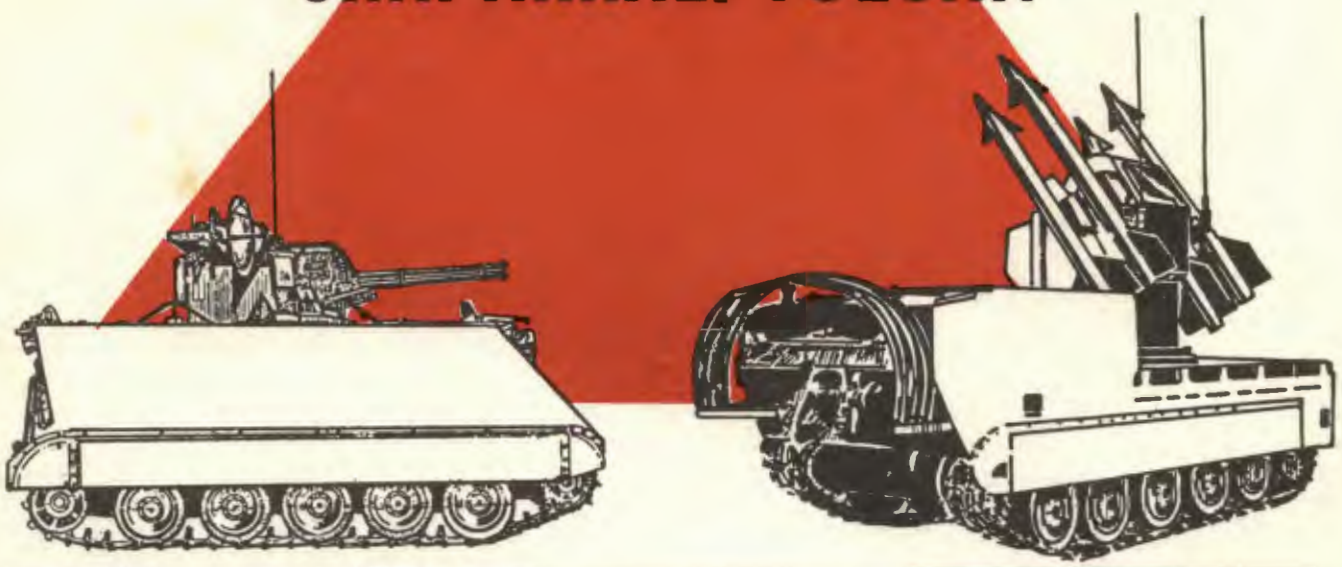
FM 44-3

DEPARTMENT OF THE ARMY FIELD MANUAL

AIR DEFENSE ARTILLERY EMPLOYMENT

CHAPARRAL/VULCAN



HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1973

PREFACE

This manual provides guidance for air defense artillery Chaparral/Vulcan (c/v) personnel from platoon to battalion level. It also provides doctrinal guidance for commanders and staffs at all echelons who may be responsible for the employment of these weapons. Doctrine presented in this manual includes organization; missions and roles; communications; command and control; fundamentals of employment; and combat operations.

By presenting detailed Chaparral/Vulcan doctrinal guidance, this manual supplements FM 44-1 and FM 44-1-1.

This manual is in consonance with the following International Standardization Agreements which are identified by type at the beginning of appropriate chapters in the manual: STANAG 2047, Emergency Warnings of Hazard or Attack; and STANAG 2112, Radiological Survey.

This manual differs from the previous manual (April 1968) in that it:

Deletes applicatory information that is adequately covered in other FMs; i.e., Logistics, 29-series field manuals; and Environmental Considerations, FM 44-1, FM 44-4, and 31-series field manuals.

Has major revisions to text and illustrations to update organization, command and control, communications, employment concepts, and the United States Strategic Army Forces (STRAF) air defense battalion organization.
Applies standard tactical mission terms to Chaparral/Vulcan operations.
Revises the SOP to include annexes on air defense and ground fire support, airspace control element, and logistics.
Adds appendixes to cover threat characteristics, tactical standing operating procedures (TACSOP), and forward area alerting radar (FAAR) employment.
Summarizes each chapter, emphasizing the main points of discussion so that a ready reference is available to the reader.
Users of this field manual are encouraged to submit recommended changes and comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to the Commanding Officer, US Army Combat Developments Command, Air Defense Agency, ATTN: CDCAD-MF, Fort Bliss, Texas 79916.

FIELD MANUAL
No. 44-3

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., *1 March 1978*

AIR DEFENSE ARTILLERY EMPLOYMENT CHAPARRAL/VULCAN

*This manual supersedes FM 44-3, 9 April 1968 including all changes.

CHAPTER 1
ORGANIZATION, MISSIONS, ROLES, AND APPLICATIONS

Section I. ORGANIZATION

1-1. Introduction

The battalion is the basic Chaparral/Vulcan tactical and administrative organization. It consists of a headquarters and headquarters battery, and assigned firing batteries.

1-2. Divisional Units

a. Air Defense Artillery Battalion, Chaparral/Vulcan (Self-Propelled (SP)). This battalion is organic to the armored, infantry, and infantry (mechanized) divisions and is part of the division base. The battalion (fig 1-1) consists of a headquarters and headquarters battery, two Chaparral batteries, and two Vulcan batteries. The Chaparral battery has a battery headquarters and three firing platoons, with four squads (*fire units) in each platoon. The Vulcan battery is organized in the same manner as the Chaparral battery. The Chaparral/Vulcan battalion (SP) has a total of 48 fire units (24 Chaparral and 24 Vulcan). The battalion headquarters and headquarters battery structure is shown on figure 1-2.

