on FM 1 and retransmit on HF.

1.Navigation.

(1) 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.

(2) Navigational experience.

(a) 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.

(b) 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.

m. Aircraft Survivability Equipment. The Warrior has an integrated ASE suite. It includes the following:

(1) 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.

(2) 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.

(3) 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.

(4) 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.

(5) 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.

n. 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 E-1 shows an 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

Table E-1. Airlift loading chart.

(1) 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 E-5, E-6, and E-7).

(2) 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.

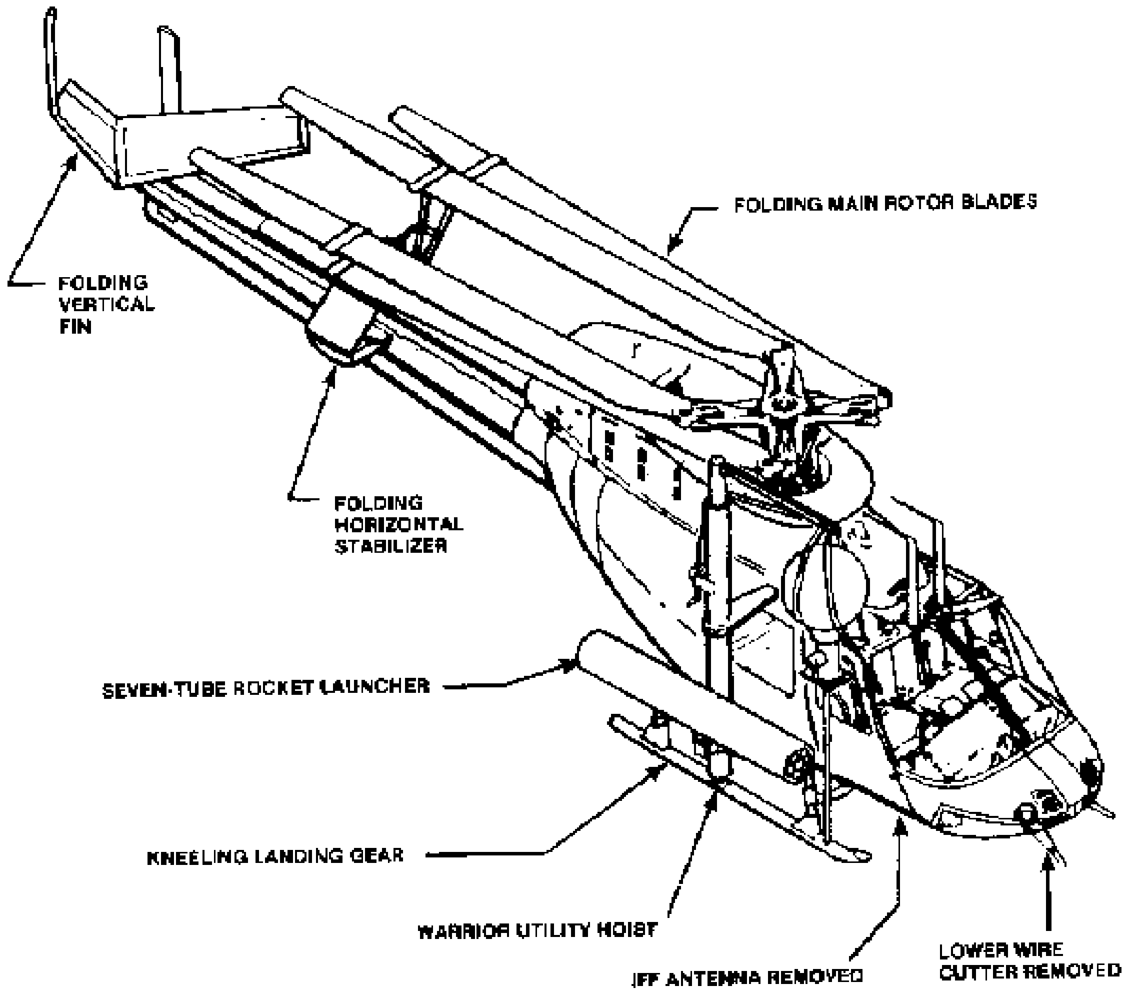


Figure E-5. Deployment load.

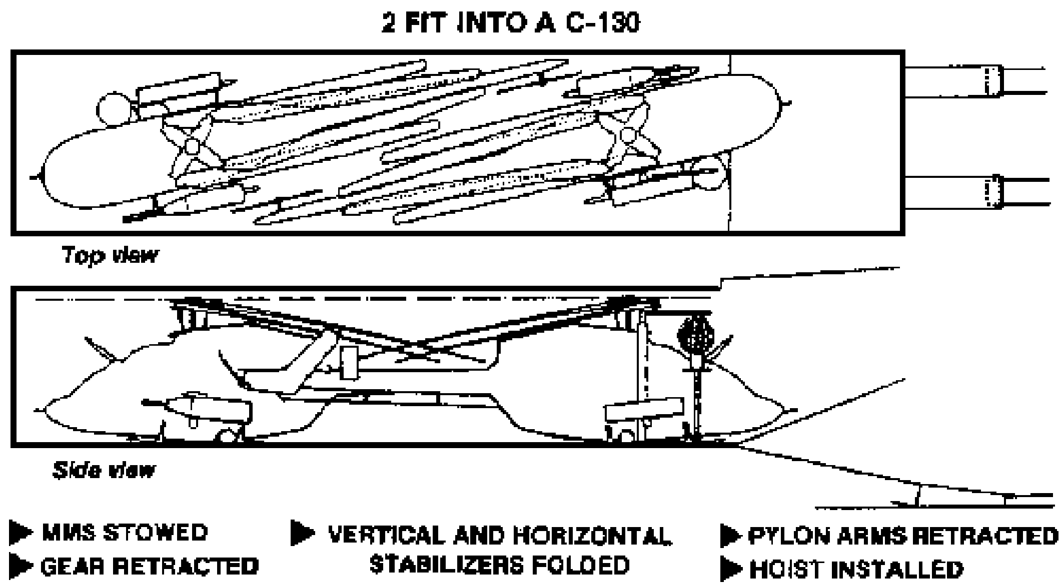


Figure E-6. C-130 RDF load.

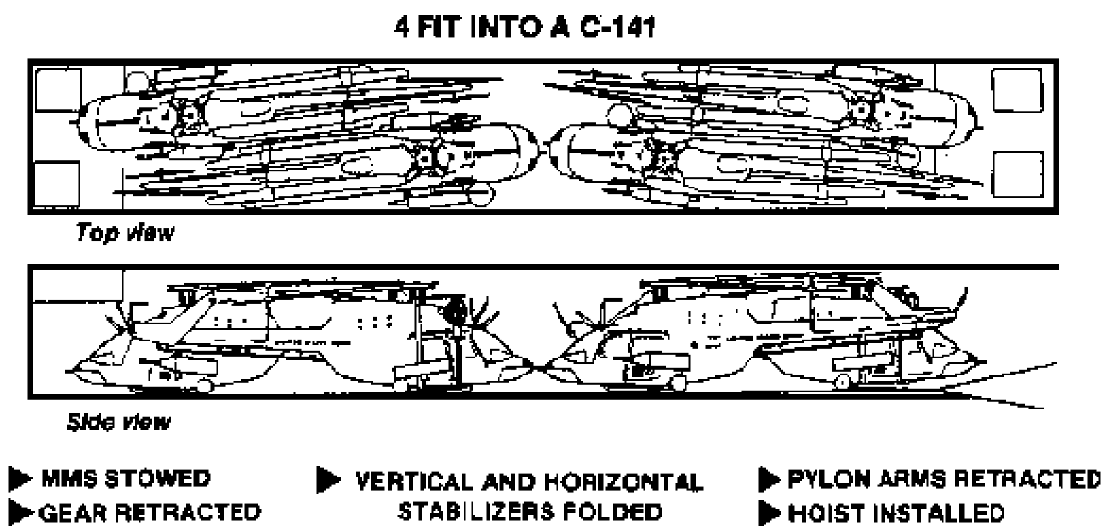


Figure E-7. C-141 RDF load.

o. Configurations.

(1) 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 E-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.

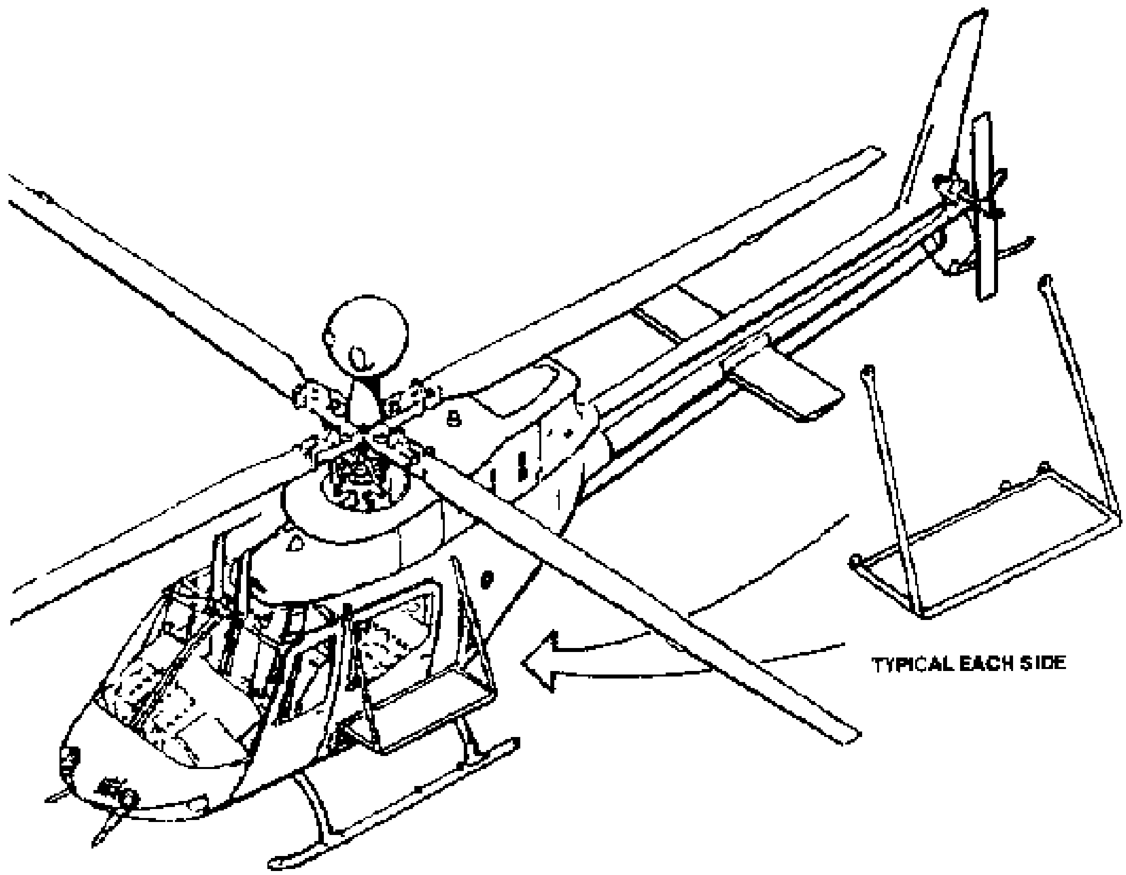


Figure E-8. Troop transport configuration.

(2) Medical evacuation. With the addition of another platform just above the troop seat platform, the Warrior can be converted into a MEDEVAC aircraft (Figure E-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.

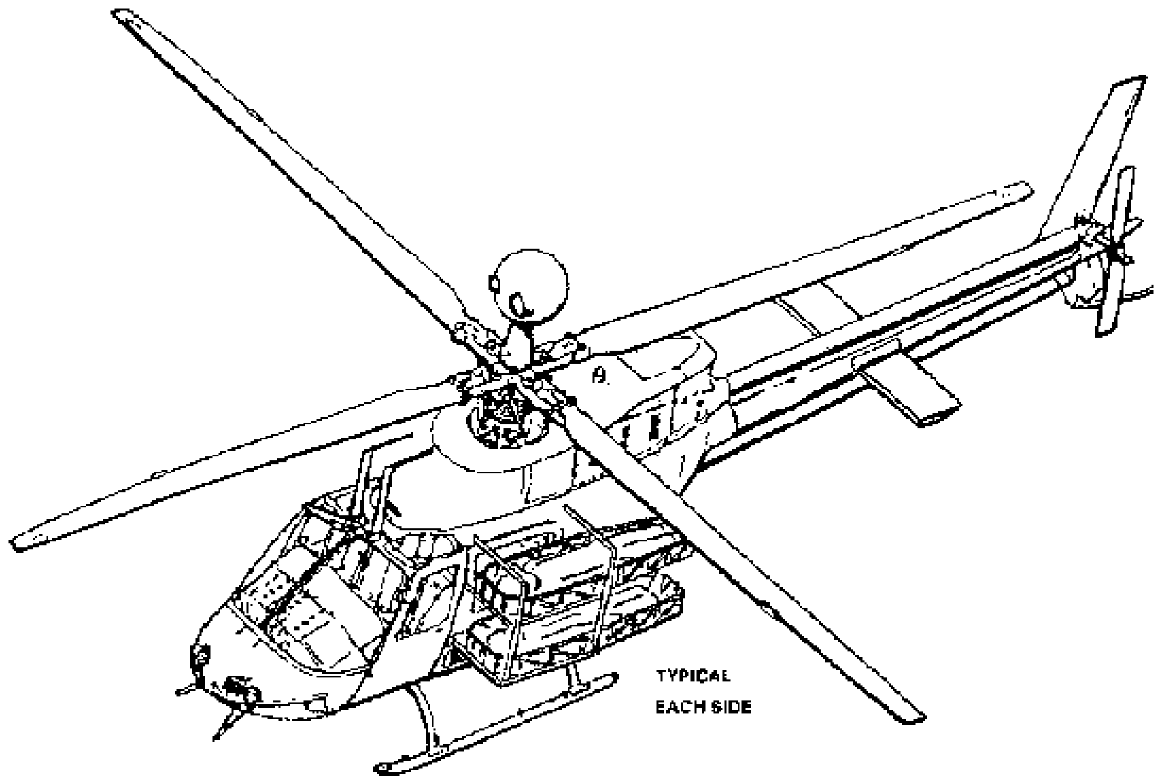


Figure E-9. MEDEVAC configuration.

(3) Sling loads. The Warrior has the capability to sling load 2,000 pounds (Figure E-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).

