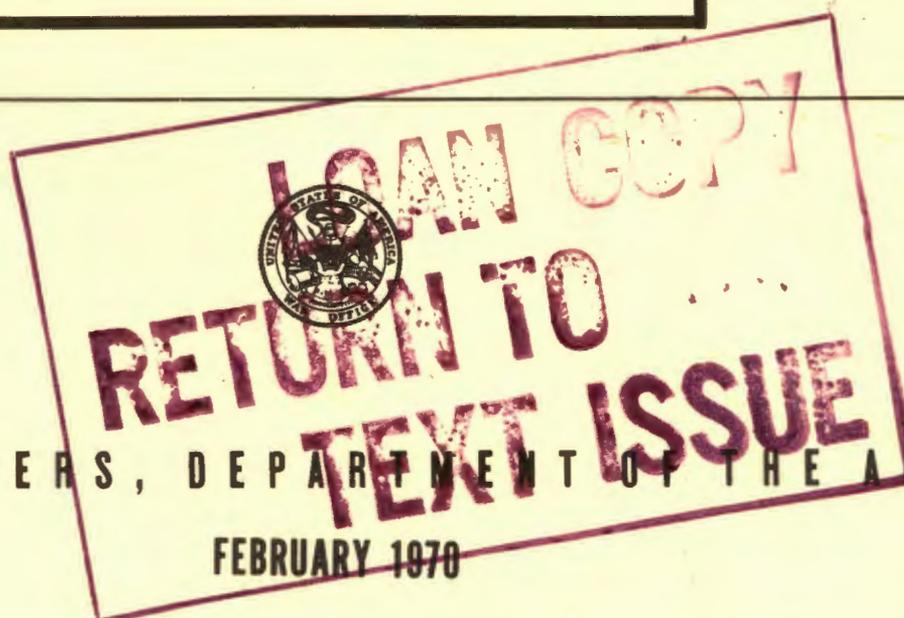


U.S. ARMY AIR DEFENSE ARTILLERY EMPLOYMENT

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
FEBRUARY 1970



FIELD MANUAL

No. 44-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 6 February 1970

U.S. ARMY AIR DEFENSE ARTILLERY EMPLOYMENT

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CHAPTER 1

GENERAL

1-1. Purpose and Scope

a. This manual is a guide for commanders and staff officers concerned with the organization, training, deployment, and employment of U.S. Army air defense artillery (ADA) units. The doctrine contained in this manual is based on applicable portions of FM 100-5, FM 100-15, FM 101-5, and JCS Pubs 2, 8, 9, 10, 11, and 12. This manual is complemented by FM 44-1-1 and FM 44-1A.

b. Coverage of the Safeguard ballistic missile defense system in this manual is limited to general information.

c. The information presented in this manual furnishes guidance for—

- (1) General war, to include operations in nuclear, biological, and chemical environments.
- (2) Limited war.
- (3) Cold war, to include stability operations.

d. This manual is in consonance with the international agreements listed below. Applicable agreements are listed by type of agreement and number at the beginning of each chapter.

<i>Title</i>	<i>NATO STANAG</i>	<i>CENTO STANAG</i>	<i>SEATO STANAG</i>	<i>ABCA SOLOG</i>
Bombing, Shelling, and Mortaring Reports	2008	2008	2008	5R2
Operational Road Movement Orders, Tables and Graphs	2041	2041	2041	51
Emergency Alarms of Hazards or Attack	2047	2047	2047	110
Relief of Combat Troops	2082	2082	2082	49R
Reporting Nuclear Detonations, Radioactive Fallout, and Biological and Chemical Attack.	2103	----	---	123
Friendly Nuclear Strike Warning to Armed Forces Op- erating on Land.	2104	2104	----	130
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Destruction of Military Technical Equipment	2113	----	2113	----
Offensive Air Support Operations—ATP-27	2134	----	----	----
Investigation of Aircraft/Missile Accidents/Incidents ...	3531	----	----	----

e. This manual differs from the superseded manual (July 1967) in that it—

(1) Does not contain nondoctrinal material. (Nondoctrinal material formerly included in FM 44-1 now is included in FM 44-1-1.)

(2) Updates coverage of the unified command structure and Army component commander functions.

(3) Implements the latest tactical operations center concepts.

(4) Implements appropriate portions of JCS Pub 12 and recent international standardization agreements.

(5) Applies standard tactical mission terms to ADA operations.

(6) Expands and updates coverage of Chaparral/Vulcan, forward area alert radar (FAAR), and division air defense officer doctrine; airspace

coordination principles; corps air defense doctrine; special operations; air defense coordination links; communications; and nuclear weapons employment doctrine.

(7) Adds coverage of air defense roles; strategic air base air defense (STRABAD) battalions; all-Vulcan battalions; Chaparral/Vulcan operations with reserve divisions; peacetime role of Chaparral/Vulcan; employment of nondivisional Chaparral/Vulcan battalions; variations of the Chaparral area defense concept; TOE 44-510, ADA Service Organization; FAAR and flak trap deployment guidelines; principles of organization; threat data requirements; survey requirements; concepts for support of a covering force; Safeguard ballistic missile defense system general concepts; equipment destruction priority guidance; and air defense priority determination.

CHAPTER 2

ARMY AIR DEFENSE DOCTRINE

2-1. The Air Defense Mission

a. The mission of air defense units is to destroy, nullify, or reduce the effectiveness of an enemy air or missile attack. The mission of Army air defense artillery is further defined as follows:

(1) To support the primary Army function of conducting prompt and sustained land warfare operations by providing the Army air defenses necessary to Army mission accomplishment.

(2) To furnish forces as required for the air defense of CONUS and military and civilian assets overseas in accordance with directives of the JCS and responsible joint force commanders.

(3) To deploy and employ the Safeguard ballistic missile defense system for the defense of CONUS against attack by intercontinental and sea-launched ballistic missiles.

b. The mission of ground fire support may be assigned to suitably equipped Army air defense artillery units.

2-2. The Air Defense Objective

The air defense forces contribute to a military posture which deters attack. Should deterrence fail, air defense forces deployed in defense of the United States must insure, as their primary objective, the survival of the United States as a nation by limiting the damage inflicted on the basic elements of our national strength. When deployed in defense of oversea land areas, air defense forces must have the objective of limiting the effectiveness of enemy offensive air efforts to a level permitting freedom of action for friendly forces.

2-3. The Air Defense Roles

Army air defense weapons are classified according to the major roles played in providing air defense coverage. The role distinctions are based on weapon altitude/range capabilities and currently

include those discussed below. This manual employs these more general terms in preference to specific weapon system names, except where discussion applies to particular weapon systems.

a. **HIMAD.** High-to-medium-altitude air defense (HIMAD) is provided by long-range weapons that are deployed in small numbers to cover relatively large areas. This role is currently filled by the Nike Hercules weapon system.

b. **LOMAD.** Low-to-medium-altitude air defense (LOMAD) is provided by medium-range weapons. The capabilities of systems employed in this role fill the gap between HIMAD and SHORAD. This role is currently filled by the towed and self-propelled Hawk weapon systems.

c. **SHORAD.** Short-range air defense (SHORAD) is provided by quick-reacting weapons designed to counter that portion of the very low-altitude air threat to the field army that underflies LOMAD coverage. They are deployed in large numbers and are employed under highly decentralized control concepts. This role is currently filled by Chaparral, Redeye, and ADA automatic weapons (AW) (M42, M55, Vulcan). The role may be subdivided into the low-altitude forward area air defense (LOFAAD) role, currently filled by the Chaparral and ADA AW organizations; and the man-portable air defense (MANPAD) role, currently filled by Redeye units deployed on an all-arms basis for self-defense.

2-4. Fundamental Considerations

The fundamental considerations that underlie the doctrine in this manual are as follows:

a. A strong air defense posture is required. The requirement is justified by the potential destructive power of the enemy's nuclear weapons.

b. A quick-reacting defense is mandatory because of the reactive nature of air defense and the extremely short time available for execution of the air defense mission.

c. A family of complementary air defense weapons must be deployed. No single weapon can counter the variety of weapon systems constituting the air and missile threat.

d. Doctrine must be sufficiently flexible to permit full exploitation of the various weapon types employed by each of the several services in the performance of its mission.

e. Control and coordination measures must be established to prevent incidents prior to an outbreak of hostilities, to insure engagement of all hostile aircraft, to prevent engagement of friendly aircraft, and to minimize mission interference. This requires that the control and coordination systems of each interfacing function be operationally interconnected and that each function be responsive to both permissive and restrictive orders.

f. ADA doctrine, organization, and materiel must support the ground force's scheme of maneuver. Operations to be supported range from a confrontation of massed forces in nonnuclear warfare to a dispersed series of highly mobile task force operations during nuclear war.

2-5. Basic Principles

a. A coordinated and integrated air defense system under a single commander is essential to successful area air defense operations. The commander takes such measures as will optimize the contribution of each of the services.

b. Air defense forces must be organized, equipped, trained and, when possible, positioned and alerted prior to hostilities. An effective air defense system cannot be improvised. Constant surveillance must be maintained to insure timely response of air defense forces and timely warning to the friendly forces.

c. The enemy air and missile threat must be considered as an entity and countered by a strategy based upon unity of effort. The hostile threat and assets to be defended are the points of departure for all air defense planning and the basis on which air defense requirements must be computed.

d. Since land operations are affected by, and are inseparable from, air operations, the ground force commander is vitally concerned with the ability of either side to use the air to influence the land battle. Air superiority is gained and maintained through offensive counterair and air defense operations. Offensive counterair operations are con-

ducted primarily by the Air Force. Active air defense operations are conducted jointly by the Army and the Air Force. All forces employ passive air defense measures.

★e. Air defense command organization should provide for—

(1) *Centralized direction.* Centralized direction is essential for coordinating the efforts of the forces commanded. Centralized direction of the air defense effort is provided through command determination and dissemination of air defense conditions of readiness, states of alert, air defense warning (red-yellow-white), rules of engagement, weapons control status, hostile criteria, nuclear weapon controls (release, control case, minimum normal burst altitude), and fire coordination rules, and through communications adequate for command guidance during operations.

(2) *Decentralized execution.* Decentralized execution is essential because no one commander can control the detailed actions of a large number of units. Reaction time, distance, and communications are major factors supporting this principle. Air defense fire units operating under this principle take tactical actions as required to meet the threat, within the framework of command guidance and joint force rules and procedures.

(3) *Common doctrine.* Common doctrine and language are essential for mutual understanding and confidence so that timely and effective action will be taken by all concerned in the absence of specific instructions.

2-6. Air Defense Forces

a. *Air Defense System.* The air defense system is composed of a mix of manned interceptors and ground-based air defense weapons to permit the advantages of one type weapon to complement another and to insure a defense in depth. Manned interceptors normally operate to the front, flanks, and rear of Army air defenses, effecting maximum attrition and breaking up concentrated air attacks before they reach the defended areas. They provide tactical flexibility to permit the rapid concentration of air defense capability at crucial locations and the quick restoration of capability to degraded areas. Ground-based air defense weapons add depth to the defense, strengthen the defense at critical points, and offset manned interceptor limitations by providing immediate and continuous air defense protection.

b. Army Air Defense. Active air defense is obtained by the deployment of all Army air defense weapon systems in depth. Deletion or significant reduction of one or more air defense weapon types in a theater may require that compensating adjustments be made in the deployment and employment concepts presented in this manual.

★*c. Army Air Defense Fire Unit.* The fire unit is the key element for effective Army air defense in combat. Therefore, Army air defense fire units (to include Safeguard ballistic missile defense system fire units) must have the capability, with minimum external assistance, to accomplish all air defense engagement functions: *detection* of potential threat objects; *identification* of unknown objects; *interception* of enemy forces; and *destruction* of the threat. Under the Army concept for decentralized execution of Army air defense fires, engagement control for HIMAD/LOMAD weapons should normally be exercised at the lowest possible level. Engagement control for SHORAD weapons operating under SOP control status will normally be exercised at the fire unit level.

2-7. Characteristics of the Air Defense Forces

Air defense forces provide tactical warning and defense in depth against enemy air and missile attack. Accordingly, air defense forces reflect those characteristics best suited to perform these tasks. The characteristics are as follows:

a. Readiness to respond with minimum warning.

b. Reliability to function without system failure.

c. Flexibility to meet varied and changing situations.

d. Survivability to continue functioning during enemy attack.

e. Kill-Effectiveness to destroy or neutralize the hostile threat.

★*f. Tactical Autonomy* to permit independent operations when directed or required.

2-8. Influence of the Situation and Environment on Air Defense Operations

a. State of Hostilities.

(1) *Peacetime.* In time of peace, air defense operations are characterized by 24-hour-a-day vigil. Training and maintenance necessary to in-

sure prompt and effective reaction to the hostile air and missile threat are conducted concurrently with the peacetime operational mission. Air defense rules and procedures are established in accordance with national policy and international agreements, and the air defense forces are exercised so that transition to war conditions may take place without confusion or delay. Restrictive air defense rules of engagement may be necessary during peacetime to provide a high degree of protection for friendly aircraft and to preclude provocative incidents; however, rules of engagement for the Safeguard ballistic missile defense system must provide for immediate response to an enemy ballistic missile attack because of the critically short time between detection of the attack and the time in which the attack must be destroyed.

(2) *Wartime.* In time of war, air defense operations are geared to those active and passive measures necessary to accomplish the air defense objective. Rules of engagement permit timely and effective response to the threat.

b. Air Situation. In the air battle, air superiority is that degree of dominance of one force over an opposing force which permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the latter. Air superiority is desirable for successful conduct of large-scale land operations and its achievement is of major concern to ground force commanders. Complete air superiority, unless it is obtained by default, results from the total incapacitation of the enemy's aviation, offensive missile delivery means, and air defense artillery. This is seldom possible. US forces can expect to operate without air superiority at the outset of hostilities where the enemy's first strike capability could achieve an initial advantage, or for limited time periods in localized areas where enemy air resources could be massed to achieve a particular objective. Air defense and the offensive counterair capability of friendly forces must be constantly maintained to establish early air superiority throughout the battle area.

c. Ground Situation. Air defense forces must be able to deploy strategically and move tactically in support of ground combat forces (an exception is the Safeguard ballistic missile defense system which will be deployed in a fixed configuration). Air defense force levels and structures are tailored to the mission of the supported force during both offensive and defensive operations. Air de-

fense forces contribute to the freedom of action of the ground combat forces by inhibiting enemy aerial reconnaissance, close air support, air interdiction attacks, and airborne electronic warfare activities.

d. Operational Environment. The operational environment is a composite of the conditions, circumstances, and influences which affect the employment of military forces.

(1) *Area of operation.* The physical features, climate, and weather of the area of operations can have considerable influence on air defense operations. Lack of adequate road nets will inhibit mobility, affect optimum deployment, and magnify logistic problems. Natural terrain obstacles may reduce radar coverage and thus influence the force level and weapons mix required to provide adequate air defense coverage. Severe weather and climate reduce the effectiveness of troops and equipment. The density and distribution of the population and the number and location of critical vulnerable areas, such as airfields, logistical complexes, and transportation centers, will exert a strong influence on the air defense requirements.

(2) *Opposing forces.* The mission, strength, and composition of the enemy forces will have direct bearing on the deployment and tactics of ADA units. A highly trained and modern enemy army bent on the destruction of US forces in the field, and capable of deep and sudden armored penetrations and highly sophisticated air and missile attacks, must be countered by a highly trained and effective ground force which possesses a strong air defense capability. On the other end of the spectrum is operation in a restricted area, without fixed battle lines, where the enemy has limited or nonexistent aerial capabilities and his ground forces depend on infiltration and surprise to achieve local tactical success. In all cases, the air defense force must be tailored to meet the existing or potential threat.

★(3) *Nuclear, biological, and chemical environment.* The differences in Army ADA activities in a nuclear-biological-chemical (NBC) environment, as opposed to non-NBC operations, are primarily due to the increased combat power involved, the sharply increased vulnerability of troops and materiel, and the possibility of CBR contamination. Generally, these differences are increased requirements for dispersion, mobility, decentralization of control, reduction of reaction time, use of special protective equipment and defensive measures, measures to reduce CBR contamination hazards, and the capability for rapid

reorganization necessitated by mass casualties. (For further information, see FM 3-1, FM 3-12, and FM 21-40.)

★(4) *Electronic warfare and signal vulnerability environment.* In an electronic warfare environment involving sophisticated electronic warfare support measures (ESM) and electronic countermeasures (ECM), Army forces are vulnerable to enemy attack of targets electronically located through ESM and to degradation of weapons system electronics, navigation system electronics, and communications systems through enemy use of ECM. Antiradiation missiles which home on electromagnetic energy must also be considered. Air defense forces must counter this threat by adhering to sound electronics security (ELSEC) and communications security (COMSEC) procedures, and by effectively applying ECCM and ESM techniques. Pertinent information regarding signal security (SIGSEC) considerations and ECCM techniques are contained in FM 32-5, FM 32-20, FM 24-18, TM 11-750, TM 11-751, and system-peculiar field manuals of the 44-series.

2-9. Command Relationship

a. Definitions. There are four possible relationships between ADA units and a force (e.g., field army). ADA units may be under the *command* of a force; they may be under its *operational control*; they may be under its *command, less operational control*; or they may be in *support* of the force.

(1) *Command.* Command (AR 310-25) includes the authority and responsibility for effectively using available resources for the accomplishment of assigned missions in accordance with established policies. The authority to exercise operational control ((2) below) is inherent. Command also includes authority and responsibility for logistics and administration, unit training, and health, welfare, morale, and discipline matters. The equivalent NATO, SEATO, and CENTO term is "full command" (JCS Pub 1).

★(2) *Operational control.* Operational control (AR 310-25) provides authority and responsibility for designation of air defense priorities, mission assignment, organization for combat (excluding internal organization), unit positioning and repositioning, control of fires, establishment of air defense rules and procedures, and delegation of authority, all in accordance with established joint policies and procedures. Administra-

tive and logistic responsibilities are retained by parent organizations ((3) below) unless modification is outlined in the operation order establishing this relationship. Authority extends from planning through execution as required for mission accomplishment. The terms "operational control" and "operational command" are synonymous; however, the latter term is reserved for use in describing the authority of the commanders of unified, subordinate unified, and specified commands over assigned forces. The term *control and operational employment* is used in JCS Pub 8 to describe the normal authority of field army commanders over their Army air defense means, and is considered synonymous with *operational control* with the understanding that control is exercised in adherence to the joint force air defense rules and procedures. See paragraph 3-5c for further discussion.

(3) *Command, less operational control.* The term is essentially the same in intent as the term "administrative control" (AR 310-25), and describes authority and responsibility in respect to administrative and logistic matters, such as personnel management, supply, services, training, and other matters not included in the operational missions of the subordinate organizations.

(4) *Support.* The commander exercising command or operational control may place ADA units in support of another unit by assigning appropriate tactical missions (para 8-7 through 8-13). Units executing a tactical mission remain under the command or operational control of the commander assigning the mission, but are obliged to render to the supported units the degree of air defense support or reinforcement specified by the particular tactical mission.

b. *Authority of Subordinate ADA Commanders.* An ADA unit commander exercising command or

operational control has the authority to issue orders to subordinate elements as necessary for mission accomplishment. This includes organizing for combat and assigning tactical missions, provided that such action does not reduce the subordinate commander's capability to accomplish the assigned mission and does not reduce the degree of control retained by the commander who originally assigned the mission.

2-10. Air Traffic Regulation and Identification

Air traffic regulation and identification is a corollary of air defense. The commander of a unified command establishes the general priorities, restraints, and readiness conditions with due regard to all users of airspace. The area air defense commander must have the capability to assure that friendly aircraft may enter, depart, or move within defended areas without undue restrictions on their movements and with the least adverse effect on the command's offensive and defensive capabilities.

2-11. Joint Use of Airspace

Each service component within a unified command has requirements for the operation of air vehicles in the performance of its mission. Procedures to eliminate or reduce interference are provided by the rules and procedures established for airspace use.

2-12. Effectiveness and Survivability

a. To attain the air defense objective, air defense forces must be effective and they must survive. A proper balance of effectiveness and survivability is essential; however, the requirements often conflict.

b. Air defense doctrine is aimed at maximizing effectiveness by insuring that weapon capabilities are exploited and limitations minimized. The application of this doctrine also contributes to the survivability of ADA units; i.e., effectiveness enhances survivability.

c. After compliance with the basic principles which insure effectiveness, emphasis should be placed on survivability measures. The commander must apply survivability tactics (para 10-12) without unacceptably compromising mission accomplishment.

2-13. Self Defense Against Air Attack

Commanders at all echelons have the authority

and responsibility to take whatever action is required to protect their forces and equipment against enemy air attack. Normally, such action will be governed by rules and procedures established by the air defense commander.

2-14. Training

Air defense rules and procedures for areas of operations will be established in detail, and the air defense forces will be exercised during peacetime so that the transition to war conditions may take place without confusion or delay. Joint air defense exercises will be accomplished whenever two or more services are involved in air defense.

Consistent with the provisions of ACD, the organizational form prescribed by the establishing authority, commanders at all echelons will insure that their forces at all times are capable of self defense. The type of organization prescribed in this chapter has been developed as a study, evaluation, and training vehicle and is not intended to limit any unique mission or being put in a theater or contingency plan.

Details of theater air defense operations are presented in chapters 7 through 10 (combined) and chapter 11 (COMMA). (Details of overall theater organization are included in FM 100-15.)

2-3. Concept of Organization

1. Theater air defense resources are organized for details of the theater ground units which include the first echelon of defense in depth by complementary weapons systems, with inter systems depending on a war area level and air defense utility providing terminal defense in critical areas and operating areas.

2. Air defense of a theater is conducted under the direction of a single air defense commander. Authority for execution of operations is vested as far as necessary to best accomplish the air defense mission. Regardless of the authority exercised in subordinate commanders, the principle of responsibility to a single air defense commander is followed.

2-3. Commander of the Unified Command

The commander of the unified command (by 2-1) is the theater of operations commander. In exercising his overall responsibility for air defense, the commander of the unified command performs the following functions:

Based on the recommendations of the commander (designated the "area air defense commander"), the commander of the unified command will establish broad policies and procedures for theater air defense. These policies and procedures are also influenced by naval surface warfare forces provided for theater air defense.

2-4. Area Air Defense Commander

1. The mission of the area air defense commander (by 2-1) will be to coordinate and integrate the entire air defense effort within the unified command. Subject to the authority of the commander of the unified command, and after appropriate coordination, he will establish broad policies and procedures for the development and coordination of air defense means, distribution of the other service component resources will be provided, as appropriate, to the area air defense commander's headquarters.

2. Where a significant portion of the air defense mission is distributed to a major effort that that of the area air defense commander, a major effort should be assigned from that area to serve as deputy in air defense matters to the area air defense commander.

3. The Air Force component commander, in the exercise of his responsibility for the conduct of Air Force offensive operations and air defense operations, will establish a theater air control system (TACS) (by 2-2) in the theater. ADA units will establish liaison with the TACS and Army electronic control and coordination system will be interconnected with the TACS as required to implement the coordination system. Technical details of electronic interconnection requirements and details coverage for more are contained in AFM 24-10. Attached

CHAPTER 3

ORGANIZATION FOR AIR DEFENSE OF A THEATER

3-1. General

a. This chapter pertains to air defense relationships within a U.S. unified command. The principles of Army ADA organization presented also apply to other types of commands and task forces.

b. Consistent with the provisions of JCS Pub 2 and the organizational form prescribed by the establishing authority, commanders of unified commands organize their forces so as to best accomplish their assigned missions. The type organization presented in this chapter has been developed as a study, evaluation, and training vehicle and is not intended to depict any organization in being nor is it meant to depict the needs of a particular theater or contingency plan.

c. Details of theater air defense operations are presented in chapters 7 through 10 (combat zone) and chapter 11 (COMMZ). (Details of overall theater organization are included in FM 100-15.)

3-2. Concept of Organization

a. Theater air defense resources are organized for defense of the theater priority assets which include the field armies. A defense in depth by complementary weapons is provided, with interceptors defending on a wide area basis and air defense artillery providing terminal defense of critical assets and operating areas.

b. Air defense of a theater is conducted under the direction of a single air defense commander. Authority for execution of operations is decentralized as necessary to best accomplish the air defense mission. Regardless of the authority delegated to subordinate commanders, the principle of responsiveness to a single air defense commander is followed.

3-3. Commander of the Unified Command

The commander of the unified command (fig. 3-1) is the theater of operations commander. In exercising his overall responsibility for air defense, the commander of the unified command performs the following functions:

a. Establishes the priorities for air defense, and allocates the available air defense resources.

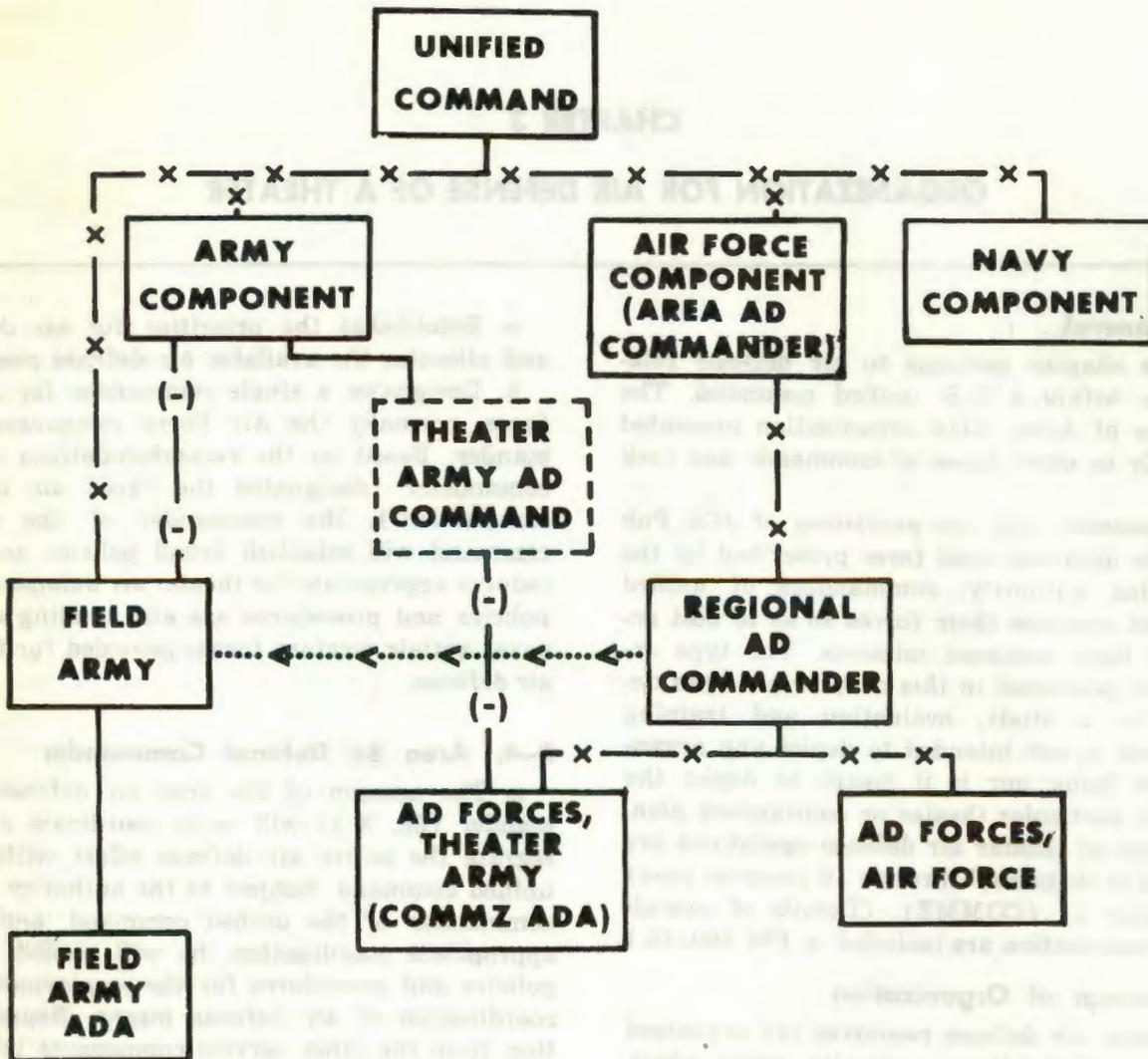
b. Designates a single commander for air defense, normally the Air Force component commander. Based on the recommendations of this commander (designated the "area air defense commander"), the commander of the unified command will establish broad policies and procedures appropriate for theater air defense. These policies and procedures are also binding on any naval antiair warfare forces provided for theater air defense.

3-4. Area Air Defense Commander

a. The mission of the area air defense commander (fig. 3-1) will be to coordinate and integrate the entire air defense effort within the unified command. Subject to the authority of the commander of the unified command, and after appropriate coordination, he will publish broad policies and procedures for the employment and coordination of air defense means. Representation from the other service components involved will be provided, as appropriate, to the area air defense commander's headquarters.

b. Where a significant portion of the air defense means is contributed by a service other than that of the area air defense commander, a senior officer should be appointed from that service to serve as deputy in air defense matters to the area air defense commander.

c. The Air Force component commander, in the exercise of his responsibilities for the conduct of Air Force offensive operations and air defense operations, will establish a tactical air control system (TACS) (fig. 3-2) in the theater. Army ADA units will establish liaison with the TACS, and Army electronic control and coordination means will be interconnected with the TACS as required to implement the coordination procedures established by the area air defense commander. Technical details of electronic interconnection requirements and detailed message formats are contained in JCS Pub 10. Minimum



- **COMMAND**
- x — **OPERATIONAL COMMAND (OPERATIONAL CONTROL)**
- (-) — **COMMAND, LESS OPERATIONAL CONTROL**
- <..... **AIR DEFENSE RULES AND PROCEDURES (PARA 3-5c AND 3-5d)**
- [- - -] **WHEN REQUIRED FOR COORDINATION OF ADMINISTRATIVE / LOGISTICAL SUPPORT OF TACTICAL UNITS**

Figure 3-1. Type unified command structure for wartime air defense.

data to be exchanged by the TACS and ADA units are defined in JCS Pub 12. The type TACS depicted in figure 3-2 is described below:

(1) The tactical air control center (TACC) is the air operations center of the Air Force commander's command post. The TACC plans

and coordinates the conduct of offensive and defensive tactical air and air control operations in the theater of operations. The TACC supervises and controls all of the components of the TACS. Liaison is established between the TACC and senior Army elements in the theater.

(2) The subordinate control and reporting centers (CRC) and associated air traffic regulation centers (ATRC) are deployed on an area basis and provide radar surveillance and aircraft control within a designated area. The CRC's are directly subordinate to the TACC and provide current air situation information to the TACC and the direct air support centers ((3) below). The CRC's vector fighter-interceptor aircraft in both offensive and defensive operations, scramble aircraft allocated to defensive counterair tasks, and provide early warning and identification information to ADA elements in the area. The CRC may, in some cases, control the fires of designated HIMAD and LOMAD weapons. CRC capabilities are extended forward by subordinate control and reporting posts (CRP) and forward air control posts (FACP). Establishment of liaison and communications between these elements and Army ADA elements operating in the area is normal.

(3) The direct air support center (DASC) normally operates at corps level; however, it may be established at field army or separate division as required. Subordinate tactical air control parties (TACP) operate at division, brigade/regiment, and maneuver battalion/squadron level. The DASC and TACP are part of the system that provides USAF close air support and tactical air reconnaissance in response to Army requirements. Forward air controllers (FAC) associated with the battalion/squadron level TACP's control strike aircraft during conduct of close air support strikes. Redeye section leaders should establish a close relationship with the TACP's at this level. The TACP's at all levels provide advice on all aspects of tactical air support to Army commanders and assist in the coordination of movement of Air Force aircraft in the forward area with Army aviation, field artillery, and ADA. All elements of this system provide information useful to ADA elements operating with the ground forces and, if prescribed by the theater air defense rules and procedures, may request temporary fire control restrictions on SHORAD weapons during conduct of air strikes.

3-5. Regional Air Defense Commanders

a. The area air defense commander normally will establish air defense regions. The number of such regions may vary, depending upon geographical and political factors and the complexities of the air defense problem. The area air defense commander will appoint the regional air defense commanders (fig. 3-1) and designate their areas

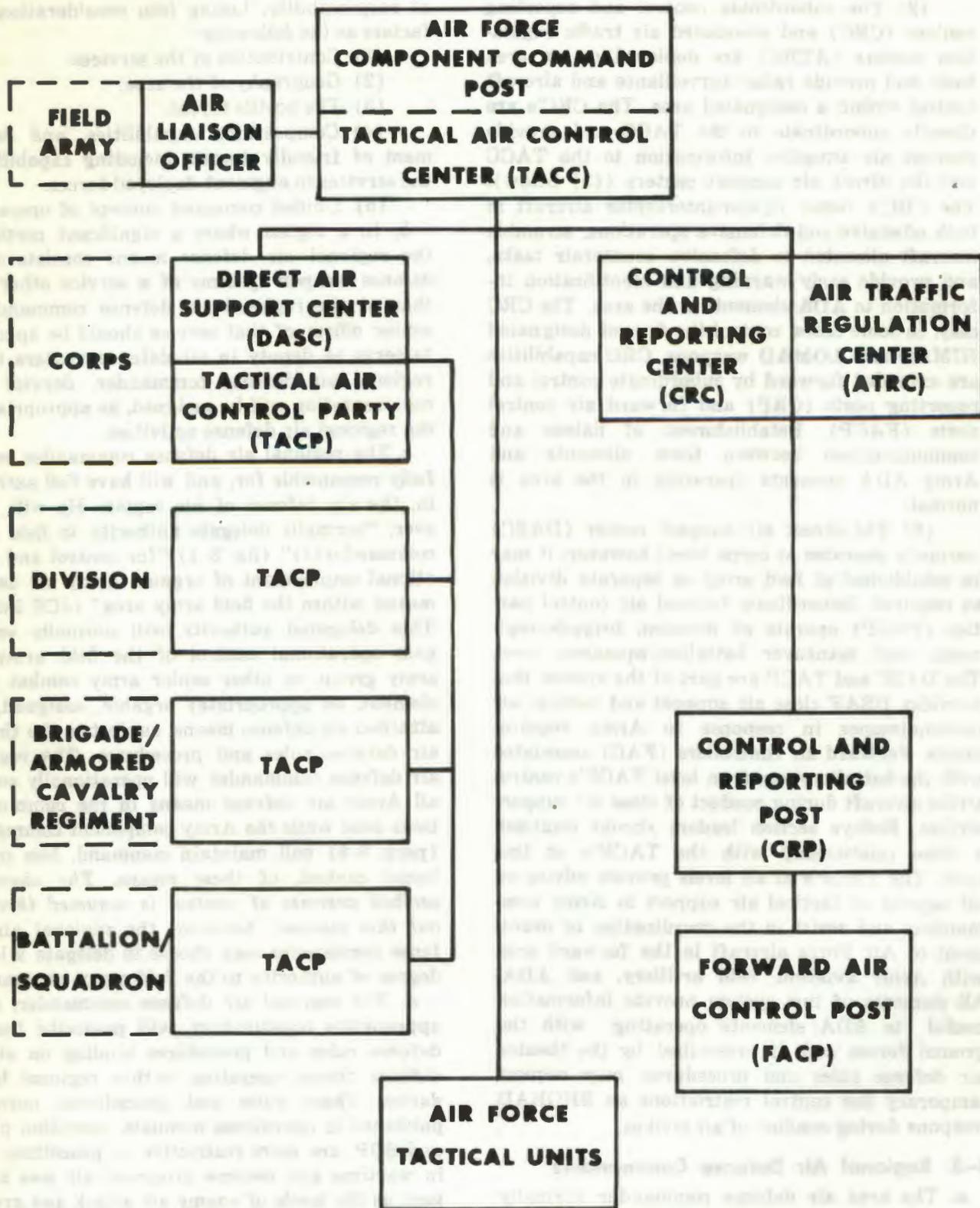
of responsibility, taking into consideration such factors as the following:

- (1) Contribution of the services.
- (2) Geography of the area.
- (3) The hostile threat.
- (4) Composition, capabilities, and deployment of friendly forces, including capability of the services to augment deployed forces.
- (5) Unified command concept of operations.

b. In a region where a significant portion of the regional air defense means consists of air defense weapon systems of a service other than that of the regional air defense commander, a senior officer of that service should be appointed to serve as deputy in air defense matters to the regional air defense commander. Service staff representation will be assigned, as appropriate, to the regional air defense activities.

c. The regional air defense commander will be fully responsible for, and will have full authority in, the air defense of his region. He will, however, "normally delegate authority to field army commander(s)" (fig. 3-1) "for control and operational employment of organic Army air defense means within the field army area" (JCS Pub 8). This delegated authority will normally encompass operational control of the field army (or army group, or other senior army combat force element, as appropriate) organic, assigned, and attached air defense means, subject to the theater air defense rules and procedures. The regional air defense commander will operationally control all Army air defense means in the communications zone while the Army component commander (para 3-6) will maintain command, less operational control, of these means. *The above-described exercise of control is assumed throughout this manual*; however, the regional air defense commander may choose to delegate a lesser degree of authority to the field army commander.

d. The regional air defense commander, after appropriate coordination, will prescribe the air defense rules and procedures binding on all air defense forces operating within regional boundaries. These rules and procedures, normally published in operations manuals, operation plans, and SOP, are more restrictive in peacetime than in wartime and become progressively less stringent as the levels of enemy air attack and ground hostilities increase. The air defense rules and procedures prescribed for ADA units may include the following items: conditions of readiness, air defense and nuclear warnings, rules of engagement, weapons control status, hostile criteria, rules for initial release of nuclear weapons and



NOTE: CRC, CRP, AND FACP LOCATIONS ARE NOT ASSOCIATED WITH SPECIFIC GROUND COMBAT FORCE UNIT LOCATIONS.

Figure 3-2. Elements of the tactical air control system.

for nuclear warhead selection, special control instructions, and certain coordinating and reporting procedures. These items are discussed in detail in paragraphs 10-7 and 10-10. The regional air defense rules and procedures may also specify the direct coordination and information exchange links (not shown in fig. 3-1) required between ADA control facilities and regional air defense control facilities.

e. In land regions where the situation indicates no likelihood of extensive tactical air *offensive* operations, the area air defense commander may establish a regional *joint* air defense command. This command may be commanded by an officer of any component, and will include a deputy commander appointed from a service other than that of the commander and a joint staff formed in accordance with the principles set forth in JCS Pub 2.

3-6. Army Component Commander

The mission of the Army component commander (fig. 3-1) is to organize, train, and provide U.S. Army forces in support of operational requirements of the theater. He is a supervisor, a planner, and a coordinator who provides centralized direction and doctrine for the decentralized execution of assigned Army missions. The Army component commander commands U.S. Army elements during peacetime and normally has command, less operational control, of Army combat and combat support elements during wartime. Operational control of Army ADA is normally exercised by the area/regional air defense commanders within the communications zone and the field army commanders within the combat zone

in accordance with the theater air defense plans and directives. In unusual cases, the Army component commander may be assigned an operational mission. In that case, he remains in the operational chain of command between the commander of the unified command and the Army ground combat and combat support elements. Specific air defense responsibilities in all cases include the following:

a. Recommending the policies and procedures for most efficient employment of Army ADA.

b. Furnishing the commander of the unified command with theater army air defense requirements in priority.

c. Allocating, organizing, and employing trained Army ADA means in accordance with theater operational plans and as required to defend the theater priority assets.

d. Prescribing unit training, operating, logistical, and administrative procedures which will achieve maximum combat effectiveness.

e. Planning, coordinating, and conducting the staging of additional Army ADA forces into the theater of operations.

f. Establishing a theater army air defense command (TAADC) (fig. 3-1), when warranted by an increased size of theater ADA forces or additional administrative or logistical requirements. The TAADC will provide the Army component commander with a means of exercising command, less operational control, of Army air defense forces not organic, assigned, or attached to field armies or field army elements. In this respect, a TAADC is similar in function to ARADCOM (para 4-5) in CONUS.

CHAPTER 4

ORGANIZATION FOR AIR DEFENSE OF THE UNITED STATES

4-1. General

a. North American Air Defense Command (NORAD) is the combined command established to defend the continental United States, Alaska, and Canada against aerospace attack. U.S. and Canadian air defense resources allocated for air defense of the North American continent are placed under the operational control of this command. The U.S. elements of NORAD, when performing missions of a purely national nature (e.g., Safeguard ballistic missile defense), are under the operational command of the Continental Air Defense Command (CONAD).

b. Army ADA units operating with the U.S. Army Forces Strike Command (USARSTRIKE) are not included in the air defense organization described in this chapter. When based in the United States and given an air defense mission, these field army type units are integrated with NORAD control elements.

c. Details of CONUS air defense operations are presented in chapter 12.

4-2. Concept of Organization

a. The concepts for air defense of the United States and for air defense of a large COMMZ (para 3-2) are similar.

b. Air defense resources, to include Safeguard ballistic missile defense system resources, are allocated for defense of specified metropolitan areas and military installations. The Safeguard system, in addition to providing vital area defenses, also provides an overall area defense. The complementary mix of weapons provided each air defense commander allows him to bring attackers under pressure far out from the defended vital areas, with pressure increasing as they approach the vital areas.

c. The air defense of the United States is conducted under the centralized direction of a single air defense commander. Authority for execution of operations is decentralized as necessary to best accomplish the mission. Control of weapon allocation and deployment is centralized at high

levels. Control of weapon fires is centralized during peacetime and decentralized to the fire unit level during hostilities or when ordered.

4-3. North American Air Defense Command (NORAD)

a. NORAD (fig. 4-1) is a combined command responsible to the United States Joint Chiefs of Staff and the Chief, Defence Staff of Canada, for aerospace defense of the continental United States, Alaska, and Canada. The Commander-in-Chief NORAD (CINCNORAD) exercises operational control over all United States and Canadian forces made available for aerospace defense. Each component force commander retains command (less operational control) of his respective force. The degree of authority denoted by the term "operational control" may vary with the provisions of the binational or multinational agreements that are the basis for the combined command.

b. By agreement between Canada and the United States, CINCNORAD and his deputy will not be of the same nationality. Staff positions are filled without regard to service or national affiliation.

c. NORAD prepares operational plans, conducts tactical exercises and readiness tests, coordinates plans and requirements for new air defense weapons, and plans for the direction of the air defense battle over North America in the event of war.

d. NORAD has established the control system depicted in figure 4-2 and discussed in (1) through (7) below (fig. 4-2 does not show Safeguard control facilities).

(1) CINCNORAD's command post is the combat operations center (COC).

(2) NORAD is divided into regions. A region is the basic NORAD unit for fighting the air battle. Operational control of all air defense resources assigned to a region is exercised by the NORAD region commander from the NORAD region control center (NRCC). Army ADA per-

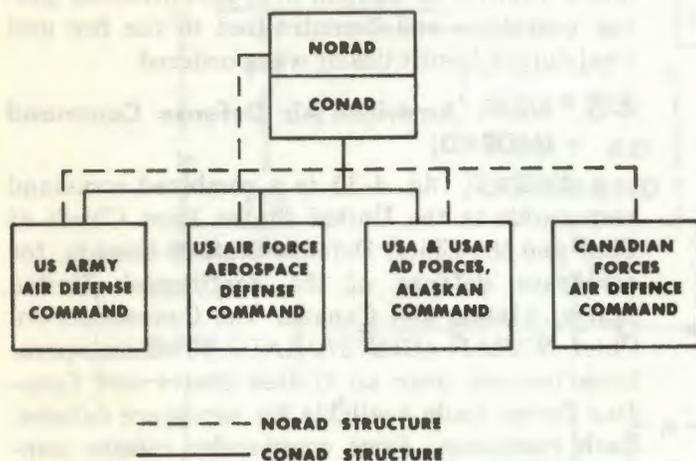


Figure 4-1. NORAD/CONAD structure.

sonnel operate in the NRCC, with the primary function of coordinating and monitoring the track and fire unit information flow between the NRCC and the Army air defense command post. The control center may be equipped with SAGE (semiautomatic ground environment) or may be manually operated. Control of Bomarc interceptors and manned interceptors is normally accomplished at the SAGE-equipped control center level.