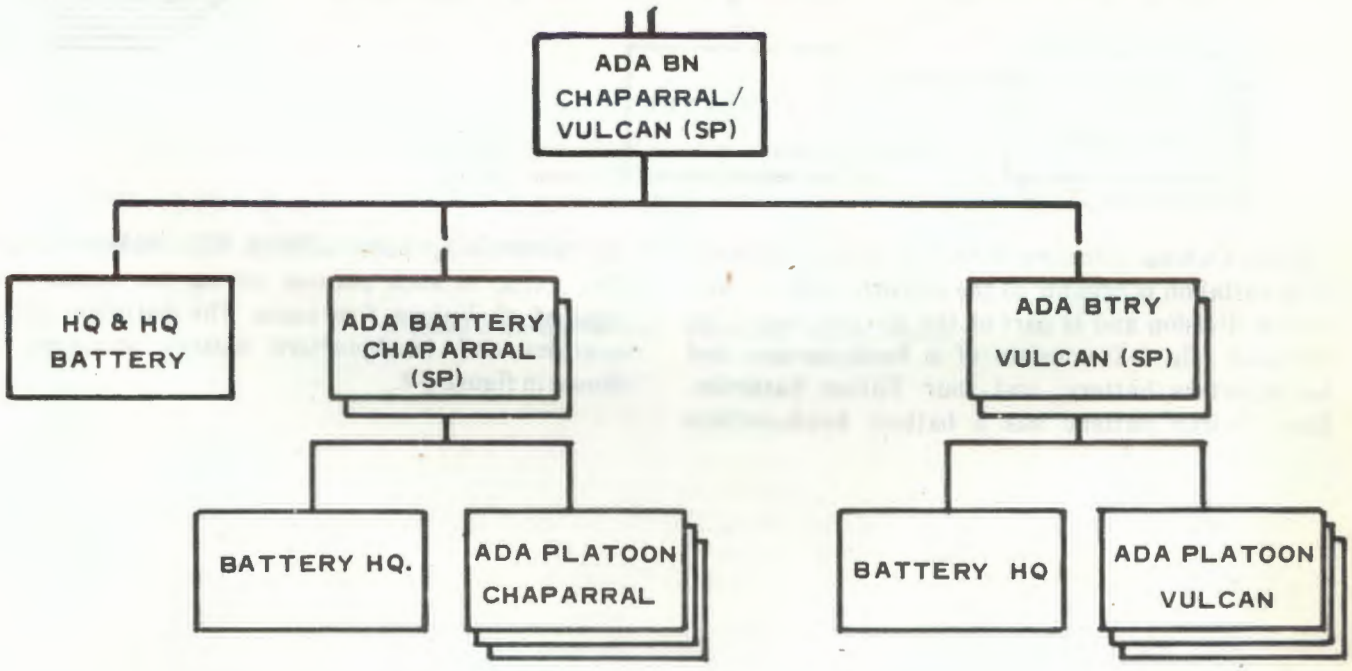


Figure 1-1. Divisional air defense artillery battalion, Chaparral/Vulcan (Self-Propelled).

*The air defense fire unit is the smallest tactical element that has the capability to accomplish the engagement functions: i.e., detection, identification, interception, and destruction. The individual Chaparral/Vulcan squads are fire units.

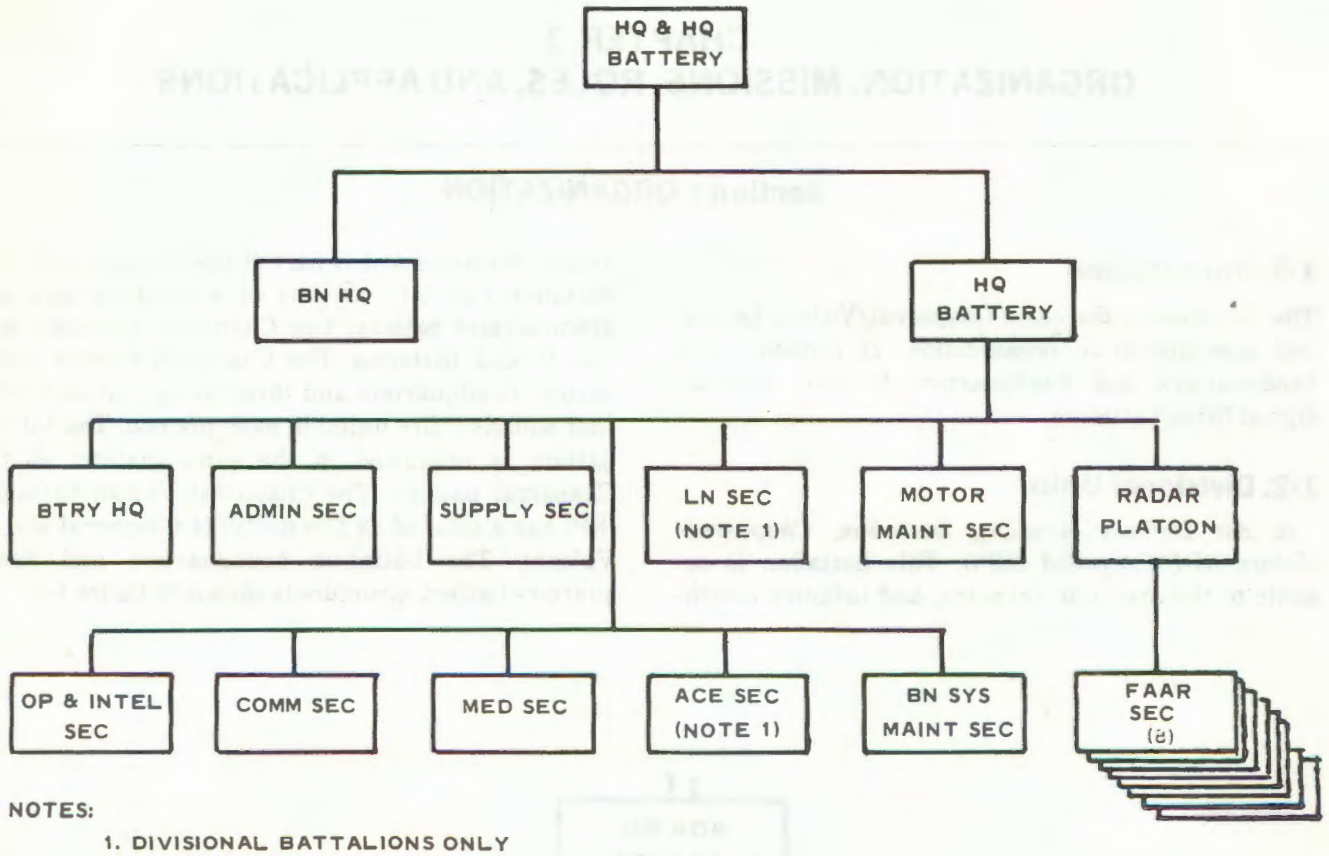
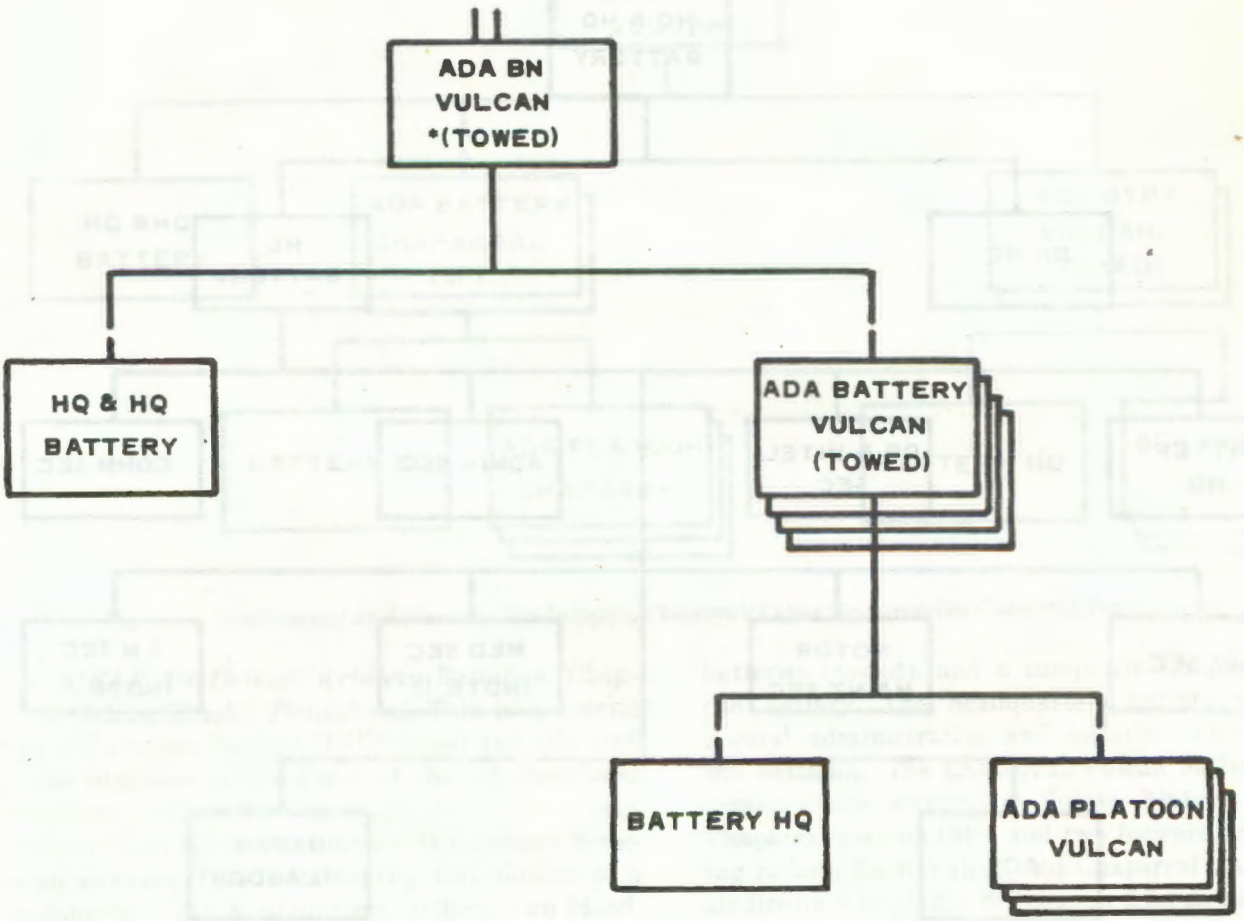