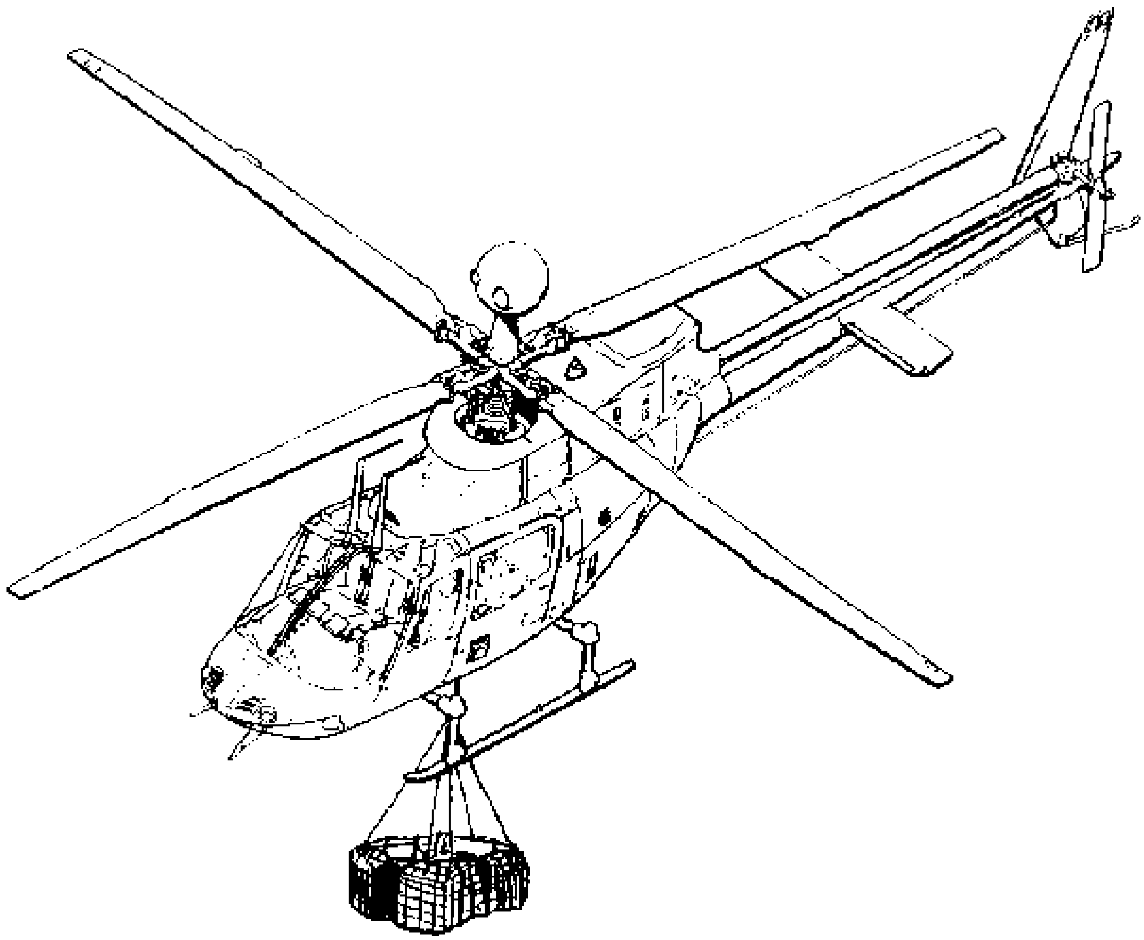


Figure E-10. Sling-load configuration.

E-3. 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.

a. 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.

b. 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.

c. 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.

d. Instrument Heteorological 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.

e. 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.

f. 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.

g. Other Considerations.

(1) The Warrior airframe does not provide an overpressure system to protect the crew in an NBC environment.

(2) 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

E-4. 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.

E-5. 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.

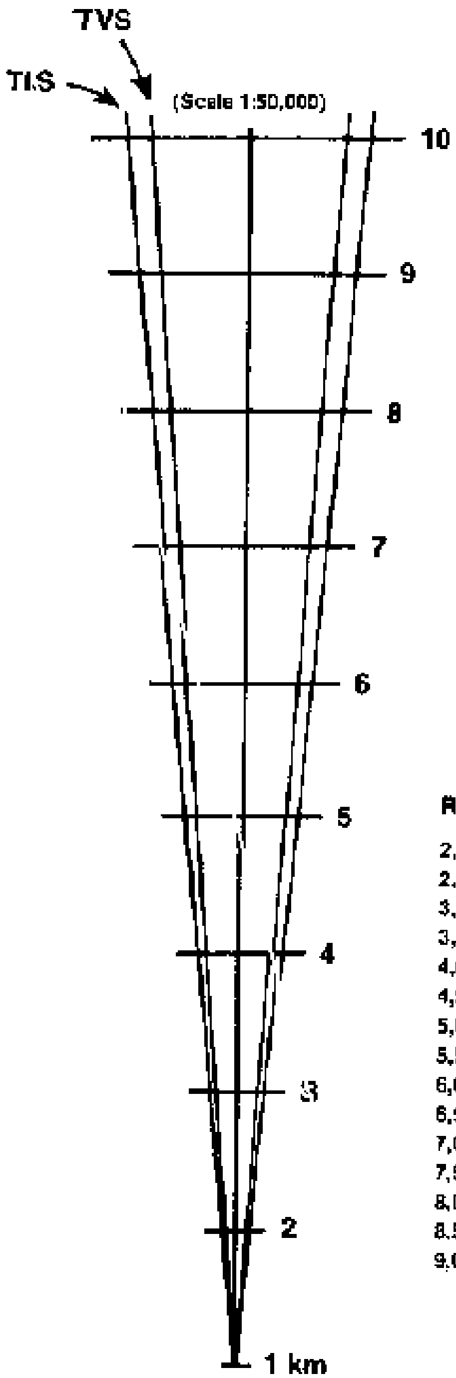
E-6. WAY POINT SELECTION

On the map, the crew selects way points for the navigation route (see navigation planning and employment below), 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.

E-7. OBSERVATION POST AND PREPOINT SELECTION

a. 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 E-11. 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. Paragraph E-18 provides additional information on the use of observation posts.

b. 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.



MMS Planning Overlay

(Place drawing on clear plastic.)

	TVS		TIS	
RANGE	NFOV	WFOV	NFOV	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	838	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	391	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 E-11. OP planning overlay.

E-8. 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 E-12.

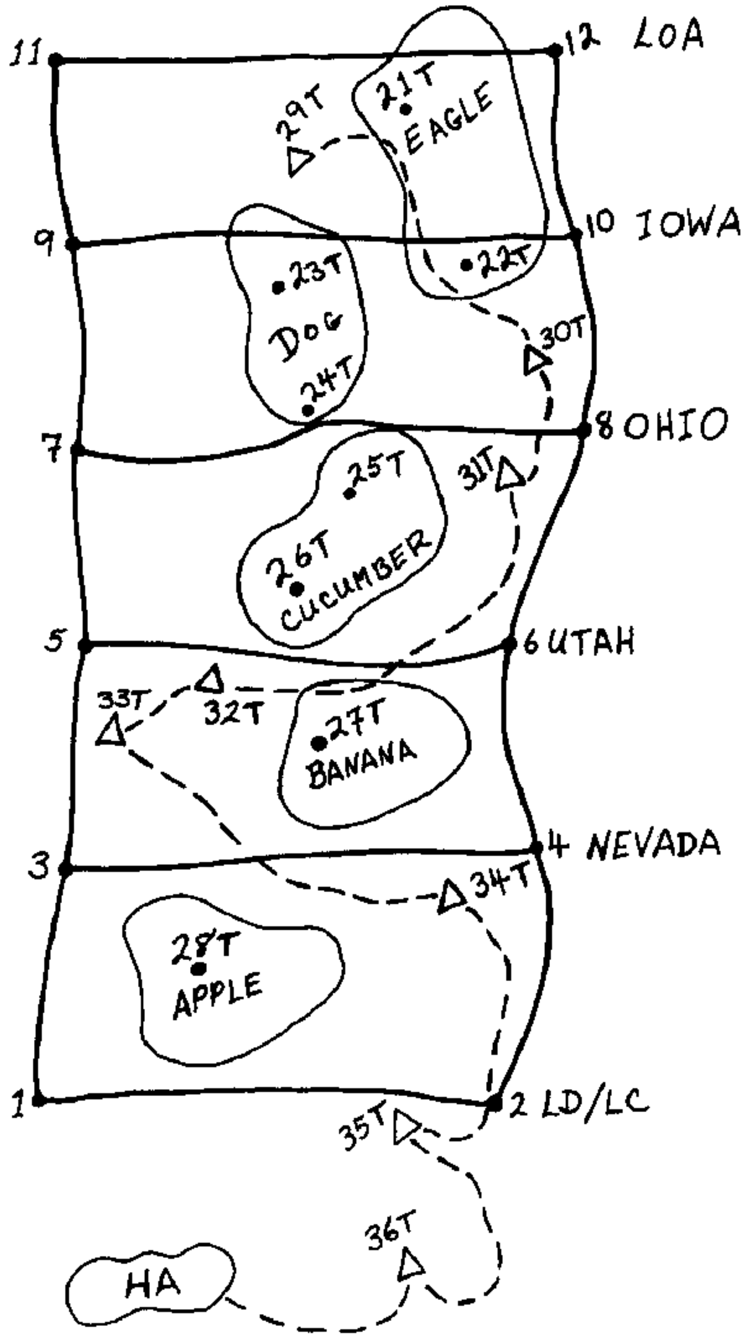


Figure E-12. Mission graphics drawing.

E-9. 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 E-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.

E-10. 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 E-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.

E-11. OBSERVATION POST/MISSION CARD COMPLETION

The crew fills in the OP/mission card as shown in Figure E-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.

E-12. 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 on Figure E-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.

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 E-13. OP/mission card.

E-13. 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.

a. 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.

b. 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 on Figure E-14. 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 f light plan is exceeded, a floating WPT may be used (such as WPT 39T on Figure E-14) and/or the copilot can enter a new flight plan along the route.

c. 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 E-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.

d. 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 E-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.

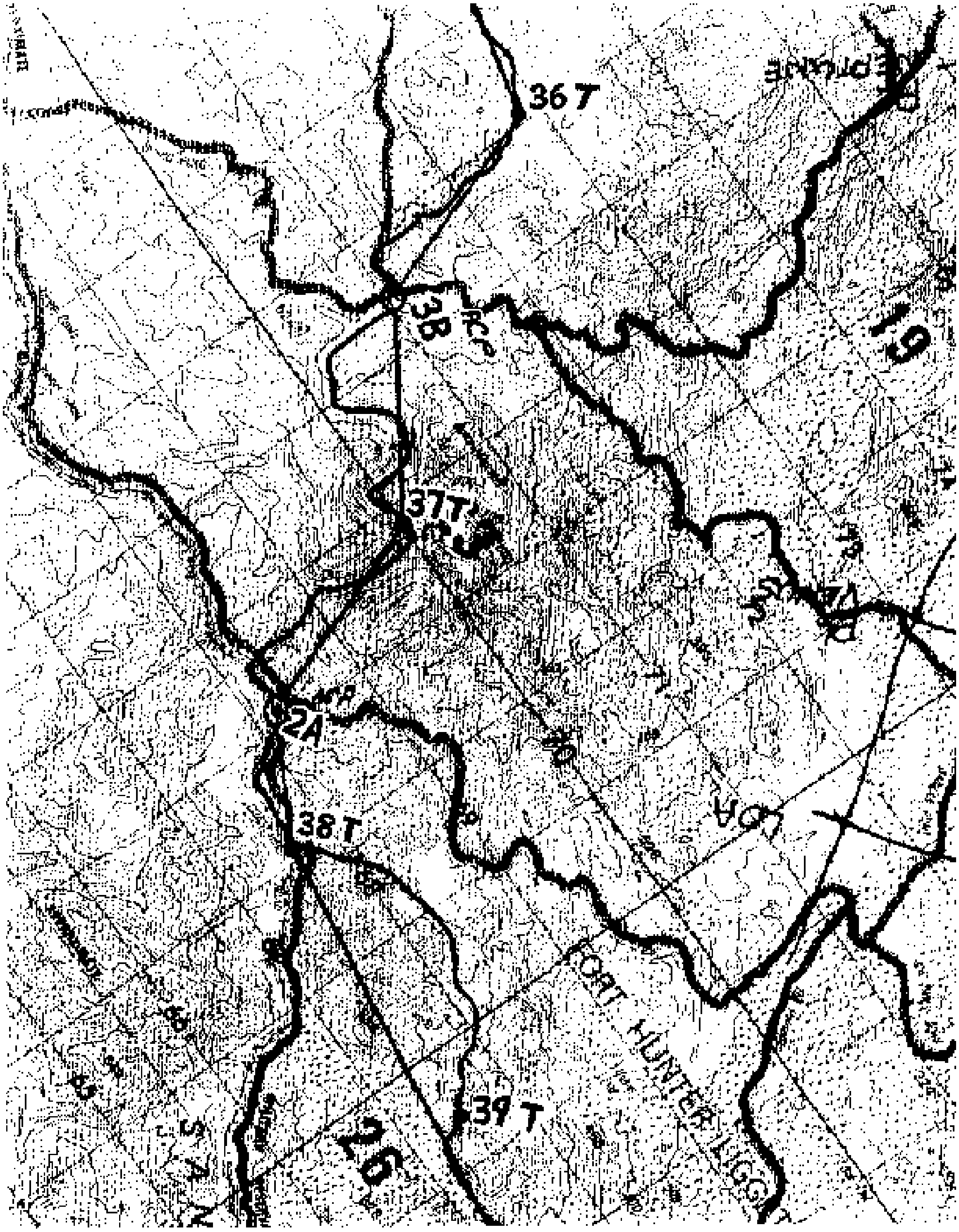


Figure E-14. Navigation route.

E-14. 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

E-15. 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.

E-16. 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 E-15 and E-16 show the organization of an air troop and an attack helicopter company equipped with the Warrior.