(3) NORAD control centers (NCC) are established subordinate to NORAD regions. Each region has at least one NCC. The NCC commander exercises operational control over all air defense forces within a designated area when an NRCC does not exist or when an NRCC commander is unable to exercise effective control. NCC's are automated or manual. Automated NCC's are equipped with the backup interceptor control (BUIC) system which provides a computerized backup capability for the control of manned interceptors and Bomarc should the SAGE system become nonoperational. Manned interceptors may be controlled by either manual or automated means from an NCC. NCC's and NRCC's also

exchange operational information with AADCP's via automatic data links if equipped with BUIC/SAGE, or by voice circuits from manual facilities.

(4) Army air defense command posts (AADCP) are established for each Army air defense vital area and may control an ADA brigade, group, or battalion. For command (less operational control) purposes, the Army ADA commander at the AADCP is subordinate to the appropriate ARADCOM region or intermediate Army ADA headquarters. For operational control purposes, the AADCP is under the NRCC or NCC commander, depending upon the equipment, organization, and operating level within the particular NORAD region. The Army ADA commander at the AADCP exercises command, to include operational control, of subordinate Army ADA forces. This commander exercises direct operational control of individual fire units in the defense in response to control instructions received from the appropriate NORAD commander. Commanders of ADA brigades, groups, and battalions who are not assigned a mission as a defense commander exercise command (less operational control) of subordinate Army ADA units. Depending on defense size, these commanders may be interposed at any point in figure 4-2 below ARADCOM region level.

(5) Figure 4-2 shows the relation between control facilities when SAGE is employed, and assumes that the air defense means of both the Army and the Air Force contribute to the defense for which an NRCC is responsible. The actual organization within a region is influenced by the size of the region, and whether forces of more than one service defend a given area. Further, the lines of control will change automatically as combat losses and equipment failure occur.

(6) Figure 4-3 shows in more detail the relation of the SAGE-equipped NRCC at NORAD region level with subordinate units and data sources.

4-4. Continental Air Defense Command (CONAD)

a. CONAD (fig. 4-1) is a unified command under the United States Joint Chiefs of Staff for air defense missions of a national nature. CINCONAD is the senior U.S. officer in NORAD headquarters. The senior U.S. officer at each echelon of the NORAD organization is the CONAD commander at that echelon. CONAD gives the U.S. the capability of unilateral air de-

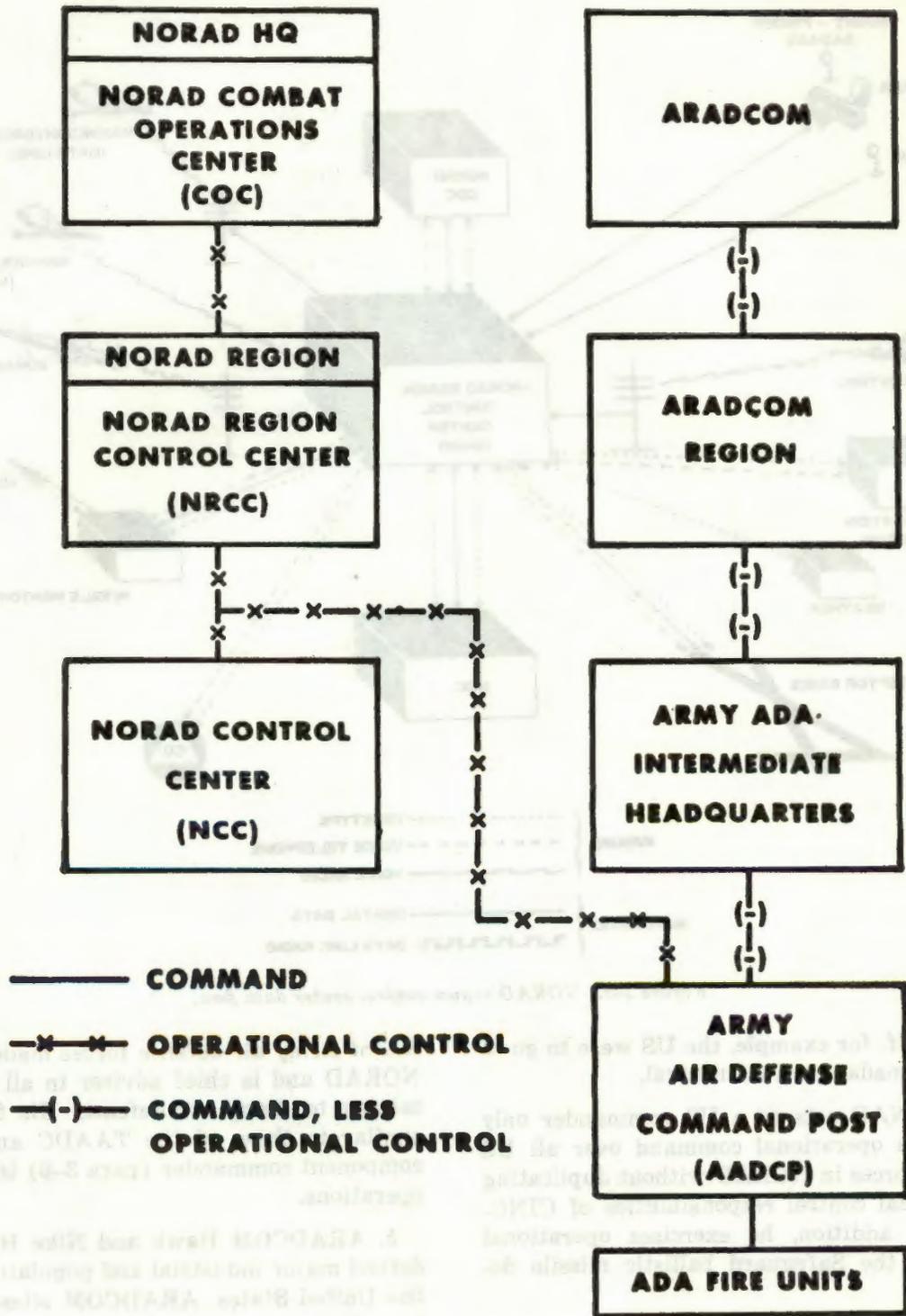


Figure 4-2. NORAD control systems.

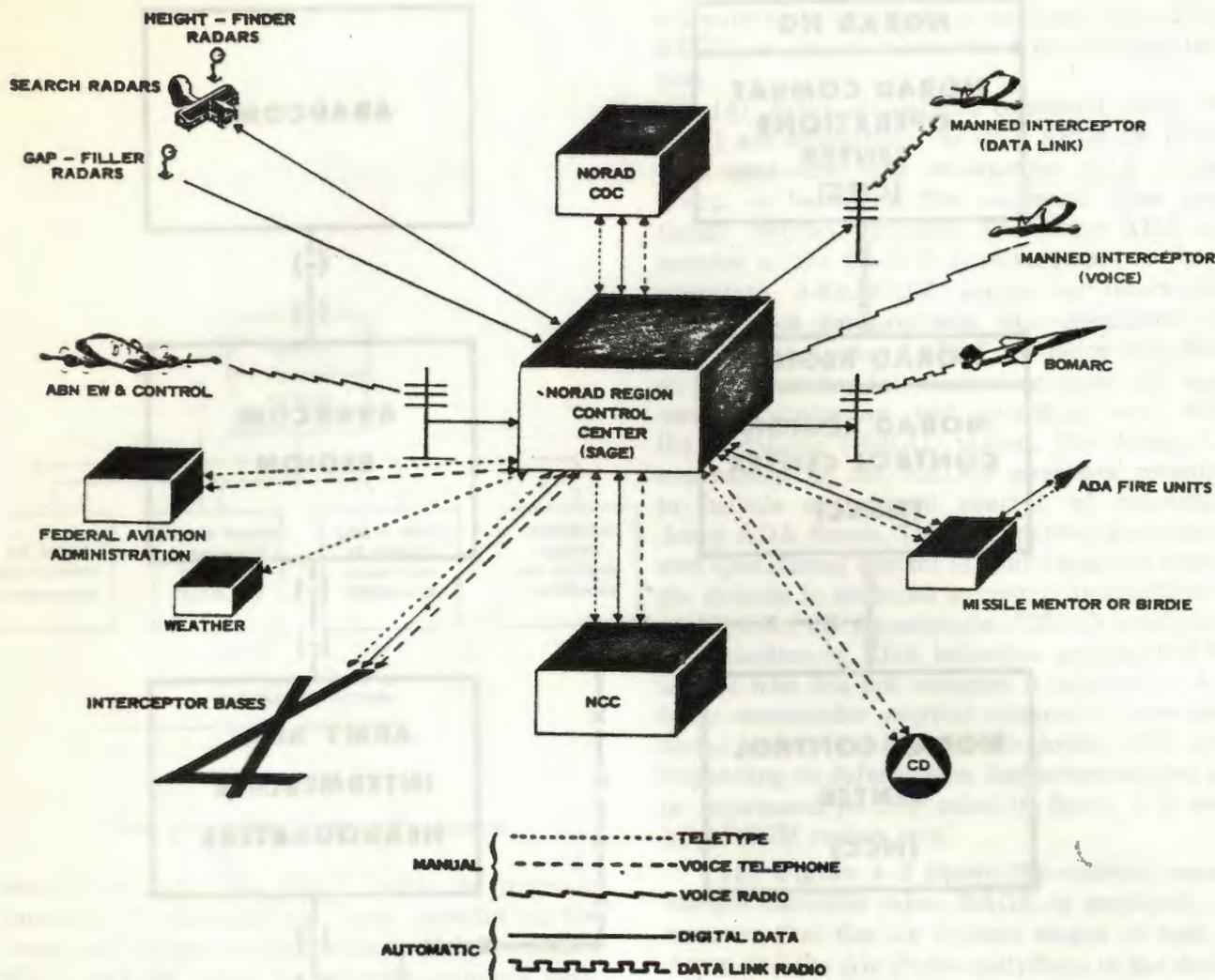


Figure 4-3. NORAD region control center data flow.

fense action if, for example, the US were to go to war while Canada remained neutral.

b. CINCONAD acts as a US commander only and exercises operational command over all US air defense forces in NORAD without duplicating the operational control responsibilities of CINC-NORAD. In addition, he exercises operational command of the Safeguard ballistic missile defense forces.

4-5. United States Army Air Defense Command (ARADCOM)

a. The senior US Army ADA headquarters in the NORAD structure is ARADCOM (fig. 4-1) which commands (less operational control) the US Army ADA units in CONUS. The CG, ARADCOM, bears a special staff responsibility to CINC-NORAD for the development, direction, and con-

trol of Army air defense forces made available to NORAD and is chief adviser in all matters pertaining to Army air defense. His functions are similar to those of the TAADC and the Army component commander (para 3-6) in a theater of operations.

b. ARADCOM Hawk and Nike Hercules units defend major industrial and population centers of the United States. ARADCOM sites are manned by active Army and Army National Guard personnel.

★4-6. Alaskan Army Air Defense Forces

Army ADA forces in Alaska are under the command (less operational control exercised by NORAD) of US Army, Alaska (USARAL). Nike Hercules sites in Alaska are manned by USARAL personnel.

CHAPTER 5

AIR DEFENSE ORGANIZATION DURING SPECIAL JOINT OPERATIONS

5-1. General

Special joint operations may be conducted by or within a specified command or any of the joint force organizations: unified command, subordinate unified command, or joint task force (JTF). This chapter considers the JTF formed by a unified command for accomplishment of a specific amphibious or airborne operation. Depending on the area of operations and the nature of the joint task force, JTF air defense may be provided by an existing area air defense system, by the JTF itself, or by both. In any case, the principles of unified command arrangements set forth in chapter 3 are normally followed.

5-2. Amphibious Operations

a. General.

(1) The organization presented in this paragraph is based on joint and Army doctrine contained in JCS Pub 8, FM 31-11, FM 31-12, and FM 100-5. Special considerations regarding execution of the air defense artillery functions in support of amphibious operations are contained in paragraph 13-7.

(2) Amphibious warfare integrates virtually all types of ships, aircraft, weapons, and landing forces in a concerted military effort against a hostile shore. The inherent naval character of the amphibian attack is reflected in the principles which govern the organization of the forces involved and the conduct of the operation.

(3) Attainment of air superiority is a requirement for the successful conduct of large-scale amphibious operations.

b. Concept of Operation.

(1) The joint amphibious task force commander will be responsible for control of all air and air defense operations within an airspace of defined dimensions over the amphibious objective area. He will coordinate such operations, as necessary, with the commander responsible for airspace control of the surrounding or contiguous airspace.

(2) Air defense during execution of the operation is initially provided by antiair warfare (c(1) below) forces operating from ships or from land bases within range of the objective area. Landing force air defense units are landed, integrated into the task force antiair warfare control system, and initially directed from a tactical air control center afloat. As the assault progresses and ADA units and control facilities build up ashore, ADA control authority is delegated ashore as deemed appropriate by the task force commander. Upon termination of the amphibious phase of the operation, usually when the landing force is firmly established ashore, ADA organization is basically the same as for any other combat zone operation.

c. Task Force Antiair Warfare Organization.

(1) This paragraph and paragraph 13-7 use Navy/Marine Corps terminology to describe the organization for antiair warfare during amphibious operations. The terms *antiair warfare* and *air defense* are not synonymous. Air defense involves destruction or reduction of an air threat after it is airborne, whereas antiair warfare operations involve destruction or reduction of the air threat both before and after it is airborne. This paragraph pertains primarily to the defensive portion of antiair warfare.

(2) The joint amphibious task force commander (fig. 5-1) will be a naval officer (normally the naval forces commander) and will, upon commencement of the amphibious operation, have operational control of all forces assigned. His forces will include sufficient antiair warfare means to defend the joint amphibious task force objective area. Figure 5-1 shows typical relationships during execution of the operation. Air defense responsibilities at each level within the joint task force parallel the responsibilities at similar levels within a unified command (para 3-3 through 3-6) (Overall responsibilities are detailed in FM 31-11, FM 31-12, and FM 100-5.)

(3) The joint amphibious task force com-

mander will normally appoint a task force tactical air commander to plan and direct the overall joint amphibious task force air and antiair efforts. The task force tactical air commander is normally a naval officer. He is designated the force antiair warfare (FAAW) commander, and reports directly to the joint amphibious task force commander. He assumes operational control of the antiair warfare effort in defense of the objective area until passage of control ashore is completed, but remains prepared to reassume operational control if necessary.

(4) The senior Army or Marine officer with the landing force is the landing force commander. This commander has responsibility for conduct of antiair warfare operations ashore as specified in the joint task force antiair warfare plan.

(5) A landing force tactical air commander (not shown in fig. 5-1) will normally be appointed to control the overall air and antiair effort in the objective area after control authority is passed ashore by the FAAW commander. The landing force tactical air commander designated the landing force antiair warfare (LFAAW) commander is normally the senior Navy or Marine aviator with the landing force and normally reports directly to the landing force commander.

(6) The joint task force tactical air commander (FAAW commander) and the landing force tactical air commander (LFAAW commander) will be Air Force officers, rather than Navy or Marine officers as specified in (3) and (5) above, if the Air Force provides the preponderance of tactical aviation during the operation. The FAAW commander (Air Force) will report directly to the joint amphibious task force commander. The LFAAW commander (Air Force) will report directly to the landing force commander or the joint amphibious task force commander, as designated by the joint amphibious task force commander, but in either case must be fully responsive to the landing force antiair warfare requirements.

(7) The FAAW and LFAAW commanders will utilize Army, Navy, Marine, or Air Force control facilities, or a combination thereof, as designated in the antiair warfare plan.

d. Army ADA Organization.

(1) *General.* The Army ADA commander is concerned with the ADA organizations for embarkation, assault, and continued operations.

(2) *Embarkation.* The embarkation phase embraces the assembly of troops and materiel and their embarkation in the assigned shipping. Embarkation plans support the landing force scheme of maneuver. Army ADA should normally be organized for embarking as separate *embarkation units*; however, these units must be loaded so as to minimize the effects of loss of one ship. SHORAD units that are to provide small unit defense normally will embark with the unit to which organic or attached.

(3) *Assault.* The assault phase begins when the assault elements of the main body arrive in assigned positions in the objective area, includes the ship-to-shore movement and landing, and terminates with the accomplishment of the joint amphibious task force mission. SHORAD units with a small unit defense mission normally are unloaded with their parent units during both the *initial* and the *general unloading* periods. Other ADA required during the initial unloading period may be landed in the *scheduled* or *on-call waves*, or may be *nonscheduled units* held in readiness. Tactical integrity of the ADA units should be maintained. In general, the ADA buildup ashore should match the buildup of priority assets ashore. The time of landing ADA units is influenced by this factor, the landing force commander's guidance, availability of position areas, ADA system vulnerability, beach conditions, and shore party capabilities to support the landing.

(4) *Continued operations.* After the amphibious task force has accomplished its mission, it will be dissolved and orders issued for the disposition of forces. This may provide for a change in command arrangements and continued operations in the area. ADA organization, unless otherwise directed, is the same as in any other combat zone operation.

e. Control Concepts.

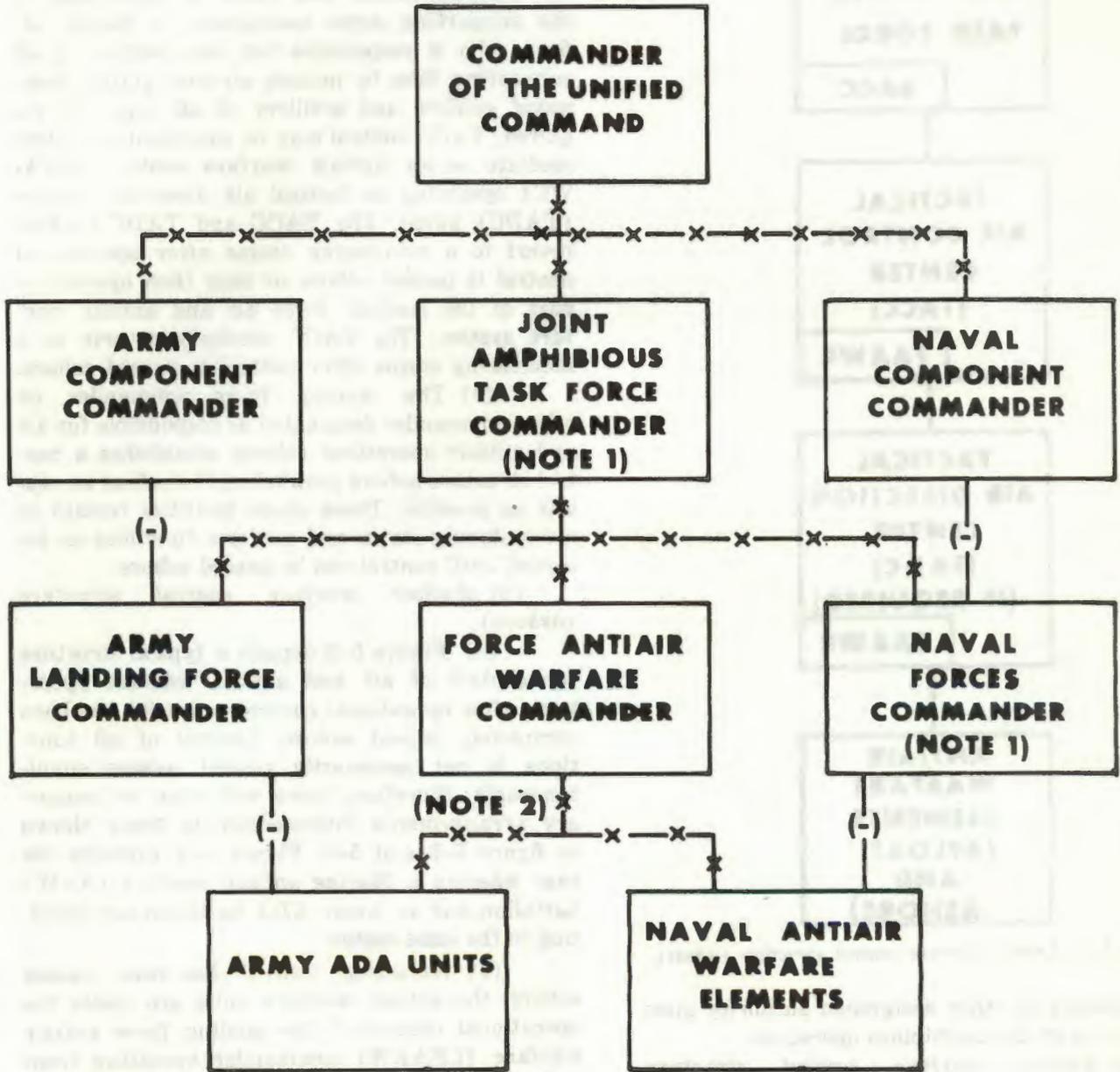
(1) *General.* Control of air and antiair warfare operations within the assigned airspace during an amphibious operation may be accomplished in the following sequence:

(a) By the advance force commander, if an advance force is employed, upon his arrival in the objective area.

(b) By the joint amphibious task force commander upon his arrival in the objective area.

(c) By the landing force or other commander ashore when control is passed ashore.

(d) By the area air defense/airspace con-



-x-x-x- OPERATIONAL COMMAND (OPERATIONAL CONTROL)

—(-)— COMMAND, LESS OPERATIONAL CONTROL

NOTES:

1. THE JOINT AMPHIBIOUS TASK FORCE COMMANDER IS NORMALLY THE NAVAL FORCES COMMANDER.
2. CONTROL RELINQUISHED IN WHOLE OR IN PART AS THE LANDING FORCE IS ESTABLISHED ASHORE.

Figure 5-1. Type organization for a joint Army/Navy amphibious operation.



Figure 5-2. Anti-air warfare control structure (afloat).

control authority or other designated authority upon termination of the amphibious operation.

(2) *Anti-air warfare control structure (afloat).*

(a) Figure 5-2 depicts a typical structure for control of anti-air operations from aboard ship, assuming that some anti-air warfare units are ashore but operational control has not been passed ashore.

(b) Anti-air warfare units ashore remain under the operational control of the FAAWC commander until control is passed ashore. The FAAWC commander operates from the force anti-air warfare center (FAAWC) element of the tactical air control center (TACC) in the joint amphibious task force commander's flagship. The FAAWC commander's operations are subject to coordina-

tion with the supporting arms coordination center (SACC) afloat. The SACC is supervised by the supporting arms coordinator, a Naval officer, who is responsible for coordination of all supporting fires to include air and anti-air fires, naval gunfire, and artillery of all types. If required, TACC control may be exercised via intermediate sector anti-air warfare centers (SAAWC) operating in tactical air direction centers (TADC) afloat. The TACC and TADC's afloat revert to a monitoring status after operational control is passed ashore or may then operate as part of the landing force air and anti-air warfare system. The SACC similarly reverts to a monitoring status after control is passed ashore.

(c) The landing force commander, or other commander designated as responsible for air and anti-air operations ashore, establishes a control structure ashore paralleling that afloat as rapidly as possible. These shore facilities remain in a monitoring status and perform functions as assigned until control can be passed ashore.

(3) *Anti-air warfare control structure (ashore).*

(a) Figure 5-3 depicts a typical structure for control of air and anti-air warfare operations after operational control authority has been completely passed ashore. Control of all functions is not necessarily passed ashore simultaneously; therefore, there will often be temporary arrangements intermediate to those shown in figure 5-2 and 5-3. Figure 5-3 presents the case wherein a Marine anti-air warfare (AAW) battalion and an Army ADA battalion are operating in the same sector.

(b) Assuming control has been passed ashore, the anti-air warfare units are under the operational control of the landing force anti-air warfare (LFAAW) commander operating from a force anti-air warfare center (FAAWC) element of a TACC established ashore. The landing force tactical operations center (TOC) or fire support coordination center (FSCC) serves a function ashore similar to that of the SACC afloat ((2) above).

(c) The LFAAW commander's area of responsibility is normally divided into sectors controlled by sector commanders in accordance with joint task force anti-air warfare plans. The sector anti-air warfare (SAAW) commanders exercise operational control of assigned anti-air warfare units through a sector anti-air warfare center (SAAWC) element of a tactical air operations center (TAOC) or equivalent facility. The

TAOC controls both air and antiair warfare operations in an assigned sector.

(d) If possible, sector Army air defense command posts (AADCP) and Marine antiaircraft operations centers (AAOC) collocate with the TAOC or locate key operations personnel at the TAOC to permit TAOC-level supervision of fire unit operations. As a minimum, liaison and communications with the TAOC will be provided.

(e) SHORAD battalions and all-arms air defense weapons organic to the Army divisions should normally remain under division operational control subject to compliance with the antiair warfare rules and procedures. These battalions will establish liaison and communications with the AADCP, TAOC, or AAOC to insure integration of operations.

(f) Many variations of the arrangement shown in figure 5-3 are possible because control facilities are tailored according to force composition, division of responsibilities, and availability of specialized personnel and equipment.

5-3. Airborne Operations

a. General.

(1) The organization presented in this paragraph is based on joint and Army doctrine contained in JCS Pub 8, FM 57-1, FM 100-5, and FM 100-27. Special considerations regarding execution of the air defense artillery functions in support of airborne operations are contained in paragraph 13-8.

(2) An airborne operation involves the movement and delivery by air into an objective area of combat forces and their logistic support for the execution of a tactical or strategic mission. Delivery may be accomplished by air drop or air landing. An administrative air movement is not termed an airborne operation. The term "airborne operations" as used in this manual implies joint airborne operations which differ from airmobile operations in that they are joint in nature, utilize different types of aircraft, and require a greater degree of administrative support and preparation. U.S. Air Force airlift forces used in the airborne operation normally operate under Air Force control but may, at Army request and with joint force commander approval, be placed under Army operational control for the duration of the airborne operation.

(3) Large-scale airborne operations require attainment of air superiority over the marshalling area and en route to and over the objective area.

b. Concept of Operation.

(1) For joint airborne task force operations in remote areas where no air defense areas or regions are established or air defense commander designated, the joint task force commander normally will follow the same principles of unified command arrangements as set forth in chapter 3. That is, the joint task force commander will appoint a joint task force air defense commander who will direct the overall air defense effort and who will delegate control authority to Army airborne force unit commanders as appropriate. Air defense concepts and overall air defense organization in this case are similar to those pertinent to amphibious operations.

(2) If an existing area or regional air defense system will support the operation, air defense of the airborne operation will be provided by both the area/regional air defense system and the ADA organic or attached to the Army airborne force. The remainder of this paragraph considers this case.

(3) Air defense of the marshalling area is provided by the area/regional air defense system. The area/regional air defense deployment may be adjusted to strengthen the defense over the marshalling area; i.e., to treat it as a vital area. Air defense en route is provided by air defense interceptors and in-range ADA of the area/regional air defense system. Air defense in the objective area is provided initially by air defense interceptors, with the ADA buildup in the airhead generally matching the buildup of the airhead forces. Control of the ADA in the airhead is by SOP until communications are established. Upon termination of the airborne operation, usually when the airborne force's mission has been accomplished, ADA organization is basically the same as for any combat zone operation.

c. *Task Force Air Defense Organization.* Figure 5-4 shows a typical organization for air defense of an airborne force's objective area, assuming that both area/regional and Army airborne force air defense means are involved. The parallel between figure 5-4 and figure 3-1 should be noted as the parallel pertains to Army commanders. Responsibilities for air defense are as described in paragraphs 3-3 through 3-6, except that the joint task force commander in this case has a limited air defense responsibility, being concerned only with obtaining adequate support from the regional air defense system and in employing the ADA with the airborne force.

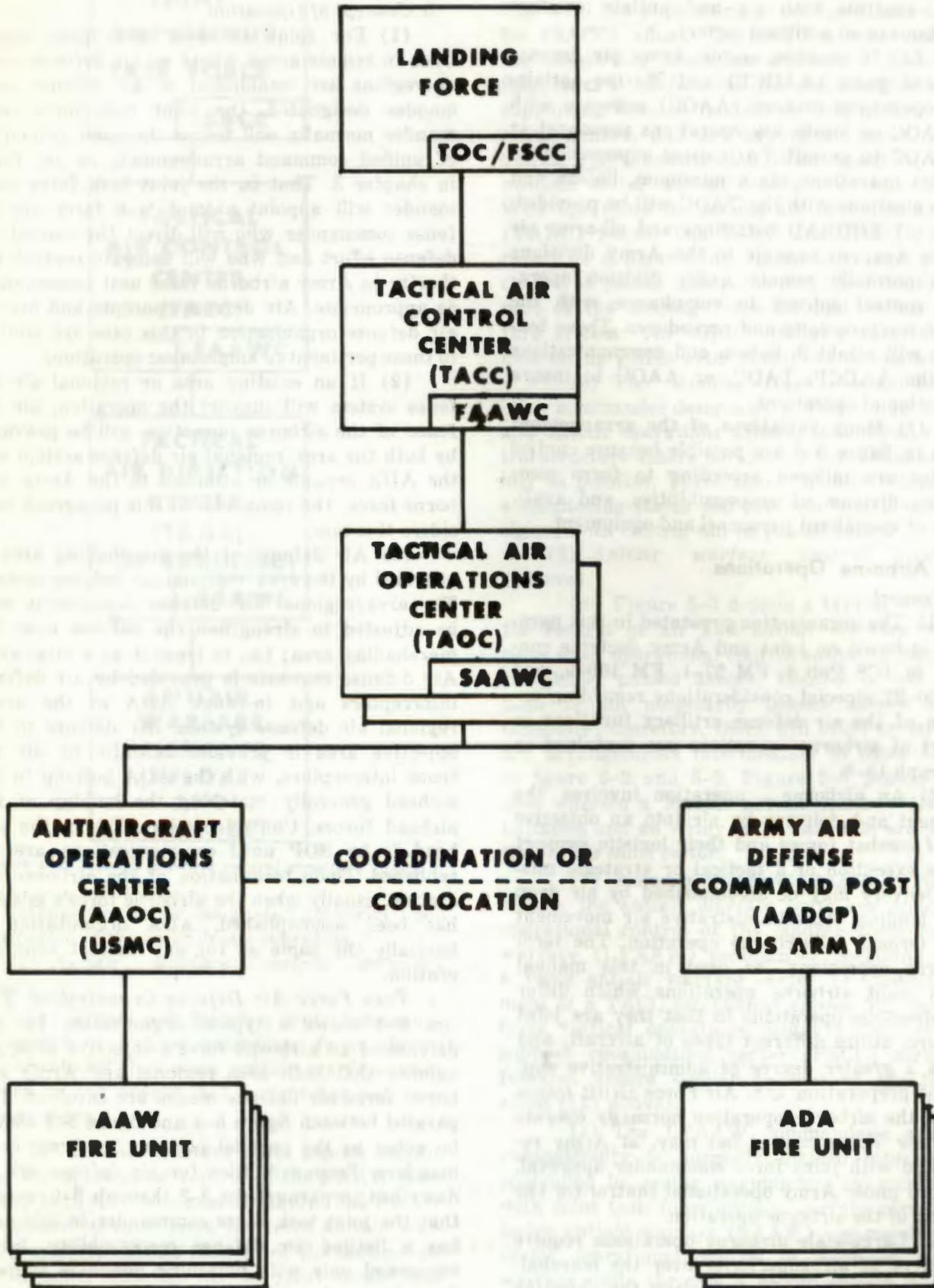


Figure 5-3. Antiair warfare control structure (ashore).

d. Army ADA Organization.

(1) *General.* The Army ADA commander is concerned with the ADA organizations for mounting, assault, and continued operations.

(2) *Mounting.* The mounting phase covers that period from receipt of the planning directive until aircraft are loaded and ready for takeoff. *Marshalling* occurs near the end of the mounting phase and includes troop movement to temporary camps (if required), movement to the loading airfields, and loading for takeoff. Operations by ADA units that are to defend the airborne force during mounting are in accordance with standard doctrine. ADA to accompany the airborne force are relieved from the air defense mission as necessary to complete final preparations for combat and to move to the loading areas. ADA should normally be organized for loading in such a way as to maintain ADA unit tactical integrity; however, loading should minimize the effects of loss of one aircraft. This latter requirement is met by visualizing, for each unit, the impact of loss of one carrier aircraft on unit command and control, firepower, mobility, and support capabilities. Emphasis is placed on retaining some capability for the application of controlled fire power, regardless of partial losses. SHORAD units committed to small unit defense normally will load with the unit to which organic or attached.

(3) *Air movement.* The air movement phase encompasses that period from takeoff of loaded aircraft to delivery of units to their drop zones or landing zones. Flight to the objective area is closely coordinated for several reasons, one of which is to insure the safety of the aircraft from friendly air defense fires.

(4) *Assault.* The assault phase begins with the initial assault landing of units on their drop or landing zones, extends through the seizure of assault objectives, and ends when the control of the airhead has been consolidated. Air defense units may land with the *assault echelon* and/or the *followup echelon*, with the latter being most likely for units other than Redeye. Determination of the specific time during which air defense units will enter the objective area is influenced by the fact that only Redeye and towed Vulcan units may be landed by parachute. Other ADA units must be air-landed, although certain elements and followup supplies may be parachuted into the area. Special care must be taken in preparing air defense guided missiles for air dropping due to their sensitivity and the need

to drop them near the ADA fire units. The ADA buildup should generally match the buildup of the forces in the airhead.

(5) *Continued operations.* The joint airborne task force may or may not be dissolved upon consolidation of the airhead, but at that time the assault phase is finished and ADA operations are in accordance with standard doctrine or as otherwise directed.

e. Control Concepts.

(1) Plans for airborne operations place Army ADA under control of the ground force commander for deployment to and within the airhead according to tactical requirements. Further responsibility for air defense of the operation is delegated as appropriate by the commander forming the joint task force, the area or regional air defense commander, or the joint airborne task force commander.

(2) The specific provisions made for airspace control will influence the requirement for communication with elements exterior to the airhead. Also, if arrangements are made for a combined air traffic control/air defense control facility within the airhead, the requirement for air defense peculiar communications may be decreased while coordination effectiveness is increased.

(3) Standard communications are established where possible and standard control procedures are used as soon as possible after the landing. Special rules of engagement based on designating the airhead as an *air defense artillery restricted area* may be used in order to exploit the probability that unidentified aircraft penetrating the airhead airspace will be hostile.

(4) Initial assault operations by SHORAD units will be characterized by extreme decentralization of control. If the fire units are to be reasonably effective during this period, all control procedures, including the procedures for control of fires, must be reduced to SOP. This will often result in restrictive fire control rules, possibly initially permitting engagement only of aircraft observed to be attacking units or facilities within the airhead.

5-4. Joint Contingency Operations

Each command prepares plans for major contingencies which can reasonably be expected in the principal geographic subareas of the command. The air defense organization(s) for contingency operations is (are) basically as described in chapter 3 when the operation is con-

ducted by the unified command or a subordinate unified command, or as discussed in paragraphs 5-2 and 5-3 if the joint task force structure is used. In any case wherein a joint contingency operation will require air defense forces, a joint force air defense commander will usually be ap-

pointed. An ADA organization especially tailored for use during the early stages of U.S. Strike Command contingency operations is the strategic air base air defense (STRABAD) battalion (para 6-3).

The Vulcan system may be used to provide ground fire support; however, the Chaparral does not have this capability. The Chaparral/Vulcan battalion includes two Chaparral and two Vulcan batteries employing a total of 24 Vulcan squads and 24 Chaparral squads, but may be mission/tactically tailored. The squad is the basic fire unit.

d. Vulcan. The Vulcan battalion includes four firing batteries employing a total of 48 Vulcan squads (fire units) and is organic to the airborne and airmobile divisions. The Vulcan system is capable of providing ground fire support in addition to SHORAD support.

e. ADA AW, M42. M42 (twin 40-mm, SP) battalions are capable of providing both SHORAD and ground fire support. The battalion includes four firing batteries, employing a total of 64 M42 squads. The squad is the basic fire unit.

f. Air Base Air Defense Battalions.

(1) *STRAF ADA battalions.* The Strategic Army Force (STRAF) air defense artillery battalion is a special organization which is activated from designated ADA units to provide LOMAD/SHORAD coverage for tactical air bases during the early stages of US Readiness Command contingency operations. The basic battalion of two Hawk batteries and one Chaparral/Vulcan battery is a building block for further tailoring, if required.

(2) *Other air base defense battalions.* Nondivisional Chaparral/Vulcan battalions deployed exclusively for tactical air base air defense may be reorganized as required for the particular mission(s) assigned. Considerations include the threat, the numbers and types of vital areas to be defended, the capabilities of the area air defense system (if present), and command, control, and support requirements.

6-4. Other Organizational Elements

a. Air Defense Command. When an echelon higher than that of the ADA brigade is required, a table of distribution organization is formed to meet the particular requirement. ADA units are then assigned or attached as required. The command may be responsible for the US Army portion of an area or regional defense, or may simply provide administrative, logistic, and training support to Army ADA elements operationally controlled by other commands. Examples of these special organizations include the US Army Air

Defense Command, theater army air defense commands, and the various CONUS and oversea regional air defense commands.

b. Army Missile Defense Command (AMDC). The AMDC will manage the Safeguard ballistic missile defense and other air defense artillery forces at the local or defense level. The AMDC will be capable of performing the administrative and tactical functions currently performed by a CONUS ADA group or brigade headquarters. It will also perform the defense-level tactical functions associated with the Safeguard ballistic missile defense system. The AMDC includes a headquarters and headquarters battery, a ballistic missile defense tactical element (consisting of a control center, missile site radar, and Spartan and Sprint missiles), a communications element, and a logistic support element.

**c. ADA AW Battery, M55.* M55 (mount with four caliber .50 machineguns) batteries are capable of providing both SHORAD and ground fire support. The batteries have no combat service support capability. The battery typically employs 24 M55 squads. The squad is the basic fire unit.

d. ADA Double Battery, Nike Hercules, CONUS. The double Nike Hercules battery employs the launching and fire control components of two Nike Hercules batteries under the control of a single battery headquarters. The double battery organization provides an increase in firepower with economy in personnel and equipment and is employed in CONUS defenses as warranted by vital area configuration and real estate considerations.

e. Battalion Group. When an ADA group headquarters is not available, or is not considered necessary, two or more ADA battalions may be combined into a battalion group. The designated battalion headquarters controls the battalion group and has the same role as an ADA group headquarters.

f. Air Defense Artillery Service Organization. TOE 44-510, Air Defense Artillery Service Organization, is a cellular table providing team composition for those capabilities peculiar to air defense artillery formerly included as augmentations or as organic to ADA TOE. Included are a variety of staff and support teams, control and coordination teams, fire distribution teams, radar

teams, and custodial teams. Teams may be assigned to the ADA brigade, group, battalion, or battery as required.

★g. Tailored ADA Organizations. Special ADA

battery or platoon, formed to support independent or semi-independent operations by units of less than division size.

4-5. Combined Arms Air Defense Resources

a. *Regimental* sections provide a local SHORAD capability for small combat and combat support units operating in the forward area. Organic

organizations may be formed (para 6-3f). Weapon ratios may also be changed within a composite organization; for example, the Chaparral/Vulcan battalion may be tailored to be

headquarters company a 2-day air defense unit. Radar sections are assigned at the mission per battalion, field artillery combat battalion, and armored cavalry squadron level and are supported by radar and armored cavalry regiments, also at the brigade/regiment level.

"gun-heavy" when deployed in a situation where in the air threat is small and the ground threat is great. Another tailoring example that may be encountered is the composite Chaparral/Vulcan battery or platoon, formed to support independent or semi-independent operations by units of less than division size.

6-5. Combined Arms Air Defense Resources

a. Redeye sections provide a local SHORAD capability for small combat and combat support units operating in the forward area. Organic

small arms and automatic weapons also provide a limited defense capability against air attack.

b. The basic Redeye fire unit is the two-man team. Three to six teams and a three-man section headquarters comprise a Redeye air defense section. Redeye sections are assigned at the maneuver battalion, field artillery cannon battalion, and armored cavalry squadron level and, in the separate brigades and armored cavalry regiments, also at the brigade/regiment level.

The functions and procedures presented in this chapter, although oriented toward combat units (field army) ADA operations, are also applicable to CONUS and CONINT ADA operations. Practices of these functions must be compatible with the rules and procedures established by the responsible command.

7-1. Principles

Principles governing field army ADA operations are contained in chapters 2 and 3.

7-2. Defense Types

ADA units may be deployed in several types of defense. The composition of the defended unit or installation, air defense priorities, ADA weapon characteristics and availability, and the threat generally determine the required defense type.

a. *Defense of an Operating Area (Area Defense).* ADA units are deployed in the area defense when ADA coverage is to be provided over all or most of an entire operating area, e.g., a field army. Total resources need not necessarily be achieved. The difference in Army and Air Force usage of the term "area defense" should be recognized in the different characteristics and employment concepts of the weapons involved. The common interceptor "area defense" typically involves a much larger distance and than does a U.S. Army ADA "area defense." The term "area defense" is used in this manual to refer to an Army ADA defense of an operating area, as opposed to Army ADA defense of an individual unit. One of the area defense is appropriate when the operating area of the supported force contains a relatively high density of critical assets (installations and units) and long range ADA is available. In such a case, provision of an overall area defense is a better utilization of ADA resources than is provision of individual defenses. A typical deployment for area defense places the ADA

units throughout the operating area, with the defenses weighted toward the most likely direction of approach and the primary assets. When ADA resources are insufficient to provide effective coverage, it often must be possible to withdraw area coverage, individual units, and resources for the higher priority assets. Figure 7-1 depicts a typical defense of an operating area. Figures 7-1, 7-2, and 7-3 illustrate basic concepts only. Actual fire unit positions will vary widely with terrain, the actual required defense weighting, and the most likely air attack direction of approach.

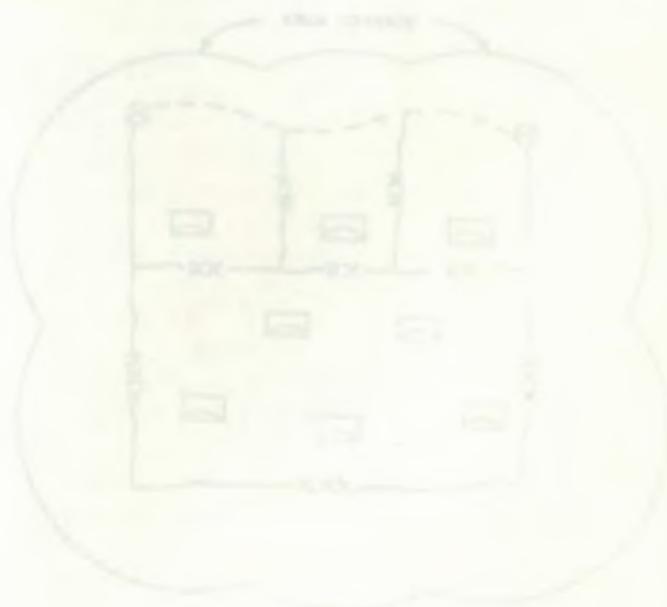


Figure 7-1. Area Defense.

b. *Defense of a Critical Asset (Point Defense).* ADA units are deployed in a point defense when critical assets are located in an operating area and the overall area defense resources are insufficient to provide effective coverage. In such a case, provision of an overall area defense is a better utilization of ADA resources than is provision of individual defenses. A typical deployment for area defense places the ADA

CHAPTER 7

FUNDAMENTALS OF ADA DEPLOYMENT AND EMPLOYMENT IN THE COMBAT ZONE

Section I. GENERAL

7-1. General

The fundamentals presented in this chapter, although oriented toward combat zone (field army) ADA operations, are also applicable to CONUS and COMMZ ADA operations. Practice of these fundamentals must be compatible with the rules and procedures established by the responsible commanders.

7-2. Principles

Principles governing field army ADA operations are contained in chapters 2 and 3.