Figure 1-2. Headquarters and headquarters battery, air defense artillery battalion, Chaparral/Vulcan.

b. Air Defense Artillery Battalion, Vulcan (Towed). This battalion is organic to the airborne and the air-mobile division and is part of the division base. The battalion (fig 1-3) consists of a headquarters and headquarters battery, and four Vulcan batteries. Each Vulcan battery has a battery headquarters and three firing platoons with four Vulcan squads (fire units) in each platoon, giving the battalion a total of 48 Vulcan fire units. The battalion headquarters and headquarters battery structure is shown in figure 1-4.



* ORGANIC TO AIRBORNE AND AIRMOBILE DIVISIONS.

Figure 1-3. Air defense artillery battalion, Vulcan (Towed).

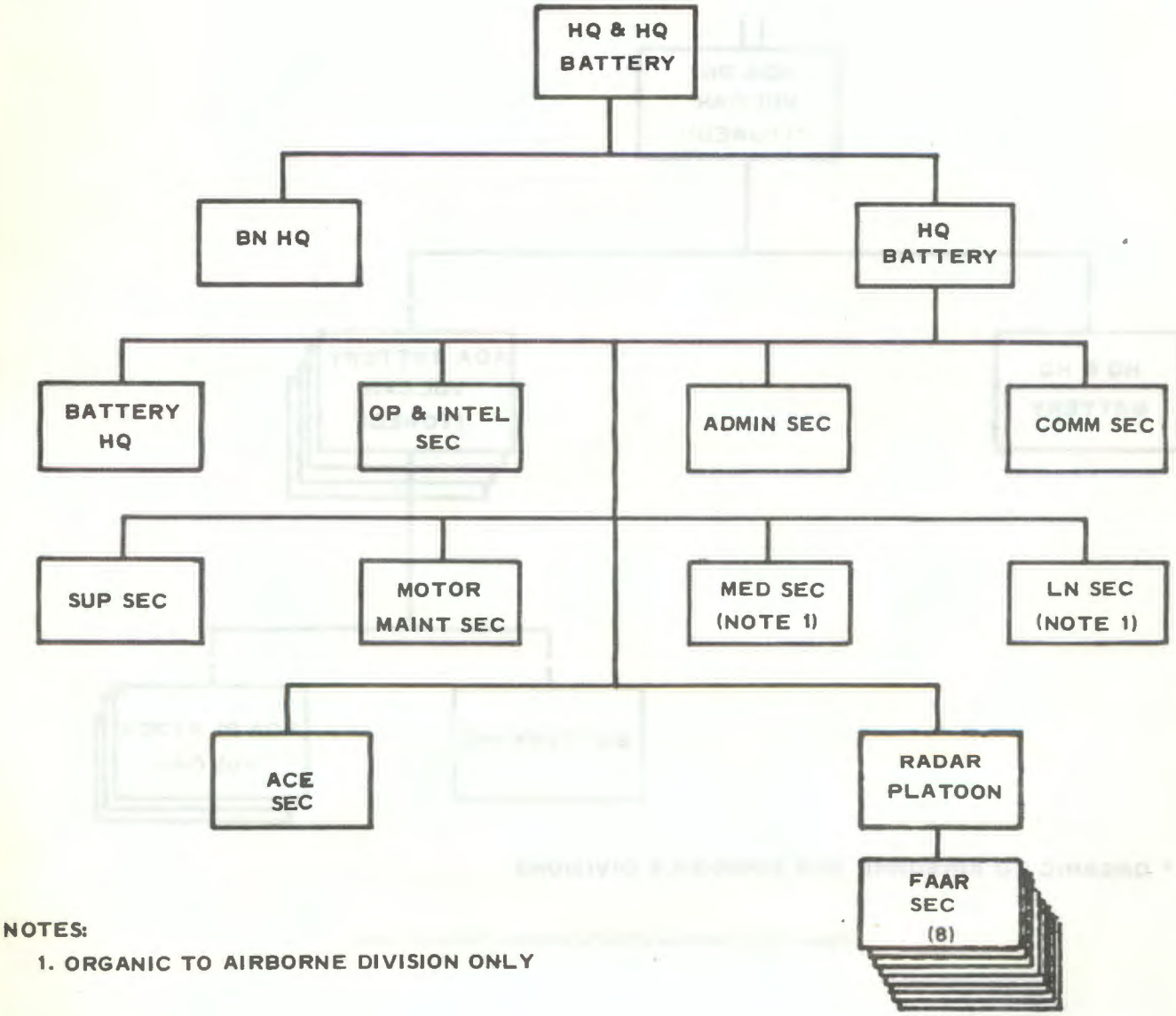


Figure 1-4. Headquarters and headquarters battery, air defense artillery battalion, Vulcan (Towed).

1-3. Nondivisional Units

a. Air Defense Artillery Battalion, Chaparral/Vulcan (Self-Propelled Chaparral, Towed Vulcan). This battalion may be allocated to air defense artillery (ADA) groups, ADA brigades, or communications zone ADA organizations. This battalion may be reconfigured in overseas theaters and allocated to major air defense commands to provide air defense for vital air bases, supply depots, and bridges in the rear areas. Reconfiguration for a specific type defense and mission is accomplished through modification of the basic table of organization and equipment (TOE). The battalion (fig 1-5) consists of a headquarters and headquarters battery, two Chaparral firing batteries (SP), and two Vulcan firing batteries (towed). This type battalion does not have an organic airspace control element or liaison section; otherwise, the organization is the same as the divisional SP battalion, (fig 1-2).