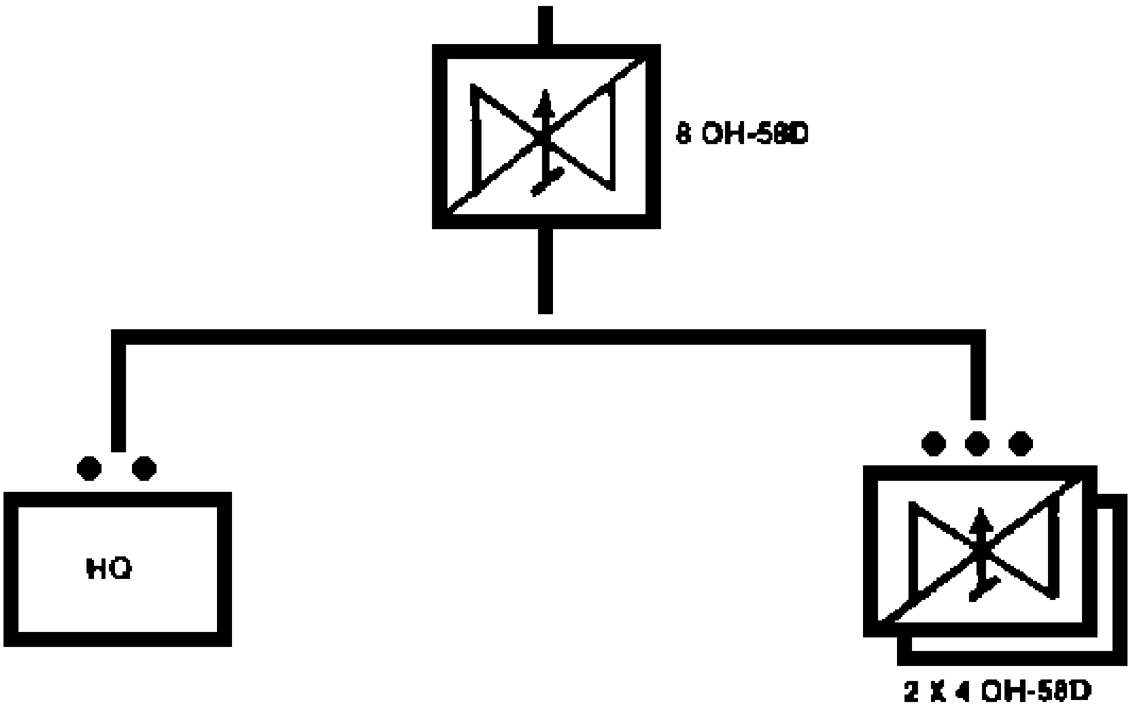


Figure E-15. Armed reconnaissance troop.

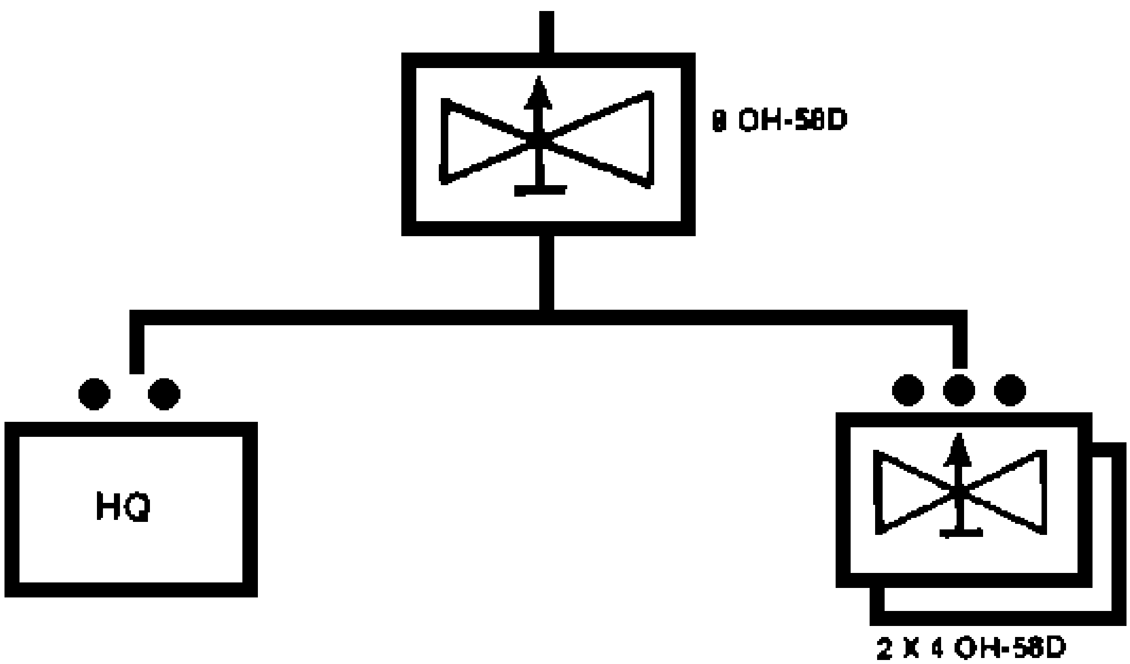


Figure E-16. Attack helicopter company equipped with the Warrior.

E-17. 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 ability 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 C3I platform. Figure E-17 shows the Warrior communications network using the advanced communication suite.

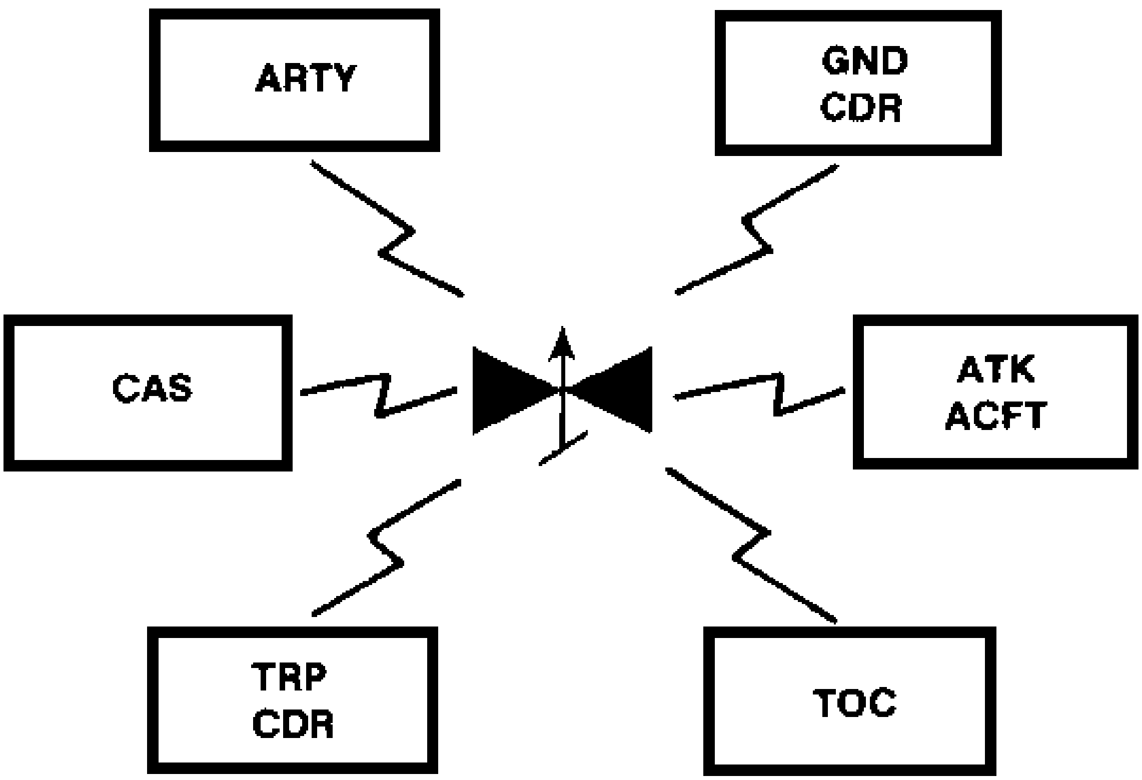


Figure E-17. Warrior communications network.

E-18. 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 E-18 shows a team using the bounding overwatch movement technique.

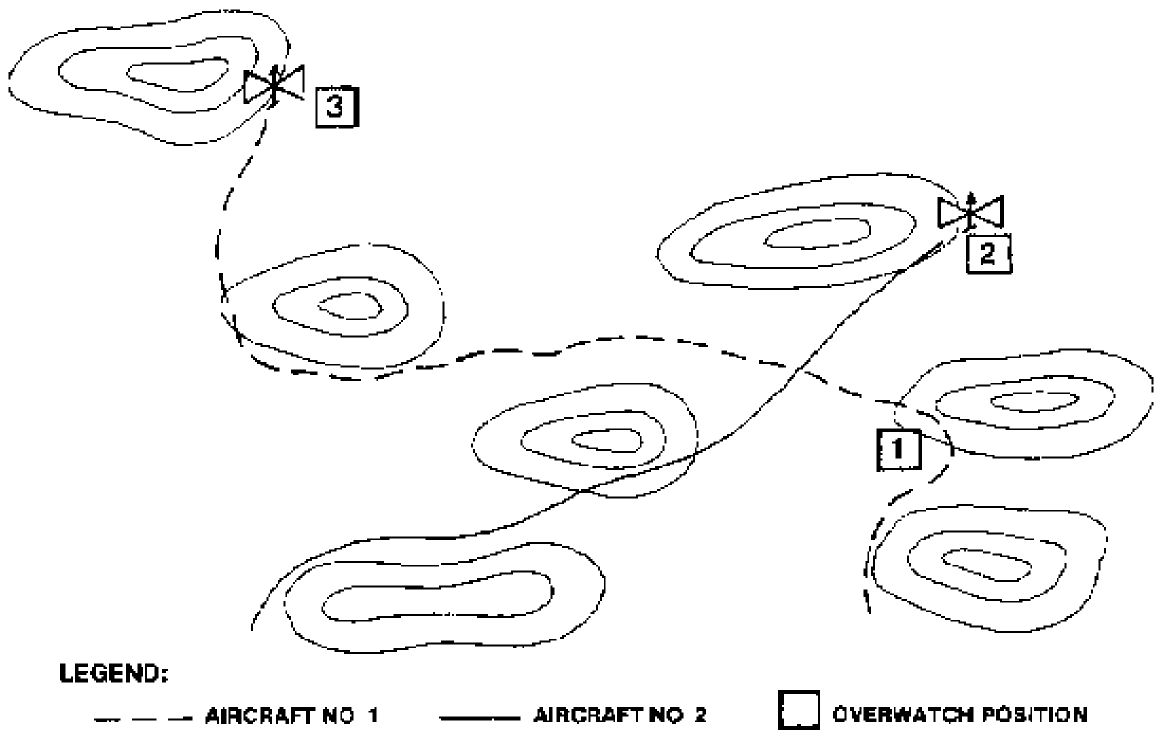


Figure E-18. Bounding overwatch.

a. 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 E-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.

b. Observation Post Use. Before unmasking the MMS, the crew should check the OP/mission card (Figure E-13) and make sure that the correct PPT is set.

(1) 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

(2) (2) 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.

(a) <u>During the day</u>. 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.

(b) <u>At night</u>. 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.

(3) <u>Detection</u>. 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.

(4) <u>Reporting</u>. 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.

E-19. 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.

a. <u>Armed Reconnaissance and Security</u>. 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.

(1) 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.

(2) 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.

(3) 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.

(4) 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.

(5) 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 E-19. The troop commander can place the four aircraft on the screen line because each aircraft can provide overwatch for the aircraft on either side.

b. Attack.

(1) 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.

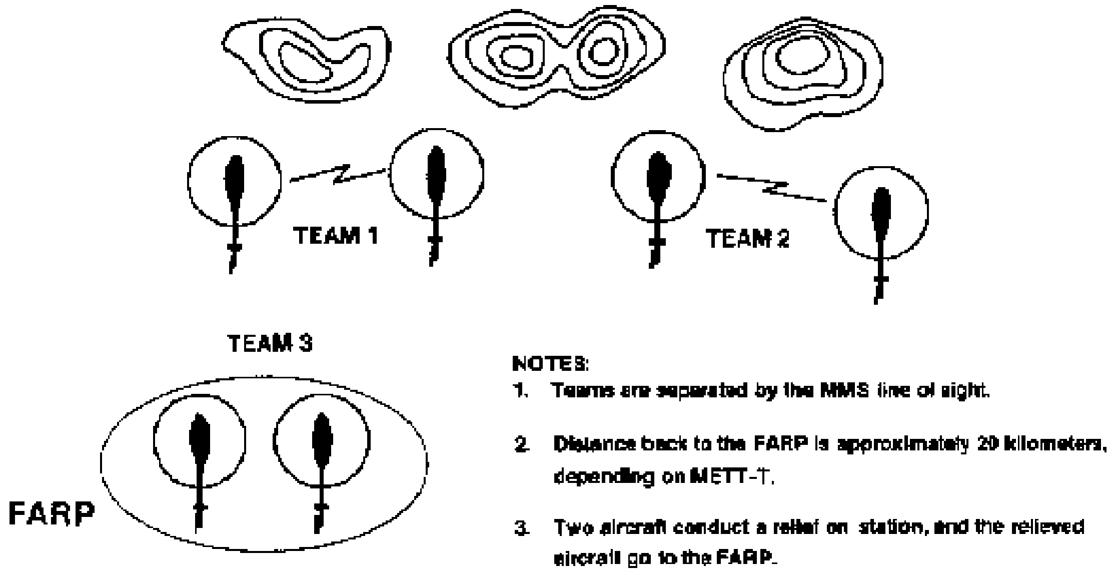


Figure E-19. Example of a screen mission.

(2) 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.

(3) 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.

c. 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, E-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.

(1) AirLand Battle-Future. Within the context of AirLand BattleFuture, 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.

(2) 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.

(3) Artillery and naval gunfire. With the Warrior, preprogrammed fire missions are sent digitally to supporting artillery battalions. Firstround 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.

(4) Communications. When CAS aircraft arrive at the IP, the H-FAC or the 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.

(5) 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.

d. 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.

(1) 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.

(2) 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.

(3) 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.

e. 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 C2; 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.

f. 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.

(1) 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.

(2) 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.

(3) Multipurpose submunition rockets can be employed against an unsuspecting hovering threat, but the probability of kill is very low.

(4) Flechettes are very effective in air combat. However, they pose danger to friendly forces and should not be employed in friendly areas.

(5) 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.

g. 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.

h. 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 LAHPS 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.)

(1) 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 10foot 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.

(2) Distance estimation. Distance estimation is difficult overwater. 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.

(3) 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.

(4) 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.

(5) 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.

(6) 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.

i. 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

E-20. 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 E-20 shows a Warrior-equipped air troop emplacing manned observation posts.