7-3. Defense Types

ADA units may be deployed in several types of defense. The composition of the defended unit or installation, air defense priorities, ADA weapon characteristics and availability, and the threat generally determine the required defense type.

a. Defense of an Operating Area (Area Defense). ADA units are deployed in the area defense when ADA coverage is to be provided over all or most of an entire operating area; e.g., a field army. Total coverage need not necessarily be achieved. The difference in Army and Air Force usage of the term "area defense" should be noted. Due to the different characteristics and employment concepts of the weapons involved, the manned interceptor "area defense" typically involves a much larger defended area than does a U.S. Army ADA "area defense." The term "area defense" is used in this manual to refer to an Army ADA defense of an operating area as opposed to Army ADA defense of an individual asset. Use of the area defense is appropriate when the operating area of the supported force contains a relatively high density of critical assets (installations and units) and long range ADA or a large number of shorter range ADA are available. In such a case, provision of an overall area defense is a better utilization of ADA resources than is provision of individual defenses. A typical deployment for area defense places the ADA

units throughout the operating area, with the defense weighted toward the more likely air avenues of approach and the priority assets. When ADA resources are insufficient to provide effective area coverage, or when asset density does not warrant area coverage, individual vital area defenses for the higher priority assets should be provided. Figure 7-1 depicts a type area defense of a corps area. Figures 7-1, 7-2, and 7-3 illustrate basic concepts only. Actual fire unit positions will vary widely with terrain, the threat, required defense weighting, and the most likely air avenues of approach.

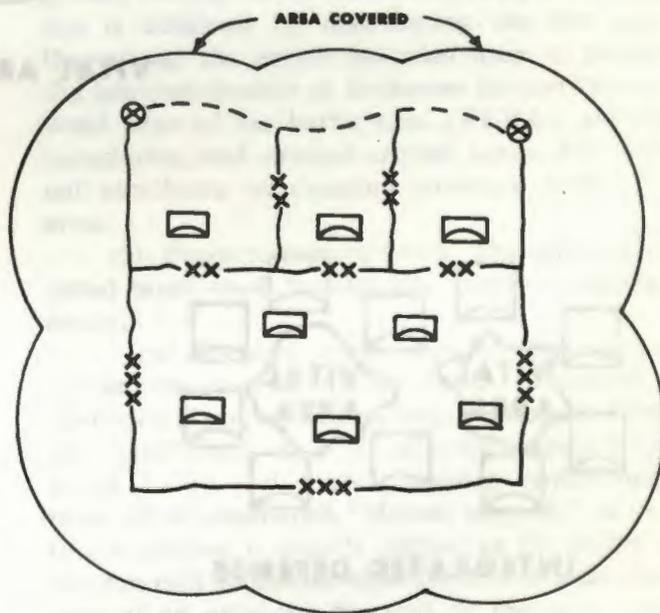
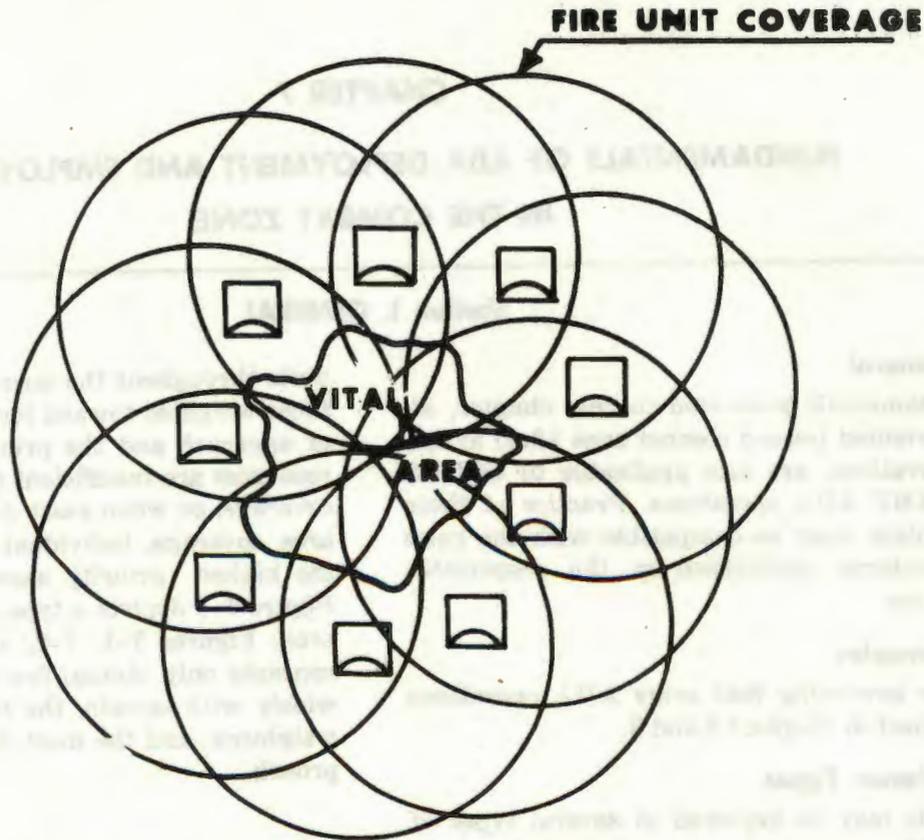


Figure 7-1. Area defense.

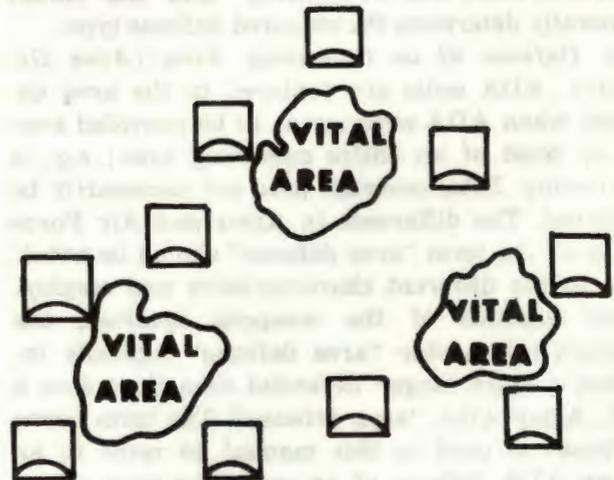
b. Defense of a Critical Asset (Vital Area Defense). ADA units are deployed in a vital area defense when specified assets, as opposed to operating areas, are to receive individual defenses. These defenses may reinforce the area defense at critical points or may be in lieu of the area de-



VITAL AREA DEFENSE



INTEGRATED DEFENSE



DEFENSE COMPLEX

Figure 7-2. Vital area defenses.

fense. The vital area defense provides approximately equal firepower on any direction of attack into the vital area, with possible weighting toward the more likely air avenues of approach. Vital area defenses range in size from small bridge defenses to defenses of CONUS population

centers. Defenses of the former type may be further identified through use of the term "small vital area defense." Figure 7-2 depicts a type defense of a single vital area and also illustrates an "integrated defense" and a "defense complex." An "integrated defense" is a single defense provid-

ing coverage for, and formed from the originally planned defenses of, two closely adjacent vital areas. Three or more defended vital areas so close together that the defenses have been combined into one defense constitute a "defense complex."

c. Defense of a Small Unit (Small Unit Defense). ADA elements assigned to defend a small unit (battalion, company) will provide a local air defense capability specifically responsive to the small unit. This defense type may be considered as a variation of the vital area defense.

d. Composite Defense. A composite defense is composed of two or more ADA weapon system

types deployed in one or more of the defense types. The composite defense is normal in the field army.

e. Special Defenses. Special ADA defenses may be required. For example, a "flak trap" may be established either as an individual deployment or in conjunction with other defenses. A "flak trap" is employed with the primary objective being the destruction of enemy aircraft which are lured or deceived into attacking a real or imaginary target. Another possible special defense assignment is harassment of enemy air lines of communication and enemy combat air patrols by the long-range ADA.

Section II. DEPLOYMENT CONCEPTS

7-4. Field Army ADA Deployment Scheme

a. The typical field army ADA defense is a composite defense employing several weapon system types. As shown in the vertical plane view in figure 7-3, the weapons in a composite defense complement each other. A horizontal plane view would reveal the same complementary effects.

b. The Nike Hercules weapons are positioned to provide area coverage of all or most of the field army area. This high-and-medium-altitude coverage may be weighted toward exposed boundaries and priority assets. Hawk weapons complement Nike Hercules at medium and low altitudes and provide an increase in the low-altitude detection and engagement capabilities of the composite defense. Both weapons are radar-directed and provide all-weather coverage.

c. The self-propelled Hawk, ADA AW of all types, and Chaparral fire units are positioned forward to complement the coverage provided by the longer range systems and to protect the forward units and installations against low-altitude air attack. The ADA AW and Chaparral are visually-directed fair-weather weapons.

d. Redeye, and organic non-air-defense weapons employed in the air defense role, are used to provide local air defense for small units. The air defense coverage provided by these visually-directed fair-weather weapons will not be considered in ADA deployment planning. However, the units employing these weapons should consider the location and coverage of nearby ADA weapons whenever practical.

e. The following paragraphs provide basic weapon deployment guidelines. Section III, chap-

ter 10, applies the guidelines in various offensive and defensive situations.

7-5. Nike Hercules Deployment Guidelines

a. Area Defense.

(1) *Weighted area coverage.* The primary guideline for deployment of Nike Hercules units in an area defense is that weighted area coverage must be achieved and maintained during the ground combat force maneuver. Weighted coverage is obtained by distributing the fire units throughout the entire defended area to provide the heaviest density of firepower toward the forward edge of the battle area (FEBA), exposed boundaries, and around critical areas, but without sacrificing overlapping coverage within the area.

(2) *Position requirements.* The position selected must meet tactical and technical requirements.

(a) *Tactical requirements.* Mission and air defense coverage requirements, provisions of operation plans, road space requirements and road net conditions, factors affecting employment (para 7-12), and mutual support requirements must all be considered. "Mutual support," as used in air defense, is usually defined as the ability of one fire unit to deliver effective fire into the dead zone of an adjacent fire unit of the same type. Mutual support strengthens the defense by providing a high degree of overlapping fires. The required degree of overlapping fires is achieved by positioning adjacent fire units of the same type *at least as far apart as their dead zone diameter but no farther apart than eight-tenths of effective missile range.* Effective missile range varies with

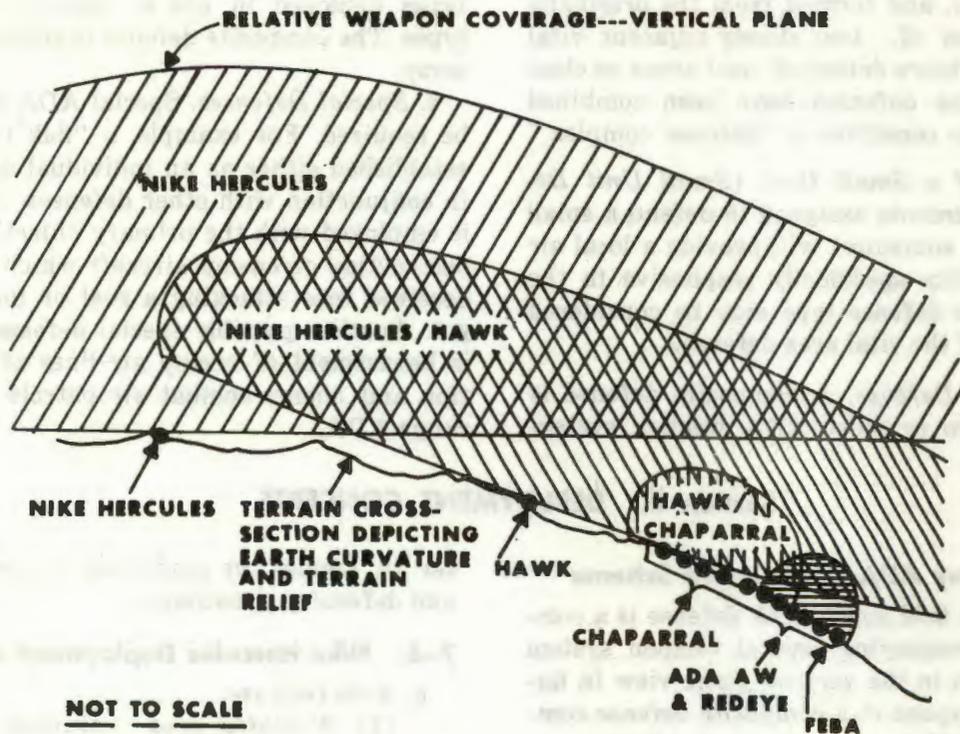


Figure 7-3. Field army ADA deployment scheme.

system and target characteristics. Mutual support cannot be achieved if eight-tenths effective missile range separation is exceeded; however, a degree of effective overlapping fires will be retained until separation exceeds 1.6 effective missile range. At this time, weaknesses may appear in the defense coverage.

(b) *Technical requirements.* Technical requirements, which include equipment line of sight, terrain level, cable lengths, maximum antenna-to-launcher depression angles, survey control, electronic security, electromagnetic safety requirements, and reduction of radar clutter effects, must be satisfied. (System-peculiar details for Nike Hercules are presented in FM 44-95.)

b. Vital Area Defense.

(1) *Balance.* The primary guideline for deployment of Nike Hercules units in a vital area defense is that the defense must be balanced; i.e., the defense must be able to deliver approximately equal firepower in all directions. The weapons must be positioned to engage the air threat before it can release ordnance against the vital area. The probable air avenues of approach should be weighted if a sufficient number of fire units are available; however, minimum coverage of all directions of attack should be maintained. Defense in depth is highly desirable and, if sufficient fire

units are available, several defense "rings" should be deployed. However, often only sufficient fire units will be available for a single defense "ring" which compromises between early engagement and mutual support requirements.

(2) *Position requirements.* See a(2) above for position requirements.

c. Composite Defense. A composite defense composed of Nike Hercules and other ADA systems is designed by first planning the deployment of Nike Hercules, and then planning the deployment of the other systems according to their deployment guidelines with emphasis on filling gaps in Nike Hercules coverage.

d. Defense Design Techniques. See AF 44-1-1.

7-6. Hawk Deployment Guidelines

a. Area Defense.

(1) *Weighted area coverage.* Provision of a Hawk-only area defense over a large area (e.g., an entire field army area) is unusual due to the range and altitude capabilities of the system. Hawk may be deployed without Nike Hercules in some operations where the area to be defended is relatively small and HIMAD coverage can be provided by interceptor aircraft. Hawk units in the area defense should be positioned so that coverage is weighted toward and into low-altitude air ave-

nues of approach and in favor of those areas containing key forces and installations; also, coverage should be provided for air avenues of approach not adequately covered by other air defense means. Mutual support, or at least a degree of overlapping fires, should be achieved and maintained during ground force maneuvers.

(2) *Position requirements.* Paragraph 7-5a (2) applies. (Details of technical requirements for Hawk positions are presented in FM 44-96.)

b. Vital Area Defense. When insufficient Hawk units are available to provide air defense of an entire area, Hawk vital area air defenses may be established. Hawk units must be positioned to provide adequate coverage of all medium- and low-altitude air avenues of approach, with emphasis on the latter. Position requirements are covered in a(2) above.

c. Composite Defense. A composite defense including Nike Hercules fire units is planned as indicated in paragraph 7-5c. In a composite defense wherein Hawk is the longest range system, Hawk deployment is planned first and the deployment of the other systems is planned according to their deployment guidelines with emphasis on filling gaps in the Hawk coverage.

d. Defense Design Techniques. See FM 44-1-1.

7-7. Chaparral Deployment Guidelines

a. Area Defense.

★(1) *Weighted area coverage.*

(a) Chaparral, in the quantities typically deployed with a force, is well-suited to provide a weighted area defense in the division area. Total coverage need not necessarily be achieved. The primary deployment guideline for conduct of a Chaparral weighted area defense is to cover the low altitude air avenues of approach into the division area that are not adequately covered by other weapons, with emphasis on forward deployment. Use of the Chaparral area defense concept, as part of a coordinated deployment with the other ADA deployed in accordance with their deployment guidelines, will lead to the most efficient utilization of available Chaparral resources. The maximum number of division high-value assets will then benefit from the Chaparral defense and the maximum number of enemy aircraft will be destroyed while fire unit requirements are minimized.

(b) Chaparral deployment variations that may be applied when limited Chaparral weapon availability, limited space for deployment, or some other condition precludes full implementation of

the above-described area defense concept are as follows: deploy to defend unit march columns; deploy to defend a priority subarea; or deploy to defend priority small vital areas, using the vital area defense concept (b below). A complete lack of complementary ADA AW may also affect the Chaparral area defense by requiring more emphasis on weighting to favor designated vital areas.

(2) *Position requirements.* Chaparral fire units are normally positioned to maintain some overlap of fires throughout most of the area defense. Mutual support (in the Chaparral application, the term simply implies a specified high degree of overlapping fires) may be required in certain areas. Some portions of the area may not be covered at all. Mutual support may be insured by separating adjacent Chaparral fire units by *no more than 2.4 kilometers* (0.8 estimated maximum range for positive visual identification of aircraft) if positive hostile visual identification is required ("weapons tight" weapons control status), or by *no more than 0.8 effective missile range* if positive hostile visual identification is not required ("weapons free" weapons control status). Other factors affecting tactical positioning are discussed in paragraph 7-12. (Details regarding Chaparral technical position requirements are contained in FM 44-3.)

★*b. Vital Area Defense.* Although the Chaparral area defense concept, or some variation thereof, is used for defense of most division operations, there will be cases where the establishment of Chaparral vital area-type defenses is appropriate. For example, Chaparral would defend an isolated airhead as a vital area. In that case, and in the air base air defense (para 6-3f) deployment, use of the area defense concept would be impractical.

(1) *Balance.* The primary guideline for deployment of Chaparral units in a vital area defense is to provide a balanced all-round defense. A defense in depth, capable of destroying the enemy before he strikes the defended vital area, is desired. An ideal deployment pattern would be a Chaparral "ring(s)" well out from the vital area, with adjacent weapons within mutual support distance of each other. ADA AW deployed in or near the vital area would back up the Chaparral defense. Terrain, ground security requirements, and the presence of other ADA weapons will dictate modifications of the basic pattern.

(2) *Position requirements.* See a(2) above for position requirements. Maintenance of mutual

support between fire units is desired in vital area defenses.

c. Composite Defense. The principles applicable to Hawk also apply to Chaparral. It should be noted that in a composite Chaparral and ADA AW defense, the two weapon types are not deployed "side-by-side." Such deployment would degrade the complementary effects of the two weapons and thus significantly reduce overall defense effectiveness. This is because Chaparral is best suited for positioning *away* from the asset to be defended, whereas ADA AW are best deployed *in* or *near* the defended asset.

d. Small Unit Defense. Chaparral units may conduct the defense of small units on an area basis or by directly accompanying the defended unit. The unit operating area and method, terrain, and proximity to the FEBA are influencing factors. Deployment of Chaparral for defense of a small unit (company, battalion) is not the most efficient utilization of the weapon.

e. Defense Design Techniques. See FM 44-1-1.

7-8. Air Defense Artillery Automatic Weapon Deployment Guidelines

★*a. General.* ADA AW (Vulcan, M42, M55) are not suited for the conduct of an area defense due to their short range. ADA AW deployments will be influenced by the coverage afforded by area defense ADA weapons. Four weapons are considered to be a minimum defense. Factors affecting tactical positioning are discussed in paragraphs 7-7c and 7-12. Technical position requirements are presented in FM 44-2 and FM 44-3.

b. Vital Area Defense. ADA AW fire units conducting a vital area defense are positioned to provide a balanced defense in those cases where the enemy can attack equally well from all directions. The weapons are sited in or near the vital area so that continuous fire can be delivered before the enemy can release ordnance. When sufficient weapons are available, coverage should be weighted toward the most likely air avenues of approach; however, adequate coverage must be provided for all directions of attack. Mutual support between weapons is required. Mutual support is obtained by weapon separations of between 100 and 1,100 meters for the 40-mm weapons, 100 and 1,100 meters for the 20-mm weapons, and 90 and 480 meters for caliber .50 ADA AW. Fire unit separation by at least the minimum distances prescribed enables crewmembers to distinguish be-

tween tracers fired from their units and adjacent fire units.

c. Small Unit Defense. Priorities for use of ADA AW may require some ADA AW to perform the small unit defense mission. Only those priority units for which an adequate defense can be provided should be allocated ADA AW. Units in position are defended using vital area defense guidelines. When defending a unit column, emphasis is placed on the front and rear of the column with the remaining weapons dispersed throughout the column. Fire units should also be placed at critical points like bridges, defiles, and passes along the march route. These fire units are kept in place only as long as the points remain critical to the march column. Road conditions and column speed permitting, towed ADA AW elements can best accomplish their mission by occupation of successive static positions along the march route; i.e., by leap-frogging. ADA AW fire should be planned to augment the ground security fires of the defended unit.

d. Ground Fire Support. When ADA AW are employed for ground fire support, fire support plans are expanded to include ADA AW fires. Weapon positions are selected by the ADA AW unit commander subject to the approval of the supported unit commander.

e. Defense Design Techniques. See FM 44-1-1.

7-9. Other Weapon Deployment Guidelines

a. General.

(1) Redeye deployment guidelines are presented in FM 23-17.

(2) Small arms and automatic weapons can provide units with a limited self-defense capability against hostile low-flying aircraft. The following guidelines apply to those weapons designated by the commander as having a primary air defense mission.

b. Defense of the Unit in Position. The air defense positions selected for the weapons must provide for maximum observation and unobstructed fields of fire. Positions selected should allow accomplishment of both the air defense and ground fire missions. Units furnished automatic weapons in sufficient numbers should position adjacent weapons within mutual support distance (90 to 480 meters) of each other. Each weapon is assigned a primary and secondary sector of fire. When a weapon is manned by

a crew, a crew member should maintain constant vigilance in the primary sector of fire, regardless of the sector in which the weapon is actually engaged. Where possible, unit machinegun positions should be coordinated with adjacent unit defenses to insure adequate coverage at unit boundaries.

c. Defense of the Unit During Movement.

When mission, time, terrain, weapon allocations, and road conditions permit, machineguns should be positioned at critical points along the route of march in advance and in addition to placing them within the convoy itself. Locations where an air attack could halt the entire column; e.g., bridges and defiles, should be considered critical points. Weapons should be located as close to the critical point as possible while maintaining balance, observation, unobstructed sectors of fire, and mutual support distances. In column movement, machineguns should be sent ahead to critical locations with column security elements. This prepositioning, or leapfrogging, to critical locations may be accomplished by using air or ground vehicles. When advance occupation of critical positions is impractical, all weapons should be placed in the march column with emphasis on the lead and rear elements and application of mutual support requirements.

d. Further Detail. See paragraph 10-13 for further detail.

7-10. FAAR Deployment Guidelines

a. General. Forward area alert radars (FAAR) are organic to the Chaparral/Vulcan battalions. The FAAR's are short-range, low-altitude air defense radars used to provide alerting and tentative identification data to SHORAD units. The FAAR mission priorities, in order, are to provide data to Chaparral and Vulcan fire units; to provide data to Redeye teams; and to provide area radar coverage. The FAAR and ADA fire unit deployments are closely interrelated. Not only must the FAAR be positioned to serve the maximum number of fire units within a designated area, but each fire unit must be informed which particular FAAR data transmissions it is to monitor with its rapid alerting/identification device (RAID). This FAAR/fire unit pairing is critical, and should normally be managed from the Chaparral/Vulcan battalion level or, in the case of Redeye, from the Redeye section level.

b. Position Requirements. The FAAR deployments and/or FAAR/fire unit pairing are changed

as necessary to maintain support of the fire units. Individual radar sites are chosen to obtain maximum low-altitude radar coverage of a designated area, and also to insure FM radio line of sight to the maximum number of in-range fire units. These requirements often conflict. Radar position in relation to the position of the fire units served must be such that the fire units receive alerting data in time to insure effective reaction to the air threat. This requirement may be met by insuring that FAAR coverage overlaps the fire unit position(s) by at least 10 kilometers in the expected direction of air attack. Since FAAR will be an attractive target for air attack, consideration should be given to collocating FAAR and ADA AW positions whenever position and mission requirements permit. See paragraph 7-12 for discussion of factors affecting tactical positioning.

7-11. Flak Trap Guidelines

a. General. Air defenses are designed to defend an area, installation, or unit against air attack. A flak trap, however, is designed with the primary objective of destroying enemy aircraft. A flak trap may be deployed separately from, or in conjunction with, a standard defense.

b. Concept.

(1) Effective flak traps require real or expertly simulated "bait" of sufficient interest to lure enemy aircraft to their destruction. Enemy flight paths should be channelized by terrain, obstacles, other air defenses, or the nature of the bait to maximize the effectiveness of the air defense units posted along the attack and escape routes. Recently-vacated ADA missile sites and major bridge complexes are likely sites for establishing flak traps.

(2) The Hawk, Chaparral, and Vulcan combination is well-suited for flak trap employment. A concept of employment would place Hawk to best cover the bait area, while remaining radar-silent, with the other weapons densely deployed along the expected attack and escape route. ADA fires commence after the enemy aircraft are committed to an attack profile and enter the Chaparral/Vulcan engagement zone. At this time, the Hawk batteries become active to engage aircraft forced up by the intense Chaparral/Vulcan fires. Fire is maintained as long as aircraft are in range. Premature firing must be avoided to maximize aircraft attrition. Close coordination and excellent communication between units are essential to a successful flak trap operation.

c. Considerations. The decision to employ a flak trap should consider the following advantages and disadvantages:

(1) *Advantages.* Provides high aircraft attrition in a short time, diverts enemy aircraft from other friendly assets, deceives and surprises

the enemy, masses ADA firepower, and blocks an air avenue of approach.

(2) *Disadvantages.* Depends on the enemy accepting the bait, requires support in bait preparation, reduces ADA unit dispersion, reduces ADA unit availability for other defenses, and often offers only a one-time opportunity.

Section III. EMPLOYMENT CONCEPTS

7-12. Factors Affecting Employment

a. Mission. The assigned mission is the paramount factor influencing ADA employment. For example, the missions of defending rapidly moving ground combat forces in the forward area and defending a static rear area installation require substantially different concepts of ADA employment.

b. Deployment Guidelines. The deployment guidelines presented in paragraphs 7-4 through 7-11 provide criteria to insure proper weapon deployment.

c. Air Threat. The threat weapons and attack techniques must be determined or estimated. The defense is then designed and operating procedures developed to provide maximum effectiveness against those combinations of weapons and techniques that are known to be available to the enemy in meaningful quantity and likely to be employed by him. The defense should deny the enemy any best path or method of penetration.

d. Ground Threat. The capability of ADA units to influence the outcome of the air battle makes them high priority targets for enemy ground attack, thus influencing ADA unit employment. Paragraph 10-12 covers local security considerations in detail.

e. Terrain and Weather. Terrain and terrain masking significantly influence ADA employment as discussed in FM 44-1-1, FM 44-2, FM 44-3, FM 44-95, and FM 44-96. Extreme rain-fall, wind, temperature, and poor visibility conditions can influence the air threat and ADA employment.

f. Weapons Capabilities and Limitations.

(1) *Range.* Although enemy ELINT, observation, and artillery capabilities influence positioning of ADA units in relation to the FEBA, the range of the weapon employed must also be considered in this regard. The weapon range will also determine positioning for mutual support.

(2) *Rate of fire and kill probability.* The rate of fire and kill probability of a given system

will determine the density of units required to counteract the threat. A defense utilizing high rate-of-fire systems capable of conducting multiple engagements will require fewer units to destroy or reduce a given threat than a less capable defense.

(3) *Radar limitations.* An ADA system employing conventional pulse acquisition radars will be relatively ineffective against very low-altitude targets. This will dictate complementation by a system using continuous-wave (CW) radars. Since terrain will present masking problems to either type radar, further complementation by SHORAD systems ordinarily will be required.

(4) *Other weapons.* Since the capabilities of the family of air defense weapons are complementary, the presence or absence of each type will affect the employment of the others.

g. Communications. The necessity of maintaining communications between fire units and control echelons must be considered in determining the employment of ADA units. Circuit requirements, responsibilities, and planning factors are discussed in detail in paragraph 10-9.

h. Mobility. The mobility of the defending ADA unit must match that of the defended unit. The mobility of ADA AW, Chaparral, and self-propelled Hawk should be exploited to provide air defense to the forward elements and to mobile task forces. Mobility can also increase the survivability of ADA units as discussed in paragraphs 7-13 and 10-12.

i. Vulnerability. Vulnerability of ADA weapons should be reduced by implementing the applicable survivability measures discussed in paragraph 10-12.

j. Electronic Warfare. ADA operations involve heavy reliance on radio and radar. The advent of sophisticated electronic counter-measures (ECM) techniques, and antiradiation missiles which home on radar energy, further complicate the problem of insuring ADA effectiveness and survivability. A careful analysis of the threat

and defense capabilities to reduce electronic vulnerability without degrading defense effectiveness must be made. Measures to reduce electronic detection vulnerability are discussed in paragraph 10-12.

7-13. Displacement and Maneuver

a. General. Displacement and maneuver of ADA units fall into two categories:

(1) Movement required to support the plan of maneuver of the supported units.

(2) Movement designed to enhance survivability.

b. Movement to Support the Maneuver Plan. The field army commander and subordinate commanders will maneuver their ADA units as necessary to support the maneuver plan. The following general considerations govern movement to support the maneuver plan.

(1) ADA units may displace by echelon, with batteries of a battalion moving one or two at a time. This technique minimizes vehicle and road space requirements and maintains maximum ADA support during the move. Planning must consider the effects of ADA unit movement time on defense effectiveness.

(2) A special consideration for the displacement of headquarters and headquarters batteries is the requirement to maintain continuous communications between the headquarters and the subordinate units. This requirement may be met by echeloning communications facilities from the old location to the new. Alternatively, a subordinate unit may be designated to absorb the headquarters functions while the headquarters moves.

(3) The deep deployment of Nike Hercules units tends to reduce the number of moves required to support the maneuver plan. One battery in each battalion is moved at a time. Battery out-of-action time may be reduced by moving some launchers to new positions while the battery is still in action. Engineer support should be requested to assist the unit in preparing the new position.

(4) Hawk units can move rapidly by motor or air transport. The method of displacement should be governed by the following considerations:

(a) Required levels of defense in the old and new areas.

(b) Limitations on the low-altitude capabilities of enemy aviation due to darkness and weather.

(c) The ability of a Hawk battery to provide limited air defense with one fire unit while moving the other(s). The impact on firepower and the increased command and control difficulties caused by splitting the battery must not be overlooked.

(5) The ADA unit accomplishes route and position reconnaissance, position selection, and occupation of position as described in FM 44-2, FM 44-3, FM 44-95, FM 44-96, and paragraph 10-18.

★(6) Redeye teams should accompany the unit with which they are normally employed.

c. Movement to Enhance Survivability. Frequent movement usually enhances the survivability of ADA units by lowering the probability of enemy detection and subsequent attack. The extent to which this tactic should be practiced is directly related to the enemy's intelligence capability. This is balanced against ADA unit mobility and self-defense capability, ADA unit vulnerability to ground and air attack during the move, ADA equipment sensitivity, air defense mission requirements, and out-of-action time. The probable priority for destruction of each type of ADA unit, as seen from the enemy viewpoint, must be considered. Also to be considered is the fact that moves conducted to support the maneuver plan may be sufficient to meet the requirement to move for survivability purposes. An examination of each situation to determine the requirement for, and the practicability of, "random" deployment to alternate sites should be a primary item of consideration in air defense planning. Considerations for movement to enhance air defense artillery unit survivability include—

(1) *Nike Hercules.* The employment of Nike Hercules in depth against the high-altitude threat permits sufficient early warning so that Nike Hercules radar emissions may be limited to counteract the electronic intelligence (ELINT) threat. The Nike Hercules movement cycle need only be of sufficient frequency to protect it from results of clandestine observation, intercept of stray electromagnetic radiation, and observation by deep reconnaissance aircraft or other slow reaction means. The effect of realistic unit movement times on mission effectiveness is significant and must be considered. The Nike Hercules siting requirements and range capability indicate an allowable radius of 25 kilometers for selection of alternate sites without disturbing overall defense balance.

(2) *Hawk*. Hawk may be deployed at considerable distances from enemy detection means, but frequently may be found in forward areas where it is more vulnerable. Since Hawk defends against low-altitude targets against which little warning will be available, a number of Hawk radars must be radiating electromagnetic energy. This increases exposure to ELINT. These considerations magnify the importance of frequent Hawk displacement. Positions intended for use as alternate sites should be selected so as not to prejudice the overall defense.

(3) *Chaparral*. Chaparral's mobility and fire unit simplicity enable it to employ passive defense measures to reduce the probability of suppression. The smoke and dust created by firing may permit detection; therefore, Chaparral should occupy alternate positions as soon after an engagement as the situation permits.

(4) *ADA AW*. ADA AW will be deployed without regard to battlefield depth. For ADA AW

outside the range capability of conventional artillery (about 15 to 20 kilometers), movement serves no passive defense function since suppression by means other than artillery would be uneconomical. ADA AW less than 20 kilometers from the FEBA will require frequent movement to alternate positions to survive. If employed within visual detection range of the FEBA, ADA AW should displace as soon as practical after each engagement.

★(5) *Redeye*. The passive nature of the Redeye weapon, and the fact that the element which it defends would normally be a higher priority target than Redeye for the enemy, indicates a reduced requirement for frequent movement of the Redeye units for survivability purposes. However, Redeye's distinctive firing signature (possibly visible to both aerial and ground observers) and forward deployment indicates a requirement for Redeye teams to establish alternate positions for occupation after an engagement as the tactical situation permits.

CHAPTER 8

ADA ORGANIZATION AND ORGANIZATION FOR COMBAT

Section I. ORGANIZATION

8-1. General

a. This chapter and chapters 9 and 10 pertain to the ADA forces of a US field army that is operating under a US army group, a unified command or subordinate unified command, or US theater army in those instances where the theater army commander has retained operational control of the Army combat forces and has responsibility for direction of US ground force operations. The organizational principles discussed also apply to the ADA forces of a US field army containing allied units or operating under the direction of a combined force headquarters. Overall theater air defense organization is discussed in chapter 3.

b. The organization and the organization for combat of the Army ADA resources assigned or attached to the field army are the responsibility of the field army air defense officer designated by the field army commander.

8-2. Field Army Air Defense Artillery

Field army air defense artillery consists of units assigned or attached to the field army and not further assigned or attached to subordinate elements of the field army. Field army air defense artillery will normally consist of an assigned ADA brigade. *Air defense artillery with the army* includes the field army ADA and the ADA organic or attached to subordinate elements of the field army.

8-3. Corps Air Defense Artillery

Corps air defense artillery may consist of an attached ADA group; or corps ADA requirements may be met by placing an ADA group of the *field army air defense artillery* in direct support of the corps (para 8-15b). *Air defense artillery with the corps* includes the corps ADA and all other ADA units which are organic or attached to subordinate elements of the corps.

★8-4. Division Air Defense Artillery

Division air defense artillery includes an organic Chaparral/Vulcan or Vulcan battalion and attached ADA units as required. When the division air defense is provided by more than one battalion, a battalion group may be formed.

8-5. Combined Arms Air Defense Means

All-arms air defense weapons organic to small divisional and nondivisional units provide a unit self-defense capability and are not considered to be a part of the theater and field army air defense deployments. However, in fulfillment of their missions the all-arms weapons contribute to the effectiveness of the overall air defense deployment.

8-6. Type ADA Allocation to a Field Army

a. A type allocation of ADA units to a field army consisting of three corps and twelve divisions (nine committed, three in reserve) has been developed for illustrative purposes. This type allocation is not intended to depict any organization in being nor is it meant to depict the needs of a particular theater or contingency plan. The type allocation provides an air defense force which, when deployed, presents the enemy no "best" choice of action—defense is strong in all areas at all altitudes. It should be noted that the basis of allocation does not suggest the organization for combat.

b. The type basis of allocation is—

★(1) One Chaparral/Vulcan or Vulcan battalion per division.

(2) One self-propelled Hawk battalion per committed division. (It is assumed that in a four-division corps, three divisions will be committed and one will be in reserve.)

(3) Two Chaparral/Vulcan battalions per corps.

(4) Four towed Hawk battalions per three-corps field army, and one towed Hawk battalion per corps.

(5) Two Nike Hercules battalions per corps.
 (6) Five ADA group headquarters.
 (7) One ADA brigade headquarters.

Section II. TACTICAL MISSIONS

8-7. General

★*a.* Tactical missions for ADA units are assigned by the force commander exercising command or operational control (para 2-9), based on the force ADA commander's recommendations, and published in the force operations order. Tactical missions define the responsibility of ADA placed in support or reinforcement of another unit. The tactical missions are primarily applicable to combat zone ADA operations, but may be used elsewhere.

b. A tactical mission assignment dictates that the ADA unit involved provide liaison and communications to certain other elements in addition to the normal command communications. The installations or headquarters with whom liaison and communications is effected will be specifically designated by the commander assigning the tactical mission. A type liaison and communication agreement is shown in figure 9-1.

c. ADA organizations from fire unit to brigade may be assigned one of four standard tactical missions. Listed in descending order of the amount of centralized control retained by the commander assigning the tactical mission, they are *general support*, *general support-reinforcing*, *reinforcing*, and *direct support*. Modified tactical missions may be assigned in some cases. The responsibilities inherent in each of these tactical missions are tabulated in figure 8-1 and are discussed in the following paragraphs.

★*d.* ADA units assigned a tactical mission normally establish communications as depicted in figure 8-1. Figure 8-1 also identifies the commander from whom the ADA unit will receive deployment and firing sector orders, and delineates the ADA unit commander's restrictions in further assigning tactical missions to his subordinate ADA units. Paragraph 2-9*b* provides further discussion of mission assignment restrictions. It should be noted that figure 8-1 provides information directly pertinent to ADA units which have been assigned tactical missions, but in no way restricts the force commander in his initial assignment of tactical missions to the ADA units.

8-8. General Support

★*a.* An ADA unit assigned the tactical mission of general support (GS) provides air defense support of a force as a whole. The ADA units with this mission will remain under the command or operational control of the commander assigning the mission. General support is the normal tactical mission of field army Nike Hercules and Hawk units, corps Hawk units, and divisional Chaparral/Vulcan battalions. It is to be understood that the force operation order requiring a tactical mission of an ADA unit may further require that certain of the ADA unit's subordinate elements accomplish other tactical missions. For example, the division operation order may specify that the divisional Chaparral/Vulcan battalion be retained in GS while requiring that one of the battalion's batteries be placed in direct support (DS) of one of the brigades.

b. Liaison and communications are established as directed with the Air Force control installations. Liaison and communications are also established as directed with other ADA GS units to insure coordination of ADA fires across force boundaries.

8-9. General Support-Reinforcing

a. An ADA unit given the tactical mission of general support-reinforcing furnishes air defense support for a force as a whole and, in addition, reinforces the defenses of another ADA unit. A unit with this tactical mission remains under the command or operational control of the commander assigning the mission. General support-reinforcing is normally accomplished through designation of engagement priorities. This is the tactical mission normally given to a self-propelled Hawk unit when it is to augment the fires of a divisional Chaparral/Vulcan battalion.

b. Liaison and communications requirements are the same as those for general support and, in addition, both are established with the reinforced unit.

8-10. Reinforcing

★a. An ADA unit assigned this tactical mission augments the defenses of another ADA unit. The reinforcing unit remains under the command or operational control of the commander assigning the reinforcing mission, but its defenses are planned and controlled by the reinforced unit as

necessary for accomplishment of the reinforced unit's mission. A sample application would be assigning a Hawk battery of a corps Hawk battalion the tactical mission of reinforcing a divisional Chaparral/Vulcan battalion for a particular operation.

b. Communications and liaison are established

SUPPORT	AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	TACTICAL MISSION	
GENERAL SUPPORT	1. AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION. 2. REINFORCED ADA UNIT.	HEADQUARTERS ASSIGNING TACTICAL MISSION.	GENERAL SUPPORT GENERAL SUPPORT-ASSIGNED/CONTROL
REINFORCING	1. REINFORCED ADA UNIT. 2. AS DIRECTED BY REINFORCED ADA UNIT. 3. AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	1. REINFORCED ADA UNIT. 2. AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	GENERAL SUPPORT GENERAL SUPPORT-ASSIGNED/CONTROL REINFORCING
DIRECT SUPPORT	1. SUPPORTING UNIT. 2. AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	1. ADA UNIT COMMANDER. 2. AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	GENERAL SUPPORT GENERAL SUPPORT-ASSIGNED/CONTROL REINFORCING DIRECT SUPPORT

between the reinforcing and reinforced unit, and as directed. This includes interconnection of electronic control and coordination systems as applicable.

8-11. Direct Support

a. An ADA unit assigned the tactical mission of direct support (DS) provides close and continuing air defense for a designated target element and must coordinate its operations with this element. The direct support ADA commander assigns his unit as necessary to defend the supported element. When an ADA unit is placed in direct support of a force element it will, if possible, be placed in direct support of the same element in subsequent operations. This will facilitate teamwork. An ADA unit with a tactical mission of direct support remains under the command or operational control of the headquarters assigning the mission. Although the direct support tactical mission is most frequently used to place an ADA battery in support of a maneuver brigade, the tactical mission is also appropriate for a single ADA squad, platoon, battalion, battalion group, or group when it is

desired to support one ADA unit in support of a single force element.

b. Communications and liaison requirements are the same as those for general support and, in addition, both are established with the supported unit.

8-12. Modified Tactical Missions

Whenever the intent of the commander cannot be conveyed by the use of a standard tactical mission, a standard mission may be modified or amplified by appropriate descriptions. For example, the type of defense desired and the air defense priorities might be specified in the modification of a standard tactical mission. Care must be taken not to degrade the ability of the unit to accomplish the original air defense responsibilities of that standard tactical mission. The direct support tactical mission is especially sensitive in this regard and normally should not be modified. It is quite common to specify the general support tactical mission.

8-13. Ground Force Support Tactical Mission

An ADA unit with the assigned mission of ground

AN ADA UNIT WITH A TACTICAL MISSION OF --	ESTABLISHES LIAISON AND COMMUNICATIONS WITH --	IS DEPLOYED AND ASSIGNED SECTORS OF FIRE, AS REQUIRED, BY --	MAY ASSIGN TO SUBORDINATE ADA UNITS THE TACTICAL MISSIONS OF --
GENERAL SUPPORT	AIR FORCE CONTROL INSTALLATIONS , ADA GS UNITS, AND OTHER UNITS AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	HEADQUARTERS ASSIGNING TACTICAL MISSION.	GENERAL SUPPORT.
GENERAL SUPPORT-REINFORCING	1. AIR FORCE CONTROL INSTALLATIONS , ADA GS UNITS, AND OTHER UNITS AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION. 2. REINFORCED ADA UNIT.	HEADQUARTERS ASSIGNING TACTICAL MISSION.	GENERAL SUPPORT, GENERAL SUPPORT-REINFORCING.
REINFORCING	1. REINFORCED ADA UNIT, AND AS DIRECTED BY REINFORCED ADA UNIT. 2. AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	1. REINFORCED ADA UNIT. 2. AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	GENERAL SUPPORT, GENERAL SUPPORT-REINFORCING, REINFORCING.
DIRECT SUPPORT	1. SUPPORTED UNIT. 2. AIR FORCE CONTROL INSTALLATIONS , ADA GS UNITS, AND OTHER UNITS AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	1. ADA UNIT COMMANDER. 2. AS DIRECTED BY HEADQUARTERS ASSIGNING TACTICAL MISSION.	GENERAL SUPPORT, GENERAL SUPPORT-REINFORCING, REINFORCING, DIRECT SUPPORT.

Figure 8-1. ADA tactical missions.

between the reinforcing and reinforced unit, and as directed. This includes interconnection of electronic control and coordination systems as applicable.