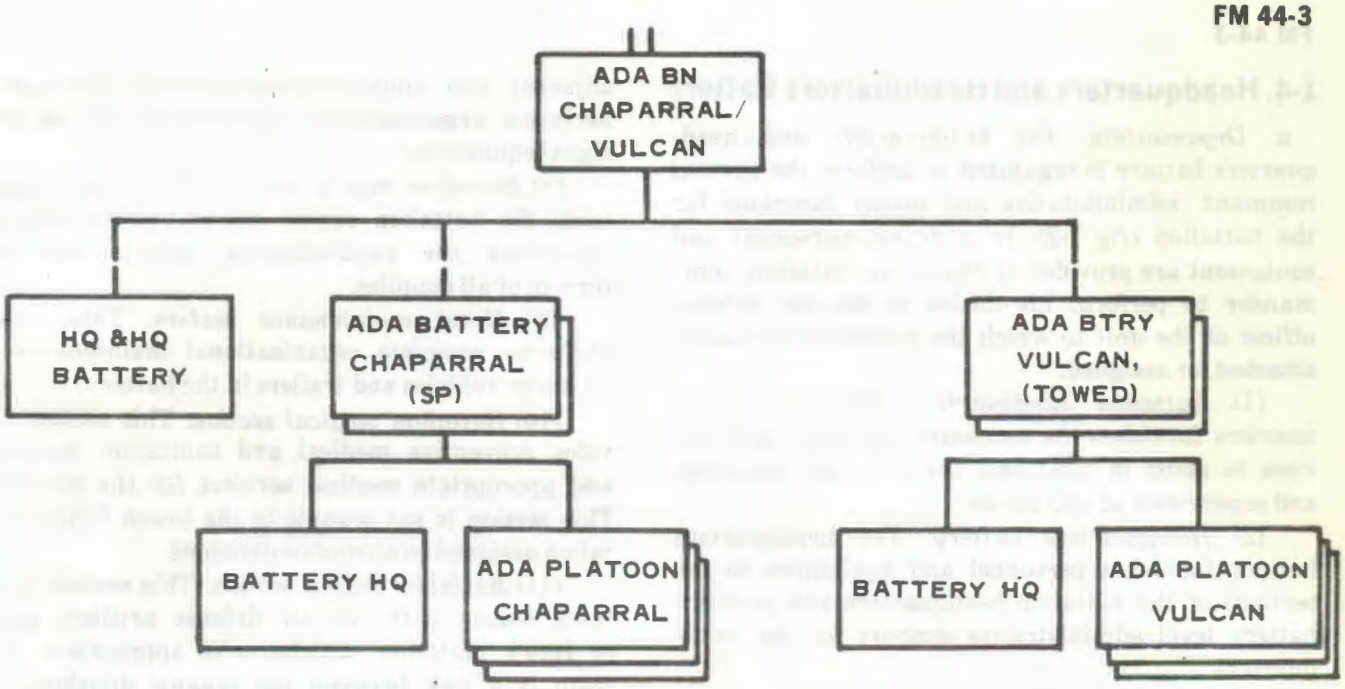


Figure 1-5. Nondivisional air defense artillery battalion, Chaparral/Vulcan (Self-propelled Chaparral, Towed Vulcan).

b. STRAF Air Defense Artillery Battalion (Chaparral/Vulcan/Hawk), Provisional. This is a special type of battalion that is CONUS-based and allocated to the Strategic Army Force of the US Readiness Command (REDCOM) for employment on a contingency basis throughout the world to defend designated airbases. This battalion (fig 1-6) consists of a headquarters and headquarters battery, two Hawk batteries (towed), and a composite Chaparral/Vulcan battery. The headquarters battery performs normal administrative and logistics functions for the battalion. The Chaparral/Vulcan battery has a headquarters section, a Vulcan platoon (SP), a Chaparral platoon (SP), and two forward area alerting radars. Each Vulcan and Chaparral platoon has six fire units (squads). See chapter 9 for details.

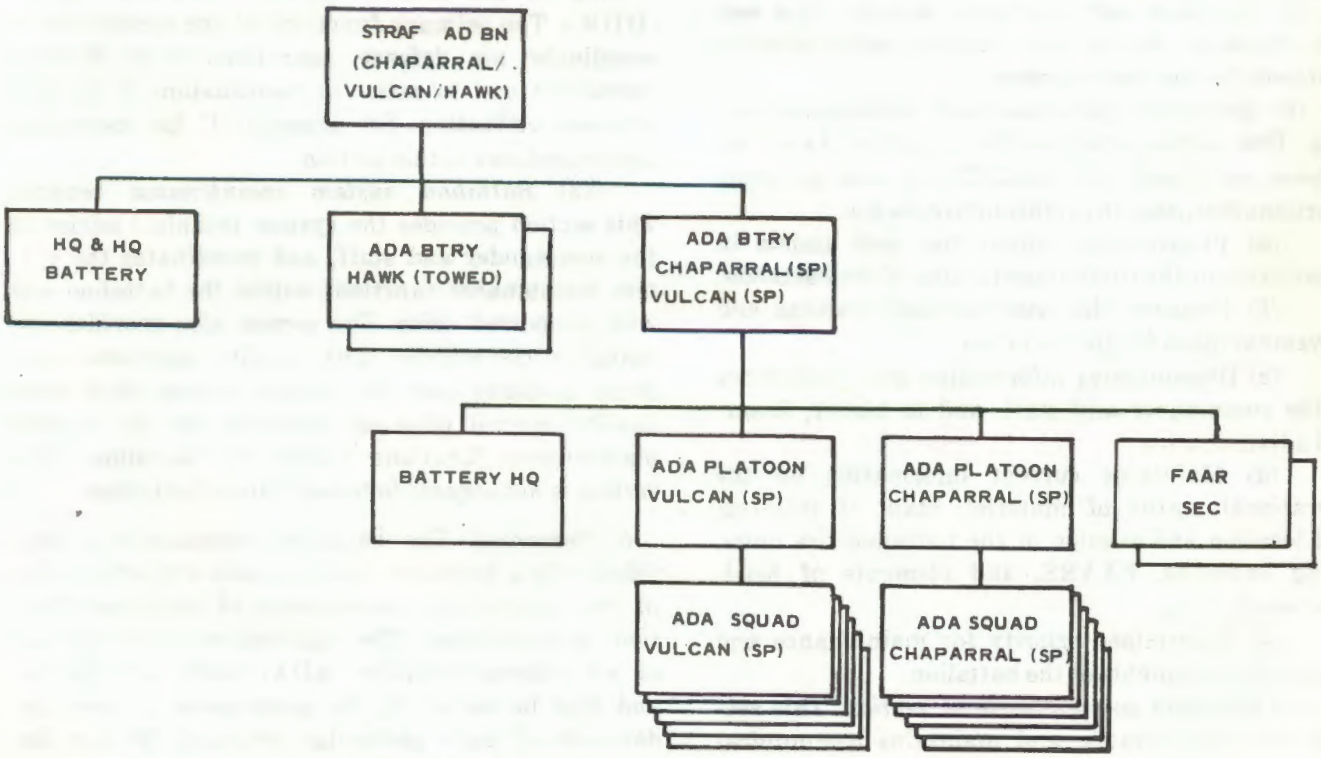


Figure 1-6. STRAF air defense battalion, (Chaparral/Vulcan/Hawk), Provisional.