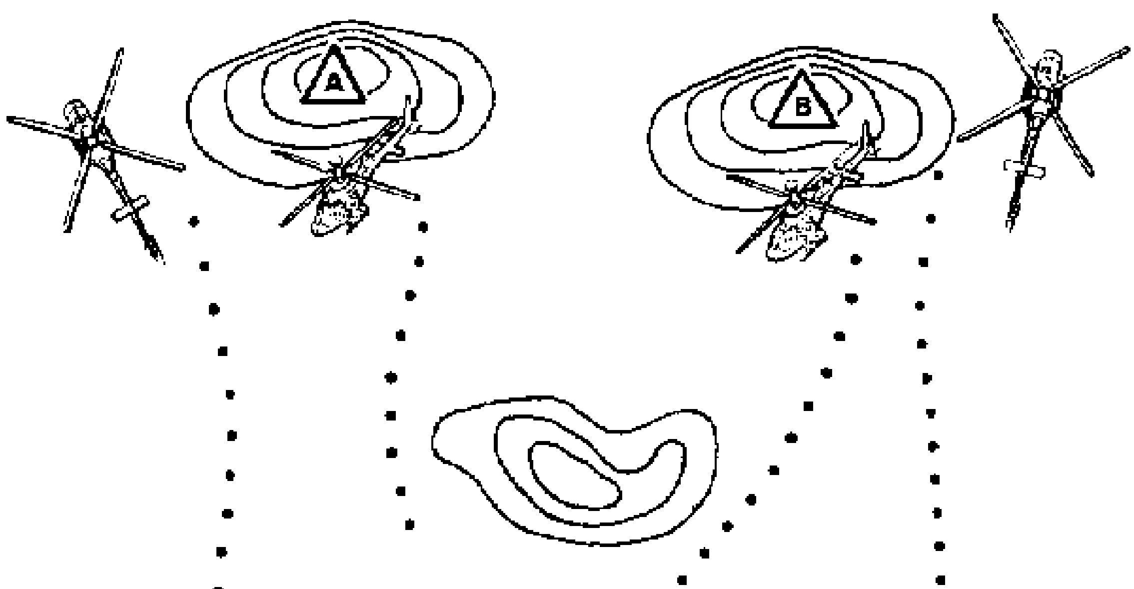


Figure E-20. Warrior-equipped air troop emplacing manned OPs.

E-21. 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 E-21 shows an attack helicopter company moving a FARP while conducting a phased attack.

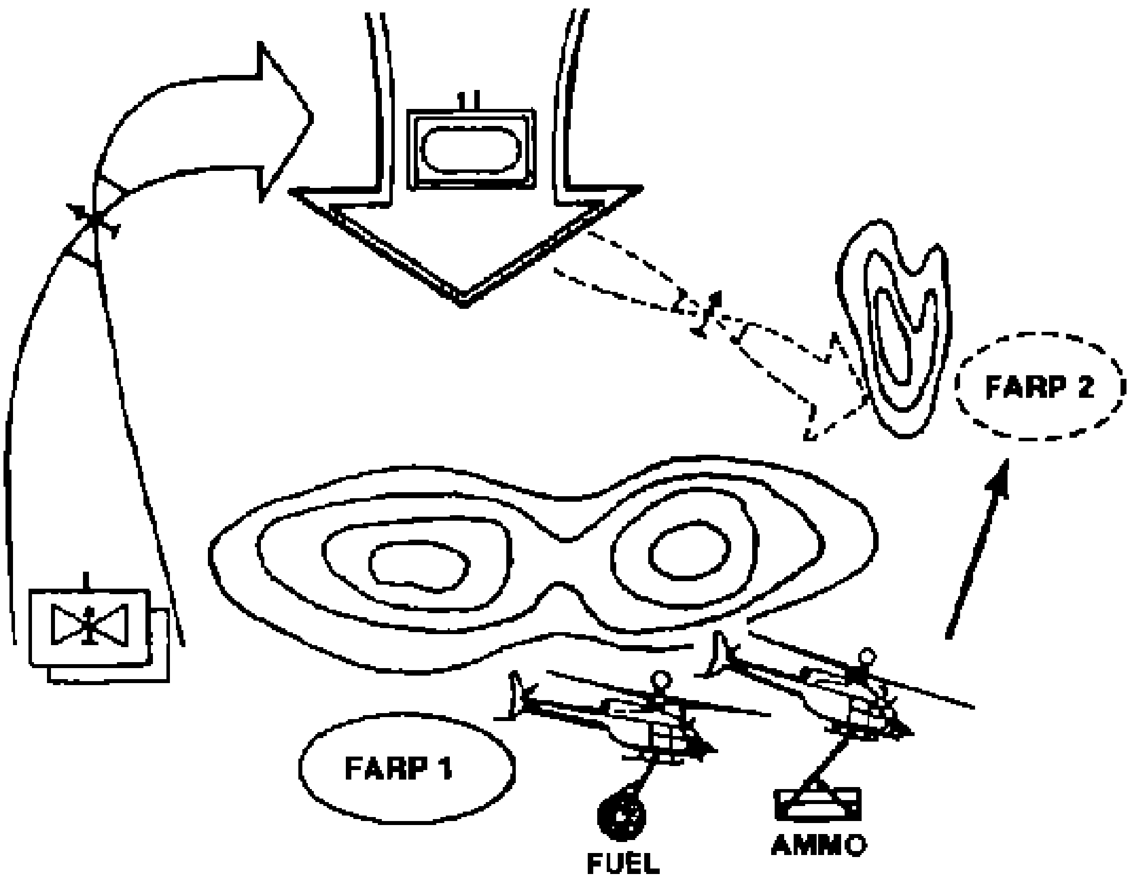


Figure E-21. Attack helicopter company moving a FARP while conducting a phased attack.

E-22. 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 E-22 shows a Warrior-equipped attack helicopter company conducting a raid.

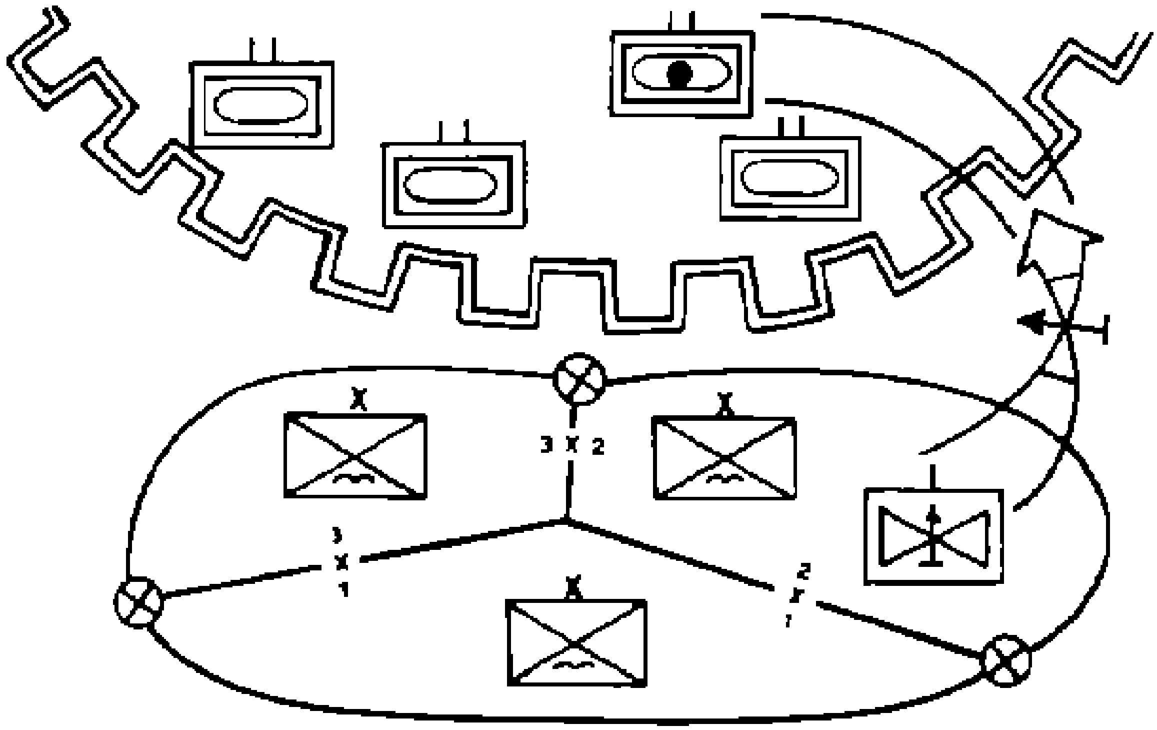


Figure E-22. Attack helicopter company conducting a raid.

APPENDIX F
UNIT MOVEMENT

Unlike other forces, the regimental aviation squadron has limited self-deployment capabilities. With preparation, however, the RAS can self-deploy aircraft, personnel, and equipment from its duty station to almost any place within the same theater. Units that plan, train, and validate their movement plans greatly increase their chances of success. The more knowledgeable personnel are of movement plans and operations, the more efficient the move becomes.

F-1. FUNDAMENTALS

a. A RAS begins training for its combat mission from the time it is activated. It deploys to a point where it can best accomplish the mission. Unit deployment training is necessary if the RAS is to move in the most efficient manner. If the squadron cannot move within its operational requirements, whether it deploys from CONUS or 3 kilometers on the battlefield, the success of the mission is jeopardized.

b. The RAS is only as effective as its logistical support. Equipment used to support and sustain the squadron is organic to the ACR. To facilitate rapid response, effectiveness, and sustained operations, the squadron must transport its logistical support. To transport its logistical support in a single move, the RAS must request assistance from the ACR.

c. The unit must give careful consideration to prestocking shipping containers for aircraft components and covers. This will ensure that items are available and preclude delays in unit deployment. Units prepare, load, and unload aircraft and equipment; therefore, predeployment of ground-handling equipment will save time. Fulfilling the requirement for tools and test equipment at the ports of embarkation and debarkation also results in more efficient unit movements.

F-2. RESPONSIBILITIES

a. Commanders. Commanders are responsible for the movement of their unit personnel and equipment. They also--

- Appoint a unit movement officer.
- Supervise the operations of subordinate units.
- Establish policies for air and sea lines of communication.
- Ensure compliance with directives, policies, and regulations.
- Review and validate movement plans, SOPs, and load plans frequently.
- Coordinate with other headquarters for technical data and logistical support.

b. Staffs. Staffs ensure compliance with the commander's directives and develop unit movement plans. They also--

- Plan and supervise unit movement training.
- Make recommendations for improvement to the commander.
- Establish training programs for unit movement personnel.
- Determine and coordinate logistical support requirements.
- Ensure compliance with directives, policies, and regulations.
- Ensure that subordinate unit movement plans, load plans, and SOPs are accurate and current.

c. Unit Movement Personnel. These personnel plan and conduct unit moves. They also--

- Develop unit movement plans, SOPs, and load plans.
- Conduct unit movement training.
- Ensure that proper support and logistical requirements are requested.
- Validate movement plans.
- Inspect and inventory equipment before and after a unit movement.
- Ensure proper preparation of personnel and equipment before a unit movement.

F-3. PLANNING AND PREPARATION

The RAS must plan and prepare to arrive at a designated location in the area of operations and begin battlefield missions. Modes of movement and deployment are designated in orders. These orders are delivered in several formats such as an OPORD, a FRAGO, or a movement order. Because of the complexity of unit movements, the movement order is preferable. Movement orders provide detailed information such as transportation support, movement tables, and clearance numbers. The least preferred format is the FRAGO. The information below will assist planners in preparing movement directives and SOPs.

a. Movement Directive. The movement directive, published by DA, is the basic document that directs units to prepare to and move from home stations. The two types of moves are administrative and tactical. In an administrative move, enemy contact is not likely and units relocate to secure areas and ports of embarkation. The S4 has staff responsibility for administrative movements. A tactical move, however, requires a combat-ready posture and organization during all phases even though the purpose of the move is to relocate only. The G3 or S3 has staff responsibility for tactical moves. Movements are categorized as follows:

(1) Category A--a move from a home station with all the equipment authorized for that unit.

(2) Category B--a move from a home station with essential equipment only.

(3) Category C--a move from a home station with less than essential equipment. (The movement directive will specify what equipment to take.)

b. Movement Instructions. Movement instructions provide details for the execution of a movement. They are issued to implement the movement program and represent accepted procedures.

c. Movement Order. The movement order directs the movement of personnel and prescribed equipment from one location to another within a stated period.

d. Movement Plan. The movement plan provides up-to-date logistical data. It is a summary of transportation requirements, priorities, and limiting factors incident to the movement of one or more units or special groupings of personnel by highway, marine, rail, or air transportation. Figure F-1 shows a sample movement plan.

e. Load Plan. The load plan is a preplanned method for loading personnel and equipment for transport.

F-4. SELF-DEPLOYMENT

Because airlift and sealift assets are limited, selected regimental aviation squadrons should plan to self-deploy within a reasonable distance. Aircraft will be equipped with the fuel systems, ALSE, and navigational and communication systems needed to self-deploy. They will be flown from the duty station to designated departure points where the preparation of the aircraft will occur. Prestationed ground and aerial support and maintenance teams provide stopover point assistance. On arrival of the self-deployed flights at destination points, ferry equipment will be removed and arrangements made for its return and reuse. Self-deployment applies only to aircraft transferred when other transportation assets are not provided; these aircraft may transport a small amount of equipment and/or a few personnel. The command structure must integrate self-deploying crews and aircraft into the theater of operations. This will expedite the availability and effectiveness of these aviation assets at their operational area.

HQ, 4th Sqdn, 208th ACR
Fort Rucker, AL 36362

TRANSPORTATION MOVEMENT PLAN 1-84

References: OPLANs 0001Q and 4102P

Task Organization:

HHC, Fort Rucker, AL
Co A, Electric, AL
Co B, Birmingham, AL
Co C, South Side, AL

1. Situation

a. Enemy forces. Current INTSUM.

b. Friendly forces. Task organization.

c. Assumptions.

(1) All unit equipment will be combat serviceable.

(2) All unit personnel will be available for movement.

2. Mission

On order, move to Fort Gordon, Georgia, for training, POR qualification, and movement to a designated theater of operations.

3. Execution

a. Concept of the operation.

(1) On M day, the commander in chief will sign the mobilization order, federalizing the unit. The order will be transmitted through command channels to the unit. N-hour sequence begins upon receipt of the mobilization order.