8-11. Direct Support

a. An ADA unit assigned the tactical mission of direct support (DS) provides close and continuous air defense for a designated force element and must coordinate its operations with this element. The direct support ADA commander deploys his unit as necessary to defend the supported element. Once an ADA unit is placed in direct support of a force element it will, if possible, be placed in direct support of the same element in subsequent operations. This will facilitate teamwork. An ADA unit with a tactical mission of direct support remains under the command or operational control of the headquarters assigning the mission. Although the direct support tactical mission is most frequently used to place an ADA battery in support of a maneuver brigade, the tactical mission is also appropriate for a single ADA squad, platoon, battalion, battalion group, or group when it is

desired to employ one ADA unit in support of a single force element.

b. Communications and liaison requirements are the same as those for general support and, in addition, both are established with the supported unit.

8-12. Modified Tactical Missions

Whenever the intent of the commander cannot be conveyed by the use of a standard tactical mission, a standard mission may be modified or amplified by appropriate instructions. For example, the type of defense desired and the air defense priorities might be specified. In the modification of a standard tactical mission, care must be taken not to degrade the ability of the unit to accomplish the explicit air defense responsibilities of that standard tactical mission. The direct support tactical mission is especially sensitive in this regard and normally should not be modified. It is quite common to amplify the general support tactical mission.

8-13. Ground Fire Support Tactical Missions

An ADA unit with the primary mission of pro-

viding ground fire support should normally be attached or placed under the operational control of the unit to be supported or the organization responsible for fire support coordination for the operation. That organization will then assign the appropriate tactical mission. Caution should be

exercised to avoid attaching an ADA unit to a maneuver element which does not have the capability for its logistic support. FM 6-20-1 presents further discussion of the use of tactical missions during ground fire support operations.

Section III. ORGANIZATION FOR COMBAT

8-14. General

Air defense artillery with the army is organized for combat to maximize air defense effectiveness in supporting field army mission accomplishment. Organization for combat includes determining required attachments, designation of tactical missions, and delegation of operational control authority as necessary. Sound organization for combat requires application of certain basic organizational principles and consideration of various influencing factors.

8-15. Principles of Organization for Combat

a. Support the Force Concept of Operation. Support of the force concept of operation is the overriding ADA organizational principle. The force commander's priorities for air defense, the scheme of maneuver, and the force mission, situation, and composition will each have a major effect on the required ADA organization for combat.

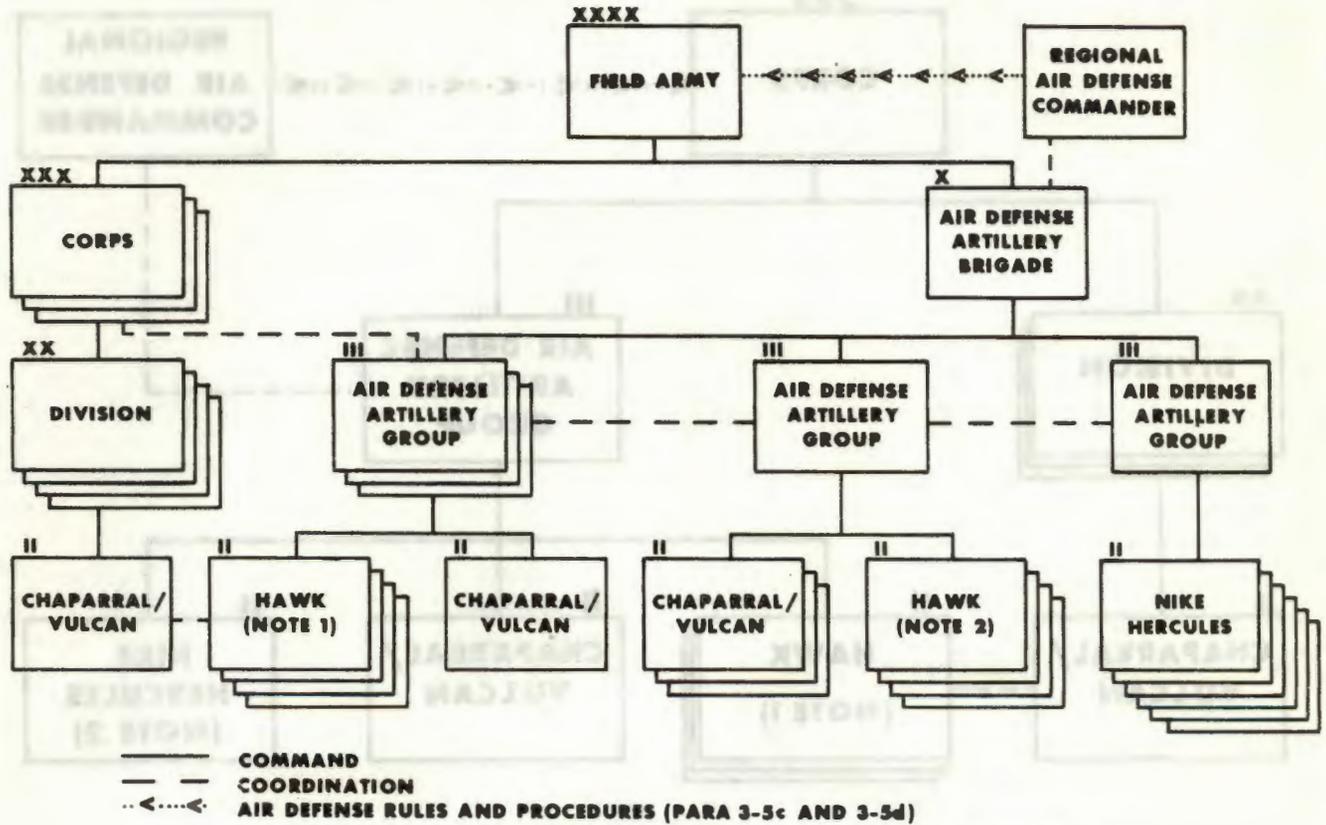
b. Provide for Centralized Direction. Retention of a responsive air defense chain of command provides significant advantages in planning, maintaining overall defense integrity, economy of forces, coordinating with other services, combat service support, and air defense technical training. Application of this principle favors retention of all nondivisional ADA under field army ADA brigade command, with corps requirements being met by assignment of corps direct support tactical missions to selected ADA groups. This retains the advantages of centralized direction while exploiting the flexibility of tactical mission assignment in providing the degree of close and continuous air defense support required by the corps. However, ADA is attached to the corps when this is the best way to insure adequate support of a particular operation; e.g., when maintenance of a responsive air defense chain of command is made impractical by planned or actual force maneuvers and disposition, or when tactical training considerations and the advantages gained by habitual corps/group association are deemed overriding.

c. Provide for Adherence to Common Doctrine. Army air defense forces must be responsive to well-defined operating doctrine, centrally prescribed, as to conditions of readiness, air defense warning, special control instructions, rules of engagement, nuclear weapon release authority, hostile criteria, weapons control status, and coordination and reporting requirements. The organization for combat should insure clear lines of authority for prescribing common operating doctrine and changes thereto. Collocation or electronic connection of AADCP's with other services' control centers is required.

d. Provide for Decentralized Execution. Authority for the conduct of operations should be decentralized to the maximum extent practicable with the commander exercising only that control necessary to insure coordinated and cohesive action. Decentralization of execution authority permits exploitation of rapid reaction capabilities and rapid response to changes in the local situation. The SHORAD weapons require the greatest degree of decentralization.

e. Support the Maneuver Elements. Maneuver elements require directly responsive air defense means. The minimum requirement is met by the SHORAD weapons organic to each division. However, consideration must be given to the requirement for additional support by LOMAD and HIMAD means.

f. Provide Means Commensurate With Responsibilities. The field army commander normally retains control of the Army air defense means required for the overall Army air defense of the field army, meeting the requirements of the corps through assignment of suitable tactical missions to selected field army ADA units. The field army commander may delegate responsibility to the corps commanders for low- and medium-altitude air defense of the corps, in which case the required SHORAD and LOMAD means are attached to the corps. Division commanders are normally held responsible for low-altitude air defense of the divisions, employing organic SHORAD means.



NOTES:

1. ONE TOWED AND THREE SELF-PROPELLED BATTALIONS.
2. FOUR TOWED BATTALIONS.

Figure 8-2. Type field army ADA organization for combat.

8-16. Factors Influencing Organization for Combat

The field army air defense officer recommends the ADA organization for combat, based on the ADA organizational principles and the influencing factors listed below.

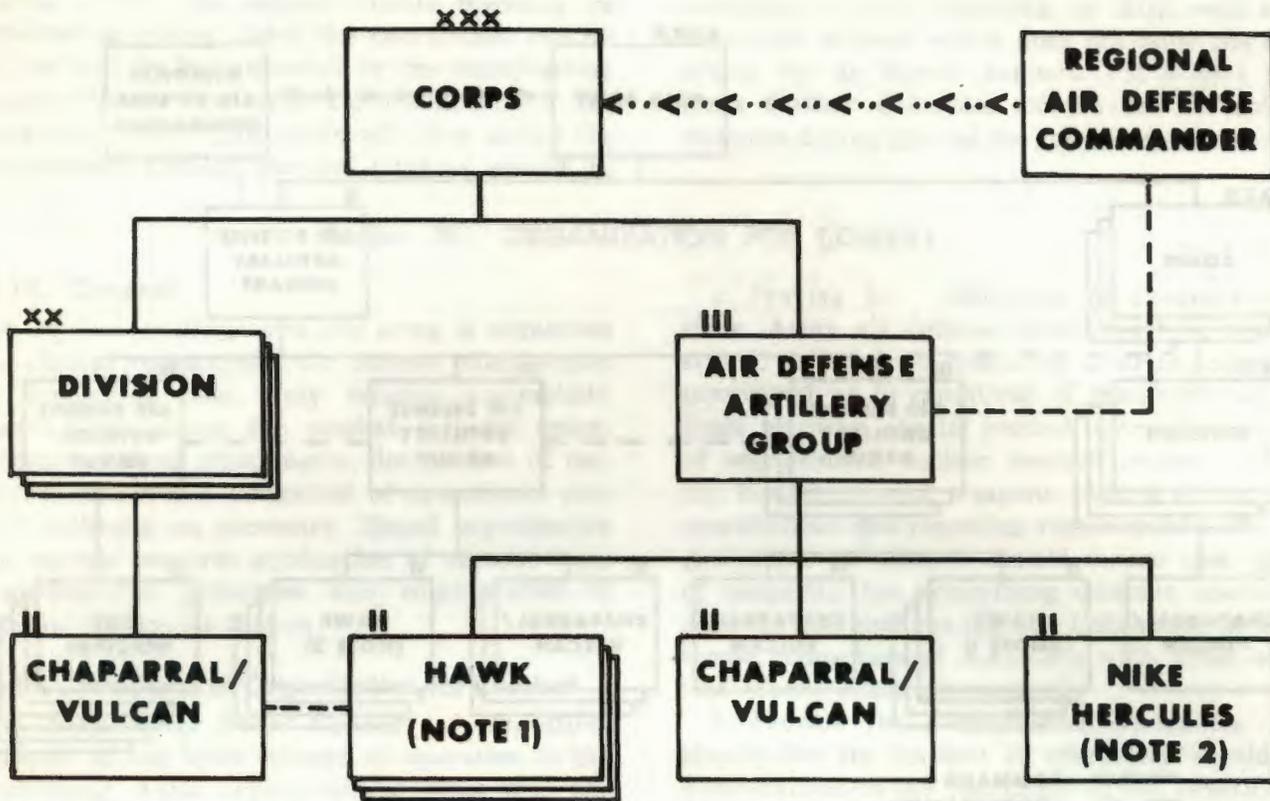
- a. ADA units available and ready.
- b. The air threat.
- c. ADA weapon capabilities and characteristics.
- d. The fundamentals of ADA deployment and employment.
- e. The types of defense envisioned.
- f. Applicability of the various tactical missions.
- g. The availability of suitable weapon positions.
- h. The availability of other air defense coverage.
- i. Anticipated losses.
- j. Combat service support capabilities.

- k. Terrain and visibility conditions.
- l. Unit boundaries.
- m. Requirements to provide ground fire support.
- n. Theater air defense policies and directives.
- o. Future operations.

8-17. Type Organization for Combat

a. *Field Army ADA.*

(1) A proposed organization for combat of ADA units in a type field army is shown in figure 8-2. ADA force levels and command structures are tailored to best accomplish the assigned missions and may vary widely from those depicted in figure 8-2. Figure 8-2 presents a possible solution applicable to wartime operations by a large force opposed by a strong well-equipped enemy. The proposed organization for combat is based on a "normal" distribution of resources provided by the type allocation. The proposed distribution of weapons is based on economy of force considerations, control require-



_____ **COMMAND**
 - - - - - **COORDINATION**
 <<<...<<< **AIR DEFENSE RULES AND PROCEDURES (PARA 3-5c AND 3-5d)**

NOTES:

1. ONE TOWED AND TWO SELF-PROPELLED BATTALIONS.
2. IF HIMAD COVERAGE IS REQUIRED.

Figure 8-3. Type independent/separate corps ADA organization for combat.

ments, and typical variations in target density and criticality from the FEBA to the field army rear as seen from the enemy viewpoint.

(2) The six Nike Hercules battalions, four of the towed Hawk battalions, and three of the Chaparral/Vulcan battalions may be organized into two groups and retained at field army level under the command of the ADA brigade commander. These units provide field army area defense and defense of specified vital areas in the field army service area.

(3) The remaining twelve Hawk battalions (nine self-propelled and three towed) and three of the Chaparral/Vulcan battalions may be divided into three groups. The groups may be placed in direct support of the corps or, if re-

quired, may be attached to the corps. The field army air defense officer integrates the corps air defense requirements into the overall field army plan.

(4) The remaining twelve Chaparral/Vulcan ADA battalions are organic to the divisions. Direct division control of ADA units utilized in the air defense role is normal due to air defense control and coordination considerations. Units are further attached to maneuver elements when required. Coordination of the operation of divisional ADA units with each other and with other ADA forces is included in division and force plans.

(5) Not indicated on figure 8-2 is the air

defense capability organic to small units; e.g., machineguns and Redeye.

b. Independent/Separate Units.

(1) ADA allocations for the type independent/separate corps and division are essentially a proportional slice of the type field army allocation. The independent/separate brigade receives a slice of the divisional allocation if air defense beyond that provided by the organic Redeye sections is required.

(2) A proposed organization for combat of ADA units in a type independent/separate corps is shown in figure 8-3. The independent/separate

division may be provided a battalion group composed of the organic Chaparral/Vulcan battalion and an attached self-propelled Hawk battalion. The independent/separate brigade's Redeye capability may be augmented by a Vulcan battery or by a composite Chaparral/Vulcan battery, if required.

★*c. Command Relationships.* The command relationships shown in the type organizations depicted in figures 8-2 and 8-3 will vary; e.g., the nondivisional ADA may be placed under the control of the area/regional air defense system. Paragraph 3-5c provides further discussion.

CHAPTER 9

ADA COMMAND, CONTROL, AND COORDINATION IN THE COMBAT ZONE

Section I. ARMY AIR DEFENSE OFFICERS

9-1. Relation to Force Commander

The relationship of the Army air defense officer to the force commander depends on the status of the air defense artillery as a member of the combined arms team. When ADA units are under the command or operational control of a force, the senior ADA unit commander is both a subordinate commander and a special staff officer (air defense officer) to the force commander. When ADA units are not under the control of the force, but are providing air defense coverage or support of that force, the ADA commander's relationship to the force commander is that of both an adviser and an independent commander obliged to render continuous effective air defense coverage in accordance with his assigned mission. In either case, liaison and close coordination between commanders is essential.

9-2. Army Group Air Defense Officer

The senior member of the army group air defense staff section is the army group air defense officer, the principal adviser to the army group commander on air defense matters. The army group air defense officer usually performs the following special staff duties:

a. Determines the number and types of ADA units required by the forces of the army group, including special equipment requirements.

b. Recommends the allocation of ADA units to army group subordinate commanders (ADA unit allocations are not normally retained at army group level).

c. Recommends the allocations of nuclear weapons for air defense.

d. Arranges for coordination and exchange of air defense intelligence between the field armies and the area and regional air defense commanders and publishes air defense information and intelligence.

9-3. Field Army Air Defense Officer

The senior commander of Army ADA units assigned or attached to a field army, normally an ADA brigade commander, commands the ADA units retained under field army control and also serves as the field army air defense officer. The field army air defense officer is considered a member of the field army special staff and is the principal adviser to the field army commander on air defense matters. The field army air defense officer usually performs the following special staff duties:

a. Recommends air defense priorities (para 10-3).

b. Determines ADA unit requirements. The ADA unit requirements recommended by the air defense officer are incorporated in the troop list presented to the field army commander for his approval.

c. Recommends the allocation of available ADA means to be made to field army subordinate units and the command relationship between the subordinate units and supporting ADA units.

d. Recommends the allocation of nuclear weapons for air defense missions and, after coordination with the G4, recommends the nuclear weapons load for ADA units.

e. Participates in development or review of theater air defense rules and procedures, as authorized, to insure that rules and procedures exploit field army ADA capabilities to their fullest; are clear and capable of implementation at the fire unit level; and are compatible with ADA man/weapon characteristics.

f. Prepares the field army air defense SOP. The SOP is coordinated with appropriate staff and other agencies, reviewed by the G3, and published as an annex to the field army SOP. FM 44-1-1

presents a sample air defense annex to an independent corps SOP. A field army air defense SOP would be similar.

g. Prepares the field army air defense plan. The plan is coordinated with field army staff and other Army agencies and other services operating in or over the field army area, and is submitted through G3 for the field army commander's approval. After approval, the air defense plan is published as an annex to the field army operation plan. (See FM 44-1-1 and FM 101-5 for samples of an air defense plan annex to a field army operation plan.)

h. Participates in planning and coordinating the use of airspace with Army aviation and other staff members as appropriate. Paragraph 10-6 provides a detailed discussion of this function.

i. Insures coordination of Army ADA matters with higher, lower, and adjacent commands and other services and allies operating in the area and within the force. In addition to coordination among elements concerned with air defense, coordination must be accomplished with other elements of the Army that employ electronic emitters or receivers. The G3 must establish priorities among these rival elements for occupation of terrain and for periods of operation. Based on G3 priorities, ADA units should be so located as to operate without interfering with higher priority elements. Coordination of current air defense operations with other operations of the force is carried out by ADA personnel assigned to the airspace control element (ACE) in the field army tactical operations center (FATOC) as discussed in paragraphs 9-13 and 9-14.

j. Coordinates the establishment and functioning of an air defense intelligence system within the field army.

k. Advises on air defense electronic warfare operations in coordination with other staff officers, and plans and supervises ADA electronic warfare operations. Assists in preparation of the electronic warfare annex to operation plans and orders.

l. Monitors the readiness status and equipment condition of ADA units and advises the commander and appropriate staff elements on associated maintenance problems.

m. Assists other staff elements in the analysis of enemy ADA capabilities, and determination of measures to counter or evade.

n. Prepares the air defense portion of the training program and exercises staff supervision of field army air defense training programs.

9-4. Corps Air Defense Officer

The senior commander of Army ADA units attached to a corps commands the ADA units retained under corps control and also serves as the corps air defense officer. The corps air defense officer is considered a member of the corps special staff. His duties and responsibilities are similar to those of the field army air defense officer except that corps level ADA is not authorized direct coordination with elements of the other Services on matters regarding air defense policy and procedures. This coordination is achieved through the field army air defense officer. Direct coordination is authorized in the case of an *independent* corps or a *separate* corps.

★9-5. Division Air Defense Officer

a. The division air defense officer is the commander of ADA forces organic to the division. The duties of the division air defense officer are similar to those of the corps air defense officer, except that division-level air defense officer duties include certain responsibilities pertaining to the employment of all-arms air defense weapons by divisional units. These duties primarily involve provision of tactical advice and special staff supervision pertaining to training programs, insuring that the division SOP and plans include instructions for control of Redeye and non-air-defense weapons used in an air defense role, and advising on the required interface between the Redeye sections and division ADA units. FM 61-100 includes a sample division air defense SOP.

b. Brigades may appoint a brigade air defense officer from organic personnel to coordinate air defense activities within the brigade and attached maneuver battalions. When an ADA unit is attached to a brigade, the commanding officer of that ADA unit should become the brigade air defense officer and will serve as the advisor to the brigade commander on all air defense matters.

c. Battalions should appoint their Redeye section leaders as battalion air defense officers, with responsibilities as specified in FM 23-17.

9-6. Task Force Army Air Defense Officer

Task force Army air defense officer functions are similar to those of the field army air defense officer.

Section II. ARMY AIR DEFENSE COMMAND POSTS

9-7. General

a. An Army air defense command post (AADCP) is the tactical headquarters of an Army air defense commander where he and his staff insure continuous and efficient control of tactical operations by subordinate ADA forces. The AADCP is established at ADA battalion, group, and brigade level or, in more static defenses, at the defense level only.

b. The AADCP is operated on the concept of centralized direction and decentralized execution. This concept requires that the authority to act be delegated to the lowest practicable level while the ability to supervise and direct is maintained by all command echelons.

9-8. AADCP Functions

Typical AADCP functions include—

a. Collection and evaluation of air defense information and dissemination of intelligence.

b. Monitoring and supervision of ADA unit operations.

c. Coordination of ADA missile unit fires.

d. Exchange of air defense information and intelligence with adjacent AADCP, Army agencies, and other Service agencies concerned with air defense activities.

e. Acting as a center for liaison and coordination with other agencies.

f. Coordination of electronic warfare (EW) activities.

9-9. AADCP, ADA Brigade

a. The brigade AADCP is the tactical headquarters of the brigade ADA commander. The brigade AADCP is not normally involved in the minute-to-minute conduct of the air battle.

b. The ADA brigade commander will designate a group AADCP as an alternate brigade AADCP. The alternate brigade AADCP will assume the functions of the brigade AADCP if the brigade AADCP goes out of action.

9-10. AADCP, ADA Group and Battalion

★a. The group AADCP is the tactical headquarters of the group ADA commander. The group, when it is controlling HIMAD and

LOMAD battalions, normally has electronic control and coordination equipment which is electronically connected to the assigned battalions' control and coordination equipment and to the nearest Air Force or other control center having compatible equipment. This equipment may be used by the group commander to exercise fire coordination, supervise fire unit operations, and exchange information and intelligence with brigade, adjacent AADCP's and Air Force control facilities. When so equipped, the AADCP is termed a semiautomatic AADCP to differentiate it from a manual AADCP. FM 44-1-1 provides general procedures. Detailed information is included in FM 44-9, FM 44-13, and FM 44-14.

b. The battalion AADCP is the tactical headquarters of the battalion ADA commander. The discussion in *a* above generally applies.

9-11. Manual AADCP

a. The discussion in this paragraph pertains directly to the manual AADCP's which should be established at ADA brigade, group, and HIMAD and LOMAD battalion level as necessary to replace or back up the normal semiautomatic AADCP facilities. Similar requirements exist at the SHORAD battalion level, *but on a reduced scale* due to the highly decentralized nature of the operations of these battalions' fire units. The SHORAD battalions do not employ semiautomatic AADCP facilities.

b. A manual AADCP receives and transmits air defense information and intelligence by means of wire and radio voice communications. Information displayed in the AADCP is plotted and posted manually. Advantages of the manual AADCP include simplicity, increased mobility, and probably increased effectiveness in a heavy ECM environment. Disadvantages include time loss in plotting and telling procedures, possibility of human error, and lack of complete information on targets under attack by other ADA fire units.

c. FM 44-1-1 provides detailed procedures for manual AADCP operations.

9-12. Primary and Alternate AADCP's

a. The duty of establishing, organizing, and operating the primary AADCP is normally delegated by the ADA commander to the S3. The S3 coordinates the establishment, organization, and

operation of the AADCP with the S1, S2, S4, and signal officer.

b. The alternate AADCP is established by a designated subordinate ADA commander. The commander designated to establish the alternate

AADCP prepares plans to facilitate rapid assumption of functions of the primary AADCP in case the primary AADCP becomes nonoperational. The plans should be tested periodically to insure their effectiveness.

Section III. TACTICAL OPERATIONS CENTERS

9-13. Field Army Tactical Operations Center

a. The field army tactical operations center (FATOC) is a command installation where the necessary communications, facilities, and personnel are centralized to control and coordinate current field army tactical operations. (FM 101-5 describes tactical operations center concepts, organization, and functions in detail.)

b. The commander or chief of staff determines the composition of the FATOC which operates under G3 staff supervision. A type FATOC contains the following elements, each of which operates on a two-shift basis:

(1) *G2 element/G3 element*. The G2 element coordinates all intelligence activities pertaining to the current situation. The G3 element supervises and coordinates current tactical operations.

(2) *Fire support element (FSE)*. The FSE coordinates all supporting fires on surface targets, to include such fires delivered by ADA units.

(3) *Tactical air support element (TASE)*. The TASE supervises and coordinates all tactical air support operations.

★(4) *Airspace control element (ACE)*. The ACE coordinates Army air defense operations and use of airspace by Army forces and performs other functions as discussed in detail in paragraph 9-14.

★(5) *Electronic warfare element (EWE)*. The EWE's at field army, corps, division, and separate brigade participate in the planning, control, and evaluation of electronic warfare missions in support of impending or current tactical operations and serve as the points of entry into the TOC's for coordination of electronic warfare intelligence. Details of the EWE are contained in FM 32-20.

(6) *Administrative section*. The administrative section serves as the FATOC message-screening agency and administrative center.

★(7) *Augmentation*. G4, G5, chemical, engineer, signal, or other representation will be established in the FATOC when and as required. If required, a chemical, biological, and radiological

element (CBRE) is formed by consolidating the CBR functions and personnel normally assigned to the G3 element, the FSE, and the chemical section (augmented by JA team, TOE 3-500, for 24-hour operations).

★9-14. Airspace Coordination Element

a. General

(1) Airspace control elements (ACE) are located in the tactical operations center at field army, corps, and division, and may be formed at other levels. The ACE is the focal point for unit airspace control, integrating information on unit airspace users, and recommending priorities for use of airspace. The ACE is manned by ADA and Army aviation personnel. The chief of the element is appointed by the force commander. The senior ADA headquarters provides personnel and equipment to the ACE of the force to which organic, assigned, or attached. ADA units with a direct support tactical mission also should provide personnel to the ACE of the supported force or to form an austere ACE for the supported force. Only the divisional Chaparral/Vulcan and Vulcan battalion TOE provides organic resources for this purpose. Other ADA units obtain the required ACE personnel and equipment from TOE 44-510, Air Defense Artillery Service Organizations or from unit resources.

(2) A detailed SOP must be developed for the ACE. Comprehensive training of ACE personnel in their duties, functions, and procedures is required. Frequent participation in field training and command post exercises is required to train personnel and test procedures and equipment. The ACE should be collocated with the TASE and FSE because it cannot function without close coordination and direct communications with both.

(3) The ACE responsibilities pertain to the following functions: the basic ACE function of airspace control which includes maintenance of airspace utilization displays and resolution of airspace conflicts; the ACE (air defense section) functions of assisting the force commander in su-

pervision of Army air defense operations and provision of intelligence and warning information obtained through air defense channels; the ACE (aviation section) functions of control of Army air traffic and assisting the force commander in supervision of Army aviation operations; and the general function of disseminating information useful to the airspace users. The airspace control function is discussed in *b* below and air defense activities are addressed in *c* and *d* below. The Army aviation and air traffic control functions are discussed in FM 1-60 and FM 101-5. Although the ACE functions are discussed separately, they are performed by personnel working closely together as a team, under one chief and using combined data displays.

b. Airspace Control Function. In compliance with higher headquarters directives and the force commander's concept for use of the airspace by organic forces, the ACE, in conjunction with the TASE and FSE, determines how airspace requirements can best be met, submits recommendations to the G3, and issues necessary instructions. If conflicts occur in the planned use of the airspace the ACE, in conjunction with the TASE and FSE, attempts to resolve the problem. Conflicts that cannot be resolved are forwarded to the G2-G3 element in accordance with command guidance. Where appropriate, as for planned multiple Army aircraft flights, clearances are granted. The authority of the ACE to grant "airspace control clearances" in no way implies the exercise of command/control by the ACE over any of the units or resources involved. The clearance indicates that control has been accomplished and known conflicts have been resolved. To facilitate the control of the use of airspace, the ACE—

(1) Maintains airspace utilization displays and provides information and advice to other elements as required. Typical displays, which should be combined with air defense, Army aviation, and other displays to the degree feasible, include the airspace utilization map and airspace utilization board. These display airspace utilization information regarding preplanned and immediate air activity, Army air traffic control data, and standing and temporary regulatory/restrictive measures. FM 44-3 depicts typical ACE displays.

(2) Issues or relays supplementary instructions to field army airspace users, as required by the situation, within the scope of established policies and procedures. Instructions are usually verbal via the appropriate TOC element or directly to the users.

(3) Recommends changes to SOP's, plans, policies, and directives in accordance with the requirements of the situation and the lessons learned.

(4) Prepares the airspace utilization annex to the operation plan/order.

c. Air Defense Coordination Function. The ACE is responsible for controlling current field army air defense operations with other combat and combat support operations. To accomplish this, the air defense section of the ACE—

(1) Maintains air defense displays and provides information and advice to other elements as required. Typical displays include the air defense situation map and the air defense status board. These display field army ADA unit locations, type, designation, states of alert, and ammunition levels; and the prevailing condition of readiness, state of air defense warning, weapons control status, and weapon control case. Typical information required in addition to that provided by the displays includes the following: air defense priorities; air defense capabilities, limitations, and employment; air defense coverage; capabilities to attack surface targets; critical ammunition shortages; and post-attack data. Appendix C, FM 44-3 depicts typical ACE displays.

(2) Maintains a continuous estimate of the air defense situation.

(3) Coordinates field army air defense operations with other field army combat and combat support operations.

(4) Coordinates field army air defense operations with higher, lower, and adjacent commands, and with other services and allies.

(5) Recommends changes to the air defense SOP, plan, task organization, nuclear weapon allocations, unit deployments, and policies and directives in accordance with requirements of the current situation and the lessons learned.

(6) Participates in coordination of ground fire support missions accomplished by ADA units, as requested by the fire support coordinator.

(7) Issues or relays supplementary instructions to field army ADA units, as required by the situation, within the scope of established policies and procedures.

(8) Coordinates the use of nuclear weapons in air defense operations—

(a) Recommends revision of minimum normal burst altitudes (para 10-10) as proper for the tactical situation, in consonance with established field army policies and theater directives.

(b) Recommends nuclear-safe areas for aircraft outside corridors, when appropriate, in coordination with the FSE and the TASE.

(9) Monitors the application of electronic security (ELSEC) and electronic warfare measures by ADA units in coordination with the EWE.

(10) Compiles statistical data and operational reports as a basis for evaluation and future plans.

(11) Represents the air defense officer in recommending allocation and employment of air defense means.

d. Air Defense Intelligence Functions. The air defense section of the ACE provides intelligence and warning information, received over its links from the AADCP and Air Force facilities, to the G2 element and other elements as required.

9-15. Corps and Division Tactical Operations Centers (CTOC and DTOC)

a. The responsibilities and functions of the CTOC and DTOC elements are similar to those described for the FATOC. Direct coordination by a CTOC or DTOC ACE with other services to

establish policy and joint operating procedures is not normally authorized, except in the case of the independent or separate corps or division.

b. The division ACE has certain responsibilities regarding the coordination of Redeye operations. Responsibilities include provision of general advice, relay of air defense warning and control instructions, and dissemination of forward area alert radar (FAAR) locations and data link frequencies.

★9-15.1 Brigade Command Posts

An informal airspace control element (BACE) may be formed from organic or attached personnel to provide airspace coordination services to the brigade. Dedicated resources for the BACE are not currently included in tables of organization and equipment (TOE).

9-16. Task Force Joint Operations Center

An ACE operating in a task force joint operations center performs functions similar to those performed by an ACE with a field army.

Section IV. AIR DEFENSE OPERATIONS OFFICERS

9-17. Tactical Air Control Center-Control and Reporting Center

The ADA brigade will be augmented from TOE 44-510 with as many sections as necessary to provide Army elements at the Air Force tactical air control center (TACC) and the control and reporting center (CRC).

9-18. Control and Reporting Center-Control and Reporting Post

The ADA group will be augmented from TOE 44-510 with as many sections as necessary to provide Army elements at the Air Force control and reporting center (CRC) or control and reporting post (CRP).

9-19. ADA Operations Officer Functions

An ADA operations officer assigned to the Army element at the TACC, CRC, or CRP normally performs the following functions:

a. Advises the TACC, CRC, or CRP director on Army air defense matters and the employment of Army ADA.

b. Supervises operation and training of the Army element personnel.

c. Takes part in planning conferences.

d. Informs the TACC, CRC, or CRP of the current status and coverage of Army ADA weapons and radars.

e. Advises the Army air defense commander of current and planned friendly air activities and of the evaluation of the enemy air threat.

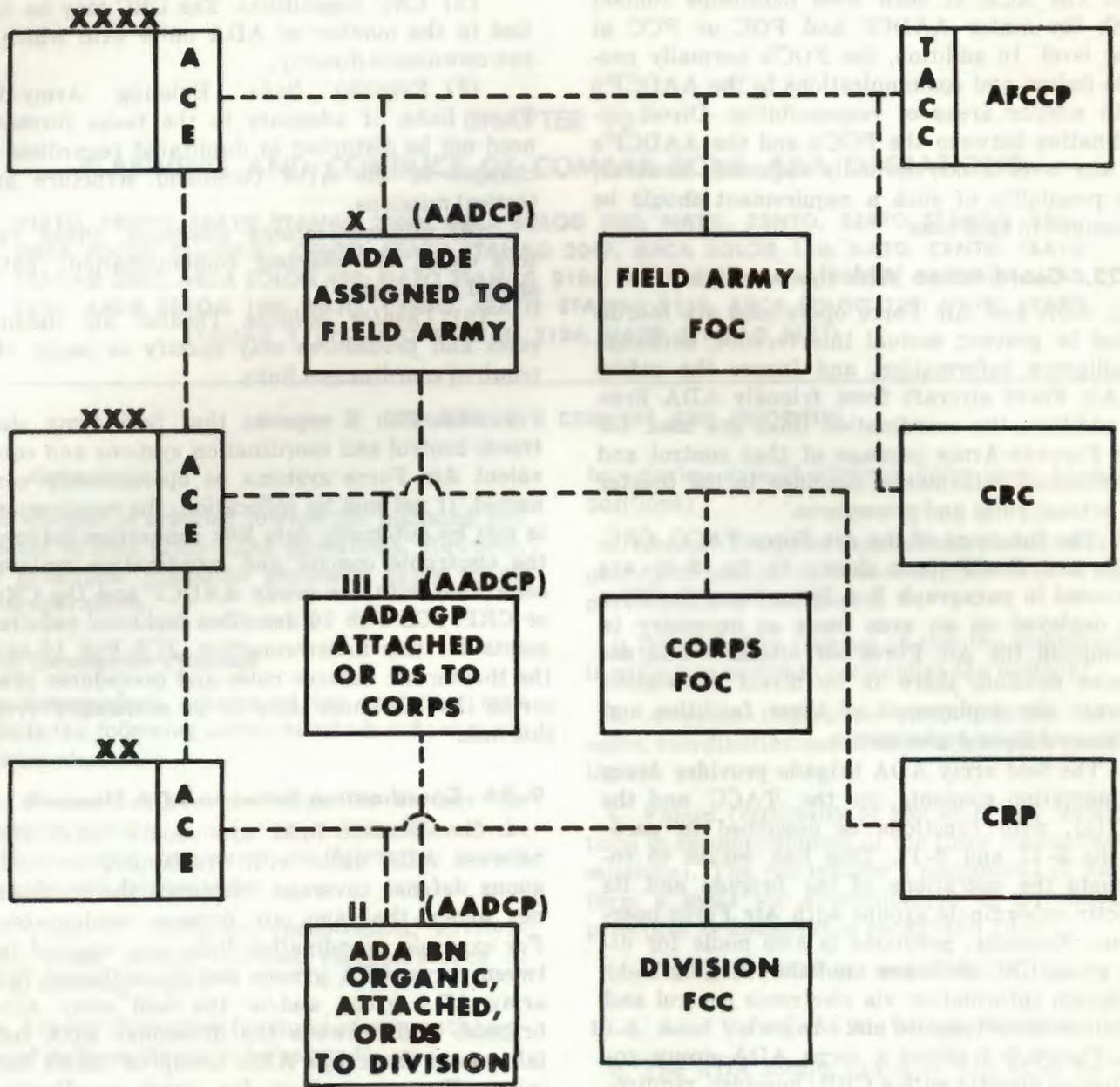
f. Informs the Army air defense commander of the current status of other elements of the air defense system.

g. Insures that timely aerial reconnaissance and surveillance information and intelligence is passed to the AADCP.

h. Insures that track information and intelligence is received from the AADCP and passed on to the appropriate agencies within the TACC, CRC, or CRP.

i. When appropriate, requests identification of plots originating in the AADCP and not displayed in the Air Force facilities.

j. Coordinates Army ADA participation in air defense exercises.



----- **ARMY AIR DEFENSE COORDINATION**

Figure 9-1. Type Army air defense coordination links.

sure the safety of Army aircraft from friendly ADA fires.

b. Army flight operations centers (FOC) are typically deployed on the basis of two per field army service area and one per corps area. In some cases, an FOC may be provided for support of a division. The FOC's are elements of the tactical Army air traffic control system that provides flight-following services for certain air-

craft, insures separation of aircraft under instrument flight conditions, and provides available friendly aircraft identification information to the air defense forces. Army flight coordination centers (FCC) are employed as subagencies of the field army and corps FOC's as necessary to extend FOC capabilities (not shown in fig. 9-1). In addition, an FCC is organic to each division aviation battalion. (FM 1-60 presents a detailed discussion of Army air traffic operations.)

c. The ACE at each level maintains contact with the senior AADCP and FOC or FCC at that level. In addition, the FOC's normally provide liaison and communications to the AADCP's with similar areas of responsibility. Direct coordination between the FCC's and the AADCP's at any level is not normally required; however, the possibility of such a requirement should be examined in each case.

9-23. Coordination With the Air Force

a. ADA and Air Force operations are coordinated to prevent mutual interference, exchange intelligence information, and insure the safety of Air Force aircraft from friendly ADA fires. In addition, the coordination links are used for Air Force-to-Army passage of that control and coordination information specified in the theater air defense rules and procedures.

b. The functions of the Air Force TACC, CRC, CRP, and FACP (not shown in fig. 9-1) are discussed in paragraph 3-4. Since these facilities are deployed on an area basis as necessary to accomplish the Air Force air offensive and defensive mission, there is no direct correlation between the deployment of these facilities and the ground force deployments.

c. The field army ADA brigade provides Army augmentation elements to the TACC and the CRC(s), with functions as described in paragraphs 9-17 and 9-19. This link serves to coordinate the operations of the brigade and its directly subordinate groups with Air Force operations. Normally, provision is also made for direct group-CRC exchange (not shown in fig. 9-1) of certain information via electronic control and coordination systems. (d and e below).

d. Figure 9-1 shows a corps ADA group coordinating directly with a CRP; however, requirements for direct Army-Air Force coordination at this level are variable. Factors to consider are:

(1) *CRP capabilities.* The CRP location or its equipment may be such that it is not capable of providing the required coordination.

(2) *CRC capabilities.* The CRC may be limited in the number of ADA units with which it can coordinate directly.

(3) *Existing links.* Existing Army-Air Force links, if adequate to the tasks foreseen, need not be disturbed or duplicated regardless of changes in the ADA command structure and tactical missions.

(4) *Communications distances.* Other factors equal, the shortest communications paths should be chosen.

(5) *Theater policies.* Theater air defense rules and procedures may specify or imply the required coordination links.

e. JCS Pub 8 requires that field army electronic control and coordination systems and equivalent Air Force systems be operationally connected. If not met by collocation, the requirement is met by automatic data link connection between the electronic control and coordination systems associated with the group AADCP and the CRC or CRP. JCS Pub 10 describes technical requirements for this interconnection. JCS Pub 12 and the theater air defense rules and procedures prescribe the minimum data to be exchanged over this link.

9-24. Coordination Between ADA Elements

a. Coordination links are usually established between ADA units with overlapping or contiguous defense coverage whenever the units are not under the same air defense headquarters. For example, coordination links are required between corps ADA groups and the adjacent field army ADA group and/or the field army ADA brigade, and between the divisional ADA battalion and the corps ADA group or Hawk battalion. The requirement for direct coordination is not normally carried below the ADA battalion level.

b. ACE-to-ACE coordination links are required.

CHAPTER 10

PLANNING AND CONDUCT OF COMBAT ZONE ADA OPERATIONS

(NATO, CENTO, SEATO STANAG 2008, ABCA SOLOG 5R2; NATO, CENTO, SEATO STANAG 2041, ABCA SOLOG 51; NATO, CENTO, SEATO STANAG 2047, ABCA SOLOG 110; NATO, CENTO, SEATO STANAG 2082, ABCA SOLOG 49R; NATO STANAG 2103, ABCA SOLOG 123; NATO, CENTO STANAG 2104, ABCA SOLOG 130; NATO, CENTO, SEATO STANAG 2112, ABCA SOLOG 132; NATO, SEATO STANAG 2113; NATO STANAG 2134; NATO STANAG 3531)

Section I. COMMANDER'S CONCEPT AND PRIORITIES

10-1. General

This chapter is oriented toward the planning and conduct of field army ADA operations. However, the principles presented generally apply to all ADA operations.

10-2. Commander's Concept

The commander's concept of the operation may include the following elements which influence air defense planning:

a. Purpose of the Operation (to destroy the enemy in position in order to continue the attack, to block enemy movement, to determine enemy strength and dispositions).

b. Type of Operation (penetration, envelopment, delay, mobile defense, reconnaissance in force, covering force).

c. Area of Operation (avenues of approach, sectors of defense, flanks to be secured).

d. Scheme of Maneuver (formation for the attack, disposition of forces for defense and delaying action, organization for combat).

e. Purpose of the Reserve (number of units and their organization for combat, general location, anticipated employment).

f. Preparation for Future Operations (changes in organization for combat, positioning of units or order of march, special efforts to support future operations).

g. Special Instructions (security measures, employment of combat and combat support units, use of aircraft).

h. Control Measures (objectives, phase lines,

boundaries, axis of advance, delay lines, blocking positions).

i. Nuclear Weapons (allocations, restrictions on use, ADA nuclear surface-to-surface fires to support scheme of maneuver).

j. Troop Safety (degree of risk the commander is willing to accept to accomplish the mission).

k. Airspace Utilization (priorities for Army users, coordination requirements, airspace restrictions).

l. Values (criticality of key units and installations to accomplishment of the force commander's missions). The commander's statements of value form a basis for determination of air defense priorities as discussed in paragraph 10-3.

m. Changes to SOP (as required).

10-3. Asset Values and Air Defense Priorities

a. The ADA means available will often be insufficient to defend all high value assets; therefore, the air defense officer must be prepared to recommend air defense priorities based on the force commander's concepts and values placed on the force's military assets.

b. The commander's statements of military value reflect a ranking of the relative importance of each military asset to the strategic and tactical objective. Criteria typically considered in determining an asset's military value are—

(1) *Criticality*. Comparative importance of the asset to the accomplishment of the force commander's mission; i.e., its relative contribution to mission accomplishment.

(2) *Recuperability*. The time, material, and

effort that would be required to return the asset to an effective operating level following enemy attack.

c. Air defense priorities are not necessarily the same as the military values. Overall criteria which must be considered in determining air defense priorities are:

(1) *Military value* (b above).

(2) *Vulnerability*. Asset resistivity to damage from air attack; i.e., the asset's "hardness" or "softness."

(3) *Enemy capabilities*. Enemy resources and tactical and technical ability to execute a destructive air attack (missile or aircraft) against the asset.