1-4. Headquarters and Headquarters Battery

a. Organization. The headquarters and headquarters battery is organized to perform the normal command, administrative and supply functions for the battalion (fig 1-2). In addition, personnel and equipment are provided to enable the battalion commander to perform his duties as the air defense officer of the unit to which the battalion is organic, attached, or assigned.

(1) *Battalion headquarters.* Battalion headquarters furnishes the necessary personnel and services to assist in command, control, staff planning, and supervision of operations.

(2) *Headquarters battery.* The headquarters battery furnishes personnel and equipment to the sections of the battalion headquarters and provides battery level administrative support for the headquarters.

(3) *Battery headquarters section.* This section performs the normal battery administrative, supply, and mess functions for the headquarters and headquarters battery.

(4) *Radar platoon.* This platoon provides eight FAAR sections to the battalion. These radar sections will provide alert and tentative identification information to the Chaparral/Vulcan fire units and the Redeye teams by means of a target alert data display set (TADDS). This platoon furnishes organizational maintenance for FAAR equipment.

(5) *Battalion administrative section.* This section prepares reports and handles administrative functions for the headquarters.

(6) *Battalion operations and intelligence section.* This section operates the battalion Army air defense command post (AADCP). It also performs functions discussed in *(a)* through *(e)* below.

(a) Prepares for, plans for, and assists in supervision of the combat operations of the battalion.

(b) Prepares the organizational training and movement plans for the battalion.

(c) Disseminates information and intelligence to the commander and staff, and to higher, lower, and adjacent units.

(d) Maintains current information on the operational status of materiel, state of training, and location and mission of the battalion fire units, firing batteries, FAARS, and elements of headquarters battery.

(e) Determines priority for maintenance and supply of all elements of the battalion.

(7) *Battalion communications section.* This section installs, operates, and maintains communications equipment within the headquarters area, it also maintains communications with higher, lower, adjacent, and supported headquarters. This section performs organizational maintenance on assigned signal equipment.

(8) *Battalion supply section.* This section maintains the battalion supply accounting records and supervises the requisitioning, distribution, and turn-in of all supplies.

(9) *Motor maintenance section.* This section performs complete organizational maintenance on all motor vehicles and trailers in the battery.

(10) *Battalion medical section.* This section provides preventive medical and sanitation measures and appropriate medical services for the battalion. This section is not organic to the towed Vulcan battalion assigned to airmobile divisions.

(11) *Battalion liaison section.* This section maintains liaison with the air defense artillery group or Hawk battalion, whichever is appropriate. This team is a link between the organic divisional air defense capability and the corps or army area air defense capability for coordination of air defense plan and exchange of air defense intelligence and information. This section is not organic to nondivisional battalions or to airmobile Vulcan battalions.

(12) *Airspace control element air defense section.* This section, organic to divisional ADA battalions only, provides air defense artillery personnel to the airspace control element (ACE) operating in the division tactical operations center (DTOC). The primary functions of the section are to coordinate air defense operations with division operations and to assist in coordination of division airspace utilization. See appendix C for operations and procedures of this section.

(13) *Battalion system maintenance section.* This section provides the system technical advice to the commander and staff, and coordinates the system maintenance functions within the battalion and with supported units. The section also provides the battalion commander with quality assurance program guidance and the battery commanders with quality control program guidance for the system maintenance functions within the battalion. This section is not organic to towed Vulcan battalions.

b. Personnel. The battalion commander is provided with a battalion staff to assist and advise him in the control and coordination of battalion functions and activities. The organization and functions of air defense artillery (ADA) staffs are flexible and may be varied by the commander to meet the demands of each particular situation. Within the limitations of tables of organization; staff organization and assignment functions to staff sections are

the prerogatives of the battalion commander. Coordination is essential within the battalion staff, and with the staffs of the next higher and adjacent headquarters. FM 101-5 outlines the functions normally assigned each staff officer. Duties that are peculiar to certain air defense battalion personnel are listed in (1) through (6) below.

(1) *Battalion commander.* In addition to his normal duties as commander, the battalion commander normally will be required to act as the air defense officer (ADO) on the staff of the unit to which the ADA battalion is organic, attached, or assigned. In this capacity he coordinates air defense activities with other staff elements, and prepares air defense plans. His ADO duties pertaining to the division's Redeye capability include providing technical advice and special staff supervision of training programs. The duties of command and of an air defense staff officer are contained in FM 101-5 and FM 44-1.

(2) *Executive officer.* In addition to the duties outlined in FM 101-5, the executive officer—

(a) Coordinates and supervises displacement of the battalion.

(b) Insures the establishment and adequacy of local security and supplements any survivability measures in the battalion headquarters area.

(c) Coordinates the establishment and organization of the battalion headquarters area.

(d) Exercises overall staff supervision of operations in the battalion Army air defense command post (AADCP).

(3) *S3.* The S3 is the battalion operations and training officer. His duties are similar to those listed in FM 101-5 for ACofS, G3. The S3 has an assistant to aid him in his duties. In addition to duties outlined in FM 101-5, the S3's duties are to —

(a) Prepare and maintain a tactical SOP (see appendix C for sample TAC SOP) that includes—

1. Measures for control of the battalion.

2. Procedures for target selection and engagement in accordance with the theater rules of engagement.

(b) Plan and supervise training in aircraft visual identification procedures.

(c) Plan, design, and evaluate the air defense and radar coverage of the battalion area of responsibility.

(d) Recommend the assignment of missions of subordinate units to the battalion commander.

(e) Supervise operations in the battalion AADCP. Although the executive officer exercises overall staff supervision, the S3 is responsible for the conduct of day-to-day operations within the AADCP, to include the training of AADCP personnel.

(f) Supervises liaison activities.

(g) Maintain current information on the operational status of materiel; state of training; the location of the battalion fire units, FAARs, and elements of the headquarters and the headquarters battery.

(h) Determine priority for maintenance and supply of all elements of the battalion.

(4) *Air defense artillery liaison officer.* The liaison officer is the personal representative of the battalion commander, acting as a link between the battalion headquarters and the headquarters to which he reports. Functioning under the supervision of the S3, he makes sure that the tactics, techniques, and employment of the Chaparral/Vulcan battalion are understood by the commander of the organization to which he reports. He keeps the Chaparral/Vulcan battalion commander informed of changes in the tactical situation which will influence battalion operations. Liaison is normally provided to a Hawk battalion or air defense artillery group AADCP, whichever is appropriate.

(5) *Headquarters battery commander.* The headquarters battery commander commands the headquarters battery and acts as headquarters commandant. As headquarters commandant, he is responsible for —

(a) Support of staff requirements with battery resources.

(b) Organization of the battalion headquarters area.

(c) Local security of the headquarters area.

(d) Organization of the movement of battalion headquarters.

(e) Supervision of mess facilities.

1-5. Firing Battery

a. Organization. The firing batteries (fig 1-7) are organized to provide fire units to the Chaparral/Vulcan battalion for the air defense of combat elements, areas, or installations against low altitude hostile aircraft.