(2) Within two hours of receipt of the mobilization order, the unit will assemble at the unit headquarters and prepare to move to the mobilization station.

(3) On M+1, the unit will move to the mobilization station.

Figure F-1. Suggested format for a movement plan.

b. Deployment to the theater of operations is covered by-

(1) OPLAN 0001Q. (See Movement Plan 2-84.)

(2) OPLAN 4102P. (See Movement Plan 3-84.)

4. Service Support

a. Supply.

(1) Class I.

(2) Class II.

(3) Class III.

(4) Class IV.

(5) Class V.

(6) Class VI. Not authorized during mobilization.

(7) Class VII.

(8) Class VIII.

(9) Class IX.

(10) Class X. Not authorized during mobilization.

b. Maintenance.

(1) Premovement support requirements.

(2) En route support requirements.

c. Transportation.

(1) Air.

(2) Convoy.

(3) Rail.

(4) Commercial.

(5) Unit movement data.

Figure F-1. Suggested format for a movement plan (continued).

d. Procurement.

e. Facilities.

f. Other.

(1) Points of contact.

(2) Other.

g. Personnel.

(1) Personnel. Current SIDPERS.

(2) Morale.

(3) Maintenance of law, order, and discipline.

5. Command and Signal

a. Command.

b. Signal. Current SOI in effect.

c. N-hour sequence.

1. (This sample coordination portion of a movement plan is developed for installation use in premobilization planning and postmobilization execution of convoy movement from the home station to the movement station or POE. The installation headquarters may use this form to indicate concurrence or coordination with and approval of the movement plan. If more space is required for coordinating instructions, attach a continuation sheet, indicating the headquarters and unit, with additional information.)

2. Coordinating HQ: Unit:
Coordinating HQ POC: Phone Number:
Planned Departure From HS: M+ _____ at ______ hours, to arrive at MS or POE on M+ ______ at _____ hours.

Crossing times into states (list in order of crossing):

State: on M+ ______ at ______ hours, Route ______;
State: on M+ ______ at ______ hours, Route ______;
State: on M+ ______ at ______ hours, Route ______;
State: on M+ ______ at ______ hours, Route ______.

Unit will use ______ buses to be coordinated by the ITO at _______.
Coordinating instructions and special considerations.

Figure F-1. Suggested format for a movement plan (continued).

F-5. AIRLIFT

a. An airlift is executed according to prepared plans which are designed to ensure air transport of supplies, equipment, and personnel. The mobile capability of the RAS requires that it be able to package, document, load and unload, and tie down equipment. Therefore, RAS personnel must be trained not only in mission accomplishment but also in the skill and execution of airlift deployment. Emergency situations require rapid response by the armed forces; air movement fulfills that requirement.

b. The Military Airlift Command provides the strategic air assets necessary to move personnel and materiel during emergencies or for operational necessities. This command has aircraft located around the world; however, the number and availability of these aircraft are limited. Equipment accepted on these aircraft must be within specified space and weight limits. Table F-1 shows an airlift loading chart.

c. The unit movement officer is the key to exercising the unit's movement and loading plans. He supervises and conducts training and maintains updated movement data. Because operational requirements may exceed the airlift capacity, the unit movement officer also plans for the use of other types of transportation to conduct the movement. Detailed information on unit air movement planning is in FM 55-9.

d. Specific planning and support requirements for each unit vary. In an emergency, little time is available for planning. Therefore, the unit movement officer routinely identifies requirements and develops and validates exercise plans to preclude difficulties.

	Minimum Disassembly			C-5[1] Optimum Transport[2]			C-141[1] Optimum Transport[2]		
Type	No	Man-Hours	Elapsed Time (Hours)	No	Man-Hours	Elapsed Time (Hours)	No	Man-Hours	Elapsed Time (Hours)
AH-1	12	18.00	3.00	15	24.00	4.00	4	0.50	0.50
UH-1	8	12.00	2.00	11	18.00	3.00	4	0.50	0.50
OH-58A/C	13	19.50	3.50	22	33.00	5.50	6	9.00	1.50
							8	12.00	2.00
UH-60	6	2.00	0.75	Not available			2	5.00	1.50
OH-58D[3]									

NOTES:
1. Six-man loading crews.
2. Number of aircraft that can be transported with further disassembly if flyaway condition is not required on arrival.
3. Similar to the OH-58A/C. However, the MMS must be removed, so man-hours and elapsed time will increase.

Table F-1. Airlift loading chart.

F-6. RAIL MOVEMENT

a. The regimental or installation transportation officer or DISCOM movement control officer helps unit movement officers plan and identify their rail-loading requirements. He provides training material and current procedures for transporting equipment as well as other information to minimize planning time.

b. When available, rail shipment is used to move heavy and outsized items to the port of embarkation. Shipment by rail, however, can cause damage to sensitive aircraft components; this type of equipment must be airlifted.

c. As in other forms of movement, the aviation unit is responsible for internal administration and preparation of unit assets for rail movement. Plans and SOPs will address all rail requirements such as loading, tie-downs, organization, and specific safety provisions. The controlling transportation agency completes rail movement plans as required.

d. The information in FM 55-20 will assist the unit movement officer in planning and preparing equipment for rail transport. This manual also provides background information on special movement requirements imposed by foreign countries.

F-7. SEALIFT

Because of the many types of merchant vessels, units can perform only minimum sealift planning and training. Planning and training is limited to on-site surveys and data about the out-loading installation, ports of embarkation and debarkation, and to a limited extent, vessels that are likely to be employed. The deploying unit will have to prepare accurate cargo-loading movement data. However, higher headquarters should provide guidance and assistance in sealift planning.

F-8. ROAD MARCH

a. Types. The movement of troops from one location to another is inherent in any phase of a military operation. A common form of troop movement is the road march. Road marches may be tactical or nontactical, depending on the enemy situation.

(1) Tactical movement. When contact with the enemy is possible, a unit will conduct a tactical movement. For example, if troops move forward to participate in combat operations, the movement is tactical. The squadron S3 plans tactical movements.

(2) Nontactical movement. If contact with the enemy is unlikely, a unit will conduct a nontactical movement. Movement in the communications zone to reposition laterally or to ease future operations is nontactical. The squadron S4 may plan nontactical movements.

b. Organization.

(1) March columns are organized to maintain unit integrity. In a tactical march column, all elements use the same route for a single movement and are under the control of a single commander. A large column may be composed of a number of subdivisions.

(a) Serial. A serial is a major subdivision of a march column. For purposes of planning, regulation, and control, it is organized as a single unit under one commander. A RAS is usually one serial.

(b) March unit. A march unit is a subdivision of a serial and is normally a squad, section, platoon, or troop. It moves and halts under the control of a single commander, using oral and visual signals. Radios are used only when no other means of communication can be used. March units of the main body are composed of individual units, any attachments, the squadron main CP, and the squadron trains. POL vehicles required for refueling during nontactical marches may move ahead of schedule to establish a forward refueling point.

(2) March columns, regardless of size, are composed of four elements. These elements are the reconnaissance party, the quartering party, the main body, and the trail party. Figure F-2 shows the organization of a squadron tactical road march.

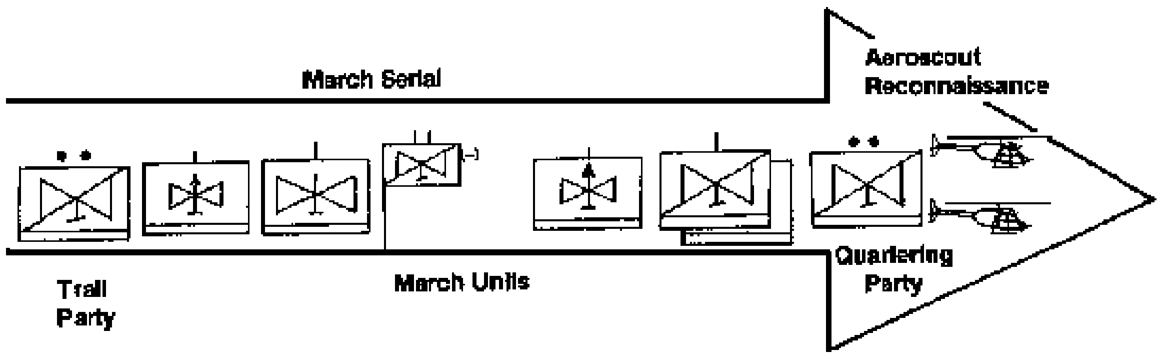


Figure F-2. Organization of a squadron tactical road march.

c. Planning Process.

(1) Tactical road marches require extensive planning. Commanders and staffs use the estimate process to determine how to best execute a move from one point to another. Road-march planning consists of three concurrent steps: determining requirements for the move, analyzing organic and nonorganic movement capabilities, and establishing unit movement priorities. During movement planning, the RAS commander and staff must consider the--

- Enemy situation and capabilities, terrain conditions, and weather.
- Organization of the RAS.
- Security measures to be taken before the movement, during the movement, and at the destination.
- Assembly of the march units.
- Loading of personnel and equipment.
- Actions at the destination.

(2) When the RAS prepares for a tactical road march, the sequence of planning for the

march, if time permits, is--

- Prepare and issue an oral warning order as early as possible to allow subordinates time to prepare for the march.
- Prepare an estimate of the situation, analyze routes designated by the regiment, and specify the organization of the march serial.
- Prepare and issue the march order.
- Prepare detailed movement plans and assembly area plans.
- Organize and dispatch reconnaissance and quartering parties as required.

d. Planning Factors. Planners apply movement formulas to known distance, rate, and time data to derive information necessary to prepare a time schedule. The time schedule regulates departures and arrivals of march elements.

(1) Time and distance relationships. Relationships between time and distance are the basis for march planning. Planners determine how far the column is to travel (distance) and how long it will take to make the move (time). They must also know how much space (length of column) the column will occupy on the route and the distance (road gap) or time (time gap) that separates march columns and their elements. Each term used for distance has a corresponding term for time. The length of a column in kilometers has an equivalent pass time in minutes; the road distance in kilometers or miles has a corresponding time distance. The relationships between time and distance in the average rate of march are shown in Figure F-3.

(2) Distance factors. Distance factors include vehicle interval, column gap, traffic density, column length, and road gap. These factors are defined below.

(a) Vehicle interval is the distance between two consecutive vehicles of an organized column element.

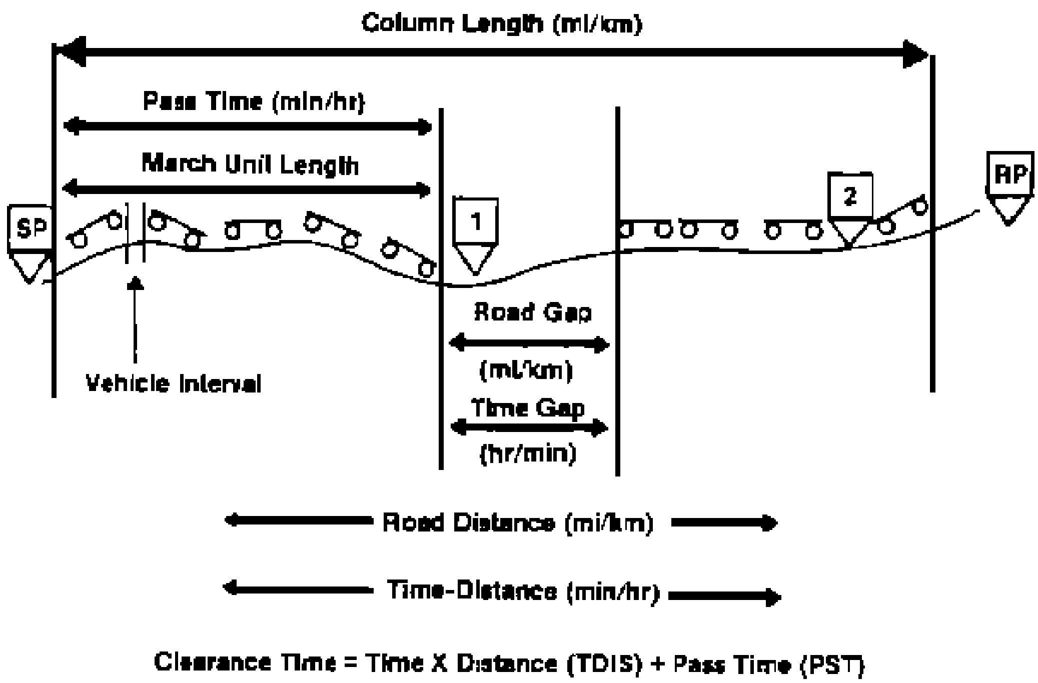


Figure F-3. Time and distance relationships.

(b) Column gap is the space between two organized elements following each other on the same route. It can be calculated in units of length (road gap) or in units of time (time gap) as measured from the rear of the leading element to the front of the following element.

(c) Traffic density is the average number of vehicles that occupy 1 mile or 1 kilometer of road space. It is expressed in vehicles per mile or vehicles per kilometer.

(d) Column length is the length of roadway occupied by a column, including gaps in the column. It is measured from the first vehicle to the last vehicle.

(e) Road gap is the distance between two march elements. It is the length aspect of the column gap. Since a road gap is more significant when the column is moving than when the column is halted, it becomes a factor of time rather than of distance.

(3) Rate factors. Speed, pace, and rate of march are rate factors. The definitions of these factors follow.

(a) Speed is the velocity of a vehicle at a given moment as shown on the speedometer (in kilometers per hour or miles per hour).

(b) Pace is the regulated speed of a column or element. It is set by the lead vehicle or an individual in the lead element to maintain the prescribed average speed.

(c) Rate of march is the average number of miles or kilometers traveled in any given period. It includes short periodic halts and other short delays. The rate of march is expressed as miles or kilometers traveled in an hour.

(4) Time factors. Time factors include arrival time, clearance time, completion time, and pass time. Other time factors are extra time allowance, time-distance, road clearance time, and time gap.

(a) Arrival time is the moment when the head of the column arrives at a designated point or line.

(b) Clearance time is the moment when the head of the column arrives at a designated point or line.

(c) Completion time is the moment when the tail of a column passes the release point.

(d) Pass time is the time between the moment the first element of a column passes a given point and the moment the last element passes the same point.

(e) Extra time allowance of one minute per 25 vehicles is always allotted above the calculated pass time within a motor march column moving under one identification serial number. For a column that has more than 600 vehicles, the EXTAL is two minutes per 25 vehicles. If a column has less than 25 vehicles, no extra time is allotted. An EXTAL is equitably added to march unit pass time within a serial.