★d. Using these criteria, the air defense officer can evaluate the commander's stated asset values in terms of the priorities in which these assets should be provided air defense. These evaluations are presented as recommendations to the force

commander for his final decision. For example, an element may receive the highest military value as the most critical asset for accomplishment of the force mission, but low vulnerability and accessibility to enemy air attack could cause this element to receive a recommended low priority for air defense. Conversely, an element with a medium value may be recommended as first priority for air defense due to its vulnerability to enemy air capabilities. The force commander approves, modifies, or disapproves the air defense officer's recommended air defense priorities. After command guidance, the approved air defense priorities become part of the operations order. The sample air defense plan in FM 101-5 shows an application of air defense priorities.

e. A detailed discussion and suggested worksheet format for the determination of recommended air defense priorities is presented in appendix B.

Section II. PLANNING CONSIDERATIONS AND LOGISTICS

10-4. Requirements and Allocations

a. Requirements.

(1) The hostile threat and the assets to be defended are the points of departure for all air defense planning and are the basis on which air defense requirements must be computed.

(2) Requirements for ADA units for field army area air defense and for employment in vital area defenses may be estimated through use of the hasty analysis procedures included in FM 44-1-1. FM 44-1-1 also discusses the influence of variations in the degree of defense required.

(3) Trial map deployments conducted for the purpose of estimating air defense requirements must consider all phases of the operation and must realistically consider the influence of terrain. Estimates so obtained should be tempered by recognition of the influence of operational reliability and availability, probable unit losses, and environmental factors.

(4) Divisional requirements for low altitude air defense are normally met by use of the SHORAD resources provided by division TOE.

b. *Allocations*. Air defense resources are allocated to the unified command by the Joint Chiefs of Staff and are further allocated by the commander of the unified command for defense of his priority assets. When allocations do not meet

known requirements, the air defense officer requests the additional means or, if an increase in force structure is not feasible, organizes the available ADA units to defend the higher priority assets. The force commander is notified of shortages and is presented alternative courses of action for consideration.

10-5. Initial Deployments

a. Using the deployment guidelines (para 7-4 through 7-11) and considering the deployment concepts appropriate to the type of operation (para 10-20 through 10-24), the approximate positions or operating areas of the assigned ADA units are determined by the appropriate air defense officer. (Techniques for determining approximate unit positions are contained in FM 44-1-1.)

b. The scheme for displacement from the initial positions to maintain continuous support of the operation is also developed. The scheme is based on the commander's concept of maneuver.

c. The initial positions and scheme for maneuver of the longer-range ADA weapons employed in the HIMAD and LOMAD roles should be closely coordinated with the next higher air defense echelon to insure maximum integration of theater and field army air defense capabilities.

10-6. Coordination of Airspace Utilization

a. General. The airspace over the combat zone is used by Army and other-Service aviation, unmanned drones, field artillery and mortars, and Army ADA. Theater policies for the coordinated use of combat zone airspace are based on the necessity for permitting each airspace user to fully exploit its capabilities, without undue interference from other uses, in accomplishment of the force mission.

★*b. Organization.*

(1) Within a theater of operation, the responsibility for coordinating the establishment of an airspace control system for use throughout the theater, together with overall responsibility for air defense, will normally be assigned to a single agency by the commander of the unified command. Normally, this agency will be the Air Force component commander of the unified command.

(2) Within the concept of the single "airspace control authority," the field army commander should normally be delegated authority for control of "designated airspace" to enable him to employ his tactical organic aircraft and weapons on an immediately responsive basis. This designated airspace should normally extend from the air traffic control line (ATCL) rearward and laterally to the field army boundaries and vertically to a coordination altitude agreed upon by the commanders involved. The Army air traffic control system must be capable of coordinating Army and other aircraft traffic operations in this designated airspace.

c. Basic Coordination Policies. Current (STANAG 2134) policies for coordination of the use of the airspace for purposes of reducing hazards to friendly aircraft are as follows:

(1) Safety of friendly aircraft operating within a designated area is normally achieved by preplanned coordination of air operations and by in-flight surveillance exercised by air traffic control facilities. However, such surveillance is impracticable for most aircraft operating at low altitudes over the forward area.

(2) Hazards to low-flying friendly aircraft in the forward area arise from enemy action, collision, friendly air defense fires, and field artillery and mortar fires. These hazards can be reduced by restricting aircraft to height bands (altitude layering), lanes (corridors), and time slots and by procedural restrictions on air defense weapons. These restrictions will limit the effectiveness of both aircraft and air defenses.

(3) Policies concerning the application of restrictions and communications procedures to be observed are normally established in the theater air defense/airspace control rules and procedures.

d. Measures to Reduce Interference. JCS Pub 2 provides guidance on measures to reduce mutual interference in joint operations. The guidance, as applied to the problem of coordination of the use of airspace, is discussed below:

(1) Airspace users may be assigned nonconflicting missions as practicable. Since air defense, air offense, and field artillery normally use the same airspace during mission accomplishment, avoidance of mutual interference solely through mission assignment will not usually be possible.

(2) The relative importance of missions may be designated where conflict of missions occurs. To be responsive to the commander's decisions regarding mission importance, the air defense system must be prepared to operate in an environment highly permissive to air defense operations, in an environment wherein air defense freedom of action is virtually denied, or in an environment of coexistence with the other airspace users in which all users lose some freedom of operation. These three conditions generally parallel the weapons control statuses of *weapons free*, *weapons hold*, and *weapons tight*, respectively. From the rules, procedures, and coordination viewpoint, the latter environment is currently the most difficult, but it must be prepared for since it will often represent the normal environment.

(3) Tasks may be scheduled to limit conflict in space, time, or area. Use of this guideline requires careful planning and coordination but will be common pending improvement in air defense identification and air traffic control means. In addition to the practices listed in *c*(2) above, other scheduling-type procedures include use of coordination altitudes, airspace tunnels, "safe" and restricted areas, and ADA/interceptor battle zone separation.

(4) Adequate recognition and identification procedures must be provided. Electronic, procedural (e.g., as discussed in *c*(2), and (2) and (3) above), and visual means must all be exploited to the fullest. At present, sole reliance cannot normally be placed on any single means.

(5) Timely exchange of essential operational data between forces where interference might occur is required. The information required by ADA is primarily that which is concerned with aircraft identification.

★*e. Guidelines.* To aid in establishing broad parameters for airspace control and coordination, the following guidelines are set forth—

(1) Army aircraft will receive aircraft advisories from the appropriate flight operations center/flight coordination center before entering the airspace under cognizance of that center.

(2) Division aircraft departing the division airspace will comply with the air traffic control regulations of the unit controlling the entered airspace. This will normally consist of filing a flight plan, following a planned flight route, and maintaining communications with the appropriate air traffic management facility.

(3) Missions by other Service aircraft will be coordinated with the airspace control element (ACE). Other Service close air support, tactical reconnaissance, and tactical airlift aircraft will be controlled in the target area by the appropriate tactical air control party or other terminal control element. These and other aircraft transiting the ground force will be provided the same assistance available to Army aircraft. Additionally, special corridors may be established to facilitate the transit of high performance aircraft.

(4) Flights involving formations of Army aircraft in the division airspace will be coordinated by the division airspace control element. Single aircraft will be coordinated as possible.

(5) Air defense artillery operations will be conducted in accordance with air defense standing operating procedures. The airspace control element will assist in employing air defense fires that are under Army control by coordinating changes in weapon control status.

(6) In the absence of other positive control measures, normally the brigade or battalion commander of the unit requesting field artillery or aerial fire support in the attack of a target is responsible for the control of airspace in the immediate vicinity of that target while it is under attack.

★*f. Execution.*

(1) The field army (corps, division, task force) air defense officer, Army aviation officer, and other appropriate field army staff members, under G3 general staff supervision, jointly plan and coordinate the use of airspace by Army forces in accordance with the above-discussed concepts. The primary functions of the Army air defense officers in this matter are to make known to all users the applicable air defense rules and procedures, assist planners and airspace users in re-

solving usage and procedural conflicts, insure that procedures provide for maximum dissemination of usable aircraft identification information to Army air defense units, advise on the air defense implications of the agreed airspace coordination system and participate in the preparation of the necessary airspace utilization plans, orders, and SOP's. Airspace utilization documents are not necessarily separate entities, but rather may be integrated as feasible into the plans, orders, and SOP's for air defense, air traffic regulation, Army aviation operations, and fire support. In any case, items with joint impact are provided to the Air Force for review and integration into overall plans. (FM 101-5 and FM 1-60 present a sample airspace utilization annex to a field army operation order.)

(2) The airspace control element (ACE) in the tactical operations center performs control of airspace usage during operations and is the Army focal point for control of airspace among Army airspace users and with other Service users of the airspace.

(3) Minute-to-minute control of airspace usage is performed directly between airspace users in accordance with established SOP, plans, and orders.

(4) FM 44-10 (Test) (when published) will provide approved doctrine for airspace control.

(5) It is essential that *all* involved, in addition to the ACE, understand and execute their part of the airspace control process.

10-7. Control of ADA Fires

a. General.

(1) ADA fires are controlled to—

(a) Insure efficient engagement of hostile aircraft.

(b) Prevent engagement of friendly aircraft.

(c) Prevent ADA and aviation mission interference.

(d) Prevent incidents prior to an outbreak of hostilities.

(2) Rules and procedures for control of ADA fires are established by the area and regional air defense commanders and published in theater directives, operation orders, and SOP. These rules and procedures for control of fires, taken together, may be categorized as "firing doctrine."

★*b. Conditions of Readiness.* Conditions of readiness are the means used by specified authori-

ties to maintain the theater forces at a state of preparedness compatible with the real or apparent threat. The terms *defense readiness condition* (DEFCON) and *defense readiness posture* (DEFREP) are frequently used in relation to conditions of readiness. In response to each condition of readiness, the Army air defense commander prescribes a required *state of alert* for each subordinate ADA unit. Conditions of readiness may be either directive or informative in nature, depending on theater air defense policies. For example, conditions of readiness emanating from the theater or regional air defense level are directive to all ADA units retained directly under area and regional air defense commander operational control, but may only be informative to the divisional SHORAD units. The divisional SHORAD units normally maintain a degree of preparedness, in peace or war, equal to that of the division or as specified by the division.

c. Air Defense Warning. Air defense warnings are normally issued after the air defenses have reached their highest condition of readiness. The air defense warnings represent the air defense commander's evaluation of the probability of air attack. Typical air defense warnings are: RED, attack imminent or in progress; YELLOW, attack probable; and WHITE, attack not probable.

d. Rules of Engagement.

(1) The air defense rules of engagement are the means by which the commander of the unified command governs the fire of air defense weapons at air targets. The rules should be formulated, disseminated, and exercised before hostilities begin, and must provide for a logical transition from peacetime to wartime conditions. The rules should provide for maximum wartime decentralization of authority to engage hostile aircraft since the quick reaction requirements of the field army air defense forces, especially the SHORAD elements, will not allow the fire units to go back to a higher level of command to obtain identification data and permission to fire. The rules should exploit the capabilities of the air traffic control system in minimizing exposure of friendly aircraft to the friendly air defenses.

(2) The four key elements of the air defense rules of engagement are—designation of persons authorized to declare an aircraft hostile; specification of criteria by which an aircraft may be declared hostile; definition of conditions under which an aircraft may or must be engaged; and notice that the right of individual and collective self-defense is never denied.

(3) The specifics of the rules of engagement are of interest to air defense officers at all levels since the rules are major factors in determining the actual effectiveness or ineffectiveness of each air defense fire unit. Well-designed rules exploit air defense effectiveness in denying hostile penetration while protecting friendly aircraft. Poorly designed rules degrade weapon effectiveness and may unnecessarily endanger friendly aircraft.

(4) The following rules of engagement are considered typical for ADA operations during conditions short of war and during wartime:

(a) *Conditions short of war.* Fire units conduct engagements only as ordered by designated air defense commanders. The right of individual and collective self-defense is not denied.

(b) *Wartime.* Fire units conduct engagements in accordance with the prevailing weapons control status (*e* below) and hostile criteria (*f* below), and, for the radar-directed HIMAD and LOMAD weapons, special control instructions (*h* below). The right of individual and collective self-defense is not denied.

e. Weapons Control Status. Each weapons control status indicates the degree of fire control imposed upon the Army units having an air defense mission. A "normal" wartime status for each ADA weapon type should be specified in the theater rules. Authority to change or modify weapons control status, if any, should also be specified. Frequently, only the authority to temporarily impose *additional* restrictions is delegated. For example, the weapons control status terms defined and discussed below may be combined to give more freedom to fire at fixed-wing aircraft and less freedom to fire at helicopters.

★(1) *Weapons free.* "Fire at any aircraft not identified as friendly." Under this status, aircraft of unknown or doubtful identification may be engaged. Ideally, this status should be applied on a selective area basis. This requires that air defense commanders remain abreast of the air situation so that they can provide the force commander with practical weapons free recommendations. The impact of a weapons free status is highly favorable for air defense effectiveness but, because of problems associated with friendly aircraft identity and protection, may lead to temporary suspension of friendly aerial activities in the area affected. Therefore, this critical command decision demands availability of adequate air situation information and requires the combined efforts of the ACE and AADCP at each level.

★(2) *Weapons tight.* "Fire only at aircraft positively identified as hostile in accordance with the hostile criteria." This should be the normal status imposed on divisional SHORAD units; however, the system controlling these units must be prepared to recommend weapons free ((1) above) when appropriate, or respond to weapons hold ((3) below) as ordered. Examples of hostile criteria are presented in *f* below.

(3) *Weapons hold.* "Do not fire (the right of self-defense is not denied in peace or war)." The term "hold fire" may be used in lieu of weapons hold but such usage may lead to confusion with the hold fire special control instruction (*h* below) as applied to the radar-directed HIMAD and LOMAD weapons. The weapons hold status is normally time, area, or unit limited, and may be further limited as to class of aircraft protected (e.g., "Redeye weapons hold, 1600-1700, area AH, jets").

f. Hostile Criteria. The theater rules of engagement will refer to or include criteria by which an aircraft may be designated hostile. Hostile criteria must be quickly understood by ADA fire unit crewmen and aircraft pilots. For example, SOP may provide fire units the authority to classify as hostile any aircraft which is meeting one, or a combination, of the following criteria:

- (1) Attacking friendly elements.
- (2) Responding improperly to electronic IFF interrogation.
- (3) Discharging smoke or spray over friendly elements without prior coordination.
- (4) Dropping flares at night over friendly territory without prior coordination.
- (5) Discharging parachutists without prior coordination.
- (6) Engaging in mine-laying operations without prior coordination.
- (7) Operating at prohibited speeds, altitudes, or directions.
- (8) Improperly entering an area designated as restricted, prohibited, or as an ADA "battle zone."
- (9) Improperly departing from a zone, route, or corridor designated as "safe."
- (10) Employing electronic countermeasure devices; e.g., dropping chaff and reflectors over friendly territory without prior coordination.
- (11) Maneuvering in a manner clearly indicating imminent attack.
- (12) Bearing the military insignia or having

the configuration of an aircraft employed by a known enemy nation

Note: Although (1), (11), and (12) above are considered to be the primary hostile criteria for visually-directed SHORAD weapons, the remaining criteria provide useful indicators for focusing attention on possible hostiles.

g. Methods of Control. Methods of control are the procedures by which the fires of air defense weapons are supervised in a particular defense. Theater rules or unit SOP may specify or imply use of either the centralized or decentralized method of control or circumstances may force autonomous operation.

(1) *Centralized.* Under the centralized method of control, fire units only conduct engagements upon receipt of specific orders or permission from a designated higher air defense echelon. The centralized method is not appropriate for most ADA operations during wartime, although it may prove efficient for control of HIMAD weapons when a small number of high-altitude aircraft are attempting to penetrate the defense.

(2) *Decentralized.* Under the decentralized method of control, engagement decisions are made at lower ADA levels based on rules of engagement, SOP, and temporary engagement restrictions imposed by higher echelons. This is the method of control appropriate for most ADA units conducting air defense missions in wartime.

★(3) *Autonomous.* Autonomous operation is the method of control assumed by an ADA defense or fire unit after it has lost all communications with higher echelons. The unit commander assumes full responsibility for control of weapons and engagement of hostile aircraft. Activities are conducted basically as in the decentralized method ((2) above), without benefit of supervision and information from higher headquarters.

h. Special Control Instructions. Special control instructions pertaining to specific engagements may be issued to radar-directed ADA weapons, regardless of the weapons control status and method of control in effect at the time. Special control instructions include the following:

(1) *Hold fire.* This order is used to protect specific friendly aircraft. Fire is withheld and any missiles in flight are immediately destroyed. Tracking ceases.

(2) *Cease fire.* This order is used to preclude simultaneous engagement of a specific target by both interceptors and surface-to-air missiles. Fire is withheld but tracking continues; however, missiles already in flight are permitted to continue toward intercept.

(3) Coordination of SHORAD weapon fires is accomplished primarily by SOP based on designation of primary sectors of fire and the rule that the fire unit concentrates its fires on the most threatening aircraft within its primary sector of fire.

m. Firing Techniques.

(1) *Definition.* Air defense artillery firing techniques provide broad guidance for optimizing the engagement of hostile aircraft. The firing techniques contained in the following subparagraphs may be modified or expanded in SOP.

(2) *Nike Hercules.* Nike Hercules is limited to firing a single missile at each target or group of targets and, following damage assessment, re-engaging if necessary. This is known as a shoot-look-shoot firing technique. The selection of Nike Hercules warhead type will be made according to the criteria promulgated by area and regional air defense commanders. Nuclear warheads will be fired only after nuclear release.

(3) *Hawk.* The time available for engagement with the Hawk system will frequently be quite short. It is imperative that firing technique guidance be provided for the tactical control officers by the tactical SOP, possibly supplemented by graphical or tabular devices. Samples of such devices are presented and discussed in FM 44-96. Specific firing techniques are based upon the engagement time available, desired engagement effectiveness, raid size, and number of missiles available. As a minimum, firing technique guidance should indicate the method of fire to be employed under various tactical conditions. Methods of fire that may be employed with Hawk are as follows:

(a) *Shoot-look-shoot.* Under this method, missiles are fired one at a time, with damage being assessed after each firing. This method affords maximum missile economy and is effective against single targets engaged at maximum range.

(b) *Ripple fire.* This method involves firing a series of missiles from one fire unit at a predetermined interval between launches, evaluating the effect of these missiles, and firing another series if required. Ripple size is increased as the raid size (one, few, many) increases, as the desired engagement effectiveness increases, and as the time available for the engagement decreases.

(c) *Salvo fire.* This method involves firing missiles simultaneously in pairs, one from each fire unit under battery control central con-

trol. Launchings are at predetermined intervals. The method permits the application of maximum firepower in a minimum time and is especially useful against close-in, high-speed targets when the urgency of the situation warrants the high expenditure of missiles. This method does not apply to self-propelled Hawk platoons operating as semi-independent fire units.

(4) *Chaparral.* Single low-performance aircraft are engaged by Chaparral fire units on a shoot (one)-look-shoot basis. Single medium- and high-performance aircraft are engaged on a shoot-shoot (two) basis. Multiple targets of all types should be engaged on a shoot-new target-shoot basis in a sequence determined by the fire coordination rules, engaging as many aircraft as possible. (FM 44-3 contains details.)

(5) *ADA AW.* An engagement commences when an aircraft is declared hostile and is within effective range, and is continued until the aircraft is destroyed, out of range, or all onboard ammunition is expended. The 40-mm and caliber .50 weapons normally are fired continuously from the time the hostile aircraft comes within range until after crossover. During firing, corrections are made based on tracer observation. The 20-mm Vulcan is normally fired in 30-, 60-, or 100-round bursts. The 30-round burst is used when engaging low-performance aircraft, the 60-round burst is used against medium-performance aircraft, and either the 60-round burst (radar mode) or 100-round burst (manual and external modes) is used against high-performance aircraft. Between each burst the gunner corrects his sight picture for more accurate tracking. (FM 44-2 and FM 44-3 provide details.)

(6) *Redeye.* Firing techniques applicable to the Redeye system must be clearly defined in the Redeye SOP. For example, single nonjet aircraft could be engaged on a shoot (one)-look-shoot basis. Single jet aircraft could be engaged on a shoot (two)-look-shoot basis with one round being fired by each team member. As a general rule for multiple attackers, Redeye team members should engage in priority those aircraft presenting the greatest threat to the supported unit. (FM 23-17 contains details.)

n. ADA Application of Hostile Criteria.

(1) *Radar-directed weapons.* The capability of Army radar-directed HIMAD and LOMAD weapons to effectively make use of the hostile criteria varies widely. Army air defense commanders must make every effort to insure compatibility of hostile criteria requirements and

ADA weapon system and human capabilities. Maximum training in application of the probable wartime hostile criteria is essential.

(2) *Visually-directed weapons.* Operations under the recommended concept for control of the fires of visually-directed SHORAD weapons involve visual aircraft recognition. It is essential that all weapon crew personnel be continually trained and tested in visual aircraft recognition, with emphasis placed on recognition of tactical aircraft common to the particular operating area and likely to be seen by the particular weapon crews. (FM 44-30 provides details.) The final identification decision is the responsibility of the team chief/squad leader.

10-8. Intelligence

a. General.

(1) The need for continuous exchange of air and ground threat intelligence between and within the air defense and supported force organizations is emphasized. Both types of intelligence are required by both organizations to best determine alert and reaction requirements and otherwise accomplish the air defense and ground combat missions. Rapid dissemination of information regarding enemy electronic countermeasure operations and unusual air activity of any type, as gathered by air defense units, is especially important. Information concerning enemy air activity is so critical and transitory that special provisions must be made for its collection, processing, and dissemination.

(2) ADA units originate air defense intelligence in the course of operations; e.g., information regarding enemy low altitude aerial activity and ECM operations is gathered by ADA organic radars. This paragraph pertains only to ADA unit requirements for intelligence generated by external sources. Intelligence collection requirements are satisfied through the use of the normal S2/G2 organization and equipment and organic radars, as detailed in FM 30-5, FM 101-5, and the 44-series ADA unit field manuals.

b. *Requirements and Sources.* The following minimum air defense intelligence must be obtained from external sources:

(1) *Strategic warning.* Strategic warning is developed by intelligence services at the national or service level and may provide warning of impending attack. Strategic warning information is analyzed at levels above the ADA units and, if disseminated through command and intelligence channels to the units, provides warning to prepare for possible attack.

(2) *Tactical warning.* Tactical warning is information that an enemy air attack has been launched or is immediately impending. Tactical warning may originate from US SIGINT units, theater surveillance system long-range radars, ADA unit radars, and observation of enemy weapon impacts in the defended area. Gathering and dissemination of tactical air warning and accompanying air defense warning conditions and weapon control instructions is the responsibility of the area and regional air defense organizations. ADA units provide intelligence input to the responsible agencies, especially as it pertains to low-altitude aerial activity. ADA radar siting and netting may be influenced by the requirements of the theater surveillance system. Because of the uncertainties of timely receipt of tactical warning by all ADA units, the ADA units must be organized and equipped to function efficiently with only the local warning developed by ADA radars, observers, and air guards.

(3) *Special warning.* Provisions must be made for ADA unit receipt of CBR and ground attack warning. This warning is obtained through communication tie-in to the warning system of the supported unit or other designated warning system. ADA SOP must also provide for ADA unit origination of such warning when appropriate.

(4) *Air threat data.* ADA planners require current air and missile threat data. Some of the data is generated in the field, but most is developed at the service or national level and then provided to the field commanders. Required threat data includes types, quantities, probable apportionment and courses of action, characteristics, all-weather capability, infrared suppression means, radar cross section reduction measures, intelligence cycle, identification procedures and means, nuclear doctrine and release procedures, ECM and ELINT capabilities and techniques, ordnance, "dead man" fuzing capability, attack profiles, specific air defense suppression techniques, and location of airfields. This information is obtained by the ADA unit S2 intelligence system from the Air Force A2 intelligence system through intelligence channels. ADA units are required to report threat intelligence gained during operations; e.g., ECM emissions, apparent flight patterns (corridors, loiter areas), and range and azimuth of observed surface-to-surface missile launches.

(5) *Weather.* Weather intelligence is required to provide the ADA commanders with sufficient data to permit determination of favorable and unfavorable influences on enemy air op-

erations, requirements for ADA equipment tie-down and protection, limitations on ADA unit movement, and requirements for redeployment of radar-directed weapons to offset the effects of weather on visually-directed weapons. Weather data are obtained by the ADA unit S2 from the defended unit G2 or other designated source. Atmospheric data required for support of Nike Hercules surface-to-surface firings are obtained by the airspace coordination element from the fire support element planning these fires.

★(6) *Terrain*. Terrain analysis, maps, and image interpretation support from aerial reconnaissance/surveillance missions (FM 30-20) required for defense design and movement planning are obtained by the ADA unit S2 from the supported unit G2 or other designated source.

★*c. Communications and Liaison.*

(1) Liaison officers employed to support operations are also assigned an air defense intelligence collection and dissemination mission.

(2) Warning nets, if established through use of available assets, disseminate air defense intelligence and other broad-interest, time-critical information. Warning may also be disseminated through command and intelligence nets; however, broadcast-type nets are the preferred means of disseminating this type of information.

★*d. Security.* The ADA unit S2 is responsible for—

(1) Electronic and communication security planning and supervision. Assistance may be obtained from counterintelligence elements, the US Army Security Agency units, and the communications-electronics staff officer or electronic warfare officer (if assigned).

(2) Personnel, document, and installation security planning and supervision. As necessary, the S2 requests support from counterintelligence elements.

★*e. Other Intelligence Support.* The ADA unit S2 may also be provided support by prisoner of war interrogators, scientific and technical intelligence personnel, order of battle personnel, and imagery interpretation personnel.

★10-9. *Communications*

a. General. Air defense artillery communications doctrine is standard Army doctrine tailored to meet the particular operational requirements of the air defense artillery.

b. Basic ADA Communications Doctrine.

(1) *Characteristics.*

(a) The nature of the threat, especially that of missiles and high performance aircraft, requires that the air defense artillery be capable of instantaneous response to that threat. This requirement dictates the basic characteristics of the air defense artillery system's communications— instant accessibility and high reliability.

(b) Variance from the basic characteristics may be indicated by the mission, capabilities, and operating environments of the weapons systems supported. For example, within SHORAD units, basic requirements can be met by operating organic AM/FM radio nets during daylight hours. However, even within these forward area ADA systems, it is essential that alerting information be provided in near realtime to permit the fire units time to respond effectively to the threat. There can be no variance from the basic characteristics for the more lethal, expensive, and sophisticated system; e.g., Nike-Hercules.

(c) Air defense artillery requires timely information to respond effectively with minimum danger to friendly aircraft. This information is required at the fire unit level to permit autonomous operations or the decentralized execution of the air defense mission. Similarly, commanders above the fire unit level must be provided timely, accurate, and reliable information to provide effective centralized direction of their units during battle.

(2) *Organic and supporting communications.* The air defense artillery short reaction time requirements and typical wide dispersion over large areas combine to create requirements for dedicated near realtime circuits capable of handling dense traffic from the lowest to the highest echelons and over nonstandard routing. Accordingly, the ADA units should be provided sufficient organic/assigned communications to fully utilize the capabilities of the weapons systems and the control and coordination system equipment.

c. Planning. Several factors must be considered in determining communications requirements.

(1) *Types of transmission media required.*

(a) Communications links must be capable of passing both digital data and voice information when electronic Army air defense control and coordination systems (AADCCS) are employed. Multichannel radio systems are the primary means of meeting this requirement. Tactical field radios (and landline links where time and dis-

tance permit) meet the requirements to back up the multichannel radio systems.

(b) Voice communications will normally suffice if electronic AADCCS are not used. Tactical field radios and, when time and distance permit, landline links satisfy voice communication requirements.

(c) Radio teletypewriter communications are required at the ADA battalion level and above.

(2) *Resources.*

(a) *ADA brigade and group.* Signal units of the field army signal brigade provide multichannel radio terminals and relays at the ADA brigade level for brigade entrance into the field army command communications system and the field army area communications system. Signal teams RV (TOE 11-500) provide multichannel radio terminals and relays to interconnect the ADA brigade, group, and battalion AADCCS echelons. The Air Force establishes multichannel radio systems to link each ADA group (or brigade, if appropriate) to an Air Force control and reporting center (CRC) or control and reporting post (CRP). This radio system includes voice links and the digital data links necessary to interconnect Army and Air Force electronic control and coordination systems. ADA brigade and group tactical radio communications requirements, as depicted in figures 10-1 and 10-2, are met through use of personnel and equipment provided by ADA unit TOE and by special arrangement with the field army, Assistant Chief of Staff, Communications-Electronics. ADA teams provided by TOE 44-510 (para 6-4) include communications personnel and equipment required to support most team operations. In the near future, most ADA brigade and group communications requirements will be met by assigned signal units.

(b) *ADA battalion.* Communications personnel and equipment for intrabattalion requirements are provided by its TOE. For the ADA battalions utilizing electronic AADCCS, the organic communications equipment includes the necessary VHF/UHF multichannel terminals and relays to establish links from battalion to the subordinate firing batteries. TOE tactical radio equipment satisfies additional voice net requirements to include the external net requirements indicated in figure 10-2.

(3) *Communications security.*

(a) Communications security (COMSEC) must be considered in the planning and establishing of all air defense communications nets, to include teletypewriter and digital data links.

COMSEC includes crypto security, transmission security, and emission and physical security. COMSEC protective measures include maximum employment of cryptoequipment and cryptomaterials, physical security of COMSEC-related materiel, protected wire "line" distribution systems (approved circuits), operator and user training and discipline, and system design and procedures that afford maximum transmission security. Personnel who use communications systems must be aware of the consequences of poor COMSEC practices, cognizant of the ADA information requiring protection, and familiar with the COMSEC means available.

(b) "COMSEC monitoring and support" will be part of the intelligence annex to operations orders. "COMSEC aids and equipment applications" will be included in communications-electronics signal instructions (CESI) and communications-electronics operations instructions (CEOI). Alternatively, such information may be included in unit SOPs.

(c) Assistance in the preparation of COMSEC plans and SOPs may be obtained from the supporting USASA element.

(4) *Electronic warfare.* Although effective COMSEC measures can be expected to make enemy employment of electronic countermeasures more difficult, such enemy activities must be expected. Staff planning must therefore incorporate provisions for maximum availability of alternate communications paths and means and for an effective electronic warfare training program.

d. *Multichannel Radio System Requirements.* As stated in c(1)(a) above, the VHF/UHF multichannel radio system is established to fulfill the tactical communications requirement for ADA units operating with electronic AADCCS. The multichannel radio system consists of high-quality, point-to-point radio links between headquarters. The links are capable of providing reliable and secure data teletypewriter and telephone communications circuits. Multichannel radio repeaters are utilized as required to extend the communications system or to overcome terrain problem areas. Within the multichannel communications system, sole-user circuits are required to rapidly transfer pertinent information concerning combat operations. ADA battalions operating with electronic AADCCS require one data link and three voice channels between battalions and batteries and between battalions and higher echelons. Reliable communications via this system are accom-

Net Stations	Fld Army Comd and Area Comm Sys (VHF/UHF Multichannel)	Fld Army Comd Net #5 (RATT)	ADA Bde Comd-Admin Net (VHF/ FM Voice)	ADA Bde ADC Net (HF/AM/ SSB Voice)	ADA Bde IRR Net (HF/AM/ SSB Voice)	ADA Bde Admin- Log Net (HF/AM/ RATT)	ADA Bde Liaison Nets (HF/AM/ SSB Voice)
Army Main	X (SBde)	X (SBde)					
Army Alternate	X (SBde)	X (SBde)					
FATOC ACE	X (SBde)						X
Air Force TACC Team							X
Air Force CRC/CRP Team							X
Army FDC	X (SBde)						
ADA Bde Comman	X (SBde)	X	X (NCS)			X (NCS)	
ADA Bde CG			X	X			
ADA Bde Staff			X				
ADA Bde AADCP			X	X (NCS)	X (NCS)		X (NCS)
ADA Bde Rdr Section					X		
ADA Bde Avn Section			X	X ^{1/}			
ADA Groups			X	X ^{2/}	X ^{2/}	X	

LEGEND

SBde - Radio equip-
ment provided
by Field Army
Signal Brigade.

NCS - Net Control
Station.

NOTES: 1/ Installed in aircraft assigned to brigade.
2/ Serves as primary communications during unit movement or emergency and as back-up for VHF/UHF multichannel system.

Figure 10-1. Recommended tactical radio nets for ADA brigade.

NET STATIONS	FLD ARMY COMD AND AREA COMM SYS (VHF/UHF) MULTICHANNEL	ADA GROUP COMD-ADMIN NET (VHF/ FM VOICE)	ADA GROUP AOC NET HF/AM/SSB VOICE	ADA GROUP IRR NET (HF/AM/SSB VOICE)	ADA GROUP ADMIN-LOG NET (HF/AM/ RATT)	ADA GROUP LIAISON NETS (HF/AM/SSB VOICE)	LEGEND
ARMY MAIN	X (SBde)						SBde -RADIO EQUIPMENT PROVIDED BY FIELD ARMY SIGNAL BRIGADE AF -RADIO EQUIPMENT PROVIDED BY U. S. AIR FORCE NCS -NET CONTROL STATION. NOTES: ¹ ESTABLISHED ONLY IF GROUP IS HIGHEST ECHELON ADA UNIT ASSIGNED IN FIELD ARMY. ² SERVES AS PRIMARY COMMUNICATIONS DURING UNIT MOVEMENT OR EMERGENCY AND AS BACK- UP FOR VHF UHF MULTICHANNEL RADIO SYSTEM. ³ INSTALLED IN AIRCRAFT ASSIGNED TO GROUP. ⁴ SERVES COORDINATION FUNCTION WHEN GROUP IS ASSIGNED TO BRIGADE BUT SUPPORTING CORPS. ADDITIONAL COMMUNICATIONS, OBTAINED THROUGH FIELD ARMY SIGNAL BRIGADE, ARE REQUIRED WHEN GROUP IS ATTACHED TO CORPS.
ARMY ALTERNATE	X (SBde)						
FATDC ACE	X (SBde)					X ¹ / ₂	
CTDC ACE	X (SBde)					X ⁴ / ₂	
AIR FORCE TACC TEAM						X ¹ / ₂	
AIR FORCE CRC CRP TEAM						X	
ARMY FDC	X (SBde)						
ADA GROUP COMMCEN	X (SBde) ¹ / ₂	X (NCS)			X (NCS)		
ADA GROUP CO		X	X				
ADA GROUP STAFF		X					
ADA GROUP AADCP		X	X (NCS)	X (NCS)		X (NCS)	
ADA GROUP ROR SECTION		X		X			
ADA GROUP AVN SECTION		X	X ³ / ₂				
HIKE MERCULES ADA BATTALION		X	X ² / ₂	X ² / ₂	X		
HAWK ADA BATTALION		X	X ² / ₂	X ² / ₂	X		
CHAPARRAL/VULCAN ADA BATTALION (NON-DIVISIONAL)		X	X		X		

Figure 10-2. Recommended tactical radio nets for ADA group.

plished by providing alternate paths between and through the different levels of command.

(1) *Dedicated channels.* Designation of required channels, the priority in which they are established, and the type of information exchanged are as follows:

(a) *Automatic data link (ADL).* This channel is used for the exchange of digital information pertaining directly to the air battle; e.g., track identity, air defense warning, track position data, engagement results, fire unit status (ready, tracking, firing, out of action), and raid size. If the ADL fails, the foregoing information can be exchanged over the ADC and IRR voice circuits.

(b) *Air defense control (ADC).* This voice channel is used for exchange of tactical information not suitable for transmission over the ADL; e.g., condition of readiness, state of alert, weapon release condition, missile count, launcher status, weapons control status, method of control, and weapon system locations.

(c) *Intelligence and radar reporting (IRR).* This voice channel is used for transmission of air defense intelligence from higher to lower echelons and radar reporting information from lower to higher echelons. Information includes long-range track position data, as read from the fire unit plan position indicator (PPI), which cannot be transmitted over the ADL.

(d) *Maintenance channel.* This voice channel is used for conduct of alinement and checks between elements of the air defense system without interfering with tactical operations.

(2) *Additional channels.* Designation of VHF/UHF multichannel circuits which may be established after the four required channels are established are as follows—

(a) *Teletypewriter channel.* This full duplex secure channel could interconnect the ADA battalions with their parent group and higher echelon AADCP's. This circuit would provide a hard-copy message which will reduce the probability of misinterpretation of important or lengthy messages.

(b) *Administrative and logistical channel.* This voice channel could provide the means of passing administrative and logistical information not pertaining directly to air battle operations.

(c) *Commands channels.* These voice channels would allow the commander to talk directly to his subordinates.

(d) *Liaison channels.* These voice channels would provide contact from the ADA brigade/

group through the field army area communications system to the field army/corps tactical operations center, Army FOC, and Army augmentation teams at the Air Force TACC, CRC, and CRP, as appropriate.

e. *Tactical Field Radio Requirements.* ADA units require tactical field radios to provide primary communications for use in the absence of multichannel radio systems, during unit movement or emergency, and for detached (liaison) elements of the unit. These radios also provide backup communications for the unit equipped with the multichannel radio system should that subsystem fail. The following nets (fig. 10-1 and 10-2) should be established as appropriate for the situation and the organization involved:

(1) *Air defense control (ADC).* This two-way HF/AM/SSB voice net is used for the transmission of tactical information to include condition of readiness, state of alert, weapon release condition, method of control, engagement instructions, engagement results, acknowledgement of receipt of commands, missile count, launcher status, weapons control status, weapon system locations, and similar tactical information.

(2) *Intelligence and radar reporting net (IRR).* This two-way HF/AM/SSB voice net is used for the transmission of intelligence from higher to lower echelons and for the transmission of radar plots from fire units and defense acquisition radars to the battalion and group AADCP. Information transmitted includes track position data, track identity, raid size, and air attack warning.

(3) *Command and administrative net.* This two-way VHF/FM voice net is used for exchanging command, administrative, and logistical information that does not pertain directly to the air battle.

(4) *Brigade (or group) liaison nets.* These two-way HF/AM/SSB voice nets are used for the exchange of information between the AADCP and other units, such as adjacent AADCP, Army FOC, supported units, and other services as required.

f. *Radio Teletypewriter (RATT) Net Requirements.* These full-duplex secure HF/AM/RATT nets (figs. 10-1 and 10-2) are established to provide transmission of lengthy, important, or secure messages requiring hard copy. Information exchanged includes command, intelligence, administrative, and logistical data.

g. Alternate AADCP Communications Requirements. Selected ADA battalion AADCP are designated as alternate group AADCP; therefore, communications must be established between these battalions and the major facilities normally contacted by the group. Radios normally used in the group ADC and IRR nets may be used for this purpose. A reorienting of communications equipment to establish nets between battalions within the group is necessary if lateral links are not normally provided between battalions in all situations.

h. STRAF Air Defense Artillery Battalion Communications. The STRAF air defense artillery battalion communications system employs internal and external communications tailored to permit integration with on-base Air Force facilities and, if present, the area/regional air defense system. Chapter 9 of FM 44-3 shows a sample application.

i. Divisional ADA Battalion Communications. Detailed communications requirements for the divisional Chaparral/Vulcan or Vulcan battalion are contained in FM 44-3. Division communications are discussed in detail in FM 61-24.

Figure 10-3. Is deleted.

j. Redeye Communications.

(1) *Command and control.* Redeye command and control communications are established through use of organic radios and wire communications. Command and control information is exchanged by the section leader and the Redeye teams via the Redeye section command net or existing unit nets, depending on whether the teams are retained under section control or are attached to other units.

(2) *Warning.*

(a) The Redeye section leader monitors the division warning net (if established) and insures timely dissemination to the Redeye teams of air and ground attack warning information and other urgent operational information received over the net. If the division warning net does not carry air defense warning information, or if that net is not provided, SOP may specify means whereby the Redeye section leaders may monitor any air defense net which will provide additional air defense information; e.g., Chaparral or Vulcan battery or platoon command nets.

(b) Redeye teams receive alerting and tentative identification (engagement of aircraft by Redeye teams is based on positive visual identifica-

tion) information directly from the forward area alerting radars (FAAR) associated with the divisional SHORAD battalion. The data is displayed on the team's target alert data display set (TADDS). The section leader receives FAAR location and TADDS data link frequency data originated by the divisional SHORAD battalion and disseminated by the ACE in the DTOC. On the basis of this data and knowledge of the Redeye team locations, the section leader accomplishes the required FAAR/fire unit pairing as discussed in paragraph 7-10. Prior to deployment of the FAAR's and TADDS, the Redeye sections' only external source of warning information is as described in (a) above.

k. Further Details. Additional information regarding the use of ADA organic communication equipment and personnel for air defense operations can be found in FM 44-2, FM 44-3, FM 44-95, and FM 44-96. FM 11-21, FM 11-23, FM 11-125, and FM 61-24 present details regarding theater, field army, corps, and division communications. FM 24-1 provides basic communications doctrine. JCS Pub 10 describes concepts and technical standards to achieve compatibility between command and control systems and equipment of the Services. JCS Pub 11 presents tables showing compatibility of the various kinds of communications equipment currently used by the Services. JCS Pub 12 defines the minimum information to be exchanged between the Air Force tactical air control system, the Marine tactical data system, and the AADCCS controlling HIMAD and LOMAD units. Detailed information relevant to electronic warfare is contained in FM 24-18 and FM 32-20.

10-10. Nuclear Air Defense Fires

★a. General.

(1) The enemy is given the capability to use devices that would cause aircraft- or missile-carried nuclear weapons to detonate if the crew were killed or the carrier destroyed. Air defense artillery can best accomplish its mission by destroying the enemy nuclear weapon before it can be detonated. However, kill of the weapon carrier alone may have to be accepted in many cases because of safety and other requirements.

(2) When nuclear weapons are used for air defense, undesirable thermal radiation, blast, nuclear radiation, and electromagnetic effects may be received on the ground.

(a) *Thermal radiation.* Fires are a threat

when a nuclear weapon is detonated over forests or urban areas. The burn hazard to personnel from direct thermal radiation is also significant. Since the fast reaction time required for air defense usually prevents troop warning, all friendly troops are considered as unwarned and exposed to the thermal effects of air defense nuclear detonations.

(b) *Blast*. Blast is not usually a controlling ground safety criterion in air defense nuclear bursts. Because of the high angle of incidence of the blast wave, translational motion effects do not extend as far as thermal or radiation effects. Glass breakage (not tactically significant) is the most likely blast effect to be expected. However, the commander may direct that blast effects be considered.

(c) *Nuclear radiation*. For a burst at greater than 30,000 meters altitude, nuclear radiation on the ground will not be significant. For lower airbursts, nuclear radiation effects on the ground may be significant. Since friendly troops are not warned in advance of the burst, no attenuation of the initial radiation can be insured.

(d) *Electromagnetic effects*. The decision to employ air defense nuclear warheads must include an awareness that nuclear explosions cause effects that may limit air defense operations. The effects are the electromagnetic pulse (EMP) and radar/communications interference.

(e) *Survival measures*. Field measures to lessen effects of friendly nuclear bursts and to aid in surviving enemy detonations are discussed in FM 21-40 and FM 44-1-1A (when published).

(3) The decreasing air density associated with increasing altitude can greatly alter nuclear weapon effects. The amount of thermal radiation received by an aircraft varies with atmospheric conditions, orientation of the aircraft with respect to the burst, ground reflecting surfaces, and clouds. Scatter and reflection may result in an aircraft receiving two or three times the thermal radiation received by a target on the ground. However, when a heavy cloud layer is between the burst and the aircraft, the thermal radiation received may be negligible. Nuclear radiation is propagated to greater ranges at higher altitudes. Blast effects are decreased due to the decreased air density. (DA Pam 39-3 provides details regarding high-altitude effects.)

(4) This paragraph pertains only to use of air defense nuclear weapons in the air defense application. (For doctrine, procedures, and data regarding the ground fire support application, see

FM 101-31-1, FM 101-31-2, and paragraph 10-11.)

b. Control.

(1) The decision to employ nuclear weapons rests solely with the President of the United States. After initial authorization has been given by the President, the authority to commit those nuclear weapons authorized for release will normally be passed by the Secretary of Defense to the commander of the unified command. Suballocation of available nuclear weapons to air defense commanders is entirely within the authority and control of the commander of the unified command. Actual expenditure of the allocated air defense nuclear weapons is not authorized until released by a predesignated authority.