(1) *Battery headquarters section.* This section provides command and control, administrative services, mess, and supply facilities.

(2) *Battery communications section.* This section installs and operates communications equipment in the battery headquarters area. It establishes radio communications with higher and lower headquarters and with adjacent or supported units. It also establishes wire communications with lower

and adjacent or supported units through the nearest division signal center if necessary. This section performs organizational maintenance on all radio and telephone equipment in the battery and maintains the prescribed load list (PLL) for communications equipment repair parts.

(3) *Battery motor maintenance section.* This section maintains the motor vehicle records and maintenance data, the PLL of vehicular repair parts, performs complete organizational maintenance on battery vehicles, provides for recovery or disabled vehicles, and evacuation of vehicles to the direct support unit.

(4) *Battery system maintenance and ammunition section.* This section maintains the weapon systems and all the electrical power generating equipment in the battery. This section keeps current the maintenance records and the PLL for maintained equipment. The ammunition element stores and transports portions of the basic load of ammunition and provides the battery ammunition resupply facility.

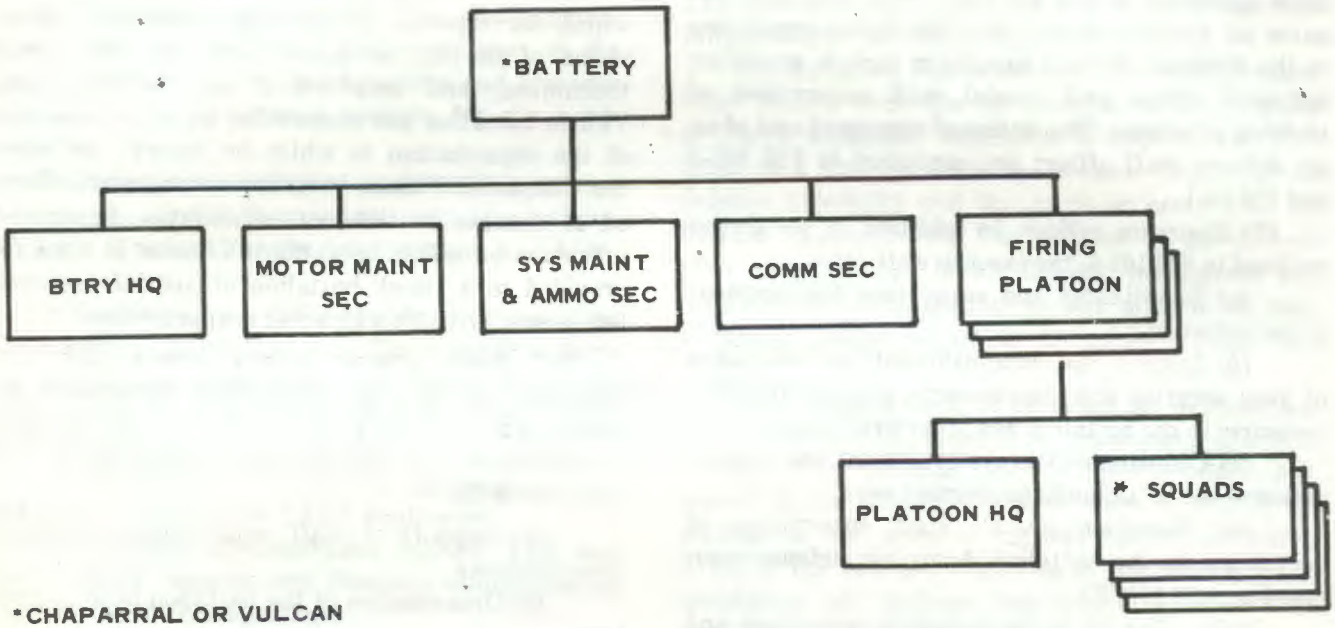


Figure 1-7. Firing battery.

(5) *Battery firing platoons.* The firing platoons provide the firing capability necessary to fulfill the battery's assigned mission.

b. Personnel.

(1) *Battery commander.* In addition to his normal responsibilities and functions, the battery commander is the air defense artillery advisor to the commander of any non-ADA unit to which his battery is attached or which it supports.

(2) *Battery executive officer.* The battery executive officer assists and advises the battery commander and insures that his policies are carried out. He is second in command of the battery and assumes command in the absence of the battery commander. At times he may perform the functions of a liaison officer—if the battery is attached to or in support of divisional maneuver elements. He is normally designated battery security officer. As such, he has direct responsibility for establishing and maintaining local security of the battery headquarters elements and for coordinating local defense where the battery headquarters is collocated with defended, supported, or organic units.

(3) *Communications chief.* The communications chief supervises the installation and operation of the communications nets that are needed to meet the tactical and administrative requirements of the battery. He supervises the organizational maintenance of all battery communications equipment.

(4) *System maintenance and ammunition section leader.* The section leader supervises the maintenance of the weapon systems and the power generating equipment in the battery. In addition, he supervises the maintaining of the battery PLL of repair parts for all equipment, the keeping of maintenance data records, and the resupply and trans-

portation of ammunition. He also coordinates with direct support units for maintenance repairs of system and test equipment beyond the capability of his personnel.

(5) *Motor sergeant.* The motor sergeant supervises the maintenance of all vehicles of the battery. The motor maintenance section has the capability to perform complete organizational maintenance.

(6) *Platoon leaders.* Platoon leaders are responsible to the battery commander for the readiness and effectiveness of their platoons. (Chaparral and Vulcan platoons have four squads each.) The platoon leader is responsible for—

(a) Training his platoon in maintenance of the weapon.

(b) Training his platoon in target selection and identification in accord with the battalion SOP.

(c) Insuring the application of such basic tactical principles as —

1. Designation of primary and secondary sectors of fire.

2. All-round, mutually-supported sectors of fire.

3. Early warning and use of TADDS.

4. Advantageous use of terrain, including maximum use of cover and concealment.

5. Engaging targets at maximum effective range and continuing the engagement until the aircraft is destroyed or out of range.

6. Smooth and rapid target transfer during a multiple target raid.

7. Training of personnel in identification criteria and communications and electronic countermeasures procedures.

8. Local security.

9. Use of measures to enhance survivability.

(d) Keeping the battery commander advised of the status of weapons and crews.

(7) *Squad leader.* The squad leader has the responsibility for the training and the combat effectiveness of his squad. He supervises target selection and identification and exercises engagement control of his fire unit. He keeps the platoon leader advised of the status of the squad equipment and crew.

Section II. MISSIONS, ROLES, AND APPLICATIONS

1-6. Mission of Air Defense Artillery

a. General. The mission of air defense units is to destroy, nullify, or reduce the effectiveness of an enemy air or missile attack.

b. Chaparral/Vulcan Battalion. The primary mission of the Chaparral/Vulcan battalion is to provide short-range air defense against low-altitude hostile aircraft.

c. Standard Tactical Missions. Standard tactical missions for air defense artillery units are prescribed in FM 44-1. The following are the standard tactical missions: *general support (GS), general support reinforcing (GSR), reinforcing,* or *direct support (DS).* These missions may be modified to carry out the intent of the commander.