(f) Time-distance is the time required to move from one point to another at a given rate of march. Time-distance normally represents the movement of the head of the column from the start point to the release point.

(g) Road clearance time is the total time a column requires to travel over and clear a section of road. Road clearance time equals time-distance plus column pass time.

(h) Time gap is the time measured between the rear and front of successive elements as they move past any given point. Time gap is the time aspect of column gap and may also be the conversion of road gap to time. There are no prescribed standard gaps. Gaps depend on the size of serials and march units, the time available for the movement, and the tactics required for protection against air and nuclear attack.

e. Movement Formula Application.

This paragraph implements portions of STANAG 2041.

(1) Distance, rate, and time are the basic factors for movement computations. If march planners know two of these factors, they can easily determine the third by dividing or multiplying one by the other. The movement formulas are--

- Determine rate by dividing distance by time: R = D/T.
- Determine distance by multiplying rate by time: D = R x T.
- Determine time by dividing distance by rate: T = D/R.

(2) March planners must determine time-distance, pass time, arrival time, and completion time. The procedures for determining these factors are given below.

(a) Time-distance. Time-distance is determined by dividing the distance to be traveled by the rate of march (Figure F-4). TDIS does not include time for long delays or extended scheduled halts. A time-distance table (Figure F-5) is a valuable tool to the march planner. It gives a list of factors used to calculate the time required to travel certain distances at specified speeds. Travel rates are expressed in speeds and corresponding rates of march. Travel factors are derived from rate of march, which includes time for short, periodic halts and other minor delays that might occur.

$$\text{TDIS} = \frac{\text{DISTANCE (miles or km)}}{\text{RATE OF MARCH (mih or kmih)}}$$

EXAMPLE: Determine TDIS of a serial traveling 135 kilometers at a speed of 24 kmph (rate of march 20 kmih).

$$\text{TDIS} = \frac{135\ \text{(km)}}{20\ \text{(kmih)}} = 6.75\ \text{hours}$$

$$\begin{array}{r} 0.75\ \text{(fraction)} \\ \underline{\times 60\ \text{(minutes)}} \\ 45.00\ \text{(minutes)} \end{array}$$

TDIS = 6 hours and 45 minutes

Figure F-4. Time-distance formula.

SPEED (miles/kilometers per hour)	RATE OF MARCH (miles/kilometers in the hour)	MINUTES TO TRAVEL 1 KILOMETER	MINUTES TO TRAVEL 1 MILE
10 mph 16 kmph	8 mih 12 kmih	5	7.5
15 mph 24 kmph	12 mih 20 kmih	3	5
20 mph 32 kmph	16 mih 25 kmih	2.4	3.75
25 mph 40 kmph	20 mih 32 kmih	1.84	3
30 mph 48 kmph	25 mih 40 kmih	1.5	2.4
35 mph 56 kmph	30 mih 46 kmih	1.3	2
40 mph 65 kmph	33 mih 53 kmih	4.13	1.8

Figure F-5. Time-distance table.

(b) Pass time. Pass time for a serial is determined by adding march unit pass times, including time gaps between march units. See Figure F-6.

$$PST = \frac{\text{NO OF VEHS} \times 60}{\text{DENSITY} \times \text{SPEED}} + \frac{\text{NO OF VEHS}}{25} = \text{TIME GAPS (Min)}$$

EXAMPLE: Determine PST of a *serial* of 150 vehicles organized into 6 march units of 25 vehicles each, traveling at a speed of 24 kmph, with a density of 15 VPK, and using a 2-minute time gap between march units.

$$PST = \frac{150 \times 60}{15 \times 24} + \frac{150}{25} + (2 \times 5) = \frac{9000}{360} + 6 + 10 = 25 + 6 + 10$$

PST =41 minutes

NOTES: 1. Round off fractions of minutes to next higher minute.

2. EXTAL is allocated on the basis of 1 minute per 25 vehicles added to serial pass time. EXTAL is equitably added to pass time of each march unit in the serial.

Figure F-6. Pass time formula.

(c) Arrival time. In march planning, the release point is normally designated as the terminal point-of movement. Arrival time at the release point is determined by adding time-distance and any scheduled halts to the start-point time (Figure F-7).

	Hours	Minutes
SP TIME	08	00
TIME-DISTANCE	6	45
SCHEDULED HALT	1	00
	15	45

ARRIVAL TIME IS 1545 HOURS

Figure F-7. Arrival time formula.

(d) Completion time. Completion time is calculated by adding pass time to the arrival time or by adding the distance, pass time, and any scheduled halts to the start-point time.

f. March Order.

(1) The march order format is the same for tactical and nontactical movements. The march order is prepared either as an annex to an OPORD, a separate OPORD, or a FRAGO. Figure F-8 shows an example of an OPORD for a road march.

(2) The march order should include, as a minimum, a strip map. A strip map is a sketch of the route of march. It is normally included as an annex to the march order. Figure F-9 shows an example of a strip map. The amount of detail on the strip map depends on its intended purpose and the unit level at which it is prepared. The map should identify critical points, start-point and release-point times and locations, order of march, maximum catch-up speed, distances to be maintained between vehicles and units, assembly area locations, and instructions on future operations. In designating distance (interval) or density, planners must know its effect on column length and the time required to move.

(3) The march order also contains a statement of the enemy situation, the weather, and visibility conditions. It should also contain (if applicable)--

- Actions in the assembly area.
- Actions on enemy contact (ground and air).
- Location of leaders and a communications plan.
- Procedures for resupply, maintenance, and feeding.
- Actions at halts and actions for disabled vehicles.
- Road restrictions and information derived from route reconnaissance.

(4) Much of the information needed to conduct the march should be in the unit SOP. Only exceptions to the SOP should be stated in the march order.

(Classification)

Copy no ___ of ___ copies
4th Sqdn, 208th ACR
GAY (GL645745)
211600Z Aug 19__
EEL

OPORD 31

Reference: Map, JOG, NH 16-2, 1:250,000, 1st Edition.

Time Zone Used Throughout the Order: Zulu

Task Organization: Annex B (Road Movement Table).

1. Situation

a. Enemy Forces. Current INTSUM.

b. Friendly Forces. 208th ACR moves 221000 Aug to assembly area vicinity FARGO (GN7512).

c. Attachments and Detachments. 2/B/31st AD and 1/A/52d Engr attached effective 220430 Aug.

2. Mission

4th Sqdn, 208th ACR, moves to assembly area vicinity FARGO (GN7512); SP (GL6672) 221159 Aug; closes on the assembly area by 221930 Aug.

(Classification)

Figure F-8. Sample format for a road movement order.

(Classification)

3. Execution

a. Concept of Operation. Annex A (Route Overlay). I intend to close assembly area during daylight. Sqdn conducts a motor march in six march units via Route RED. First march unit crosses SP at 221159 Aug, and last march unit clears the RP vicinity FARGO by 221830 Aug.

b. March Unit 1:

c. March Unit 2:

d. March Unit 3:

e. March Unit 4:

f. March Unit 5:

g. March Unit 6:

h. Coordinating Instructions.

(1) Annex B (Road Movement Table).

(2) Quartering party assemble at main CP at 220900 Aug.

(3) Vehicle density: Open column; 12 vehicles per kilometer.

(4) Rate of march: 24 kilometers per hour.

(5) Time gap: Five minutes between march units.

(6) Vehicle bumper markings will be covered.

4. Service Support

a. Supply. Each soldier draws two MREs at breakfast for noon and evening meals on 22 Aug.

b. Services. Trail party task force control.

(Classification)

Figure F-8. Sample format for a road movement order (continued).

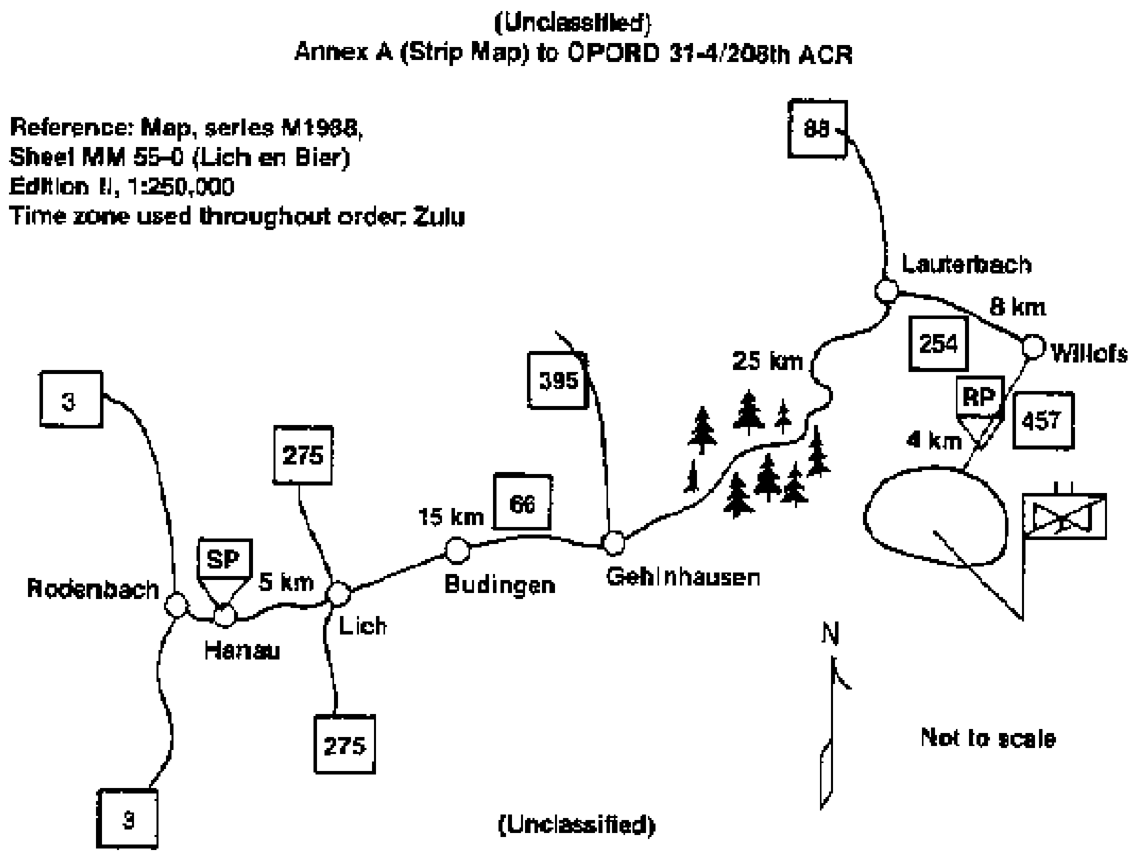


Figure F-9. Strip map.

g. Road Movement Table.

(1) A road movement table is normally an annex to a movement order, as shown in Figure F-10. It is a convenient means of transmitting to subordinate units the time schedules and other essential details of the move. It is particularly useful when the inclusion of such details in the OPORD would make the order complicated or unduly long. Road movement tables consist of two parts. The first part contains data paragraphs that reflect information common to two or more march elements. The second part contains a list of serials or march units along with all other necessary information arranged in tabular form.

(2) March planners must know the times at which serials and march units arrive at and clear critical points. Other information in the road movement table includes serial or march unit number, date of move, units involved, number of vehicles, and load class of the heaviest vehicle routes to be used. A remarks section should reflect any details not covered elsewhere.

h. March Procedures.

(1) Reconnaissance party. An ACT, augmented by engineer and other CS assets, conducts a route reconnaissance to determine travel time, capacities of underpasses and bridges, and locations of ferries and fords. The ACT also identifies critical points, including choke points and obstacles. Route reconnaissance confirms and supplements data from map studies, higher

headquarters, and air reconnaissance. Instructions to the ACT should include the nature and extent of the required information and the time and place the report is to be submitted.

(Classification)

Annex B (Road Movement Table) to OPORD 31

Reference: Map, JOG, NH 16-2, 1:250,000, 1st Edition.

Time Zone Used Throughout the Order: Zulu

General Data:

1. Average Speed: 24 kilometer per hour.

2. Traffic Density: 12 vehicles per hour.

3. Halts: 1545-1645, meal and fuel; all others SOP.

4. Critical Points: Route RED.

    a. Start point: BOLL WEEVIL (GL6672).

    b. Release point: FARGO (GN7512).

    c. Other critical points: COLUMBIA (GL6979), DURHAM (GL6989), NIAGARA (GL6893), and BOSTON (GN7106).

    d. Route Classification: 10X50.

    e. Route restriction: None.

5. Main Routes to Start Point: NA.

6. Main Routes to Release Point: NA.

(Classification)

Figure F-10. Sample format for a road movement table.

(2) Quartering party. The quartering party consists of the quartering parties of each of the troops. The commander dispatches a quartering party to reconnoiter the new area and guide march elements into position.

(3) Main body.

(a) Before starting a march, each march unit of a serial reconnoiters its route to the start point and determines the exact time required to reach it. The movement order states the time that the serial will arrive at and clear its start point. The serial commander then determines and announces the times for march units of his serial to arrive at and clear the start point. Arrival time at the start point is critical. Each march unit must arrive at and clear the start point on time; otherwise, movement of other elements may be delayed.

(b) During the movement, march units move at the constant speed specified in the order, maintaining proper interval and column gap. Elements in a column of any length may simultaneously encounter many different types of routes and obstacles. As a result, different parts of the column may move at different speeds. This can produce an undesirable accordion-like action or "whip effect." The movement order gives march speed, rate of march, and maximum catch-up speed to ensure safety and to reduce "column whipping." March units report crossing each control point as directed by the march order. During the move, air and ground security are maintained.

(4) Trail party. The trail party is normally made up of elements of the HHT maintenance platoon and is the last unit in a squadron serial. The trail party is led by the squadron maintenance officer. Its function is to recover disabled vehicles. If a vehicle cannot be repaired or towed, the vehicle and its crew are moved off the road into a secure area. Crew members are given sufficient food and water and left with the vehicle. When vehicles are left behind, the SMO reports their locations and the reason they were left behind to the squadron S4. Once the trail party completes the road march, maintenance priority becomes recovery of disabled vehicles. A tactical road march is not complete until all march units and vehicles arrive at their destination.

i. March Techniques.

(1) Close column. In a close column, vehicles are spaced about 20 to 25 meters apart during daylight hours. At night, vehicles are spaced so that each driver can see the two lights in the blackout marker of the vehicle ahead. A close column is normally used for marches during the hours of darkness under blackout driving conditions. This method of marching takes maximum advantage of the traffic capacity of the route but provides little dispersion. Normally, vehicle density is about 30 vehicles per kilometer along the route.