(2) To achieve a timely nuclear air defense response to nuclear air attack, delays in obtaining initial authority to expend air defense nuclear weapons must be minimized. Constant evaluation of air defense intelligence, early requests for release, and rapid dissemination of initial nuclear release information via responsive communications down to the ADA fire unit are mandatory.

(3) Once the air defense nuclear weapons release has been authorized, the authority to employ nuclear weapons should be decentralized. The ADA battery must then be given the authority to use its nuclear weapons subject to rigid conditions specified in SOP's based on theater policies. The rapid reaction required of an ADA battery in support of a field army does not permit involved nuclear coordination procedures.

(4) Nuclear weapons may be provided to the commander of a unit made up of forces from other countries. These weapons may be delivered by either US or non-US delivery units. In the latter case, missile warhead arm plugs are retained under the control of US personnel in accordance with directives of the US commander or with theater directives until time of launching or firing.

c. Minimum Normal Burst Altitude (MNBA).

(1) Restrictions on the use of air defense nuclear warheads are required to preclude unacceptable damage to friendly personnel and friendly installations. The degree of restriction to be imposed is a command decision based upon the amount of damage the enemy threat may cause and the amount of damage friendly air defense bursts may inflict on friendly forces. The restrictions to be imposed are determined by the commander of the unified command or a designated

subordinate. The restrictions are incorporated in the SOP of each ADA battery having a nuclear capability.

(2) The theory of ground safety from air defense nuclear detonations is similar to the theory of troop safety described in FM 101-31-1. There are two significant differences:

(a) Friendly personnel are always considered "unwarned, exposed."

(b) The distance between the burst point and friendly ground elements is measured vertically.

(3) For a given nuclear warhead, the risk on the ground increases as the burst altitude decreases. Therefore, it is necessary to establish minimum normal burst altitudes for each weapon. The commander evaluates the damage that may occur from a friendly air defense burst, compares it with the air threat, and determines the risk of ground damage due to friendly air defense bursts he is willing to accept. For each risk and weapon combination, there is an associated burst altitude below which the weapon is not normally employed. These altitudes are known as minimum normal burst altitudes (MNBA). The terms minimum normal burst altitude (MNBA) and minimum burst altitude (MBA) should not be confused. The MNBA is defined, for joint usage, as the altitude above terrain below which air defense nuclear warheads are not normally detonated. MBA, on the other hand, is the sum of terrain elevation and MNBA and is a Nike-Hercules system dial setting referenced to sea level and used to implement the MNBA. (MNBA computation procedures, based on the commander's risk guidance and on warhead yield, are included in FM 44-1A.)

(4) The various risk altitudes from which the risk levels ((3) above) are derived are defined as follows:

(a) *Negligible risk altitude.* The negligible risk altitude is an altitude at which an air defense burst of a given yield has no significant effect on the ground.

(b) *Moderate risk altitude.* A burst at this altitude causes some physical damage on the ground, but little injury to personnel. A moderate risk is usually acceptable throughout the theater.

(c) *Emergency risk altitude.* Bursts at this altitude cause some injuries to personnel on the ground and possibly some deaths, although the direct effects of the detonation are well below lethal criteria. Considerable material damage can be expected. Mild radiation sickness, but no lethal

doses of radiation, can be expected. With some yields, fires will occur. Although the emergency risk exists only at a point directly below a burst, at this altitude a relatively large area surrounding ground zero will be exposed to greater than moderate risk. For bursts below the emergency risk altitude, deaths can be expected to occur in significant numbers; also, there is a greater danger of fires spreading, because of the increase in the number of fires and the deterioration of the local firefighting capability.

(d) *Fallout safe height of burst.* The fallout safe height of burst is the height of burst at or above which no militarily significant fallout will be produced and below which significant fallout may be expected.

(5) In determining the acceptable risk, the commander considers the following factors:

(a) Enemy capabilities.

(b) Disposition of friendly forces.

(c) Effect of damage by a friendly air defense nuclear weapon at a prescribed altitude.

(d) Passive air defense measures.

(e) Effectiveness of friendly air defense units employing nonnuclear warheads.

(f) Previous exposure of friendly forces to nuclear radiation.

(g) Criticality of the defended asset(s) to the success of the overall mission.

d. Employment of Nuclear Weapons Below the MNBA. Rules for nuclear weapon employment below the MNBA are prescribed in theater policy. Exceptions to the MNBA must be rigidly controlled. Exceptions may provide that:

(1) Nuclear weapons may be used below the MNBA when the engagement occurs over enemy-held territory or unpopulated areas. Under these circumstances, and when engagement is close to friendly troops, ADA units are required to observe minimum safety distances (FM 101-31-2) for unwarned and exposed personnel. ADA unit commanders must keep informed of the areas where nuclear weapon employment below the MNBA is permitted.

(2) The tactical necessity for destruction of hostile aircraft or missiles may dictate a risk of casualties to friendly troops. In such circumstances, employment of ADA nuclear weapons below the MNBA may be authorized by the commander of the unified command.

e. Warning. Time permitting, ADA fire units will report to the AADCP via command or other prescribed nets the intention to engage hostile air-

craft with nuclear weapons, stating estimated time, altitude, and GEOREF of the burst. The AADCP will transmit a warning message to its associated tactical operations center and CRC or CRP. These agencies may then transmit alerts to their respective airborne aircraft (STANAG 2104). The warning may not assure sufficient time to permit pilots flying low-performance aircraft in the vicinity of the predicted burst to reach safety. It is possible that time will not permit any warning at all to friendly forces. The risks involved are accepted when the air threat justifies use of nuclear weapons.

f. Planning. A detailed terrain analysis of the area to be defended is conducted early in the planning phase. This analysis includes the terrain, location of critical military installations and their priorities, and a general survey of troop and population density. This information, tempered with the commander's guidance, permits the determination of the risk altitudes that should be employed. Every effort is made to minimize the oper-

ational restrictions imposed upon the ADA units in order to obtain the highest possible level of air defense. For this reason, the emergency and moderate risk altitudes are the most frequently employed. Although it is desirable to use only one risk altitude in any one defense, the variability of the situation on the ground often makes this impractical. However, no more than two risk altitudes should be employed in one defense.

★g. ATBM Operations. Under certain conditions, the Improved Nike-Hercules system, employing nuclear warheads, may be used in the antitactical ballistic missile (ATBM) role. Prior to the decision to so employ Nike-Hercules, force commanders should consult the force air defense officer to determine the most effective means of employment. The following factors regarding ATBM operations should be considered:

(1) Nuclear release and fire unit authority to engage tactical ballistic missiles under a weapons free weapons control status are prerequisites.

(2) The system must be maintained at battle stations once nuclear release has been given and there are indications of imminent tactical ballistic missile attack. Crewmen observing scopes should be rotated frequently; e.g., every 30 minutes.

h. Classified Doctrine. See FM 44-1A for classified nuclear weapon employment doctrine concerning weapon control cases, warhead selection guidance, definition of "unpopulated" areas, and procedures for MNBA computation.

10-11. Ground Fire Support

a. General. Although the primary mission of ADA is countering the enemy air threat, fire units having a surface-to-surface capability may be relieved from the air defense mission and assigned a ground fire support mission when the situation dictates. Unless otherwise specified by order or SOP, the authority to assign such a mission rests with the commander having operational control of the ADA unit.

b. Nike Hercules Ground Fire Support.

(1) *Planning.*

(a) Nuclear weapons allocated for air defense are employed in ground fire support missions only after receipt of authorization from the commander exercising operational control over the ADA units and weapons involved. Nuclear weapons may be specifically allocated for ground fire support.

(b) Ground fire support missions for Nike Hercules units normally will be a backup for field artillery nuclear fires. These missions will be scheduled on an "on call" basis with firing data furnished to the selected ADA unit. The fire support annex to the operation order must provide for ADA unit relief from the air defense mission for the duration of the ground fire support mission.

(c) When no field artillery or aviation means are available to attack a target of opportunity, it may be necessary to assign the attack mission to a Nike Hercules unit. This requires that the airspace control element (ACE) keep the fire support element (FSE) informed of ADA status and capabilities for engaging surface targets.

(2) *Nuclear weapon allocation.* Based on the mission and commander's concept of the operation, and after appropriate coordination, the FSE prepares a recommended allocation of nuclear weapons to be used to attack surface targets.

ADA nuclear weapons to be allocated for use in a ground fire support mission are included.

(3) *Target evaluation.* Based on target intelligence received from the G2 element and organic artillery resources, the FSE evaluates targets continuously as they develop. After appropriate coordination, the FSE recommends to the G3 element those targets that should be attacked, the type warhead and delivery system to be used, the desired ground zero and height of burst, expected results, and prediction of fallout.

(4) *Survey.* The location, altitude above mean sea level, and line of known direction to a known datum point of a Nike Hercules target tracking radar to be employed in a ground fire support mission must meet the survey accuracy requirements presented in FM 44-82. Nike Hercules units do not have the organic capability to meet these target tracking radar survey accuracy requirements. Therefore, the ACE must coordinate with the FSE or, alternatively, with the engineer officer, to obtain required survey support for the Nike Hercules batteries expected to fire ground fire support. Procedures will be outlined in plans and SOP's.

(5) *Required mission data.* The ACE disseminates the following mission data to the appropriate AADCP if the data are not already contained in the operation order: target location and altitude above mean sea level, nature of target, height of burst, warhead to be used, time on target (TOT), target number, and authority for release from the air defense mission during ground fire support mission preparation and firing. The designated ADA battalion computes the mission firing data (FM 44-82A presents procedures) and relays the data to the designated Nike Hercules battery. Computations are double-checked.

(6) *Post-strike procedures.* Apparent results are reported through ADA unit channels to the appropriate ACE which informs other elements of the tactical operations center of the attack results. The FSE coordinates any reconnaissance deemed necessary to ascertain actual damage caused by the attack. The G2 element estimates effects on enemy capabilities.

(7) *Detailed procedures.* Detailed procedures, survey requirements, and communications requirements for the conduct of Nike Hercules ground fire support operations are presented in FM 44-82, FM 44-82A, and FM 44-95.

c. ADA AW Ground Fire Support. Detailed concepts and procedures for use of ADA AW to

provide ground fire support are contained in FM 44-2, FM 44-3, and FM 44-62.

10-12. Survivability Measures

a. General.

(1) Air defense forces must seek to limit the effectiveness of enemy air efforts to a level permitting freedom of action to friendly forces. To attain this objective, the air defense forces must be effectively employed and they must survive.

(2) A properly designed defense, employing a family of complementary weapons operating under procedures allowing adequate freedom of action, provides the required effectiveness while enhancing ADA unit survivability. In addition to the survivability inherent in an effective defense, ADA unit survivability is further enhanced through practice of the survivability measures discussed below, with due regard given to the threat, ground situation, manpower and equipment limitations, and applicable basic doctrine. FM 44-2, FM 44-3, FM 44-95, and FM 44-96 should be consulted for system-oriented details beyond the scope of *b* through *o* below.

b. Defense Against Ground Attack. ADA missile units and ADA control elements are lucrative targets for ground attack and should not be deployed in unsecured areas. ADA AW units are more easily defended due to the lesser vulnerability of the weapon systems and their appreciable ground fire capability. Establishment of security perimeters and internal site security is a unit responsibility which must be met through use of organic forces assisted by other unit personnel or specially-provided security forces. The actual or anticipated ground threat determines requirements for assistance. Listening/observation posts and wire communications should be established immediately upon site occupation. The security perimeter must be established, with a radius as large as available weapons and personnel will permit. Obstacles and warning devices should be installed beyond the security perimeter. Frequent patrolling between outposts is required. A reserve force should be designated and be prepared, on order, to take up assigned defensive positions. Man-transportable radios should be provided for control of patrols and the reserve force. When complementary ADA AW are provided to improve ADA missile unit self-defense capabilities against air attack, these weapons should be positioned for optimum air defense effectiveness during daylight, but may be repositioned to support the ground defenses at night. FM 5-15 should be con-

sulted for methods of constructing emplacements for individual and crew-served weapons. Ground attacks which threaten unit destruction will require temporary abandonment of the air defense mission. Unit movement should be preceded by route reconnaissance and analysis of current intelligence regarding local enemy activity. When possible, armed escort should be provided for ADA missile units. Unit personnel must be drilled in immediate action against ambush. Security plans and SOP are essential for all units. (FM 44-2, FM 44-3, FM 44-95, and FM 44-96 contain examples.)

c. Siting. ADA survivability against enemy air and ground attack can often be increased by siting weapons as deep in friendly territory as possible, provided the ability to perform the assigned mission is not unduly degraded. *Suggested* guidelines regarding minimum distance from the FEBA are: Nike Hercules, 40 kilometers; towed Hawk, 30 kilometers; and self-propelled Hawk, 15 kilometers. These figures balance mission effectiveness and unit survivability in a type situation in which all members of the ADA family of complementary weapons are employed. The enemy artillery, ground, and air threat and the enemy electronic and visual intelligence means, versus ADA unit mobility, vulnerability, typical missions, and engagement range, were considered in arriving at these figures. The figures are *guidelines only* and should be used with caution because the absence or reduced deployment of some members of the ADA weapons family, the urgent requirements of a particular mission, and other factors will often justify or demand the increased risk involved in deploying ADA weapons considerably closer to the FEBA than the guidelines suggested. For example, a requirement to provide low-altitude air defense for a covering force or a penetration force can only be met by violating some of these guidelines.

d. Dispersion. Dispersion minimizes the probability of detection and destruction, and is especially important in a nuclear, biological, or chemical environment. However, dispersion practices must be compatible with mission requirements. Dispersion between ADA units is normally achieved by deploying the family of complementary air defense weapons in accordance with the guidelines presented in this manual. The technical and safety requirements of HIMAD and LOMAD systems normally provide adequate dispersion within the firing batteries. Additional dispersion may be accomplished by proper location of the

battery command post, assembly and service area, motor park, bivouac area, and administrative facilities. Dispersion within the unit position must be balanced against the need for defense against ground attack.

e. Movement. Movement is separated into two categories. One is movement to support tactical operations; the other is the tactic of movement solely to prevent being targeted.

(1) *Movement to support tactical operations.* ADA missile units in movement are vulnerable to visual detection and to air attack once detected. Movement should be conducted at night when the mission and tactical situation permit. When the tactical situation demands daylight fair-weather movement, defilade and concealed or secondary routes should be used if available. If considerations of mission, ground security, control, and speed of movement permit, infiltration is a valuable daylight movement tactic. Paragraph 7-13 presents further discussion.

(2) *Random movement to prevent targeting.* The survivability of ADA units may be enhanced by random movement where the operational environment (mission, terrain, and weather) permits. Although frequent movement is encouraged, it should not be conducted more often than necessary to avoid being targeted. Paragraph 7-13 presents further details.

f. Field Fortifications. Construction of field fortifications is of value in reducing the vulnerability of ADA units. Weapon emplacements should be dug in or revetted as soon as the tactical situation permits. Emplacements should be constructed to allow for continuous improvement. Engineer support may be required. (FM 5-15, FM 44-82A, FM 44-95, and FM 44-96 provide further details.)

g. Camouflage, Concealment, and Tone Down. ADA units should be concealed from visual observation where possible, although this procedure alone cannot prevent pretargeting of permanent and semipermanent sites nor can it conceal electronic radiation. ADA AW units and nonradiating and nonfiring elements of ADA missile units lend themselves to the use of conventional natural and artificial camouflage and concealment techniques. Radars and launchers with missiles present a severe camouflage problem due to the blast associated with missile launching, and the radar signal attenuation and line-of-sight obstruction caused by camouflage materials. While complete camouflage of these items is not usually possible, judicious use of paint to tone down the equipment

will be of assistance. (FM 5-20 provides camouflage details.)

h. Early Warning. Provisions must be made for receipt of early warning of air or ground attack so that adequate preparation for engagement or self-defense can be made. Primary reliance for warning of low-altitude air attack must be placed on personnel operating LOMAD and SHORAD radars, and on observers from SHORAD units. Paragraph 10-8 provides further discussion.

i. Use of Complementary Air Defense Weapons. ADA AW fire units may be employed at HIMAD and LOMAD weapon sites to improve unit self-defense capability against low-altitude air attacks. Use of these weapons also improves unit security against ground attack.

j. Decoy and Dummy Positions.

(1) When authorized by higher headquarters, decoy or dummy positions may be constructed to deceive the enemy. Decoy and dummy positions are designed to lure hostile aircraft into kill zones or flak traps, or to dilute the enemy's air offensive effectiveness. Dummy positions are passive. Decoy positions are more elaborate and include active devices to fully simulate an ADA position; e.g., a decoy LOMAD weapon site would include an electromagnetic energy transmitter operating at the appropriate acquisition radar frequency, power, and pulse repetition rate. To improve realism, decoy and dummy positions may be provided some personnel activity.

(2) Decoy and dummy position materiel, as available, is obtained from theater resources or is locally improvised and is emplaced using engineer and ADA unit labor. Dummy position plans may be based primarily on use of full or partial camouflage at alternate sites so that the primary and alternate sites all appear to be occupied. Effectiveness of the decoy and dummy position deployment will be enhanced when these positions are used in conjunction with a coordinated movement plan. Effective use of dummy and decoy positions requires extensive training in camouflage techniques.

★*k. CBR and Nuclear Defense Measures.* The commander must insure that CBR and nuclear defense measures are implemented if enemy chemical, biological, or radiological attack occurs or if such an attack is anticipated. Unit dispersion will normally be provided through adherence to standard doctrine. Normal field fortification procedures will provide some measure of protection.

CBR equipment and personnel with CBR responsibilities must be kept in a state of readiness and CBR training must be emphasized. Unit CBR teams must be organized and trained. All personnel must be trained in the proper use of protective clothing and equipment. (AR 220-58, FM 21-40, FM 21-41, and FM 21-48 contain details.)

★*l. Electronic and Communication Security.* The vulnerability of ADA units to electronic detection and countermeasures must be understood by all unit personnel. Guidance in this area is provided in the TB 380-6-series pertaining to electronic security. Command emphasis must be placed on use of the standard security measures (FM 32-5 and FM 32-20). Radio discipline, including radio silence when appropriate, must be strictly enforced. ECCM and electronic identification, friend or foe features should be used only as actually required. Fire unit and command facilities should be separated when technical considerations permit and when ground security for both can be provided. Selection of radio and radar positions must be made to accomplish the mission and to minimize unnecessary transmission into enemy-controlled areas. Dummy loads should be used during maintenance when practical. Radar radiation may be limited on a programmed or intermittent basis when the threat warrants; how-

ever, some radars in a defense must always remain active.

m. Use of Non-Air-Defense Weapons Against Aircraft. Unit self-defense capabilities against low-level air attacks should be increased by widespread but controlled use of organic small arms and automatic weapons. Paragraph 10-13 provides detailed doctrine and techniques.

n. Blackout Discipline. Blackout discipline should be enforced, both in position and on the move. Frequent practice is required to improve operation under blackout conditions. Night vision devices should be made available to drivers and selected weapon operators. Camouflage coverage may suffice for blackout covers; otherwise, tents and other opaque coverings are required.

★*o. Warning Signals.* Unit SOP must prescribe specific warning signals for ground, air, and nuclear, biological, or chemical attacks. Periodic rehearsals and drills should be conducted to insure that the signals used are understood, methods of dissemination are adequate, and personnel can take required actions. STANAG 2047 prescribes use of the warning signals listed below. (FM 21-60 provides additional guidance regarding visual signals.)

Type	Sound signal	Visual signal
Nuclear, biological, or chemical attack --	Rapid and continuous beating on any metal or other object which will produce a loud noise (bells, iron pipes, empty shell casings, vehicle bodies, etc).	Donning the protective mask and protective equipment followed by such signals as are prescribed in national and local regulations.
Air attack -----	Continuous series of short blasts on any available wind instrument (vehicle horn, siren, whistle, bugle, etc).	Rapidly crossing and uncrossing the arms fully extended above the head.
Ground attack -----	Series of long blasts on any available wind instrument.	Per unit SOP.
All clear -----	Continuous sustained blast on any available wind instrument.	Per unit SOP.

10-13. Use of Non-Air-Defense Weapons Against Aircraft.

a. Concept.

(1) The substantial low-altitude air threat faced by units in the theater of operations may be partially countered by aggressive use of the large volume of fire which non-air-defense weapons, e.g., small arms and automatic weapons, can place against this threat.

(2) Exercise of the individual and collective right of self-defense against hostile aircraft must be emphasized.

(3) Indiscriminate use of non-air-defense weapons must be prevented. Engagement of hostile aircraft in immediate self-defense will be most frequent and training emphasis should reflect this.

b. Rule of Engagement. In the absence of orders to the contrary, individual weapon operators will engage attacking aircraft; engagement of all other hostile aircraft will be on orders (based on SOP) issued through the unit chain of command and will be supervised by unit leaders. Nothing in this rule is to be taken as requiring actions prejudicial to accomplishment of the primary mission

of the unit. It is imperative that training of personnel in using non-air-defense weapons against aircraft emphasize that engagement of aircraft is based on positive visual identification.

c. Techniques. For detailed discussion of techniques of fire against aerial targets, see FM 23-12 and TC 23-15.

(1) *Engagement of low-speed aircraft.* The target-leading technique is used against low-speed aircraft. Using the maximum rates of fire, gunners distribute their fire by continuously tracking along the flight path of the aircraft so that the weapon is aimed at a point well ahead of the aircraft when it is fired.

(2) *Engagement of high-speed aircraft.* The pattern-of-fire technique is used against high-speed aircraft. A high volume of sustained fire is massed at a fixed point in space well ahead of the aircraft. The fire is continued until the aircraft flies through it.

(3) *Use of tracer ammunition.* Automatic weapons should utilize the highest practical proportion of tracer ammunition to enhance the deterrent or disruptive effect. A practical consideration is the fact that use of tracers may pinpoint well-camouflaged positions that are otherwise unidentifiable to pilots of high-speed aircraft. This consideration does not apply if the position is already under air attack or otherwise identified by enemy aircraft.

(4) *Massed fire.* Units should employ a massed fire technique when using small arms and automatic weapons in an air defense role; i.e., unit leaders should direct fires so as to mass the available fires against a selected target(s).

d. SOP Items. Battery SOP should cover, but not be limited to, the following items relevant to engagement of aircraft with non-air-defense weapons.

(1) *Applicability.* (Operators of designated weapons.)

(2) *Relation to primary mission.* (Primary mission is never prejudiced.)

(3) *Relation to passive air defense.* (The necessity for aggressively engaging hostile aircraft is balanced with the requirement to place in proper perspective the tactic of withholding fire to preclude disclosure of position.)

(4) *Authority to engage.* (Authority to engage attacking aircraft delegated to individual weapon operators, except when explicitly denied. Authority to engage all other hostile aircraft on orders through unit chain of command, subject to local and theater SOP.)

(5) *Rule of engagement.* (Normally only self-defense against attacking aircraft, or as ordered.)

(6) *Rules of withholding fire.* (When ordered. When not positive that aircraft are actually attacking or otherwise hostile. When friendly aircraft or troops are endangered.)

(7) *Position selection.* (Applicable only to weapons specifically assigned an air defense mission; e.g., designated single-barrel caliber .50 machineguns.)

(8) *Firing techniques.* (Lead and superelevation. Massed fire. Maximum rate of fire. Maximum use of tracer ammunition.)

(9) *Unit training requirements.* (Motivation and discipline. Gunnery. Aircraft recognition.)

★10-14. Air Attack Warning

SOP should direct AADCP's to disseminate air attack warning information. Lacking an area warning broadcast system, command and intelligence nets must be used to the degree feasible.

10-15. Reports

Operational reports and statistical data may be required as follows:

a. Each nondivisional ADA battalion should submit an after-action report to the ADA group for consolidation as soon as possible after engagement(s). Divisional ADA battalions furnish their reports to the division ACE.

b. Operational reports should be submitted by nondivisional ADA battalions to the ADA group with copies furnished to the ACE and Army augmentation elements at TACC and CRC. Divisional ADA battalions furnish their reports to the division ACE. These reports reflect the following information:

(1) Current locations and status of ADA units.

(2) Dead areas (radar coverage and fires) as changes occur.

(3) Ammunition status and tactical action summary.

c. Accidents or incidents involving aircraft or missiles of the Army ADA will be reported through channels to the host nation's Air Force for investigation. Wreckage should be undisturbed and safety zones established as necessary (based on STANAG 3531).

d. Bombing, shelling, and mortaring or rocketing reports are to be rendered as normal messages by the fastest means available. The following format, preceded by the code word (BOMREP, SHELREP, or MORTREP), is prescribed by STANAG 2008. Additional reporting required when NBC weapons are involved is described in e below.

(1) Unit or origin (call sign, address group, or code name).

(2) Position of observer (grid reference preferred—encoded, if it discloses location of headquarters or important observation post, or if method (6) (b) below, is used).

(3) Direction (degrees or mils measured clockwise from grid north).

(4) Time from.

(5) Time to.

(6) Area bombed, shelled, or mortared.

(a) Grid reference (in clear), or,

(b) Direction in degrees or mils from grid north to impact points and distance in yards or meters from observer (encoded).

(7) Number and nature of methods of delivery (guns, rocket launchers, aircraft, etc.).

(8) Nature of fire (registration, harassing, bombardment, etc.).

(9) Number, type, and caliber (measured or assumed).

(10) Time of flash-to-bang (omit for aircraft).

(11) Damage (encode, if required).

★e. Nuclear, biological, and chemical attacks are reported to the tactical operations center in accordance with STANAG 2103. See FM 21-40 for reporting procedures for chemical and biological attacks and FM 3-12 for nuclear attacks. Reports cover enemy or unidentified nuclear detonations and resulting radioactive contamination, and enemy and unidentified biological or chemical attacks and resulting contamination. ADA firing batteries and headquarters and headquarters batteries are generally the most suited for collection and reporting of nuclear burst data. Normally, these units will be given this responsibility. Specific reporting procedures and channels are discussed in FM 3-12.

10-16. Supply and Maintenance.

a. Proper administration of supply and maintenance is a function of command. It is essential for supply, maintenance, and tactical purposes that

commanders insure that required property is on hand or on request, is in safe and serviceable condition, is properly maintained and operated, and authorized levels or allowances are maintained. Key documents to be considered by commanders in fulfillment of their supply and maintenance responsibilities include AR 220-1, AR 735-35, AR 710-2, TM 38-750, TM 9-1300-206, FM 9-6, FM 31-35, and FM 100-10. TM 38-750 also prescribes procedures for reporting equipment safety deficiencies.

b. The tactical and operational requirements of current and future ADA systems demand employment of skilled technicians and mechanics and adequate test equipment to provide responsive maintenance support. Advanced system design will permit substantial reduction in maintenance requirements. Preventive maintenance must be efficiently scheduled and malfunctions rapidly corrected. Maintenance management is the responsibility of every commander and includes motivation, organization, accurate records/reports, training, command inspections, and a quality assurance/quality control program for ADA system maintenance.

c. The ADA commander must have at his immediate disposal a maintenance and repair parts supply capability which is responsive to the tactical requirements. Considering current system design characteristics, the capability provided must permit repairs to be accomplished as close to the origin of failure as possible. To fulfill the current organizational maintenance mission, maintenance technicians and mechanics are assigned to the ADA unit to perform those maintenance functions which occur on a day-to-day basis and are required to maintain the ADA unit in a constant state of readiness. The ADA maintenance technician is concerned primarily with weapon system performance analysis. The organizational maintenance technicians and mechanics will be responsible for maintenance as follows:

(1) Operator maintenance functions to include monitoring equipment and performing checks, adjustments, alinements, and preventive maintenance.

(2) Organizational maintenance technician and mechanic functions to include replacement of selected defective assemblies and subassemblies isolated through the use of built-in and external common-type test equipment, replacement of malfunctioning assemblies and/or chassis, adjustments and alinements required to maintain the system at peak operational readiness, replacement

of selected piece parts requiring soldered connections but which are not a part of critical or balanced circuits, and installation of system modification work orders within capabilities.

d. Maintenance and repair parts supply support is provided to the ADA unit under different procedures depending on the area of employment and the type of unit.

(1) In CONUS, support is provided as described in chapter 12.

(2) In theaters of operation:

(a) Chaparral/Vulcan ADA units organic to divisions will receive direct support from the division support command. Direct support will be provided on an area basis for nondivisional Chaparral/Vulcan units. The direct support units are backed up by general support units.

(b) The Nike Hercules and Hawk ADA battalions each have an organic direct support platoon. The platoon leader is directly responsible to the ADA battalion commander for ordnance, engineer, and signal maintenance and repair parts support for mission-essential equipment. The direct support platoon is responsible for on-site maintenance and repair of components and assemblies beyond the capability of organizational maintenance technicians, liaison with appropriate support agencies, operation of the battalion technical supply for mission-type repair parts, and installation of designated modification work orders on assemblies and subassemblies.

(c) The AN/GSA-77 battery terminal equipment associated with Army electronic control and coordination systems requires no direct or general support maintenance. All maintenance is accomplished by the ADA unit. The only support required is depot maintenance, and a repair parts supply system responsive to organizational maintenance requirements.

(d) Redeye-peculiar maintenance by a using unit is limited to cleaning, and replacement of certain minor parts by the Redeye gunner with no special tools or training required. Defective parts or items are replaced on a direct exchange basis.

e. Logistic support requirements for the Nike Hercules and Hawk systems will increase as these systems age. This aging will require a more responsive supply system. The prime factor in maintaining operational readiness of these missile systems is an adequate stockage of repair parts in the ADA units. Maintaining the fill of authorized stockage levels of repair parts at the ADA units will enhance system availability.

f. Timely and accurate reports must be made of conditions that adversely affect the maintenance effort. Commanders must insure that reports concerning maintenance support of their equipment are accurate and reflect the true operational readiness of their unit. Analysis of these reports aids in determination of total support requirements.

10-17. Emergency Destruction of Equipment

a. Plans must be made for emergency destruction of nonmedical equipment to prevent its capture by the enemy. The priorities for destruction are preestablished. Destruction is accomplished as a matter of last resort—

(1) When authorized by higher headquarters if it can be contacted.

(2) On order of the senior commander present when communications with higher headquarters have failed.

(3) When capture is imminent and the equipment cannot be evacuated.

b. Detailed methods and means of destruction, the required degree of destruction, authorization and reporting details, and priorities for destruction are established by SOP. STANAG 2113 provides the following general guide for destruction priorities pertinent to ADA equipment.

(1) *Gun systems.*

(a) Sighting and fire control equipment.

(b) Breech, breech mechanism, and spares.

(c) Recoil mechanism.

(d) Tube(s).

(e) Carriage and tires.

(2) *Missile systems.*

(a) Battery control centers.

(b) Missile guidance equipment.

(c) Launchers, including control circuits.

(d) Missiles.

(e) Generators and cable systems.

(3) *Radar and other electronic equipment.*

(a) Frequency-determining components, records, and operating instructions, which are subject to security regulations, and identification, friend or foe, equipment.

(b) Antennas and associated components.

(c) Transmission lines and waveguides.

(d) Transmitter high-voltage components.

(e) Control consoles, displays, and plotting boards.

(f) Cable systems.

(g) Automatic devices.

(h) Other control panels and generators.

(i) Carriage and tires.

c. Disposition of nuclear components is discussed in FM 44-95.

10-18. Reconnaissance, Selection, and Occupation of ADA Position Areas

a. *General.* ADA position areas are designated by unit commanders as required to support the

force maneuver plan or as a survivability measure. Well-organized and executed displacements from one position area to another minimize the loss of air defense protection for the supported element and reduce the probability of enemy detection and attack of the ADA unit. The purpose of reconnaissance, selection, and occupation of position (RSOP) is to facilitate orderly, rapid, and safe displacement by reconnoitering the designated position area and routes thereto; selecting march routes to, and positions for, unit equipment and facilities within the position area; and moving in echelon or by infiltration over the routes and occupying the positions thus selected. These phases involve the accomplishment of several tasks which are performed concurrently or in sequence depending upon the type unit, mission, and time available. The following general chronological steps apply and, although they vary in application, the relatively stable aspects of each are included in unit SOP.

b. Receipt of Orders. ADA unit displacement orders are issued by regional air defense commanders who have retained operational control authority, by Army force commanders to whom operational control authority has been delegated, or by ADA unit commanders authorized to displace their own units.

c. Warning Orders. A warning order is issued, normally as a written or oral fragmentary order, to alert subordinate echelons of an impending move. It is issued as soon as sufficient information is available to permit planning and preparations by subordinate commanders. Additional information is distributed as received or as determined. A warning order should be brief but should include the following items when applicable: probable tasks and movement, earliest time of movement or degree of notice, rendezvous and time of order group (if any), orders for movement of reconnaissance parties, and administrative instructions affecting the resting or feeding of troops, regrouping of transport, and preliminary movements (STANAG 2041).

d. Reconnaissance. A reconnaissance is planned and conducted to enable the ADA unit commander to make decisions upon which to base his orders for movement to, and occupation of, the position area. As a minimum, a map reconnaissance is required. Data obtained from a map reconnaissance must be confirmed and refined by a detailed aerial or ground reconnaissance whenever possible.

(1) *Planning.* The following factors in-

fluence the required reconnaissance tasks and the size and composition of the reconnaissance party:

- (a) Permissive and restrictive instructions from higher commanders.
- (b) The type unit involved and its current and future mission requirements.
- (c) Time available for completion of the RSOP.
- (d) Personnel and equipment available.
- (e) The method(s) of reconnaissance required to include any physical security check and radiological survey requirements.
- (f) Distance and routes to the new area.
- (g) Siting requirements of the unit and their relation to the characteristics of the defended area, unit, or installation.
- (h) Tactical situation to include requirements for local ground security and passive air defense measures.
- (i) Method of movement for both the unit and the reconnaissance party.
- (j) Means of control.
- (k) Coordination, liaison, and briefing requirements.

(2) *Conduct.* The commander will seldom personally perform all the required reconnaissance tasks. His reconnaissance plan is implemented by assembling the reconnaissance party, explaining the situation, and issuing instructions for the conduct and control of the reconnaissance. Specific reconnaissance tasks, formulated during the planning step, are assigned and the time and place of reassembly is prescribed. The party then proceeds to examine the position area, alternate positions, and routes thereto. Per STANAG 2112, radiological survey parties (a party normally consists of a driver and monitor and may be part of, or separate from, the reconnaissance party) will be briefed on the specific objectives of the survey, start time and completion time, location at which readings are required, route to be followed and spacing of the readings, maximum dose rate beyond which the party will not proceed, minimum dose rate below which no record is to be made, methods of communication, marking instructions, and special instructions. (FM 3-12 provides additional information on the conduct of radiological surveys.)

(a) *Route reconnaissance.* All routes, assigned or otherwise under consideration, should be reconnoitered. Conditions and capacities of underpasses, bridges, culverts, ferries, and fords along each route are noted. Critical points (such as hill crests, curves, and defiles) and obstacles are also

noted so that congestion can be avoided and security and control enhanced. Requirements for route markers and guides are determined. Required radiological surveys are conducted. The speed and ease of movement depend largely upon the completeness of this reconnaissance.

(b) *Position area reconnaissance.* The entire position area should be secured and then reconnoitered to determine that portion of the terrain that best accommodates each major item of equipment. Consideration is given to provisions for communication, dispersion, cover, concealment, security, accessibility, drainage, and siting of administrative, supply, and maintenance facilities. Alternate position areas should be noted.

e. *Selection of Position.* Routes to the position area and the alternate position area(s) and positions therein are selected on the basis of results of the map, aerial, or ground reconnaissance conducted and, where appropriate, on the results of radiological survey. Time permitting, an alternate route to the position area should be reconnoitered.

(1) *Route(s).* Any available route(s) that will permit all vehicles in the unit column to negotiate it may be selected. The available route(s) that best serves the mission is the one selected. Arrangements for engineer support are made when the clearance of obstacles exceeds unit capabilities.

(2) *Positions.* The precise disposition of unit facilities within the position area is based upon the recommendations of the reconnaissance party. The commander or his authorized representative must adjust dispositions to the characteristics of the terrain as necessary to attain the best possible balance of unit effectiveness and survivability.

f. *Preparations for Occupancy.* After routes and positions have been selected, final preparations for the smooth and unimpaired displacement of the unit are planned, initiated, and completed as time and resources permit. Final preparations include the following:

(1) Initiating and completing pioneer and engineer work along the routes and within the position area.

(2) Obtaining route clearances if required.

(3) Positioning route markers to aid in the identification of routes and positions. Security considerations in areas where guerrillas are active may require that route markers not be used.

(4) Positioning guides. Guides should be employed in pairs to enhance security.

(5) Installing communications in the position area.

(6) Designating the start point (SP) and release point (RP).

(7) Establishing liaison as necessary.

(8) Determining the method and order of march, rate of march, march density, and the need for checkpoints and halts (FM 101-10-1 and FM 55-30).

(9) Providing for air, ground, and communications security, including provisions for armed escort.

(10) Determining requirements for light and sound discipline.

(11) Preparing strip maps as practicable.

(12) Preparing and issuing the operation or movement order (FM 101-5).

g. *Movement and Occupation of Position.* The movement and occupation phase begins with the implementation of the unit operation or movement order. The order reflects all essential decisions of the commander. The order also includes additional details; e.g., destination, routes, rate and order and method of march, start points, time of crossing the start points, details for air and ground alert guards and measures, scheduled halts, vehicle distances, release points, communications, location of the commander, strip maps, markers to be used, control and checkpoints, and location of guides. Items standardized and included in the unit SOP are not repeated in the unit operation or movement order. Once the area has been occupied and secured against the ground attack threat and the prescribed operational status has been attained, the unit maintains and improves its position, revises the unit SOP for RSOP in accordance with the experience gained, and otherwise prepares for subsequent displacement.

h. Unit SOP (STANAG 2041 and 2112). Items appropriate for inclusion in unit SOP, in addition to normal displacement and march order procedures, include the following:

(1) Composition and duties of the reconnaissance party.

(2) Vehicle loads, including personnel.

(3) Grouping of vehicles and group commanders.

(4) Organization of columns.

(5) Signposting and traffic control.

(6) Responsibility for manning start point (SP) and release point (RP).

- (7) Discipline, halts, lighting.
- (8) Action in the event of enemy attack.
- (9) Drill for establishing headquarters on arrival.
- (10) Responsibility for issuance of operation orders for movement.
- (11) Inspection of vacated site for security purposes.
- (12) Radiological survey party composition and procedures (FM 3-12).

10-19. Survey

a. General. ADA weapon and control facility survey requirements vary, depending on weapon type and mission, map availability, control and coordination system employed, and existence of special fire restrictions. (FM 6-2 discusses artillery survey in detail.)

b. Nike-Hercules and Hawk.

(1) Nike-Hercules and Hawk units operating in the air defense role and employing electronic control and coordination systems (e.g., Missile Monitor) do not require survey control if suitable maps are available and if there are no restricted areas of fire. Map-inspected coordinates and aiming circle orientation will provide sufficient accuracy when the radar survey techniques (AADCP survey and battery survey) described in

TM 11-5895-292-23 are used. When suitable maps are not available, or if there are areas in which fires are restricted, survey is required to an accuracy of 1:500. Provided that survey control is available, internal requirements can be met through use of organic resources. However, location by artillery survey to fifth order accuracy (1:1000) is preferred in order to improve directional control. Survey of this accuracy must be performed by appropriate field artillery or engineer units.

(2) Nike-Hercules and Hawk units operating in the air defense role and *not* employing electronic control and coordination systems do not require survey control if suitable maps are available and if there are no restricted areas of fire. When suitable maps are not available, or if there are areas in which fire is restricted, rough survey (1:500; aiming circle accuracy) is required. This requirement can be met through use of organic resources.

(3) Nike-Hercules units providing ground fire support have special survey requirements. Requirements cannot be met by use of organic resources; therefore, support must be obtained from appropriate field artillery or engineer units. Details are provided in paragraph 10-11.

c. Chaparral/Vulcan. Chaparral/Vulcan battalion survey needs are met by use of maps and compasses.

Section III. CONDUCT OF OPERATIONS

10-20. Support of the Offense

★*a. General*

(1) Offensive operations are preferred to defensive operations because the initiative lies with the attacker. The purpose of offensive operations is to accomplish one or more of the following: develop the situation, defeat the enemy, secure territory or terrain, deprive the enemy of required resources, or divert the enemy's attention from other areas. The most decisive results are achieved by strong, mobile, exploiting forces. Effective ADA support assists the force commander in maintaining the initiative by destroying, nullifying, or reducing the effectiveness of hostile air interference with the main attack and the movement of support elements. Control of ADA supporting the offense is normally decentralized with frequent use made of the direct support tactical mission to insure responsive support to maneuver elements.

(2) The five basic *types of offensive operation* are the movement to contact, the reconnaissance in force, the coordinated attack, the exploitation, and the pursuit. Each offensive operation will normally use one or more of the three basic *forms of maneuver*: the penetration, the frontal attack, and the envelopment (the turning movement and the double envelopment are variations of the basic envelopment maneuver). ADA support of the forms of maneuver is discussed in *b*, *c*, and *d* below. The movement to contact operation is covered in *e* below to further illustrate techniques for support of moving columns. (Offensive operations and maneuvers are discussed in further detail in FM 61-100 and FM 100-5.)

b. General Employment Considerations. Following are general guidelines for deployment and employment of various ADA weapons during the offense. Variations appropriate to specific offensive maneuvers are discussed in *c* through *e* below.

(1) *All-arms weapons.* These weapons should be used to assist in the defense of attacking forces against disruptive air action. Automatic weapons in particular should deliver concerted self-defense fires at attacking aircraft. Redeye will inflict a significant toll on attacking aircraft, thus preventing or discouraging enemy air attack or reconnaissance.

(2) *ADA AW.* These weapons will ordinarily move with attacking columns. Their heavy firepower, complemented by the fires of all-arms weapons, will exert a deterrent as well as a destructive effect. These effects will be particularly valuable against low-level aircraft underflying radar-directed HIMAD and LOMAD systems. The ADA AW ground fire support capability may be used to advantage.

(3) *Chaparral.* Having no ground self-defense capability, these weapons are less suited than are ADA AW to action in the most forward elements of an offensive force. Whenever possible, Chaparral fire units are employed in an area-type defense, and will displace forward in response to forward movement of the friendly-controlled area. If terrain in the situation does not permit use of this tactic, Chaparral may provide an area-type defense of each of the force march columns.

(4) *Forward area alerting radars (FAAR).* The FAAR's should be positioned as far to the rear of the FEBA as will permit them to perform their mission of providing alerting and tentative identification data to SHORAD fire units. In the offense they will move forward as required to support the SHORAD units with which associated. FAAR's should move at night if possible.

(5) *Hawk.* The Hawk systems normally should be deployed far enough forward to cover the maneuver elements en route to and on the objective. Provision of required coverage may involve deployment of certain Hawk units closer to the FEBA than suggested in the unit survivability guidelines (para 10-12c). This might also be the case when a friendly salient extends well forward of the FEBA, or during periods of poor visibility when the effectiveness of the visually-directed SHORAD weapons is degraded. Hawk fire units may operate semi-independently when this is the best way to accomplish the mission. However, fire units not retained under the full control of the battery control central do not have full acquisition radar and ECCM capabilities and cannot take full advantage of data provided by electronic Army air defense control and coordination systems.

(a) *Self-propelled Hawk.* Self-propelled Hawk, with its rapid emplacement and march order capability, is well suited for support of fast-moving forward echelons. In a general movement of ground forces, these units would cause little road congestion because of their relatively small fire unit size and because of their ability to move cross-country. Self-propelled Hawk is suited to deployment within the division area.

(b) *Towed Hawk.* Because it is less mobile than the self-propelled Hawk, this system is usually deployed farther rearward. Its coverage, when considered with the self-propelled Hawk coverage, usually will provide adequate LOMAD coverage of the forward forces.

(6) *Nike-Hercules.* The long range of this system permits it to be positioned a considerable distance from the FEBA, while still accomplishing its assigned mission. Displacements forward, therefore, will be relatively infrequent.