(1) General support is the normal tactical mission of the divisional Chaparral/Vulcan battalion. Given the GS mission, the battalion provides air defense of the division as a whole. The batteries remain under the command of the ADA battalion commander. The division operation order may assign a GS tactical mission to the Chaparral/Vulcan battalion, and also assign a mission of direct support of a maneuver brigade, or other tactical mission, to one of the batteries of the battalion. The battalion establishes liaison and communications with a Hawk battalion or ADA group AADCP. Deployments near boundaries are coordinated with adjacent ADA units to insure adequate air defense coverage.

(2) A general support-reinforcing mission may be given to a Chaparral or Vulcan battery. For this mission the battery may furnish air defense for the division as a whole and, in addition, reinforce the air defense of a battery that has a direct support mission. A battery with a GSR mission remains under the command of the ADA battalion commander. This tactical mission is normally accomplished by designation of engagement priorities. The GSR battery establishes liaison and communications with the reinforced battery.

(3) A reinforcing mission may be given to a battery. With this type mission the battery may augment the air defense of another battery. The reinforcing battery remains under the command of the ADA battalion commander, but its deployment and operations are planned and controlled by the reinforced battery to best accomplish its mission. The reinforcing battery establishes liaison and communications with the reinforced battery.

(4) A DS mission may be given to a battery. In this type mission the battery provides close and continuous air defense for a designated supported force element and coordinates its deployment with the element. The DS battery commander deploys his unit as necessary to provide air defense of the

supported element. To facilitate teamwork, a battery once given a DS mission normally supports the same force element in later operations in which a DS mission is appropriate. The battery remains under the command of the ADA battalion commander. The DS unit commander acts as the ADO for the supported unit and establishes liaison and communications with that unit. The DS unit also furnishes personnel for airspace control in the absence of an established airspace control element.

1-7. Roles in Air Defense

Air defense weapons are classified according to the major roles played in providing air defense coverage. The role distinctions are based on weapon capabilities of altitude and range, and currently include those discussed below.

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 weapons 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 short-range air defense (SHORAD). This role is currently filled by the towed and self-propelled Hawk weapon systems.

c. SHORAD. 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. These weapons are deployed in large numbers and employed under decentralized control concepts. This role is currently filled by Chaparral/Vulcan, M42, M55, and Redeye. SHORAD may be subdivided into the low-altitude forward air defense (LOFAAD) role, using the Chaparral/Vulcan, M42, and M55 units, and the man-portable air defense (MANPAD) role currently filled by Redeye units deployed on an all-arms basis for self-defense.

1-8. Chaparral/Vulcan Application

a. General. The Chaparral and Vulcan weapon systems were designed for separate and specific applications in defense against the low-altitude air threat. Vulcan fire unit capabilities are best realized when they are employed in defense of point targets, moving targets, or small vital areas. Chaparral units are most effective when deployed in an area defense pattern in order to provide sufficient air defense to the maximum number of divisional elements and other elements in vulnerable areas to the rear. Vulcan should not be employed to defend the Chaparral or to cover its dead zone. Such employment would seriously limit the deployment of Vulcan to protect other targets and would decrease the system's overall air defense effectiveness.

b. Vulcan.

(1) Vulcan fire units are employed to provide local air defense of units and installations throughout the combat zone, and may also be employed in the communications zone. Vulcan units are capable of providing air defense for fixed and mobile units, and installations against low-flying hostile aircraft when these aircraft can be engaged by these visually directed weapons.

(2) Vulcan units may be employed in conjunction with Nike Hercules and Hawk units to offset the low-altitude radar masking limitations of these units and high-altitude range limitations of the Vulcan units. This employment principle denies a best attack option to the enemy.

(3) Vulcan units may be employed to provide low-altitude air defense of march columns. The fire units can travel within the march column or be stationed along the route of march.

(4) When there is a very low risk of a low-altitude air attack, the force commander may choose to use the fire power and mobility of the Vulcan fire units in an indirect or direct-fire ground support role. (For detailed explanation of indirect fire methods, see FM 44-62.)

c. Chaparral.

(1) Chaparral fire units primarily are employed to provide air defense for ground combat and combat support units and installations. The weapons are deployed forward and along likely low-altitude avenues of approach when such avenues are clearly defined. If there are no definite low-level avenues of approach, Chaparral fire units may be distributed throughout the defended area, particularly toward the front and to cover the folds of the earth where Hawk units cannot detect and engage aircraft because of radar masking.

(2) Chaparral fire units may also be employed in conjunction with Vulcan fire units in an integrated defense of large vital areas (VA), such as supply depots, airfields, and staging areas in the field army service area and communications zone. This is the normal employment of nondivisional battalions.

(3) Chaparral fire units may be used to provide low-altitude air defense for march columns. However, Chaparral does not have the capability to engage ground targets and unlike Vulcan, cannot fire while moving. Chaparral can best be employed in defense of march columns by prepositioning fire units along the route of march or moving them in echelon to preselected positions along the route.

SUMMARY

The ADA battalion, Chaparral/Vulcan (SP), is organic to the armored, infantry, and infantry (mechanized) divisions and is part of the division base. The battalion consists of a headquarters and headquarters battery, two Chaparral, and two Vulcan batteries.

The ADA battalion, Vulcan (Towed), is organic to airborne and airmobile divisions and is part of the division base. The battalion consists of a headquarters and headquarters battery and four Vulcan batteries.

The ADA battalion, Chaparral/Vulcan (SP Chaparral, towed Vulcan), may be allocated to ADA brigades, groups, or COMMZ ADA organizations. It may be reconfigured in oversea areas for a specific type of defense or mission. The battalion consists of a headquarters and headquarters battery, two Chaparral, and two Vulcan batteries.

The STRAF ADA battalion, (Chaparral/Vulcan/Hawk), provisional, is a special organization allocated to the Strategic Army Force of the US Readiness Command for defense of designated air bases. The battalion consists of a headquarters and headquarters battery, two Hawk batteries (towed), and one composite Chaparral/Vulcan battery.

The primary mission of the Chaparral/Vulcan battalion is to provide short-range air defense against low-altitude hostile aircraft.

Chaparral/Vulcan organizations from fire unit to battalion level may be assigned one of four standard tactical missions –general support, general support-reinforcing, reinforcing, or direct support.

In general support, the divisional Chaparral/Vulcan battalion provides air defense of the division as a whole.

In general support-reinforcing, the general support battery reinforces the air defense of a battery that has a direct support mission, accomplishing this by designation of engagement priorities.

In reinforcing, a battery augments the air defense of another battery. The reinforcing battery's deployment and operations are planned and controlled by the reinforced battery.

In direct support, a battery provides close and continuous air defense for a designated supported force/element with which it coordinates its deployment.

The Chaparral and Vulcan weapon systems were designed for separate and specific applications in defense against the low-altitude air threat.

Vulcan fire unit capabilities are best realized when they are employed in defense of point targets, moving targets, or small vital areas.

Chaparral units are most effective when deployed in an area defense pattern to provide sufficient air defense for ground combat and combat support units and installations.

CHAPTER 2
CHARACTERISTICS AND CAPABILITIES

Section I. GENERAL

2-1. Introduction

The general characteristics and capabilities of the Chaparral and Vulcan weapons systems are discussed in this chapter. Specific data are contained in TM 9-235-300-10, TM 9-1440-585-12 and (S) FM 44-1A.