(2) Open column. In an open column, the distance between vehicles is increased to provide greater dispersion. The distance between vehicles varies from 50 to 100 meters but may be greater if required. An open column is normally used during daylight hours. It may also be used at night with infrared lights, blackout lights, or passive night-vision equipment. Vehicle density varies from 10 to 15 vehicles per kilometer.

(3) Infiltration. During a move by infiltration, vehicles are dispatched individually, in small groups, or at irregular intervals. The vehicles move at a rate that will keep down traffic density and prevent undue massing of vehicles. Infiltration provides the best possible passive defense against enemy observation and attack. It is suited for tactical marches when sufficient time and road space are available and when maximum security, deception, and dispersion are desired.

j. Control Measures.

(1) Critical point. Critical points on a route are those points used for reference in providing

instructions, places where interference with movement might occur, or places where timing might be a critical factor. The route reconnaissance report or a map study should provide march planners with information to designate critical points along the route of march and distances from one critical point to another. At designated critical points, guides or signs may be used to ensure the smooth flow of traffic. The convoy commander may want to be present at the passing of some critical points. The start point and release point are two critical points that are always designated. Critical points are designated by number, letter, or code word, using the checkpoint symbol. March planners must ensure that designations for critical points do not conflict with those of checkpoints.

(2) Start Point. SPs provide all units of a march column with a common point for starting their movement. When units use more than one route, each route has a start point. The SP is a place along the route of march that is easily recognizable on the map and on the ground, such as a road intersection. An SP should be far enough from assembly areas to allow units to be organized and moving at the prescribed speed and interval when they reach the SP. No element of a march column should be required to march to the rear or through another unit to reach the SP.

(3) Release point. RPs provide all units of the march column with a common point for reverting to the control of their parent unit. The RP should be on the route of march and easily recognizable on the map and on the ground. Units do not stay at the release point. Guides meet units as they arrive at the release point and lead them to the assembly area. Multiple routes and cross-country movement from the release point to assembly areas enable units to disperse rapidly. No unit should be required to countermarch or pass through another unit to reach its new position.

(4) Strip map. Copies of the strip map should be provided to all key personnel. The strip map should contain the start point and release point, restrictions, and critical points and the distances between them.

k. Security.

(1) During the march, units maintain security through observation, weapons orientation, dispersion, and camouflage. Commanders assign sectors of observation to their personnel so that observation spans 360 degrees. Weapons are oriented on specific sectors throughout the column. The lead elements cover the front, following elements cover alternate flanks, and the trail element covers the rear. Elements also maintain security during halts.

(a) Scheduled halts are planned along the march route for maintenance and rest or to follow higher-level movement orders. At scheduled halts, vehicles and soldiers move to the side of the road while maintaining march dispersion. Local security is set up immediately, and drivers perform operational maintenance checks. However, the unit must be ready to move at a moment's notice.

(b) Unscheduled halts and actions may be caused by unforeseen developments such as obstacles, traffic congestion, or equipment failure. If a halt is necessary, the march column's first priority is to establish security. Each unit forms a hasty perimeter defense.

(2) Planning for air defense and implementing all forms of air defense security measures are imperative to reduce the squadron's vulnerability to enemy air attack. The convoy commander must be able to effectively integrate into his fire plans the air defense artillery assets attached to the convoy. He must also ensure that all passive and active air defense measures that may be implemented at regimental level are planned and used. Each vehicle in a motor march has an air guard to provide air security. Specific vehicles may be designated as air guard vehicles, performing air rather than ground observation.

(3) Obstacles that are reported by an ACT should be bypassed if possible. If obstacles cannot be bypassed, the lead march unit assumes a hasty defense to cover and overwatch and with engineers, if they are available, breach the obstacle. As the lead march unit breaches the obstacle, the other march units move at decreased speed or move off the road and monitor the squadron command net.

(4) Should the squadron come under attack by enemy indirect fire during the road march, the unit in contact continues to move. The remainder of the squadron attempts to bypass the impact area (Figure F-11).

(5) If the squadron is attacked by hostile aircraft during the march, the march unit that is attacked moves off the road into a quick defensive posture and immediately engages the aircraft with all available automatic weapons. The rest of the convoy moves to covered and concealed areas until the attack stops.

(6) Ambushes are fought without delay. If the convoy is ambushed, the march unit in the kill zone increases speed, fights through, and reports the ambush.

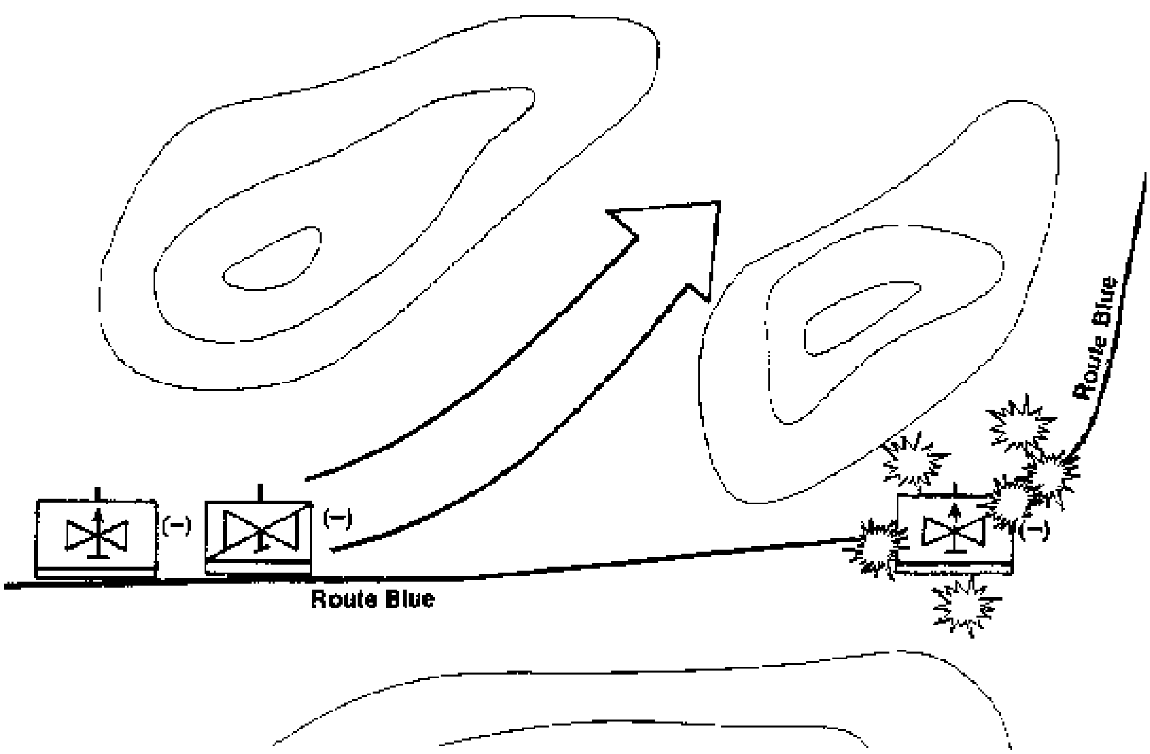


Figure F-11. Actions under indirect fire.

(7) Disabled vehicles must not obstruct traffic. They are moved off the road and their status is reported immediately. Security is established, and guides are posted to direct traffic. If the operator repairs the vehicle, it rejoins the rear of the column. If the operator cannot repair the vehicle, trail party maintenance elements pick it up.

(8) Messengers and visual signals are the preferred means of communication during road marches. Because the enemy has radio direction-finding equipment, units should not use radios except in emergencies and when no other means of communication are available. Road guides can pas messages from one march unit to a following march unit. Because of the need to stay off the radio, road guides are important in controlling the speed of march units and the intervals between them.

(9) Restrictions are points along the route of march where movement may be hindered or obstructed. These points can include bridges, intersections, ferries, and bypasses. March planners should stagger start times or adjust speeds to compensate for restrictions or plan to halt the column en route until the restriction is lifted.

(10) Units must be able to operate under limited visibility conditions caused by darkness, smoke, dust, fog, heavy rain, or heavy snow. Limited visibility decreases the speed of movement and increases difficulties in navigating, recognizing checkpoints, and maintaining proper intervals between units. To overcome command and control problems caused by limited visibility, convoy commanders may position themselves just behind lead elements. More restrictive control measures, such as additional checkpoints, phase lines, and the use of a single route, may become necessary.

(11) The convoy commander also plans for an NBC attack. Some measures taken are given below.

(a) Protective and decontamination material is properly distributed and its location is known to the entire march unit.

(b) The proper MOPP level is maintained, based on the threat and the temperature level. Personnel may start in MOPP2 to avoid having to stop to change into MOPP3 or MOPP4.

(c) Chemically or biologically contaminated areas are avoided, if possible. If contaminated areas must be crossed, personnel--

- Use MOPP4.
- Cover as much equipment as possible.
- Avoid moving through underbrush.
- Stay on hard-surfaced roads.
- Avoid low areas.
- Avoid moving early or late in the day.

- Stagger vehicles in the column.
- Decrease speed to reduce dust or mud.
- Increase vehicle interval.
- Scrape the surfaces of dirt roads to clear them of contamination.

(d) Nuclear contaminated areas are avoided, if possible. If nuclear contaminated areas must be crossed, personnel--

- Wear regular wet-weather gear and a scarf or handkerchief over the nose and mouth.
- Avoid stirring up dust as much as possible.
- Ensure that the IM174 radiacmeter is used.
- Wash hard-top roads before traveling over them.
- Wet dirt roads to minimize fallout dust.

F-9. TRAINING

No special training requirements exist for unit movement personnel. However, an individual must be designated on orders to sign DD Form 1387-2. When signed, this form constitutes certification that hazardous cargo is properly prepared for shipment. Training in the preparation of hazardous cargo for transport is taught by the Joint Military Packaging Center, Aberdeen Proving Ground, MTIMaryland. Also, the US Air Force conducts the Military Airlift Command airload planners course. This course trains unit movement officers to plan movements using Air Force assets. Other movement training is listed in AR 351-1.

GLOSSARY

A^2C^2	Army airspace command and control
AA	assembly area
AARS	Advanced Airborne Radiac System
AAST	Army Aerial Scout Test
AATF	air assault task force
ABMOC	air battle management operations center
ACA	airspace control authority
acft	aircraft
ACM	aircraft combat maintenance
ACP	air control point
ACR	armored cavalry regiment
ACT	air cavalry troop
ACV	armored command vehicle
AD	air defense
ADA	air defense artillery
admin	administrative
ADSS	ANVIS display symbology system
AFSCOORD	assistant fire support coordinator
AFST	aerial fire support team
AH	attack helicopter
AHRS	attitude and heading reference system
AHT	assault helicopter troop
AICV	amphibious infantry combat vehicle
AIMI	aviation intensive management items
AL	Alabama
A/L	administrative/logistics
ALB-F	AirLand Battle-Future
ALFGL*	automatic low frequency gain limiting
ALO	air liaison officer
ALSE	aviation life support equipment
alt	altitude
AM	amplitude modulated
AMB	aviation maintenance battalion
AMC	air mission commander
AMCO	aviation maintenance company
ammo	ammunition
ANGLICO	air and naval gunfire liaison company
ANVIS	aviator's night vision imaging system
APC	armored personnel carrier
APP	Allied Procedures Publication
ARTEP	Army Training and Evaluation Program
arty	artillery
ASAC	all-source analysis center
ASC	armored scout car
ASCA	airspace coordination area
ASE	aircraft survivability equipment
ASL	authorized stockage list
ASOC	air support operations center
ASP	ammunition supply point
ASU	Aviadesantnaya Samokhodnaya Ustanovka [literal Russian: air-droppable self-propelled gun]
at	antitank
ATA	air to air
ATAS	air-to-air Stinger

ATC	air traffic control
ATCCS	Army Tactical Command and Control System
ATGL	antitank gun launcher
ATHS	airborne target handover system
atk	attack
ATKHT	attack helicopter troop
ATP	Allied Tactical Publication; ammunition transfer point
ATS	air traffic services
ATTN	attention
auto	automotive
AVIM	aviation intermediate maintenance
avn	aviation
AVUM	aviation unit maintenance
AWACS	Airborne Warning and Control System
BCS	battery computer system
BDA	battle damage assessment
BDAR	battle damage assessment and repair
bde	brigade
BDR	battlefield damage repair
BDZ	base defense zone
BH*	black-hot
BHL	battle handover line
BMD	Boyevaya Mashina Desantnika [literal Russian: combat vehicle, airborne]
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)]
BRM	(combat reconnaissance vehicle, formerly the BMP)
BRT*	brightness
BTR	Bronetransporter [literal Russian: amphibious armored transporter personnel carrier (series used as APCs)]
btry	battery
C^2	command and control
C^2I	command, control, and intelligence
C^3	command, control, and communications
C^3I	command, control, communications, and intelligence
C	Celsius
CAA	combined arms army
cal	caliber
CAS	close air support
CB	chemical and biological
cbt	combat
cdr	commander
C-E	communications-electronics
CEB	clothing exchange and bath
CEWI	combat electronic warfare intelligence
CF	correlation factor
CFL	coordinated fire line
cGy	centigray

cGyph	centigray per hour
CH*	channel
CHEMWARN	chemical strike warning
CI	combat ineffective
cmd	command
co	company
comm	communication
COMMZ	communications zone
comp	component
COMSEC	communications security
CONT*	contrast
CONUS	continental United States
COSCOM	corps support command
CP	command post
CPX	command post exercise
CRP	combat reconnaissance patrol
CS	combat support
CSR	controlled supply rate
CSS	combat service support

DA	Department of the Army
DAG	division artillery group (opposing forces)
DAO	division ammunition officer
DC	District of Columbia
DEA	Drug Enforcement Agency
decon	decontamination
desc	description
DF	direction finding
DIR WPT*	direct way point
DISCOM	division support command
div	division
DS	direct support
DSA	division support area
DSM	direct support maintenance
DS2	decontamination solution number 2
DT	demanding task
DTG	date-time group
DTS	data transfer system
DZ	drop zone

E	east
ECCM	electronic counter-countermeasures
ECM	electronic countermeasures
eff	effective
EH	electronic helicopter
EMP	electromagnetic pulse
engr	engineer
ESM	electronic warfare support measures
ETE	estimated time en route
EW	electronic warfare
EXTAL	extra time allowance