★c. *Support of the Envelopment or Penetration Maneuver.* Maneuvers of this type usually employ heavy concentrations of troops and materiel in readily targetable postures and, due to the threat they offer to the enemy, may sustain heavy pressure from the hostile air forces. Air defense buildup must be begun at the earliest possible time without giving away the objective or mission of the maneuver force. The type and variety of ADA weapons accompanying these offensive maneuvers will be determined by the scale of the operation. A brigade-size task force conducting a penetration would probably be defended by organic and direct support air defense weapons and attached ADA AW of platoon strength or greater. As the penetration widens and permits forward staging of the low-altitude area defense, Chaparral fire units would move forward into the area of penetration. A division-size penetration (fig. 10-4) might include both Chaparral and ADA AW in the attack columns. Self-propelled Hawk, if available, may be in general support-reinforcing and would move into the division penetration at an early stage to provide LOMAD coverage over the attacking forces. Towed Hawk and Nike-Hercules (not shown in fig. 10-4) should maintain LOMAD and HIMAD coverage over the entire force.

★d. *Support of the Frontal Attack Maneuver.* In this type of offensive maneuver, in which the line of contact advances more or less uniformly, ADA units should stage forward in conformity with the close-combat forces they defend. ADA AW accompany the supported units. Chaparral units are moved as suitable areas come under

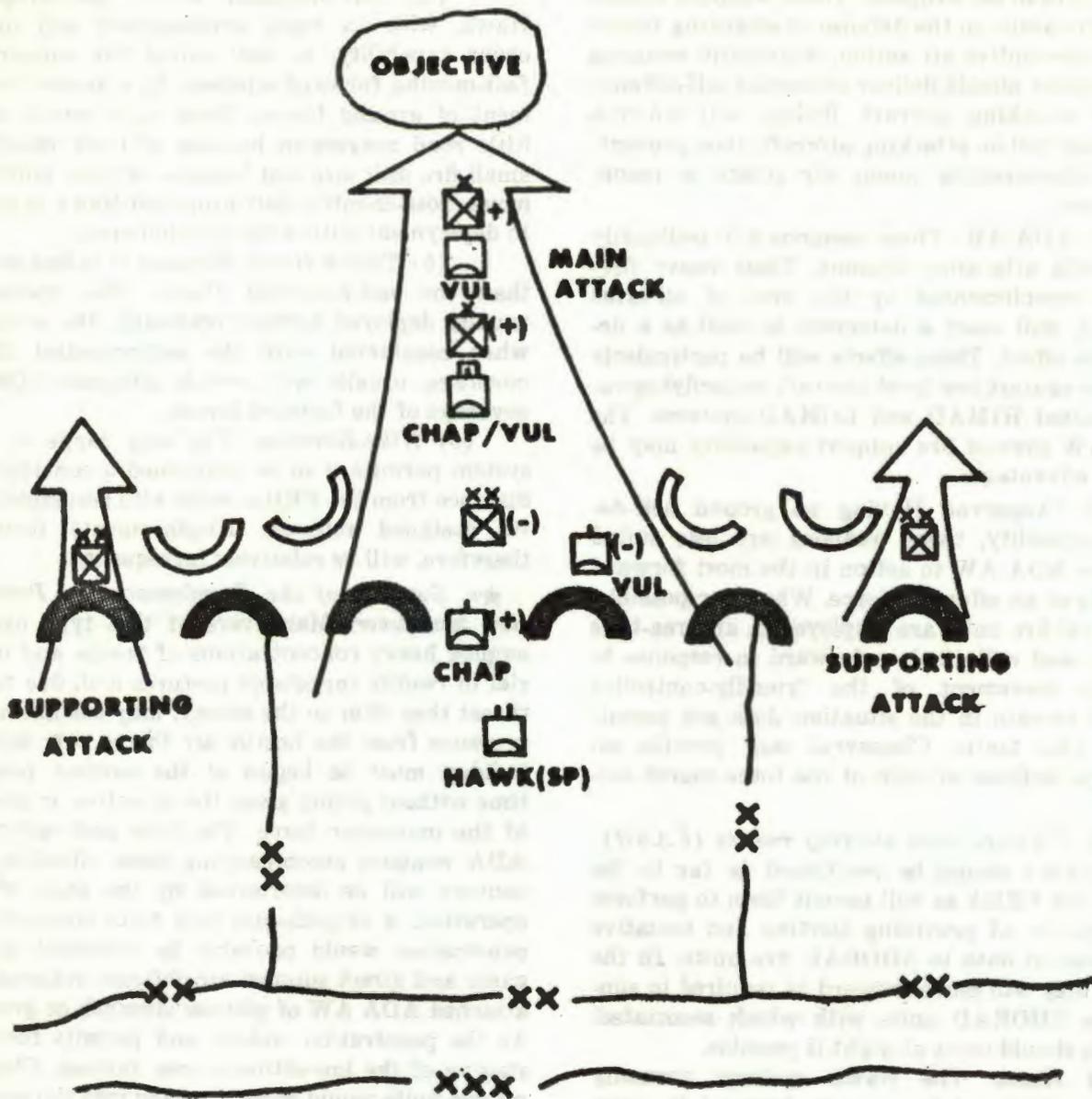


Figure 10-4. Air defense of division-size penetration.

friendly control. Hawk fire units usually are sited forward in preparation for the offensive, and often need only move forward should it appear that the FEBA will advance beyond Hawk engagement range.

★e. *Support of the Movement to Contact Operation.* Movement to contact is an offensive operation designed to gain or reestablish contact. The maneuver requires that air defense be established over forward-moving ground combat forces. A significant feature is that contact has not yet been made with major enemy forces. This condition permits considerable freedom of siting. Air defense planning for movement to contact should

take maximum advantage of this freedom. Figure 10-5 depicts the march columns of a division (part of a larger force) moving to establish contact. A type ADA deployment for defense of this type of operation is illustrated. This deployment typifies Chaparral/Vulcan deployment for direct support of fast-moving columns in all types of operation (exploitation, pursuit, retrograde). Such deployment is considered to be a variation of the standard Chaparral area defense/ADA AW vital area defense pattern, and will be common in armored and mechanized operations.

(1) Nike Hercules (not shown in fig. 10-5) is positioned well to the rear of the probable area of

contact, and need not displace forward unless there is a considerable forward shift in this area.

(2) Several tactics may be used to maintain Hawk coverage over advancing lead elements.

(a) Hawk may be prepositioned well forward. This tactic assumes considerable warning of impending movement is given and may expose Hawk batteries to risk of capture or destruction. Such movement may also provide the enemy warning of a major friendly move.

(b) Hawk may use secondary march routes to leapfrog forward, maintaining coverage over the advancing columns. This tactic depends upon a well developed road net and will require considerable planning in the selection of routes and positions. If these conditions are met, self-propelled Hawk is well-suited to perform this leapfrogging maneuver. Figure 10-5 depicts this variation of Hawk tactics.

(c) Hawk units might be included near the heads of the several advancing columns, dropping off at predetermined position locations. These positions would be preselected to extend Hawk coverage forward, in time with the advance of the march columns.

(3) March columns are most vulnerable to aircraft attacking at low altitudes along the long axis of the column. The primary use of Chaparral, ADA AW, and all-arms air defense weapons in the movement to contact is to defend against these low-altitude air attacks and prevent disruption and delay of the movement. Self-propelled ADA AW should be integrated into, and move with, the defended columns and the security forces. They are interspersed in the column, with emphasis on the column front and rear. Thus employed, they may engage while moving, thereby performing their mission without endangering the movement to contact. The fires of these weapons will be dense and effective, and exert a powerful deterrent influence. Other ADA AW may be positioned to defend vulnerable key assets (e.g., bridges) along the route of march. Chaparral fire units should move out in advance or near the head of columns if practicable and take up preselected positions along the several routes of march. All-arms weapons accompany the units to which organic or attached. Ring-mounted or turret-mounted automatic weapons should engage incoming attacking aircraft. These fires may be delivered from moving vehicles. Redeye teams, however, must drop out of a moving column when engaging.

10-21. Support of the Defense

a. General.

(1) Defensive operations employ all means and methods available to prevent, resist, or destroy an enemy attack. The purpose of a defensive operation may be to develop more favorable conditions for offensive action, economize force in one area to apply decisive force elsewhere, destroy or trap a hostile force, reduce the enemy capability for offensive action, or deny an enemy entry into an area. Effective ADA support, by countering hostile air activities supporting the attacking ground force, assists the force commander in maintaining freedom of action in order to regain the initiative.

(2) The force may employ either an area defense or a mobile defense, or a combination of the two. The form of defense employed influences ADA disposition and tactics as discussed in *b* and *c* below. (Details of defensive operations are contained in FM 61-100 and FM 100-5.)

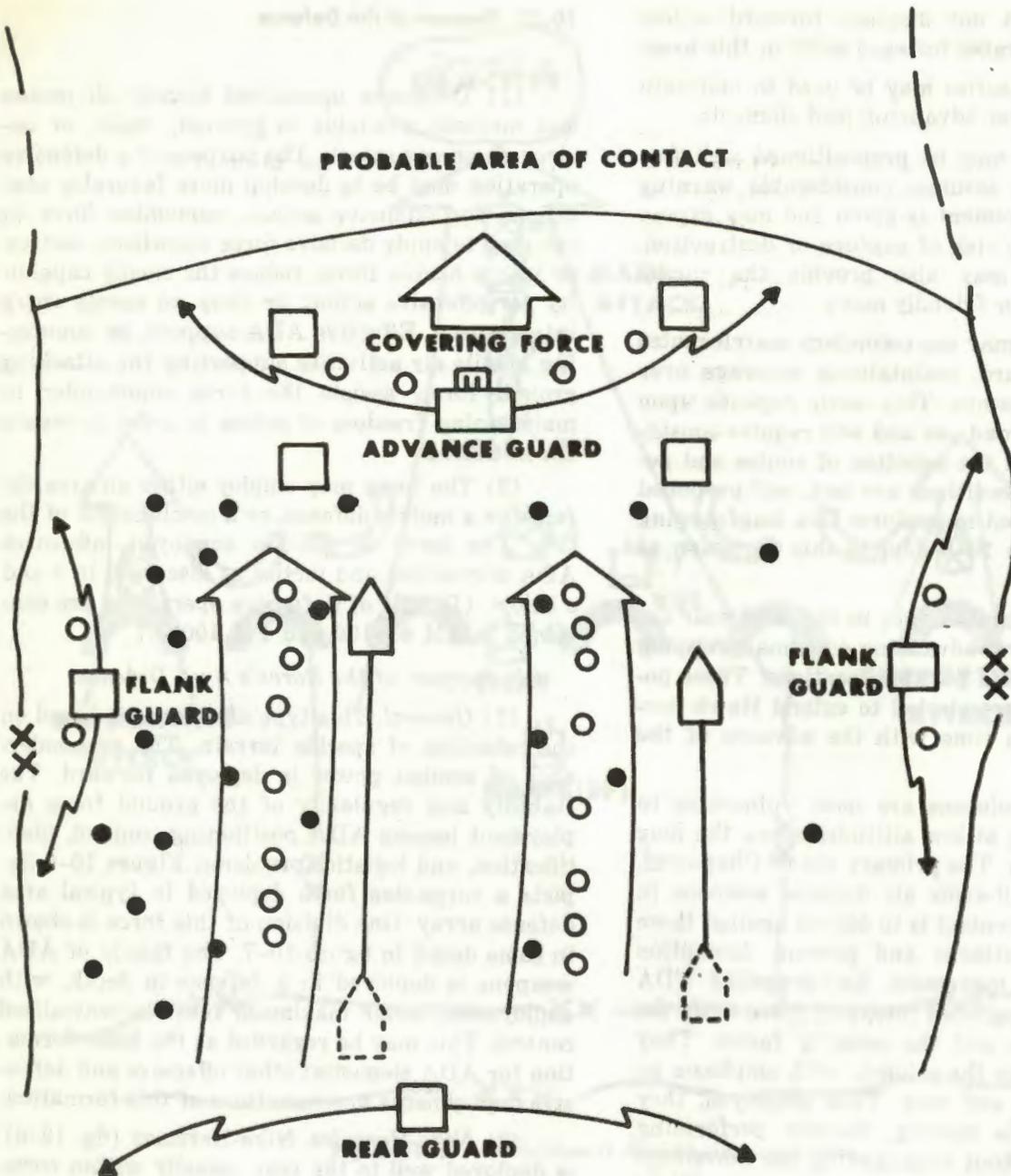
★b. Support of the Force's Area Defense.

(1) *General.* This type of defense is based on the retention of specific terrain. The preponderance of combat power is deployed forward. The stability and regularity of the ground force deployment lessens ADA positioning, control, identification, and logistics problems. Figure 10-6 depicts a corps-size force deployed in typical area defense array. One division of this force is shown in some detail in figure 10-7. The family of ADA weapons is deployed in a defense in depth, with deployment under maximum feasible centralized control. This may be regarded as the basic formation for ADA elements; other offensive and defensive deployments are variations of this formation.

(2) *Nike-Hercules.* Nike-Hercules (fig. 10-6) is deployed well to the rear, usually within corps rear areas and the army service area, as dictated by its long range and relatively low order of mobility. From its deep deployment, the system is capable of providing nuclear or nonnuclear HIMAD coverage over the entire field army area.

(3) *Hawk.*

(a) When sufficient weapons are available, Hawk units (fig. 10-6) are deployed in depth throughout the field army area. The units are sited to provide interlocking LOMAD coverage, weighted toward likely avenues of low-altitude air attack. The mobility and small size of self-propelled Hawk fire units adapt the system to operation in the forward area. During periods of good



LEGEND

- VULCAN FIRE UNITS MOVING WITH MARCH COLUMNS AND SECURITY FORCES.
- CHAPARRAL FIRE UNITS IN PRESELECTED POSITIONS ALONG PRIMARY ROUTES.
- ▲ SP HAWK FIRE UNITS MOVING FORWARD IN ECHELON OVER SECONDARY ROUTES.

NOTE: DEFENSE WEIGHTED TO THE LEFT TO COVER AN ASSUMED PROBABLE AVENUE OF LOW-ALTITUDE AIR ATTACK.

Figure 10-5. Air defense of division movement to contact.

visibility, when the threat is primarily at low altitude and when visually-directed SHORAD weapons are operative, self-propelled Hawk platoons may be moved farther to the rear for increased survivability. However, in darkness and foul weather, these platoons should remain forward so that their low-altitude coverage extends well beyond the FEBA. One of the two self-propelled platoons in each battery should be retained under close control of the battery control central, whenever possible. This will permit maximum exploitation of acquisition radar, ECCM, and electronic control and coordination system capabilities.

(b) When there are insufficient Hawk units to provide interlocking LOMAD coverage throughout the field army area, the available self-propelled units are sited well forward in division zones to provide coverage over the maneuver units and beyond the FEBA. Available towed Hawk units are sited around priority vital areas in the corps and rear areas.

(4) *ADA AW and Chaparral.* ADA AW and Chaparral units (fig. 10-7) are preferably deployed in depth throughout the combat zone in accordance with their deployment guidelines. These ADA units are deployed with greatest overall weapon density forward. The rear defenses might also be complemented by these types of units. Weighting of the low-altitude air defense toward the front serves two purposes: it destroys many attackers before they can reach their intended targets, and it concentrates air defense protection in the region of greatest concentration of combat power. However, the defense is continuous in depth to insure that an attacker cannot exploit his advantage if he penetrates the forward zone. Chaparral units usually are deployed in an area-type defense. The area defense is weighted to the front, along likely low-altitude air avenues of attack, and toward high-value division assets. ADA AW units are employed in close-in defense of small, high-value assets such as command posts, support installations, nuclear delivery artil-

lery batteries, reserve elements, and key bridges. ADA AW units realize their highest capability against lower-speed, multiple-pass, deliberate attack tactics, and encourage aircraft to take evasive maneuvers which reduce ordnance delivery accuracy and force the aircraft up into the HIMAD/LOMAD engagement envelopes. It is to be noted that the above-discussed Chaparral and Vulcan deployment guidelines normally preclude side-by-side deployment of these weapons. Forward area alert radars (FAAR) are employed to provide alerting information, general target location, and tentative identification information to the SHORAD units.

(5) *All-arms weapons.* All-arms weapons, such as Redeye, are present with units to which they are organic. Their deployments for air defense may be more carefully planned and coordinated when the ground forces are conducting an area defense since most units are not then generally as heavily occupied with ground actions as they might be in the offense. These weapons can contribute significantly to the SHORAD coverage by engaging low-altitude aircraft in accordance with the air defense rules and procedures.

c. Support of the Force's Mobile Defense.

(1) *General.* The mobile defense employs minimum combat power forward to warn of impending attack, canalize the attacking forces into less favorable terrain, impede and harass them, and cause their disorganization. The preponderance of combat power is employed in offensive actions to destroy the enemy at a decisive time and place. The aims and manner of conduct of the mobile defense are different from those of the area defense, and ADA employment and operations differ accordingly. Further, the defending ground force is divided; thus, the forward defense units and reserve units may have to be defended separately. In general, the problems of air defense of the force conducting mobile de-

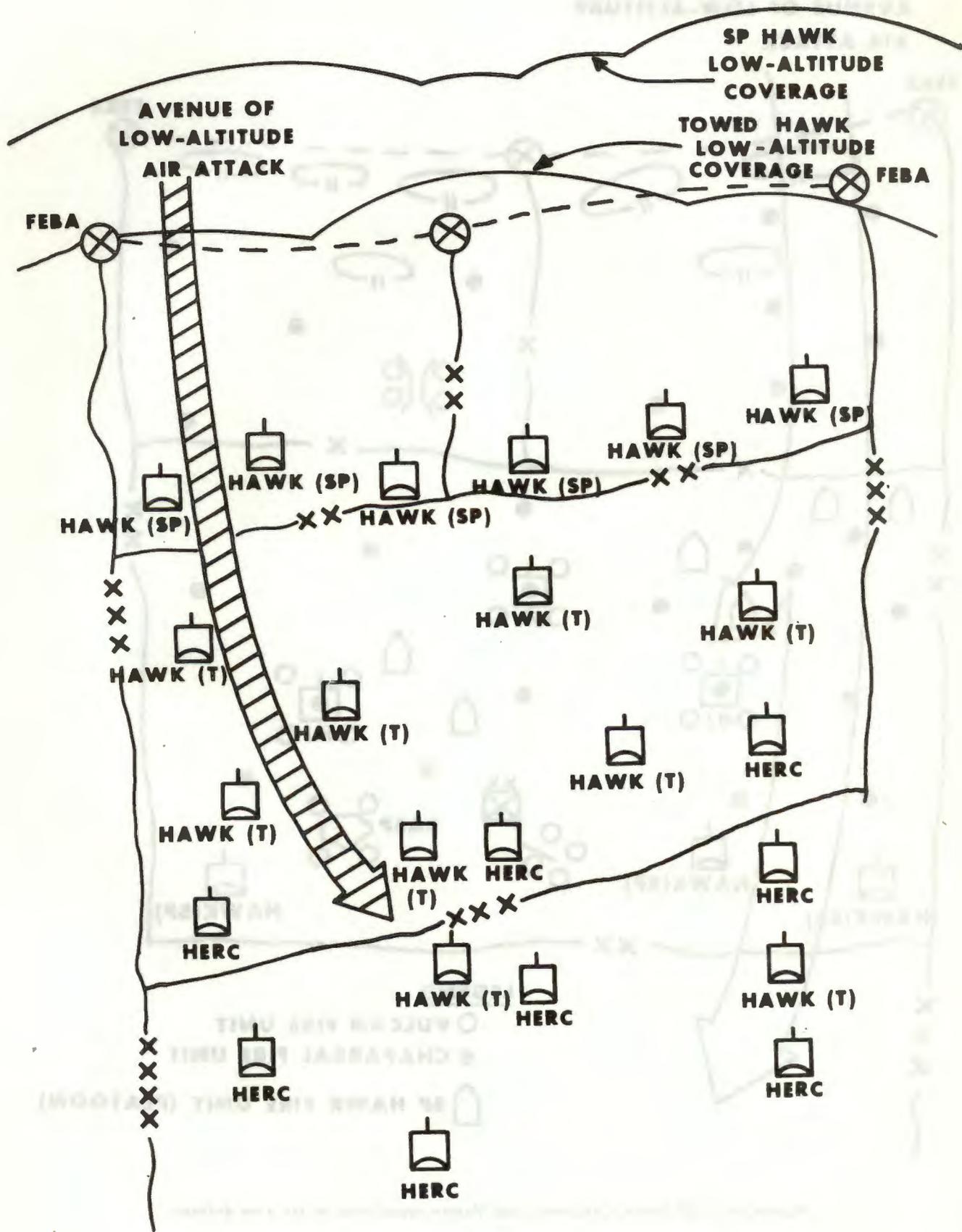


Figure 10-6. Nike Hercules and Hawk deployment in the area defense.

fensive operations are somewhat greater than those involved in defense of the force conducting an area defense due to the constantly shifting deployment of the ground forces.

(2) *Nike Hercules*. Nike Hercules deployments are similar to those encountered in defense of the forces conducting the area defense. The system is deployed at depths compatible with its long range and relatively low degree of mobility.

(3) *Hawk*. Hawk should be positioned to provide coverage over the area in which the defense is to be conducted so that forward defense units of the defense are always protected. This may require extensive planning, as batteries must be well forward to provide adequate protection but at the same time must avoid excessive risk of destruction or capture. Hawk fire units may be positioned on the flanks of the visualized penetration. From these positions they may cover the forward defense units maneuvering within the area of penetration, but are relatively secure from being overrun.

(4) *ADA AW and Chaparral*. SHORAD weapons and associated FAAR's support both the forward defense units and reserve units. Those of the reserve units are deployed in a manner similar to that used when the supported force is conducting an area defense. Those supporting the forward defense units are likewise deployed in the usual area defense posture or variations thereof, but maintain a fluidity of disposition compatible with that of the mobile ground forces they defend. In some cases fire units and radars may avoid the use of best positions in favor of other positions offering speedy access to withdrawal routes. The force air defense officer should insure that allocation of the SHORAD weapons among separate forces does not dangerously weaken the overall defense. In particular, he must insure that sufficient strength is present in the low-altitude air defense inclosing the area of penetration; otherwise, the airspace over the area of penetration becomes a corridor through which aircraft may enter to attack the more vulnerable rear areas.

(5) *All-arms weapons*. All-arms weapons accompany the forces to which they are organic. The lessened Chaparral and ADA AW effectiveness that may be produced by the splitting of the ADA resources between the forward defense units and the reserve units will emphasize the need for effective employment of the all-arms weapons.

10-22. Support of Retrograde Operations

a. General.

(1) A retrograde operation is any movement of a command to the rear or away from the enemy. Retrograde operations are conducted to accomplish one or more of the following: harass, exhaust, and inflict punishment on the enemy; draw the enemy into an unfavorable situation; permit the employment of the command or a portion thereof elsewhere; avoid combat under undesirable conditions; gain time without fighting a decisive engagement; disengage from battle; conform to movements of other friendly troops; and shorten lines of communication. Effective ADA support assists the force commander in maintaining an orderly and organized retrograde.

(2) The several types of retrograde movements (withdrawal, delaying action, and retirement) are sufficiently similar that no special variation in ADA tactics will be required for any one. (FM 61-100 and FM 100-5 provide further detail regarding retrograde operations.)

b. *General Employment Considerations*. Air defense during retrograde operations is complicated by the fluidity of the ground situation and by the wide frontages frequently involved. Most ADA weapons are incapable of engagement while moving. Careful planning and conduct of the operation are necessary to provide a sufficient number of operational systems while the remainder move to the rear.

(1) *Nike Hercules*. This system normally is positioned at considerable depth from the FEBA and would be required to displace only if the enemy advance is on an unusually large scale.

(2) *Hawk*. Hawk fire units ordinarily are deployed throughout the combat zone. As the line of contact moves back, the forward echelons of Hawk must move rearward accordingly. If displacing in response to only minor and temporary shifts in the FEBA, threatened Hawk units may make temporary moves to preclude capture or suppression by cannon fire. If, however, it is expected that the line of contact will stabilize well to the rear of its former position, it may be desirable to shift the entire Hawk deployment to the rear. This should be accomplished by echelon. In many cases, one element of a force, such as an armored division, might fight a delaying action to cover the retirement of the main force. These forces may require defense by self-propelled Hawk, in addition to the Chaparral and

ADA AW defense, as discussed in paragraph 10-23.

(3) *Chaparral and ADA AW.* Employment of these weapons in retrograde actions is similar in principle to their employment with the forward forces in the mobile defense. Chaparral fire units may be employed in the normal weighted area defense and should maintain the continuity of this defense. One means of maintaining continuity of defense is to have the most forward Chaparral fire units, as they displace, take up positions behind the rearmost fire units. If the operation does not permit the standard Chaparral area defense deployment, Chaparral march column defenses may be used. Preferably, Chaparral units move at night. This minimizes the probability of destruction by air attack while on the march and insures protection to the defended force during daylight and the most likely time of enemy air attack. ADA AW are employed in defense of small vital areas and units essential to the success of the retrograde. In many cases, one element of a force may fight a delaying action to cover the retirement of the main force. If this retirement is conducted during fair weather conditions, composite column defenses similar to those described in paragraph 10-20e (3) should be established.

(4) *All-arms weapons.* As with the mobile defense, the importance of all-arms air defense weapons in retrograde operations is relatively heightened by the lowered effectiveness of other air defense means.

10-23. Support of a Covering Force

a. General. A covering force may be used during offensive, defensive, and retrograde operations. The covering force normally has a mission of screening or delaying. Due to the isolated and semi-independent nature of many of the larger covering force operations, adequate LOMAD protection of the operation often cannot be provided by units located behind the FEBA. This may require that the covering force be provided Hawk support.

b. General Employment Considerations.

(1) *Organization.* A type air defense organization for a division-size covering force consists of attached self-propelled (SP) elements of an SP Hawk battalion (six SP Hawk platoons plus control and support elements) and the organic Chaparral/Vulcan battalion, formed into a battalion group.

(2) *Deployment and maneuver.* ADA with the covering force deploys and maneuvers basic-

ally as in the movement to contact, the mobile defense, the retrograde, and the withdrawal through rearward positions, as appropriate, with great emphasis on mobility.

(3) *Control of fires.* Control of SP Hawk platoon fires will pose a special problem due to communications limitations, the isolated nature of the defense, and the fact that Hawk battery control elements behind the FEBA are linked to their SP Hawk platoons by voice radio only. Implementation of rules of engagement will require special planning since typical rules based in part on friendly high-performance aircraft maintaining altitude over the Hawk defense may prove unusable in this application. Friendly aircraft should coordinate their flights through the covering force defense area in order to be covered by a time- or area-limited "weapons hold" weapons control status imposed via the DTOC on selected ADA units. At all other times, the SP Hawk platoons with the covering force should normally be granted a "weapons free" weapons control status against high-performance aircraft penetrating the defense area, depending on electronic identification, friend or foe, devices as the primary means of friendly aircraft identification. Implementation of this Hawk fire control concept requires close inter-serve coordination.

10-24. Relief in Combat

a. General.

(1) When tactical operations continue for a prolonged period, conservation of fighting power, maintenance of effectiveness, and the requirements of the tactical plans may necessitate the periodic relief of units. Such reliefs will be accomplished by relief in place, passage of lines, or withdrawal through a rearward position. The congestion inherent in each of these relief operations makes air defense particularly critical.

(2) In the relief of combat units, close cooperation and coordination of plans is necessary between the passing and passed ADA units to maintain air defense continuity and effectiveness. Other items requiring coordination include identification procedures/recovery corridors and mutual support actions.

(3) Hawk and Nike Hercules units will generally be little effected by relief of the close-combat units they defend. An exception is that movement of fire units may be necessitated by major shifts in the FEBA attendant to a passage of lines or a withdrawal through a rearward position. Special procedures are not indicated for the all-arms air defense means in relief opera-

tions. The detailed procedures for the ADA AW and Chaparral units involved in relief operations vary, as discussed in *b* through *d* below. As a general rule, when an entire division is being passed through or relieved by another, the headquarters of the two divisional ADA elements involved should be collocated at least during the period of passage or consolidation of command.

(4) This paragraph complies with STAN-AG 2082. (For further details regarding relief operations, see FM 61-100 and FM 100-5.)

b. Relief in Place.

(1) A relief in place is an operation in which all or part of a unit is replaced in a combat area by the incoming unit. The relief is executed rapidly, in an orderly manner, and preferably at night or during periods of reduced visibility. The mission and zone responsibilities of the replaced element are transferred to the incoming unit and command passes at a time mutually agreed or as ordered. The incoming unit continues the operation as ordered.

(2) When the relief involves two commands within a division; e.g., the relief of one brigade by another, there is often no requirement to replace the divisional ADA units in the sector in which the relief takes place. However, when all or parts of two divisions are involved, it will be necessary to relieve the associated divisional ADA units along with the other division elements. The relief of ADA units need not, and often should not, occur at the same time as the relief of the supported units.

(3) The relief is preceded by detailed reconnaissance by the incoming units. Normal patterns of activity should be preserved to the degree feasible. Relief of Chaparral units in place should be accomplished by emplacing the relieving units to provide the same defense pattern as the relieved units, but occupying different fire unit positions. This use of new positions by the new defense will invalidate enemy intelligence gathered on the old positions, and precludes unnecessary concentration of fire units during the relief process. The old Chaparral defense may be relieved when the relieving units' communications are sufficiently established to permit effective control. The new Chaparral defense may then be adjusted after command passes. ADA AW elements of the relieving units are attached to or placed in support of units they will defend, and accompany those units to the new positions. ADA AW elements of the unit being replaced are relieved simultaneously with the elements they defend. In the case of ADA

AW defending stationary assets such as bridges, the old fire units may be relieved when the new units have established communications and are ready to engage.

c. Passage of Lines.

(1) A passage of lines is an operation in which an incoming unit attacks through a unit which is in contact with the enemy. The unit in contact provides all possible aid to the attacking unit and, when its assistance is no longer required or effective, may then undertake other missions. The attacking unit normally will have priority in the use of routes and facilities. Secrecy and surprise are of paramount importance.

(2) The ADA fire units of the unit being passed through remain in place until assigned other missions. The ADA of the attacking unit deploy as for any other offensive operation.

(3) If the passage of lines involves only units of the same division, the air defense plan for the entire operation should be prepared at the headquarters of the divisional ADA battalion. A joint plan for passage is required if the passage involves elements of more than one division. In that case, the commander of the unit being passed through may concentrate planning efforts on operations to be conducted behind the line of contact, whereas the passing commander may plan operations forward of the line of contact.

d. Withdrawal Through a Rearward Position.

(1) A withdrawal through a rearward position is an operation in which a unit effecting a withdrawal passes through a unit occupying a rearward defensive position. The unit in position provides all possible assistance to the withdrawing unit and holds the enemy on the defensive position after the withdrawing unit has passed through. The withdrawing unit has priority on routes and facilities, provided this does not prejudice the defense.

(2) ADA fire units of the unit being passed through are employed as required for its defense, while providing maximum feasible defense for the withdrawing unit. The ADA of the withdrawing unit are employed as in any other retrograde operation. Passage plans provide mutual recognition procedures and for withdrawing units to avoid local prepared defensive positions.

(3) If the operation involves only units of the same division, the air defense plan should be prepared at the divisional ADA battalion headquarters. A joint plan is required if elements of more than one division are involved.

CHAPTER 11

COMMZ ADA OPERATIONS

11-1. General

a. This chapter pertains to operations by theater army ADA deployed directly under the operational control of regional air defense commanders. Since these units will usually be located in the COMMZ, they are referred to in this chapter as COMMZ ADA units. COMMZ ADA units are assigned a theater air defense mission and are deployed throughout the theater as necessary to accomplish their mission. Certain COMMZ ADA may be physically located within the field army areas and may be administratively and logistically supported by the field armies.

b. The basic theater air defense organization, which includes the COMMZ ADA organization, is discussed in chapter 3.

11-2. Comparison to Combat Zone Operations

a. *General.* All ADA operations are basically the same in deployment and employment concepts, and in the fundamentals of planning and execution. However, certain specific concepts for COMMZ ADA operations are more like those for CONUS than for the combat zone.

b. Deployment Scheme.

(1) COMMZ site, isolation, or distance between critical assets will usually cause the COMMZ critical assets to be defended as individual vital areas by Army ADA. Overall area coverage is provided by air defense interceptors. In this case, the deployment schemes for air defense of a large COMMZ and for air defense of CONUS are identical.

(2) A COMMZ of appropriate size and critical asset density may be defended by deploying ADA in both area and vital area defenses in a manner similar to the field army air defenses.

c. *Organization.* Figure 11-1 depicts a type organization for air defense in a large COMMZ wherein the COMMZ critical areas are defended by Army ADA as individual vital areas. In the example depicted, a theater army air defense command (TAADC) is organized to exercise command, less operational control, of an assumed large (e.g., two-brigade) COMMZ ADA force.

ADA fire units are deployed in defense of specified vital areas; e.g., port facilities, national capitals, and key military installations. The fire units in each vital area defense are controlled by an ADA defense commander operating from a defense-level AADCP. The ADA defense commander is under the direct operational control of the regional air defense commander or designated representative. The parallel between this organization and the CONUS air defense control organization (fig. 4-2) should be noted.

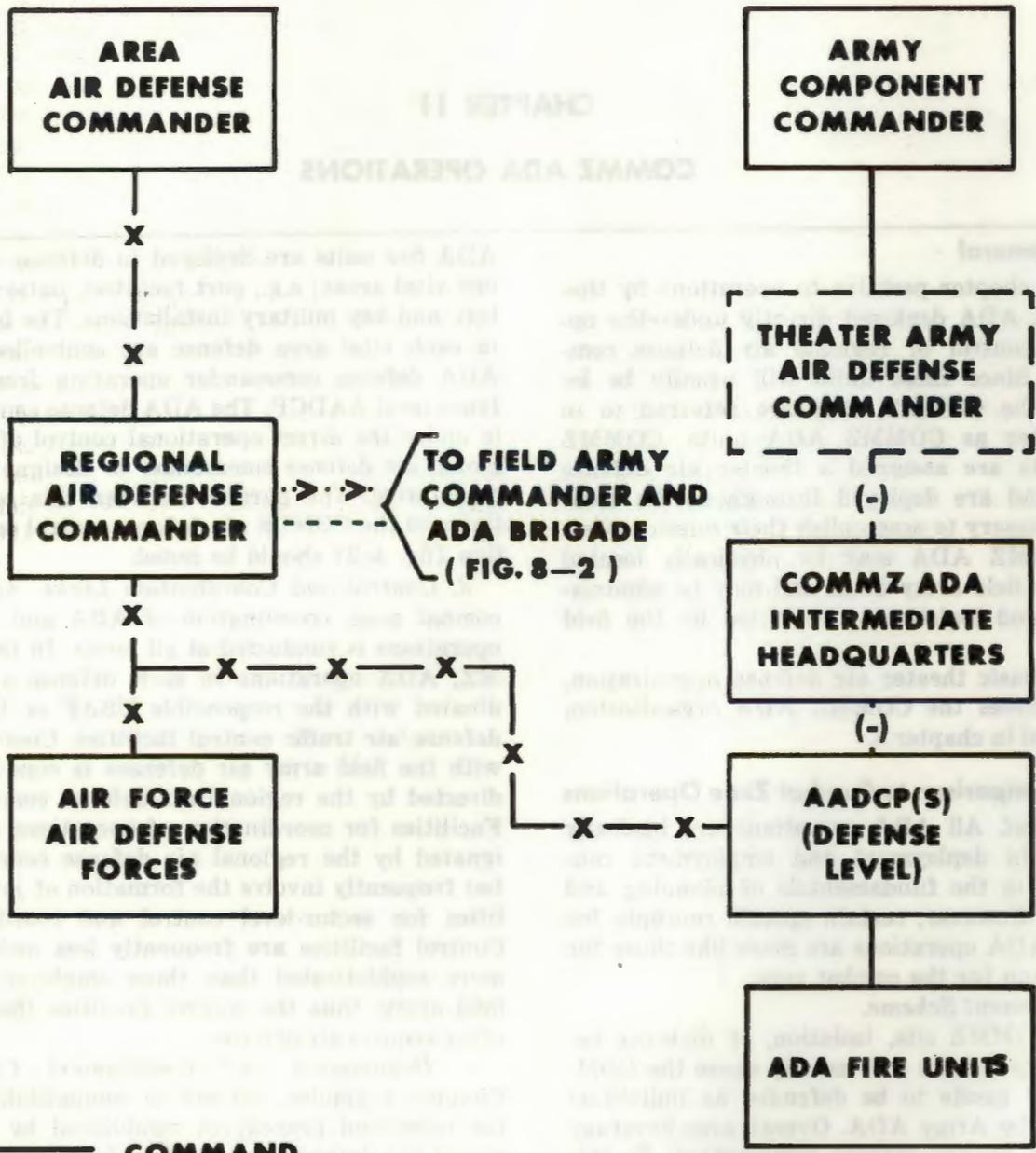
d. *Control and Coordination Links.* As in the combat zone, coordination of ADA and aviation operations is conducted at all levels. In the COMMZ, ADA operations in each defense are coordinated with the responsible USAF or USN air defense/air traffic control facilities. Coordination with the field army air defenses is conducted as directed by the regional air defense commander. Facilities for coordination of operations are designated by the regional air defense commander, but frequently involve the formation of joint facilities for sector-level control and coordination. Control facilities are frequently less mobile and more sophisticated than those employed in the field army, thus the control facilities themselves often require air defense.

e. *Deployment and Employment Concepts.* Chapter 7 applies, subject to compatibility with the rules and procedures established by the regional air defense commander. In general, ADA unit redeployments are only required when theater air defense priorities change, and when redeployment to alternate positions is practiced as a survivability measure.

f. *Planning and Conduct of Operations.* Chapter 10 applies, within limits imposed by the regional air defense commander.

g. Communications.

(1) The commander of the unified command, through his communications-electronics officer (J6), plans, directs, and coordinates the provision of communications to the air defense forces in the theater. Communications required by air defense units of any of the services may be provided through facilities operated by that



- COMMAND
- X — OPERATIONAL CONTROL
- (-) — COMMAND, LESS OPERATIONAL CONTROL
- ...<...<... AIR DEFENSE RULES AND PROCEDURES (PARA 3-5c AND 3-5d)
- - - - COORDINATION
- [- - -] WHEN REQUIRED FOR ADMINISTRATIVE/LOGISTICAL SUPPORT OF TACTICAL UNITS

Figure 11-1. Type air defense organization, large COMMZ.

service or by another service, depending on such factors as unit locations, availability of facilities, and requirements of other users.

(2) Army-operated communications facilities available for the support of air defense forces are provided by the theater army communication system. This system is installed, operated, and maintained by U.S. Army Strategic Communications Command (Theater) (FM 11-23). The system extends from the theater rear boundary into the field army areas where it interconnects with the field army area communications systems. It is important to realize that the Army-operated communications facilities are not secure circuits. COMSEC procedures must be employed when this communication facility is used, since it is a lucrative source of information for enemy intelligence.

(3) The headquarters of the theater army

air defense command (TAADC) or the COMMZ ADA unit serving in equivalent capacity will require internal communications among staff sections, and external communications to theater army headquarters, the area air defense commander, subordinate units, and air defense agencies of other services. The internal communications are provided by the signal operations company (medium headquarters). External communications are provided as outlined in (1) and (2) above.

h. Logistic Support. Logistic support is provided by the theater army support command (TASCOM). Necessary arrangements are made by the theater army headquarters, the TAADC, or a designated COMMZ ADA unit headquarters. ADA units located in the field army area, but deployed as part of the COMMZ air defense system, may be logistically supported by the field army support command. (Details are in FM 100-10.)

13-2. Comparison to COMMZ Operations
The ADA units are organized to provide support to the theater army command. The ADA units are organized to provide support to the theater army command. The ADA units are organized to provide support to the theater army command.

13-3. MORGAN Operational Concepts
The MORGAN units are organized to provide support to the theater army command. The MORGAN units are organized to provide support to the theater army command. The MORGAN units are organized to provide support to the theater army command.

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The ADA units are organized to provide support to the theater army command. The ADA units are organized to provide support to the theater army command. The ADA units are organized to provide support to the theater army command.

(1) Level 1 and Level 2 operations are those operations which are performed by the theater army command. The ADA units are organized to provide support to the theater army command. The ADA units are organized to provide support to the theater army command.

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CHAPTER 12

CONUS ADA OPERATIONS

12-1. General

a. Army ADA resources are allocated to defend specified vital areas in the United States. In addition to providing vital area defenses, the Safeguard ballistic missile defense system also provides an overall area defense. The organization for air defense of the United States is discussed in chapter 4.

b. Safeguard operations will be covered in a separate series of publications.

12-2. Comparison to COMMZ Operations

COMMZ and CONUS ADA operations generally are the same except that in CONUS vital area criticality often demands a higher level of defense. Also, CONUS ADA operations are characterized by use of fixed and semifixed sites, the Safeguard ballistic missile defense system, and a more sophisticated control system.

12-3. NORAD Operational Concepts

a. Weapon roles. The NORAD (North American Air Defense Command) concept of weapon roles is as follows:

(1) Manned interceptors inflict maximum attrition and bring the attackers under increasing pressure as they approach the vital areas.

(2) The Army ADA weapons provide a final line of defense around the vital areas. Their role is to deny penetration by surviving attackers.

b. Operating Levels. The following operating levels are prescribed by NORAD for operations in a SAGE (semiautomatic ground environment)-equipped NORAD region.

(1) *Level 1.* In level 1 operations, the SAGE NRCC (NORAD region control center) supervises the conduct of the air battle in the region. It vectors fighter-interceptors, programs and fires Bomarc missiles automatically through the SAGE computer, and supervises and monitors ADA engagements through the AADCP. Reference data (symbology) are furnished over the automatic data link (ADL) to the AADCP's. Level 1 also indicates to the commander that all backup facilities (the NORAD control centers (NCC)) are fully operational.

(2) *Level 2.* Level 2 indicates that the NRCC is still controlling the air battle but that the backup facilities are degraded to some extent.

(3) *Level 3.* Level 3 indicates that the NRCC is still controlling the air battle but that the backup facilities are nonoperational.

(4) *Level 4.* Level 4 indicates that the NRCC is no longer controlling the air battle and that the combat elements are being controlled by (an) NCC(s). Each region has at least one NCC which can furnish limited early warning and identification to the AADCP and can vector interceptors. An automated NCC (para 4-3d(3)) is also capable of launching and programming Bomarc surface-to-air missiles.

(5) *Level 5.* Level 5 autonomous operations are predicated on the complete loss of communications between the AADCP and all higher headquarters in the NORAD chain of command or between an individual firing battery and the AADCP. The loss of communications must be a total loss and not a temporary outage due to natural causes. Upon assuming level 5 operations, the Army air defense commander or the battery commander assumes full responsibility for the air battle, utilizing the limited identification means available to him.

c. Methods of Control. The Army air defense commander at the AADCP has essentially two choices of methods for control of ADA fires, decentralized and centralized, or he may be forced into autonomous operations. These methods are discussed in paragraph 10-7g.

d. DEFCON. CINCNORAD announces DEFCON's (defense readiness condition) to progressively and systematically prepare NORAD units for combat, based on the worldwide intelligence estimate. There are five numbered DEFCON's. The sixth readiness condition is designated *air defense emergency* and represents the highest degree of readiness. Within established NORAD minimum states of alert, the Army air defense commander will convert a prescribed DEFCON to a state of alert for each battery in his defense.

e. Air Defense Warning is normally issued after NORAD has reached its highest condition of read-

iness, the air defense emergency. It represents CINCNORAD's evaluation of the aerospace threat. There are three warnings: RED, attack imminent or in progress; YELLOW, attack probable; and WHITE, attack not probable.

f. Special Control Instructions. The three terms presently used within ARADCOM to issue specific engagement and disengagement instructions are basically as described in paragraph 10-7h.

g. Weapon Control Case. Weapon control case is used to control the employment of nuclear warheads and is prescribed by classified NORAD/ARADCOM directives. (Weapon control cases are defined in FM 44-1A.)

h. Minimum Normal Burst Altitude (MNBA). The MNBA specify the minimum heights of nuclear burst above terrain which will result in acceptable effects on the surface. Paragraph 10-10 presents a discussion of minimum normal burst altitudes. MNBA's are computed in advance and published in the tactical SOP.

i. Rules of Engagement.