F	Fahrenheit
FA	field artillery

FAAD	forward area air defense
FAC	forward air controller
FARE	forward area refueling equipment
FARP	forward arming and refueling point
fax	facsimile
FCC	flight coordination center
FCT	firepower control team
FD	fire direction
FEBA	forward edge of the battle area
FFA	free-fire area
FFAR	folding-fin aerial rocket
fld	field
FLIR	forward-looking infrared radar
FLOT	forward line of own troops
flt	flight
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
frag	fragmentary
FRAGO	fragmentary order
FR FRZ*	frame freeze
FS	fire support
FSCL	fire support coordination line
FSCOORD	fire support coordinator
FSE	fire support element
FSO	fire support officer
ft	feet
FTX	field training exercise
fwd	forward

G2	Assistant Chief of Staff, G2 (Intelligence)
G3	Assistant Chief of Staff, G3 (Operations and Plans)
GAZ	(medium truck produced by Gorkiy Motor Vehicle Plant)
gnd	ground
gp	group
GRREG	graves registration
GRU	Chief Intelligence Directorate of the General Staff
GS	general support
GSE	ground support equipment
GSR	general support reinforcing
GTA	graphic training aid
GTL	gun-target line

HA	holding area
HE	high explosive
HF	high frequency
H-FAC	heliborne forward air controller
HHC	headquarters and headquarters company
HHT	headquarters and headquarters troop
HI*	high
HIDACZ	high-density airspace control zone

HIMAD	high- to medium-altitude air defense
HMMWV	high-mobility, multipurpose, wheeled vehicle
how	howitzer
HQ	headquarters
hr	hour
HS	home station
HSD	horizontal situation display
HUMINT	human intelligence
hvy	heavy
ID	inside dose
IEW	intelligence and electronic warfare
IFF	identification, friend or foe (radar)
IMC	instrument meteorological conditions
inf	infantry
info	information
int	intersection
intel	intelligence
INTG*	integrate
INTREP	intelligence report
INTSUM	intelligence summary
IP	initial point
IPB	intelligence preparation of the battlefield
IR	infrared
ITB	independent tank battalion
ITO	installation transportation officer
JAAT	joint air attack team
JOG	Joint Operation Group
JP	jet petroleum
KIA	killed in action
KIAS	knots indicated airspeed
km	kilometer
kmih	kilometers traveled in an hour
kmph	kilometers per hour
KrAZ	(heavy truck produced by Kremenchug Motor Vehicle Plant)
kt	knot
LAMPS	light airborne multipurpose system
LC	line of contact
LD	line of departure
ldr	leader
LLTR	low-level transit route
LNG	light machine gun
LO*	low
LOA	line of advance
LOAL	lock-on after launch
LOC	lines of communication
log	logistics
LOI	letter of instruction
LORAN-C	long range navigation--C series
LOS	line of sight

LRF/D	laser range finder/designator
lt	light
LTC	lieutenant colonel
LZ	landing zone
m	meter
MAC	maintenance allocation chart
maint	maintenance
max	maximum
MBA	main battle area
MCS	maneuver control system
mech	mechanized
med	medical
MEDEVAC	medical evacuation
METL	mission-essential task list
METT-T	mission, enemy, terrain, troops, and time available
MFD	multifunction display
MG	machine gun
ml	mile
MI	military intelligence
mih	miles traveled in an hour
MIJI	meaconing, intrusion, jamming, and interference
min	minute
mm	millimeter
MMC	materiel management center
MMS	mast-mounted sight
MOPP	mission-oriented protective posture
MOS	military occupational specialty
MP	military police
mph	miles per hour
MPLH	multipurpose light helicopter
MPSM	multipurpose submunition
MR	motorized rifle
MR-1	Minefield Report 1
MRD	motorized rifle division
MRE	meal, ready-to-eat
MRR	motorized rifle regiment
MS	movement station
MSE	mobile subscriber equipment
msn	mission
MSR	main supply route
MSRT	mobile subscriber radiotelephone
N	north
NA	not applicable
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
NC	node center
NCO	noncommissioned officer
NCS	net control station

NFA	no-fire area
NFOV	narrow field of view
NGF	naval gunfire
NGO	naval gunfire officer
NM	nautical mile
no	number
NOE	nap of the earth
NTC	National Training Center
NVG	night vision goggles
O&I	operations and intelligence
obj	objective
OBS	optical boresight system
OD	outside dose
ODA	optical display assembly
OH	observation helicopter
OMG	operational maneuver group
op	operation(s)
OP	observation post
OPCON	operational control
oper	operator
OPLAN	operation plan
OPORD	operation order
OPSEC	operations security
ORF	operational readiness float
org	organization
OSET*	offset
PAC	personnel and administration center
PAO	public affairs officer
PC	pilot in command
PD	performance degraded
PFC	private first class
PL	phase line
PLL	prescribed load list
plt	platoon
PMC	partially mission capable
PMCS	preventive maintenance checks and services
PNVS	pilot night vision system
POC	point of contact
POE	port of embarkation
POL	petroleum, oils, and lubricants
POR	preparation of replacements for oversea movement
pos	position
PP	passage point; present position*
PPT*	prepoint
psi	pounds per square inch
PST	pass time
PW	prisoner of war
pwr	power
PZ	pickup zone

QA	quality assurance
QSTAG	Quadripartite Standardization Agreement
RAG	regimental artillery group (opposing forces)
RAOC	rear area operations center
RAS	regimental aviation squadron
RATT	radio teletypewriter
RAU	radio access unit
rd	road
RDF	rapid deployment force
recon	reconnaissance
regt	regiment
RF	radio frequency
RFA	restrictive fire area
RFL	restrictive fire line
rkh	(Russian abbreviation [literally: radio-chemical] used as a suffix in Soviet designations for NBC reconnaissance vehicles)
RKhM	(tracked NBC reconnaissance vehicle)
rkts	rockets
RL	readiness level
RMMC	regimental materiel management center
rng	range
ROA	restricted operations area
RP	release point
RPG	rocket-propelled grenade
RPK	squad machine gun
RSA	regimental support area
RSR	required supply rate
RSS	regimental support squadron
RTOCSE	regimental tactical operations center support element
RX	repairable exchange
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
S	south
SAAFR	standard-use Army aircraft flight route
SAAS	Standard Army Ammunition System
SALT	supporting arms liaison team
SALUTE	size, activity, location, unit, time, and equipment
SAM	surface-to-air missile
SAMS-1	Standard Army Maintenance System--Level 1
S&T	supply and transport
SARSS-1	Standard Army Retail Supply System--Level 1
SCC	signal command center
SCL SEL*	scale select
SEAD	suppression of enemy air defenses
SEMA	special electronic mission aircraft
SEN	small extension node
SGT	sergeant
SHORAD	short-range air defense
SIDPERS	Standard Installation/Division Personnel System
SIGINT	signals intelligence

SIGSEC	signals security
SINCGARS	single channel ground and air radio system
SITREP	situation report
SMCT	soldier's manual of common tasks
SMO	squadron maintenance officer
SOI	signal operation instructions
SOP	standing operating procedure
SP	start point
SPOTREP	spot report
spt	support
sqd	squad
sqdn	squadron
SSA	squadron support area
SSM	surface-to-surface missile
STANAG	Standardization Agreement
stat	status
STB	supertropical bleach
std	standard
STP	soldier training publication
STRIKWARN	friendly nuclear strike warning
SUPCOM	support command
supv	supervisory
svc	service
SWT	scout-weapons team

T2	tricothecene toxin
T	telephone
tac	tactical
TAC(A)	tactical air coordinator (airborne)
TACAIR	tactical air
TACAN	tactical air navigation
TACC	tactical air control center
TACCS	Tactical Army Combat Service Support Computer System
TACFIRE	tactical fire
TACP	tactical air control party
TC	training circular
TCAE	technical control and analysis element
TD	tank division
TDIS	time-distance
TGT LOC*	target locate
TIS	thermal imaging sensor
TIS INTG*	thermal imaging sensor integrate
tk	tank
tm	team
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

UAZ	(light truck produced by Ulyanovsk Motor Vehicle Plant)
UH	utility helicopter
UHF	ultra high frequency
ULLS	unit-level logistics system
UMT	unit ministry team
US	United States (of America)
USA	United States Army
USAF	United States Air Force
UT	undemanding task
UTM	universal transverse mercator
VAR*	variation
veh	vehicle
VHF	very high frequency
VPK	vehicles per kilometer
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
WIA	wounded in action
wpns	weapons
WPT*	way point
XO	executive officer
XTK*	cross track
Z	Zulu
ZIL	(medium truck produced by Likhachev Motor Vehicle Plant)

*Control display subsystem nomenclature

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

AR 95-1	Aviation: Flight Regulations
AR 385-10	Army Safety Program

DEPARTMENT OF THE ARMY FORMS

DA FORM 1156	Casualty Feeder Report
DA FORM 1971-R	Radiological Data Sheet--Monitoring or Point Technique
DA FORM 1971-2-R	Chemical Data Sheet--Monitoring or Survey

FIELD MANUALS

FM 1-100	Doctrinal Principles for Army Aviation in Combat Operations
FM 1-104	Forward Arming and Refueling Points
FM 1-111	Aviation Brigades
FM 1-112	Tactics, Techniques, and Procedures for the Attack Helicopter Battalion
FM 1-113	Assault Helicopter Battalion
FM 1-116	Tactics, Techniques, and Procedures for the Air Cavalry/ Reconnaissance Troop
FM 1-117	Air Reconnaissance Squadron
FM 3-3	NBC Contamination Avoidance
FM 3-4	NBC Protection
FM 3-5	NBC Decontamination
FM 5-36	Route Reconnaissance and Classification
FM 6-20	Fire Support in the AirLand Battle
FM 6-20-40	Tactics, Techniques, and Procedures for Fire Support for Brigade Operations (Heavy)
FM 6-30	Observed Fire Procedures
FM 17-95	Cavalry Operations
FM 34-1	Intelligence and Electronic Warfare Operations
FM 34-60	Counterintelligence
FM 34-81	Weather Support for Army Tactical Operations
FM 34-130	Intelligence Preparation of the Battlefield
FM 55-9	Unit Air Movement Planning
FM 55-20	Army Rail Transport Units and Operations
FM 90-4	Air Assault Operations
FM 100-2-1	Soviet Army Operations and Tactics
FM 100-2-2	Soviet Army Specialized Warfare and Rear Area Support
FM 100-2-3	The Soviet Army Troops Organization and Equipment
FM 100-5	Operations
FM 100-10	Combat Service Support
FM 100-103	Army Airspace Command and Control in a Combat Zone
FM 101-5	Staff Organization and Operations

Section II
RELATED PUBLICATIONS

Related publications are sources of additional information. They are not required in order to understand this publication.

ARMY REGULATIONS

AR 351-1	Individual Military Education and Training
AR 750-1	Army Materiel Maintenance Policy and Retail Maintenance Operations

DEPARTMENT OF THE ARMY FORMS

DA FORM 581	Request for Issue and Turn-In of Ammunition
DA FORM 1155	Witness Statement on Individual
DA FORM 1355-1-R	Hasty Protective Minefield Record
DA FORM 2028	Recommended Changes to Publications and Blank Forms

DEPARTMENT OF THE ARMY PAMPHLETS

DA PAM 25-30	Consolidated Index of Army Publications and Blank Forms
DA PAM 738-751	Functional Users Manual for The Army Maintenance Management System--Aviation (TAMMS-A)

DEPARTMENT OF DEFENSE FORM

DOD FORM 1387-2	Special Handling Data/Certification

FIELD MANUALS

FM 1-301	Aeromedical Training for Flight Personnel
FM 1-500	Army Aviation Maintenance
FM 3-6	Field Behavior of NBC Agents (Including Smoke and Incendiaries)
FM 3-8	Chemical Reference Handbook
FM 3-50	Deliberate Smoke Operations
FM 5-100	Engineer Combat Operations
FM 8-9	NATO Handbook on the Medical Aspects of NBC Defensive Operations
FM 8-55	Planning for Health Service Support
FM 8-285	Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries
FM 10-63	Handling of Deceased Personnel in Theaters of Operations
FM 14-7	Finance Operations
FM 16-1	Religious Support Doctrine: The Chaplain and Chaplain Assistant
FM 20-22	Vehicle Recovery Operations
FM 21-10	Field Hygiene and Sanitation
FM 21-10-1	Unit Field Sanitation Team
FM 21-11	First Aid for Soldiers
FM 24-33	Communications Techniques: Electronic Counter-Countermeasures
FM 44-8	Small Unit Self-Defense Against Air Attack
FM 54-23	Materiel Management Center, Corps Support Command
FM 63-2-2	Combat Service Support Operations: Armored, Mechanized and Motorized Divisions
FM 63-3J	Combat Service Support Operations--Corps

FM 100-26	The Air-Ground Operations System
FM 101-10-1/2	Staff Officers Field Manual--Organizational, Technical, and Logistical Data, Planning Factors (Volume 2)
FM 704-28	Classes of Supply

GRAPHIC TRAINING AID

GTA 3-6-5	NBC Warning and Reporting System

SOLDIER TRAINING PUBLICATION

STP 21-1-SMCT	Soldier's Manual of Common Tasks (Skill Level 1)

TECHNICAL MANUALS

TM 3-4240-280-10	Operator's Manual for Mask, Chemical-Biological: Aircraft, ABC-M24 and Accessories and Mask, Chemical-Biological, Tank, M25A1 and Accessories
TM 55-1500-204-25/1	General Aircraft Maintenance Manual

TRAINING CIRCULARS

TC 1-210	Aircrew Training Program: Commander's Guide
TC 6-40A	Field Artillery Automated Cannon Gunnery

Section III
PROJECTED PUBLICATIONS

Projected publications are sources of information that are scheduled for printing but are not yet available. Upon print, they will be distributed automatically via penpoint distribution. They may not be obtained from the US Army Publications Distribution Centers until indexed in DA Pamphlet 25-30.

FIELD MANUALS

FM 1-107	Air Combat Operations (Approved Final Draft, June 1989)
FM 25-101	Battle Focused Training (Approved Final Draft, April 1990)

FM 1-114
20 FEBRUARY 1991

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

JOHN A. FULMER
Colonel, United States Army
Acting The Adjutant General

DISTRIBUTION:
Active Army, USAR, and ARNG: To be distributed in accordance with DA Form 12-11E, Requirements for FM 1-114, *Tactics, Techniques, and Procedures for the Regimental Aviation Squadron* (Qty rqr block no. 714).

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