(1) Prescribed by CINCNORAD, these rules state who may declare an airborne object hostile and under what conditions the object may be engaged. Criteria currently fall into two categories:

(a) *Circumstantial evidence.* Under this criterion, aerospace objects in peacetime may be declared hostile and engaged only on authority of CINCNORAD or his deputy. In wartime, authority is delegated to the NORAD region commanders.

(b) *Hostile act.* Specified NORAD commanders may declare an airborne object hostile under this criterion, providing it is committing a hostile act according to the criteria contained in NORAD rules of engagement.

(2) There are currently two exceptions to the NORAD rules of engagement.

(a) *Self-defense.* Under the criterion of self-defense, specifically designated NORAD commanders may take action to destroy aircraft attacking their forces.

(b) *Pop-up targets.* A pop-up target is any aircraft exceeding speeds and below altitudes established by CINCNORAD. Any air defense commander may declare a target hostile that meets the established pop-up criteria, provided: plan SCATANA (*j* below) is fully implemented; air defense emergency has been declared; and pop-up has been placed in effect by the NORAD region control center. No further checks with NORAD agencies are required prior to engagement by the battery.

j. Identification.

(1) The principle means of identifying aircraft penetrating North American airspace currently is flight plan correlation. Any flight from an overseas area must enter an air defense identification zone (ADIZ) within 20 miles of a predetermined point and within 5 minutes of an estimated time. Entry place and time are based on the pilot's flight plan filed at his takeoff point and sent ahead to the Federal Aviation Administration (FAA) in the United States or the Department of Transport (DOT) in Canada. This information is relayed to the appropriate NRCC and stored for correlation when the track is acquired.

(2) If the aircraft enters the ADIZ outside of the prescribed limits, it is declared an unknown and air defense interceptors are scrambled to make positive visual identification. Radar operators establish a track and make flight plan correlation. Electronic identification, friend or foe (IFF), devices are a supplement to flight plan correlation. The electronic IFF is used with ADA radars at all echelons down to battery level and provides identification assistance even during autonomous operations.

(3) Under combat conditions, the identification process is somewhat simplified when provisions of the emergency passive air defense plan SCATANA (security control of air traffic and air navigation aids) is placed in effect. This NORAD emergency plan provides for orderly grounding of nonessential aircraft and for establishment of military control over radio navigational aids. EBS (emergency broadcast system), another passive emergency plan, provides control of civil defense information radio broadcasts.

k. Logistic Support. Logistic support is provided by direct/general support combined shops. Maintenance and supply requirements for these shops are met through the U.S. Army Materiel Command, national inventory control points (NICP), and a depot system. The logistic support provided by the combined shops to ADA units is the responsibility of CG, USCONARC and ultimately, the continental army commanders in whose areas the ADA units are located. In some cases, batteries of the same battalion may be logistically supported by different CONUS armies and, in other cases, logistic support is furnished by one or more of the other services. It is to be noted that the Missile Mentor system and the battery terminal equipment associated with Army air defense electronic control and

coordination systems require no direct/general support maintenance. Organizational maintenance, supported by a responsive repair parts system and depot maintenance system, is all that is required for maintenance of these systems.

1. Communications.

(1) *General.* Operation of Army ADA units as part of an integrated defense of the United States requires reliable, highspeed communication. The responsibility for providing the required tactical communications is shared by the various component forces in NORAD. Considerable use is made of commercial facilities. NORAD entrance into the commercial automatic voice network (AUTOVON), the automatic secure voice communications (AUTOSEVOCOM), and the automatic digital network (AUTODIN) systems adds capability to the already sophisticated and multirouted air defense communications system.

(2) *AADCP-NORAD communications.* Communication between the AADCP and higher NORAD echelons is by leased voice and teletype circuits. Communications between SAGE/BUIC and Army air defense control and coordination systems is by leased voice and automatic data link circuits. Backup circuits are provided. The U.S. Army is responsible for providing, operating, and maintaining the Army-used entrance, termination, and supporting equipment for these

communications. Actual maintenance of leased equipment is performed by local telephone companies.

(3) *AADCP-AADCP communications.* The U.S. Army is responsible for establishing leased communications between adjacent AADCP's. Maintenance of these leased facilities is performed by the telephone companies involved.

(4) *AADCP-fire unit communications.* The Army air defense commander is responsible for providing, operating, and maintaining leased communications between the AADCP and fire units. Army air defense control and coordination system data circuits should be backed up with manual (voice-tell) circuits. Maintenance of leased equipment and communications facilities is performed by the local telephone companies. (Communications facilities required within the ADA missile battalions are covered in detail in FM 44-95 and FM 44-96.)

(5) *Cross-service agreements.* The responsibilities outlined above may vary depending upon special support agreements at specific sites where one service is host and the other is tenant. In such cases, the tenant service is responsible for providing information as to its future requirements in accordance with programing practices of the host service.

CHAPTER 13

SPECIAL OPERATIONS

Section I. GENERAL

13-1. Operations Under Special Conditions

a. Special operations are those in which the environment or nature of the operation creates the need for special techniques, tactics, or equipment. Basic doctrine remains unchanged.

b. Organization during special joint operations is discussed in chapter 5.

13-2. Plans and Training

a. Information and intelligence on which plans are based will often come from foreign agencies. In some operations, it is impossible to verify the information received. Plans based on this information must be flexible so that they may be adjusted to unforeseen situations.

b. Training is required in the following:

(1) Special techniques required to apply the basic air defense artillery doctrine.

(2) Use of special equipment.

(3) Operation, care, and maintenance of equipment under expected terrain and weather conditions.

(4) Special combat service support techniques.

(5) Individual health and safety special measures.

(6) Language and customs of the area of deployment.

Section II. SPECIAL OPERATIONS—ENVIRONMENT

13-3. Jungle Operations

a. General. The jungle is characterized by dense forests, high temperatures, high humidity, and heavy rainfall. These features prevail to varying degrees in all jungles and will affect the efficiency of personnel and equipment.

b. Special Considerations. Special considerations for ADA operations in the jungle are as follows:

(1) *Type of defense.* Factors affecting security, mobility, mutual support, communications, and resupply will frequently make establishment of an area-type defense against low-altitude air attack difficult or impossible. This will emphasize the importance of weighting vital area defenses toward avenues of low-altitude air approach.

(2) *Fire units required.* Effective passive air defense is possible for many maneuver units engaged in jungle operations, thereby reducing the number of fire units required for their defense. Massing of support elements in a limited number of clear or secure areas may increase fire unit requirements for defense of these elements.

(3) *Control and coordination.* The jungle environment will usually favor decentralized operations. ADA units must be prepared to operate autonomously at any time.

(4) *Communications.*

(a) The limitations imposed by the jungle environment on communication cause a greater than normal dependence upon wire. Ground wire routes are limited and the few available will be heavily traveled. Overhead construction will be the rule.

(b) Radio operating ranges are seriously reduced by dense vegetation and adverse atmospheric conditions. Operators should be trained in copying weak signals and in siting and constructing antennas.

(5) *Mobility.* Ground mobility is seriously degraded during jungle operations. Good roads are rare and even these are sometimes impassible during or after heavy rains. ADA units in support of maneuver elements may be required to be helicopter-transportable, air-droppable, or have extremely good ground mobility.

(6) *Effectiveness of fires.* Reduction of the

effectiveness of fires is caused by degraded radar coverage and an increase in equipment malfunctions due to climatic conditions. SHORAD weapons will also be hampered by limited visibility and the jungle mask.

(7) *Reconnaissance, selection, and occupation of position (RSOP)*. The need for position reconnaissance in considerable detail, the requirements for extensive clearing of fields of fire, and the inaccessibility of good positions may prevent the attainment of the optimum level of defense by limiting the number of weapons that may be effectively employed. Occupation of positions should be carried out under strict security, whether the occupation is by air or ground.

(8) *Intelligence and counterintelligence*. The limited effectiveness of security elements, ability of the enemy to approach the position unseen, limitations on the use of defensive weapons, and possibility of an attack from any direction intensify the requirements for good intelligence and counterintelligence measures. The ADA unit should maintain close liaison with the supported unit to obtain intelligence regarding impending enemy ground attack.

(9) *Alerting and warning*. Degraded communications and radar coverage will often result in engagement of hostile aircraft with little or no warning, thus requiring a high state of unit alert.

(10) *Reference*. FM 31-35 provides details pertaining to jungle operations.

13-4. Desert Operations

a. General. A desert is an area in which the seasonal or annual rainfall rate is less than the seasonal or annual evaporation rate. Meteorological conditions common to all desert regions are glaring sunlight, sudden and violent windstorms, and drastic changes in temperature. Deserts usually have sparse or no vegetation, large areas of sand, scant human habitation, and little or no surface water. The principal difficulties encountered during desert operations are caused by the drastic effects the environment has on humans and equipment, exposed nature of lines of communication, and vulnerability of positions.

b. Special Considerations. The following are considerations for ADA employment during desert operations:

(1) *Fire units required*. A larger than normal number of ADA units may be required to support the field army engaged in desert operations since the lack of natural cover and con-

cealment makes the force especially vulnerable to air attack.

(2) *Communications*. Dust, sand, and heat hamper all types of communications. Communications equipment deteriorates quickly under desert conditions. Because speed, mobility, and dispersion characterize desert operations, wire communication is not used extensively except in rear areas and under stable conditions. Greater emphasis is placed upon the employment of air and/or ground radio relay installations for ADA communications.

(3) *Mobility*. Relatively flat desert terrain usually presents no problem to tracked or wheeled vehicles. However, mountainous terrain, salt marshes, and dunes will restrict movement significantly. Roads and trails are scarce and usually connect villages and bases. Army aviation may be used for movement of supplies and equipment. Landing of aircraft on the desert may be accomplished with little or no preparation; however, the lift capability of aircraft is decreased in the high temperatures found in the desert.

(4) *RSOP*. Reconnaissance can be accomplished by aircraft or ground vehicle; however, the vastness of the desert lends itself to aerial reconnaissance. Proper selection of positions is important in desert operations. The desert terrain provides little cover and concealment, making it necessary to blend into the existing ground pattern with a minimum amount of change to the original terrain.

(5) *Reference*. See FM 31-25 for details regarding desert operations.

13-5. Mountain Operations

a. General. Mountainous areas are usually characterized by one or more of the following: exaggerated terrain features, heavy woods or jungle, glaciated peaks, compartmentation, limited routes of communication, extreme weather conditions, and high altitudes. These conditions will significantly affect ADA operations. Some problems include degradation of radar coverage and communications, resupply difficulties, control problems, adverse effects of high altitudes on operating personnel, and an increase in vulnerability.

b. Special Considerations.

(1) *Type of defense*. Factors influencing communications, mobility, security, mutual support, and resupply will often prevent establishment of a complete area-type defense against low-altitude air attack. Emphasis on covering

the most critical avenues of low-altitude air approach will be necessary.

(2) *Fire units required.* Air defense operations in mountainous areas must often depend on fewer ADA units than would be employed to accomplish a similar mission on less rugged terrain because of the limited number of positions available and the difficulty of occupying suitable positions.

(3) *Control and coordination.* Decentralized control of ADA units will be required where terrain features degrade communications.

(4) *Communications.* In mountainous country, a commander must give communications a high priority in his planning and supervision. In most instances, communication can be maintained by TOE equipment if supplemented with sufficient additional radios to establish relays. High-frequency AM/SSB radio sets, using ground wave propagation, will reduce many communication problems.

(5) *Mobility.* Movement in mountainous areas is severely hampered by the lack of adequate roads and the difficult terrain. Road nets are especially vulnerable to enemy artillery. Track-laying vehicles may be hampered by tracks slipping on icy roads and should be equipped with grousers for added traction. Airlift of equipment and supplies may be required; however, helicopters are limited in lift capacity at high altitudes.

(6) *Effectiveness of fires.* Bad weather, limited visual and electronic observation, and high radar masks will degrade the effectiveness of ADA fires during mountain operations. These same effects may also reduce the enemy low-altitude air threat.

(7) *RSOP.* Detailed reconnaissance is essential during mountain operations. In planning a move, advantage must be taken of map studies, aerial photographs, and ground and aerial reconnaissance. Weapon positions should be selected for their tactical utility, security, and accessibility for logistical support. ADA weapons are usually positioned on commanding terrain. These positions are less exposed to small-arms fire from surrounding heights, have less chance of being caught in rock slides or avalanches, and command maximum sectors of fire. Alternate positions should be chosen early and prepared as time permits.

(8) *Alerting and warning.* Radar masking and degraded communications will reduce warning time. Commanders must emphasize the need for training in aircraft recognition and crew

procedures to minimize reaction time. Radar operators must be trained to operate in extreme radar clutter conditions.

(9) *References.* FM 31-70, FM 31-71, and FM 31-72 should be consulted for details.

13-6. Operations in Deep Snow and Extreme Cold

a. General. The intense cold in the northern latitudes (about 45 percent of the North American continent and 65 percent of the Eurasian land mass), will significantly affect ADA operations. Influencing factors are the long hours of daylight and the heat and dust of summer, the long nights and bitter cold and storms of winter, the mud and morass of the transition periods of autumn and spring, the scarcity of roads and rail nets, and the vast distances and isolation.

b. Special Considerations.

(1) *Communications.* Laying and maintaining wire lines during extreme cold is difficult, but wire nets should be established when possible to provide communication flexibility and security. Radio will be the normal means of communication. There will be some degradation of radio communication and consequently, retransmission from an aircraft or other radio position may be necessary.

(2) *Mobility.* Snow, blizzards, thick forests, mountains and hills, innumerable waterways, and the lack of roads are some of the barriers to movement in most cold areas of the world. The period of spring breakup with its accompanying slush, mud, and swollen waterways, and the fall freezeup with its rain and open or half-frozen streams are the most difficult seasons in which to maintain mobility. The early winter period, when there is little snow and the ground and waterways are firmly frozen, will provide good foot and vehicle trafficability. Track-laying vehicles are the most suitable for movement in snow. Both fixed-wing and rotary-wing aircraft are used extensively during cold weather operations.

(3) *RSOP.* Prior detailed reconnaissance is most important in insuring successful operations in cold weather. Positions should be selected for their tactical utility, security, and logistic supportability. ADA units dependent on wheeled vehicle transportation should, if possible, occupy previously prepared positions. Tracked ADA weapons may be able to occupy hastily prepared positions.

(4) *References.* FM 31-70 and FM 31-71 should be consulted for details.

Section III. SPECIAL OPERATIONS—MISSION TYPE

13-7. Amphibious Operations

a. General. Navy/Marine Corps terminology is used in this paragraph whenever appropriate. Paragraph 5-2 defines terms. Basic concepts and detailed procedures for the conduct of joint amphibious operations are presented in FM 31-11, FM 31-12, and FM 100-5.

b. Special Considerations. In addition to the organization and control considerations discussed in chapter 5, the ADA commander should consider the special factors discussed below.

(1) *ADA unit requirements.* The types and numbers of ADA units required for defense of the landing force are determined by the landing force commander. Initially, the emphasis will be on providing adequate low-altitude air defense ashore to cover the congested beach area and to provide for small unit defense. The SHORAD capability included in division TOE will normally suffice for this and, in a small operation, may be all the ADA that is required ashore. However, most large operations will require that HIMAD and LOMAD weapons also be landed in order to complement and eventually replace the ship-based air defense means.

(2) *Unit transportability.* All ADA units likely to support an amphibious operation are transportable in navy ships and landing craft. All can be beach-landed, but landing of the heavier ADA equipment in this manner is unusual. Equipment dimensions and loading instructions are contained in Department of the Army equipment publications (technical manuals). General ship and landing craft data are presented in FM 31-12, but data for detailed planning must be obtained from naval agencies.

(3) *Type of defense.* The standard ADA defense types (area defense, vital area defense, small unit defense) apply, but space restrictions may initially prevent deployment in an area defense posture. The beachhead should initially be defended as a single vital area, with selected units or installations receiving additional and directly responsive air defense means.

(4) *RSOP.* Ground reconnaissance to select ADA position areas will usually be impossible. Map and photograph reconnaissance, and sea and air reconnaissance if possible, should be made of the beach area and immediate terrain inland to select recommended landing beaches, tentative primary and alternate position areas, and tentative routes. Initial positions are usually limited in number, small in area, and near the frontlines.

Position area selection must be coordinated with other elements of the landing force to minimize interference and to insure that ADA units have adequate ground security. Ground reconnaissance plans should provide for larger reconnaissance parties than normal to insure thorough reconnaissance and rapid preparation and occupation of positions.

(5) *Communications.* Communications plans must provide communications between the landing force AADCP(s) and the designated tactical air control facility(ies) afloat and ashore. Initially, communications may be direct from the ADA platoons or batteries to the force or sector anti-air warfare centers (FAAWC or SAAWC) afloat. Army ADA elements must be prepared to tailor their communications to comply with the requirements of Navy/Marine Corps doctrine.

13-8. Airborne Operations

a. General. Basic concepts and detailed procedures for the conduct of joint airborne operations are presented in FM 57-1 and FM 100-5.

b. Special Considerations. In addition to the organization and control considerations discussed in chapter 5, the ADA commander should consider the following factors:

(1) *ADA unit requirements.* The types and numbers of ADA units required for defense of the airhead are determined by the airborne force commander. Initially, the emphasis will be on providing adequate low-altitude air defense to cover the airhead area and to provide for small unit defense. The SHORAD capability included in division TOE will normally suffice for this and, in a small or short operation, may be all the ADA that is required in the airhead.

(2) *Unit transportability.* All Army air defense units are air-transportable, but only the Redeye and towed Vulcan units can be parachute-landed. Equipment dimensions and loading instructions are contained in Department of the Army equipment publications (technical manuals). Planning factors for air loading of ADA equipment are contained in FM 101-10-1.

(3) *Communications.* Communications plans should provide communications between the ADA in the airhead and exterior air defense control facilities if practical. Analysis of communications traffic to be carried over this link may show that minimum requirements may be temporarily met by gaining access to other planned nets; e.g., nets for air traffic control.

(4) *Other.* Defense type and RSOP considerations are similar to those discussed for amphibious operations in paragraph 13-7.

13-9. Airmobile Operations

a. General. Airmobile operations are tactical operations in which combat forces move about the battlefield in tactical aircraft in the furtherance of a ground combat effort. The airmobile movement of ADA is characterized by detailed planning and coordination, aggressive execution, speed of displacement, and operation with minimum personnel and equipment for periods of short duration. Details regarding airmobile operations are included in FM 57-35.

b. Concepts.

(1) Airmobile movements by ADA units are conducted in four phases—planning, marshalling, movement, and occupation of position. The planning phase encompasses coordination with supported units, map/photo reconnaissance and tentative selection of positions, preparation and issuance of plans and orders and, time permitting, rehearsals. Airmobile operations planning follows the reverse planning sequence. Factors to consider in planning are listed in paragraph 13-8b. The marshalling phase consists of ground movement to appropriate areas; preparation of the aircraft loading area; preparation of troops, equipment, and supplies for airmobile operations; and loading of aircraft. The movement phase commences with takeoff of the first aircraft from the loading area and ends with arrival of the last aircraft at the landing sites. The occupation phase of the airmobile movement consists of the unloading of personnel and equipment, organization of the landing site, and occupation of positions.

(2) The depth of the objective and linkup time are major considerations determining the amount and type of accompanying air defense artillery required. ADA equipment dimensions and weight are major limiting factors. The development of an airmobile force air defense capability beyond a complementary Redeye, Vulcan, and fighter-interceptor defense is dependent on the threat, ground situation, available aircraft, and expected duration of the operation. Passive measures and aggressive use of crew-served and individual weapons will also reduce the effects of enemy air attack.

13-10. River Crossing Operations

a. General.

(1) River obstacles influence ADA support

of river crossing operations because they restrict the movements of the attacking ground forces and because they provide natural avenues for low-altitude air attack. Additionally, they afford natural lines of defense.

(2) U.S. forces classify river crossings as hasty and deliberate. Ideally, the river is crossed at maximum speed on a broad front. Surprise, speed of execution, boldness, and flexibility are key elements of a successful river crossing operation.

(3) ADA is employed to cover all possible crossing sites and the bridgeheads and yet retain maximum area coverage of the friendly forces in the staying, holding, and dispersal areas. ADA supports the river-crossing operation from positions as far forward as possible. Emphasis is placed on covering avenues of low-altitude air attack.

(4) Basic concepts, doctrine, and detailed procedures for the conduct of river-crossing operations are presented in FM 31-60.

b. Concepts.

(1) Redeye and Chaparral/Vulcan units should be employed with the troops approaching the river obstacle and establishing the bridgehead. Hawk units may move up behind the line of departure, possibly deploying to within 10 to 15 kilometers of the near bank, depending on the tactical situation and other ADA support available. Redeye should accompany assault echelons and Vulcan and Chaparral should close as soon as possible to provide ADA protection of the crossing site. Vulcan may also provide ground fire support. Hawk units should be sent across as soon as a division-sized beachhead has been secured.

(2) ADA movement plans for supporting river crossings are designed to support the tactical scheme of maneuver. At the onset, movement in the forward combat area is planned, controlled, and coordinated by the assault brigade commanders. Once the crossing area is established, movement over the river is controlled through the crossing area commanders; movement within the areas of the assault brigades is controlled through the brigade commanders; and movement elsewhere in the division zone is controlled through unit commanders and the division traffic headquarters. The turnover of responsibility from the commanders of the assaulting brigades to the crossing area commanders is by mutual agreement or by direction of the division commander. Normally, corps assumes responsibility for control of movement over the river

when the division rear boundary is moved to the far bank. ADA commanders must note that the crossing area commander is vested with absolute authority for control of the traffic and crossing means within the crossing area. This favors decentralized control of divisional ADA unit movements.

c. Special Considerations. Some of the considerations in planning for ADA support of river-crossing operations are as follows:

(1) *Control and coordination.* Control difficulties will exist due to restrictions on traffic, communication, and available land area on the far shore. Decentralized control of the forward ADA units will be normal.

(2) *Mobility.* Special engineer support and Army aviation support may be needed for movement of ADA troops and equipment. Bridge sites for use by the heavier ADA equipment must be selected. Rafts may also be used to reduce congestion at the bridge-crossing sites.

(3) *Effectiveness of fires.* The effect of smoke, often used during the assault phase of a deliberate crossing, on visually-directed SHORAD weapon employment must be considered. (FM 3-50 provides information on the use of smoke.)

(4) *Counterintelligence.* Use of ADA radars to aid in demonstrations and feints, through displacement and increased activity, should be considered.

(5) *Security.* In a hasty river crossing, the near bank may not be entirely secured prior to the assault crossing. This will create security problems for the ADA units supporting the assault brigades.

13-11. Insurgent War

a. General. The possible escalation from insurgent war to limited war with concurrent rapid development of an air threat may occur with little or no warning. Air defense forces must be organized, equipped, trained, and when possible, positioned, before air attacks commence. The deployment of Army ADA units during insurgent war will depend upon the commander's estimate of the threat and the probability of threat escalation.

b. Employment Concepts. ADA may be deployed during insurgent war to protect the priority ports and air bases and to cover the air and ground lines of communication. SHORAD elements supporting units in combat must take special care in their local security arrangements

with emphasis on prevention of theft, capture, or destruction of weapons.

c. Non-Air-Defense Roles. During periods when the air threat is insignificant or nonexistent, ADA units may be employed in operations not associated with air defense. ADA AW units may be employed to provide ground fire support for maneuver elements. Other ADA units may be engaged in stability operations. Prolonged activity in non-air-defense operations could cause the loss of identification of the ADA unit as an air defense force and consequently degrade the capability of the ADA unit to react quickly to an escalating air threat. ADA commanders must insure that their units' ability to conduct effective air defense operations is maintained.

d. Special Considerations. The success of the insurgent depends upon his ability to strike, inflict casualties, cause damage, and withdraw before opposing forces can mass their fire-power to destroy him. The insurgent enhances the chance of success by choosing terrain and situations which degrade the capability of the opposing force to react quickly. To defeat the insurgent in his own environment, ADA commanders must give a high priority to the following:

(1) *Communication security.* Wire communication is normally limited to internal use because wire can be tapped or destroyed with relative ease by the insurgent. Communications sites are prime targets and should be selected with care. Since most communications sites will have limited numbers of personnel available for local defense, commanders must be prepared to commit other forces to defend these sites. The insurgent's ability to gain useful intelligence through intercepted communication must not be underestimated. Communications security measures should be employed at all levels with emphasis on the changing of operational codes at the lower tactical echelons.

(2) *Use of aircraft.* Many ADA moves will be made by air. Resupply and evacuation of wounded will be almost entirely by air. Airborne radio relays will be employed frequently. Since requirements cannot be fully met through use of ADA unit organic aircraft, nonorganic aircraft support must be obtained. This will require extensive planning, resolution of priority conflicts, and coordination in such matters as determination of aircraft radio frequencies and establishment of landing zones. Extensive use of aircraft will also complicate coordination of air defense fires and aviation activities.

(3) *Special environmental considerations.* Paragraphs 13-3 through 13-6 apply.
 (4) *Special mission considerations.* Paragraphs 13-7 through 13-10 apply.

(5) *Local security.* Paragraph 10-12 applies.
 e. *References.* FM 31-16, FM 31-23, and FM 31-78 contain details.

APPENDIX A
 REFERENCES

★A-1 Army Regulations (AR)

200-1 Unit Regulations

200-20 Organization and Training for Chemical, Biological, and Radiological (CBR) Operations

210-25 Dictionary of United States Army Terms

210-40 Authorized Abbreviations and Security Codes

710-2 Material Management for Using Units, Support Units and Installations

780-81 Maintenance Assistance and Instruction Team (MAIT) Operations

A-1 Department of the Army Pamphlets (DA PAM)

38-3 The Effects of Nuclear Weapons

A-2 Department of the Army Technical Bulletins (TB)

(C)280-5-1 Improved Electronic Security for the Hawk Air Defense Guided Missile System (U)

(C)280-5-2 Improved Electronic Security for the Improved Nike-Hercules Air Defense Guided Missile System (U)

★A-4 Department of the Army Field Manuals (FM)

1-40 Army Air Traffic Operations

3-1 Chemical, Biological, and Radiological Support

3-12 Operational Aspects of Radiological Defense

3-50 Chemical Smoke Generator Units and Smoke Operations

3-15 Field Fortifications

3-25 Camouflage

4-2 Artillery Survey

4-10-1 Field Artillery Tactics

4-4 Ammunition Service in the Theater of Operations

4-1 Explosive Ordnance Disposal Service

11-21 Tactical Signal Communications Systems, Army, Corps, and Divisions

11-23 US Army Strategic Communications Command (Pamphlet)

11-126 Field Army Signal Communications

21-40 Chemical, Biological, Radiological, and Nuclear Defense

21-41 Soldier's Handbook for Defense Against Chemical and Biological Operations and Nuclear Warfare

21-43 Chemical, Biological, and Radiological (CBR) and Nuclear Defense Training Exercises

21-40 Visual Signals

23-22 Technique of Fire of the Rifle Squad and Tactical Applications

23-17 Redeye Guided Missile System

23-62 Recoiling Machinegun Caliber .50 BM, 602

24-1 Tactical Communications Handbook

30-6 Combat Intelligence

31-11 Exercises for Amphibious Operations

APPENDIX A

REFERENCES

★A-1. Army Regulations (AR)

- 220-1 Unit Readiness.
- 220-58 Organization and Training for Chemical, Biological, and Radiological (CBR) Operations.
- 310-25 Dictionary of United States Army Terms.
- 310-50 Authorized Abbreviations and Brevity Codes.
- 710-2 Materiel Management for Using Units, Support Units and Installations.
- 750-51 Maintenance Assistance and Instruction Team (MAIT) Program.

A-2. Department of the Army Pamphlets (DA PAM)

- 39-3 The Effects of Nuclear Weapons.

A-3. Department of the Army Technical Bulletins (TB)

- (C) 380-6-1 Improved Electronic Security for the Hawk Air Defense Guided Missile System (U).
- (C) 380-6-2 Improved Electronic Security for the Improved Nike-Hercules Air Defense Guided Missile System (U).

★A-4. Department of the Army Field Manuals (FM)

- 1-60 Army Air Traffic Operations.
- 3-1 Chemical, Biological, and Radiological Support.
- 3-12 Operational Aspects of Radiological Defense.
- 3-50 Chemical Smoke Generator Units and Smoke Operations.
- 5-15 Field Fortifications.
- 5-20 Camouflage.
- 6-2 Artillery Survey.
- 6-20-1 Field Artillery Tactics.
- 9-6 Ammunition Service in the Theater of Operations.
- 9-14 Explosive Ordnance Disposal Service.
- 11-21 Tactical Signal Communications Systems, Army, Corps, and Division.
- 11-23 US Army Strategic Communications Command (Theater).
- 11-125 Field Army Signal Communications.
- 21-40 Chemical, Biological, Radiological and Nuclear Defense.
- 21-41 Soldier's Handbook for Defense Against Chemical and Biological Operations and Nuclear Warfare.
- 21-48 Chemical, Biological, and Radiological (CBR), and Nuclear Defense Training Exercises.
- 21-60 Visual Signals.
- 23-12 Technique of Fire of the Rifle Squad and Tactical Application.
- 23-17 Redeye Guided Missile System.
- 23-65 Browning Machinegun Caliber .50 HB, M2.
- 24-1 Tactical Communications Doctrine.
- 30-5 Combat Intelligence.
- 31-11 Doctrine for Amphibious Operations.

31-12	Army Forces in Amphibious Operations (The Army Landing Force).
31-16	Counter guerrilla Operations.
31-23	Stability Operations, U.S. Army Doctrine.
31-25	Desert Operations.
31-35	Jungle Operations.
31-60	River-Crossing Operations.
31-70	Basic Cold Weather Manual.
31-71	Northern Operations.
31-72	Mountain Operations.
31-73	Advisor Handbook for Stability Operations.
(C)32-5	Signal Security (SIGSEC) (U).
(S)32-10	USASA in Support of Tactical Operations (U).
(C)32-20	Electronic Warfare (U).
(S)44-1A	US Army Air Defense Artillery Employment (U).
44-1-1	US Army Air Defense Artillery Operations.
(S)44-1-1A	US Army Air Defense Artillery Operations (U) (when published)
44-2	Air Defense Artillery Employment, Automatic Weapons M42/M55.
44-3	Air Defense Artillery Employment, Chaparral/Vulcan.
(C)44-9	Air Defense Artillery Fire Distribution System AN/TSQ-51 (U).
44-10 (Test)	Army Airspace Coordination Doctrine (when published).
(C)44-13	Air Defense Artillery Fire Distribution System AN/MSG-4 (Missile Monitor) (U).
(C)44-14	Air Defense Artillery Fire Distribution System BIRDIE (U).
44-30	Visual Aircraft Recognition.
44-62	Air Defense Artillery Automatic Weapon Gunnery.
44-82	Procedures and Drills for Nike-Hercules Missile Battery.
(C)44-82A	Procedures and Drills for Nike-Hercules Missile Battery (U).
44-95	Air Defense Artillery Employment, Nike-Hercules.
44-96	Air Defense Artillery Employment, Hawk.
55-30	Army Motor Transport Operations.
57-1	US Army/US Air Force Doctrine for Airborne Operations.
57-35	Airmobile Operations.
61-24	Division Communications.
61-100	The Division.
100-5	Operations of Army Forces in the Field.
100-10	Combat Service Support.
100-15	Larger Units, Theater Army-Corps.
100-27	US Army/US Air Force Doctrine for Tactical Air-Lift Operations.
101-5	Staff Officers' Field Manual: Staff Organization and Procedure.
101-10-1	Staff Officers' Field Manual: Organizational, Technical, and Logistical Data (Unclassified Data).
101-31-1	Staff Officers' Field Manual: Nuclear Weapons Employment Doctrine and Procedures.
(S)101-31-2	Staff Officers' Field Manual: Nuclear Weapons Employment Effects Data (U).

★A-5. Department of the Army Technical Manuals (TM)

38-750	The Army Maintenance Management System (TAMMS).
9-1300-206	Care, Handling, Preservation, and Destruction of Ammunition.
(C)11-5895-292-23	Organizational and DS Maintenance Manual: Antiaircraft Defense System AN/MSG-4 (U).
(C)11-750	Radar Electronic Counter-Countermeasures for the Operator (U).
(C)11-751	Radar Electronic Counter-Countermeasures for the Technician (U).

A-6. Department of the Army Training Circulars (TC)

23-15 Engagement of Aerial Targets with Small Arms.

A-7. Joint Chiefs of Staff Publications (JCS Pub)

- 1 Dictionary of United States Military Terms for Joint Usage.
- (FOUO)2 Unified Action Armed Forces (UNAAF).
- (FOUO)8 Doctrine for Air Defense from Oversea Land Areas.
- (FOUO)9 Doctrine for the Unified Defense of the United States Against Air Attack.
- (C)10 Tactical Command and Control and Communications Systems Standards (U).
- (S)11 Tactical Communications Planning Guide (U).
- (FOUO)12 Tactical Command and Control Procedures for Joint Operations.

★A-8. Other Publications

- (C) DASA EM-1 Capabilities of Nuclear Weapons (U) (Formerly TM 23-200).
- TT 44-10-1 Army Airspace Coordination Techniques.

Military assets within the area of air defense responsibility may be categorized by type to facilitate data analysis. When a classification disparity exists within a major category, the principal variants should be listed. A sampling of categories to include possible subdivisions is as follows:

1. Air Force Air Base. This category consists of single air bases and should separate listings for strike, dispersal, air defense, and airlift bases. Dispersal base warehouses will consider this base prior to dispersal activity. This category is primarily of theater headquarters, but may include the field army in some cases.

2. Missile Units. This category covers air defense and field artillery missile units of battalion size and includes both nuclear and nonnuclear capable organizations. Special weapons storage of a nuclear expedition will be taken into account in judging its contribution to the force.

3. Command and Control Headquarters. The command and control headquarters category includes both fixed and mobile installations. The Air Force command and reporting center (CRC) and other related facilities may be included in this category, especially in theater-level facilities.

4. Special Weapons Storage Sites. This category includes single installations and includes both fixed and mobile storage areas and the active role of the storage area.

5. Depots. Depots of various sizes and single installations should be provided for general supply and medical supply installations.

6. Other Categories. This category includes general categories and different organizations not mentioned in the other categories. The list of

1. POL Facilities. This category includes POL farms, terminals, and pumps at various values which are already installed at each type.

2. Maintenance and Repair Facilities. These include battalion-size up to a self-sufficient ground equipment and aircraft repair and maintenance facilities.

3. Military Ports. The military port is a category primarily composed of the area of defense commander. The port is the main base of the main supply route. This category includes air base and other facilities which are self-sufficient and which are not mobile.

4. Army Airports. The army airport is considered to be a base or self-sufficient installation of division, corps, or theater level. General resources are the units based at the base and the POL reserves and repair facilities.

5. AFB Facilities. These include both fixed and mobile units which are self-sufficient and which are not mobile.

6. Signal Center. Coordinated within the category are the installations for electronic warfare, communications, and other related activities. These include both fixed and mobile units and are not mobile.

7. Aerial Units. This category includes various types of organizations and different types of aircraft, including transport, reconnaissance, and other types. The units should be listed by type and not by organization.

APPENDIX B

AIR DEFENSE PRIORITY COMPUTATIONS

B-1. General

This appendix provides an approach to determination of asset military values and air defense priorities. The results of this determination may be provided by the air defense officer for the force commander's consideration in final determination of the priorities for air defense.

B-2. Asset Categories

Military assets within the area of air defense responsibility may be categorized by type to facilitate analysis. When appreciable disparity exists within a major category, the principal variants should be listed. A sampling of categories to include possible subdivisions is as follows:

a. Air Force Air Bases. This category considers single air bases and shows separate listings for strike, dispersal, air defense, and airlift bases. Dispersal base evaluation will consider the base prior to dispersal orders. This category is primarily of theater-level concern, but may concern the field army in some cases.

b. Missile Units. This category covers air defense and field artillery missile units of battalion size and includes both nuclear and nonnuclear capable organizations. Special weapons stores at a nuclear capable unit will be taken into account in judging its contribution to the force.

c. Command and Control Headquarters. The command and control headquarters category includes both fixed and mobile installations. The Air Force control and reporting center (CRC) and other related facilities may be included in this category, especially in theater-level listings.

d. Special Weapons Storage Sites. This category considers single installations and includes army and corps storage areas and the mobile SASP in the division areas.

e. Depots. Depots are viewed as single installations. Separate consideration should be provided for Class V, general supply, and medical supply installations.

f. Troop Concentrations. This category encompasses maneuver and artillery organizations not considered under other categories. The battalion-

size unit could be considered in determining division priorities while theater or field army might consider reserve and committed divisions.

g. Major Tactical Bridges. This includes permanent vehicle and rail river crossings within the area under consideration. This category considers bridge complexes as single assets, with individual units of military worth for a single bridge in a complex determined on a proportional basis.

h. POL Facilities. This area includes POL farms, terminals, and pumping stations. Values relate to single installations of each type.

i. Maintenance and Repair Facilities. These include battalion-size units subdivided into ground equipment and aircraft repair and maintenance facilities.

j. Military Ports. The military port is a category normally considered by the area air defense commander. This asset is the ocean terminus of the main supply route. This complex includes supply units and fixed assets such as docks, unloading facilities, supply railways, rail yards, and access routes.

k. Army Airfields. The Army airfield is considered to be a single battalion-size installation at division, corps, or field army level. Included resources are the units based at the field, limited POL reserves, and repair facilities.

l. MSR Targets. These include main supply route single bridges, and railroad line and road net points of interdiction.

m. Signal Centers. Considered within this category are the installations for automatic data systems, area communication systems, Air Force early warning radar stations, and the command and control communications complex at each echelon.

n. Aviation Units. This category treats company-size organizations and differentiates between aerial transport facilities and aerial weapons units. The listings should consider the landing strips or helipads utilized by the organization.

o. Rail Centers. These consist of medium and large railroad marshalling yards.

B-3. Priority Computation

The military value of an asset is considered to be a function of the criticality or contribution (C) of that asset in the accomplishment of the commander's mission, as reduced by the asset's recuperability (R) after degradation by enemy action. Considerations in assessing the contribution (C) level of each asset category are force posture, conflict intensity, mission capabilities, type/redundancy, and mobility. Recuperability (R) levels are judged in accord with an estimate of the time, technical skills, and equipment required to return an asset to an effective level or to absorb the impact of its loss. The C and R factors should be obtained from the force GS. The air defense officer then introduces asset vulnerabilities (V) into the analysis, considering the asset's characteristics and enemy air attack capabilities. Vulnerability (V) is rated as an asset's resistance to damage by air attack. The effect of passive air defense measures should be taken into account. The computation $C-R+V$ is then made to develop an air defense priority (ADP) figure for each asset. The higher the ADP figure, the higher the relative air defense priority ranking of the asset under evaluation; i.e., the asset with the highest numerical ADP figure becomes air defense priority #1.

B-4. Examples

For example purposes a common scale of one to ten has been selected. A rating of *ten* is used only in the contribution column (fig. B-1) and indicates that this asset category or subdivision is absolutely essential to successful accomplishment of the force mission. The remaining scale values are divided into thirds, indicating high (7-9), medium (4-6), and low (1-3) ratings for contribution (C), recuperability (R), and vulnerability (V).

a. Example #1—Tactical Bridges.

(1) See figure B-1.

(2) In this assumed case there are a number of tactical bridges over a major river and the area road net is extensive. These bridges will be utilized in moving supplies forward to sustain a division offensive action. The contribution of this asset is judged as high degree (8).

(3) Recuperability is estimated at upper medium degree (6) due to the availability of alternate lines of communication and considering the degree of engineer support available for bridge repair.

(4) Vulnerability is assessed at lower medium degree (4). No passive defense measures are available for this type asset and enemy resources and technology are capable of attacking it. However, the nature of the asset is such that it must suffer a direct hit to be destroyed or damaged.

b. Example #2—MSR Targets.

(1) See figure B-1.

(2) This example is an extension of the scenario cited in example #1 above where road nets are extensive and open to heavy trucking. The MSR targets under consideration are between the Army rear and division rear boundaries. Contribution is assessed at upper low degree (3), because rerouting is acceptable and can be readily accomplished.

(3) Recuperability is rated as lower medium degree (4), considering available road repair capability.

(4) Vulnerability to interdiction by enemy air is judged to be upper low degree (3), due to the nature of the MSR targets.

c. Use of ADP Value. The above examples show the basic considerations and evaluation process necessary in determining air defense priorities. If in example #1 the "6" rating in the ADP column was the fourth highest ADP number on the worksheet, the air defense priority ranking for tactical bridges would be #4. The value "2" in the ADP column (example #2) would receive a priority ranking equal to its standing in relation to the highest rating in the column. For example, the value "2" might merit a priority #6.

ASSET CATEGORY	ASSET VALUE			AD PRIORITY	
	CONTRIBUTION-RECUPERABILITY-RELATIVE MIL VALUE	RELATIVE MIL VALUE	RELATIVE MIL VALUE	RELATIVE	
				+VULNERABILITY-ADP	
A. _____					
B. _____					
(1)					
(2)					
(3)					
C. _____					
D. _____					
(1)					
(2)					
E. TAC BRIDGES	8	6	2	4	6
F. _____					
G. _____					
(1)					
(2)					
(3)					
(4)					
H. _____					
I. MSR TARGETS	3	4	-1	3	2
J. _____					
(1)					
(2)					
(3)					
K. _____					
L. _____					
M. _____					
(1)					
(2)					

Figure B-1. Sample worksheet.

GLOSSARY

Standard definitions are contained in AR 310-25 and JCS Pub 1. Standard abbreviations are contained in AR 310-50.

Air defense artillery—Weapons and equipment for actively combating air targets from the ground. (The term includes both radar-directed and visually-directed weapons, but, as used in this manual, excludes all-arms air defense weapons.)

All-arms air defense weapon—An air defense weapon assigned to or employed by two or more of the combat arms; e.g., Redeye.

All-weather air defense weapon—An air defense system which can complete the entire engagement sequence (target detection to target destruction) under all weather and visibility conditions; e.g., Nike Hercules and Hawk.

Fair-weather air defense weapon—An air defense weapon system which can normally complete the entire engagement sequence (target detection to target destruction) only during day-light fair-weather visibility conditions, e.g., Redeye, Vulcan, and Chaparral.

Fire unit—In air defense, the smallest group of personnel and equipment of a particular air defense weapon system capable of detecting, identifying, intercepting, and destroying an airborne object. The requirement to identify may be met through ability to receive identification data from external agencies, through use of identification devices at the fire unit,

through ability to determine identity based on SOP rules of engagement, or through use of any combination of the foregoing. (Based on this definition, fire units are: the Redeye team; the Vulcan, Chaparral, M42, and M55 weapon squads; the SP Hawk firing platoon; the Nike Hercules firing battery; the SAM-D firing section; and the individual interceptor aircraft. The towed Hawk firing battery usually operates as one fire unit; however, it has two firing sections, each capable of operating as a fire unit. The towed Hawk battery is therefore considered as having two fire units.)

Firing doctrine—The principles and logic that enable a commander to most effectively employ an air defense weapon system against a specified range of threats. It includes, but is not limited to, such items as rules of engagement, fire coordination rules, firing technique guidance, and rules for weapon, warhead, sector, and target selection.

Radar-directed air defense weapon—An air defense weapon system which employs radar for target detection and identification; e.g., Nike Hercules and Hawk.

Visually-directed air defense weapon—An air defense weapon system which depends primarily on the operator for target detection and identification; e.g., Redeye, Vulcan, and Chaparral.

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