2-2. Major Items of Equipment

The major items of firing and alerting equipment organic to the Chaparral/Vulcan battalion are the Chaparral missile system, Vulcan 20mm automatic weapon system, forward area alerting radar, and the target alert data display set.

Section II. VULCAN

2-3. General

a. Capabilities. The Vulcan fire units are capable of providing low-altitude air defense against subsonic aircraft or may be employed in the ground fire support role against personnel and lightly armored vehicles. Effective Vulcan fire depends upon visual detection, identification, and tracking by the crew; therefore, weapon effectiveness is dependent on visibility conditions.

b. Description. The Vulcan is an automatic weapon system consisting of a turret-mounted, six-barrel, 20mm cannon; an ammunition storage and feed system, a gyro-stabilized lead-computing sight, and a range-only radar. The Vulcan is fielded in two configurations, a self-propelled system that uses a full-tracked armored vehicle as the carrier, and a towed system with the weapon trailer-mounted and towed by a prime mover.

2-4. SP Vulcan Description and Characteristics

a. Mobility. The SP Vulcan system (fig 2-1) is capable of high-speed travel on improved roads, cross-country travel over rough terrain, and amphibious crossing of water barriers. It utilizes the M741, full-tracked weapon carrier. The mobility characteristics are—

(1) Cruising range approximately 480 km (300 miles)

(2) Maximum speed:

Highway	64 kph (40 mph)
Cross-country	24 kph (15 mph)
Swimming	5.8 kph (3.6 mph)

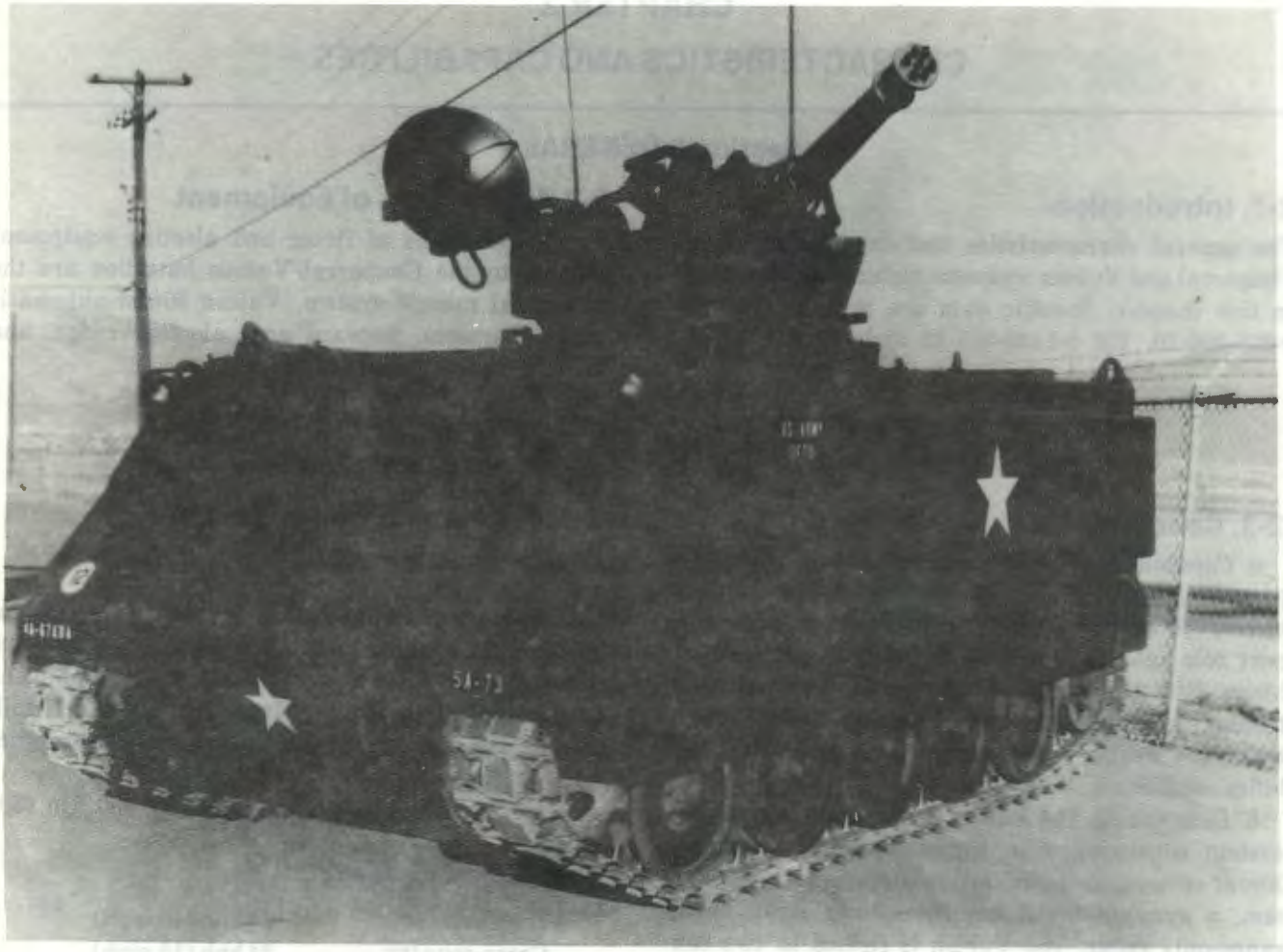


Figure 2-1. Self-propelled Vulcan.

b. Ammunition. The four types of 20mm ammunition available for the Vulcan gun are described in (1) through (4) below. All live ammunition is electrically primed. The basic load of ammunition is 6,000 rounds per weapon, of which 1,800 rounds are carried on the weapon carrier. The remainder of the basic load is carried on battery ammunition vehicles.

(1) *Cartridge, high-explosive incendiary tracer, self-destroying (HEIT-SD) M246.* This ammunition is equipped with a superquick, point-detonating fuze designed to function on contact with the target. Shortly after the projectile is fired, a tracer element is ignited and burns visibly over the remainder of the visible portion of the trajectory. The trace produced is visible during most daylight conditions. If the projectile does not impact on target, it will self-destruct at tracer burnout.

(2) *Target practice—tracer (TP-T), M220.* This ammunition is used in training and has a tracer element similar to that used in the M246 round.

(3) *Cartridge, HEI, M56A3.* This point detonating ammunition is for use against ground targets, including light-skinned vehicles, functioning with both explosive and incendiary effect.

(4) *Cartridge, dummy, M51A1B1.* This ammunition is completely inert and is used for filling the conveyor system during shipment or storage and for nonfiring system checkout.

c. Ammunition Linkless Feed System. The SP Vulcan weapon system uses a linkless feed system (fig. 2-2). This system consists of a drum and a conveyor system. Approximately 1,000 rounds of ready-to-fire ammunition can be loaded in the drum, and the remaining 800 rounds of on-vehicle ammunition are stored in the carrier. Reload of a partially empty drum can be accomplished any time there is a lull in the firing of the weapon. Eight hundred rounds can be loaded in the drum in about 7 minutes. (The estimated time for loading the drum is 3 minutes plus an additional 1/2 minute for each 100 rounds loaded.)

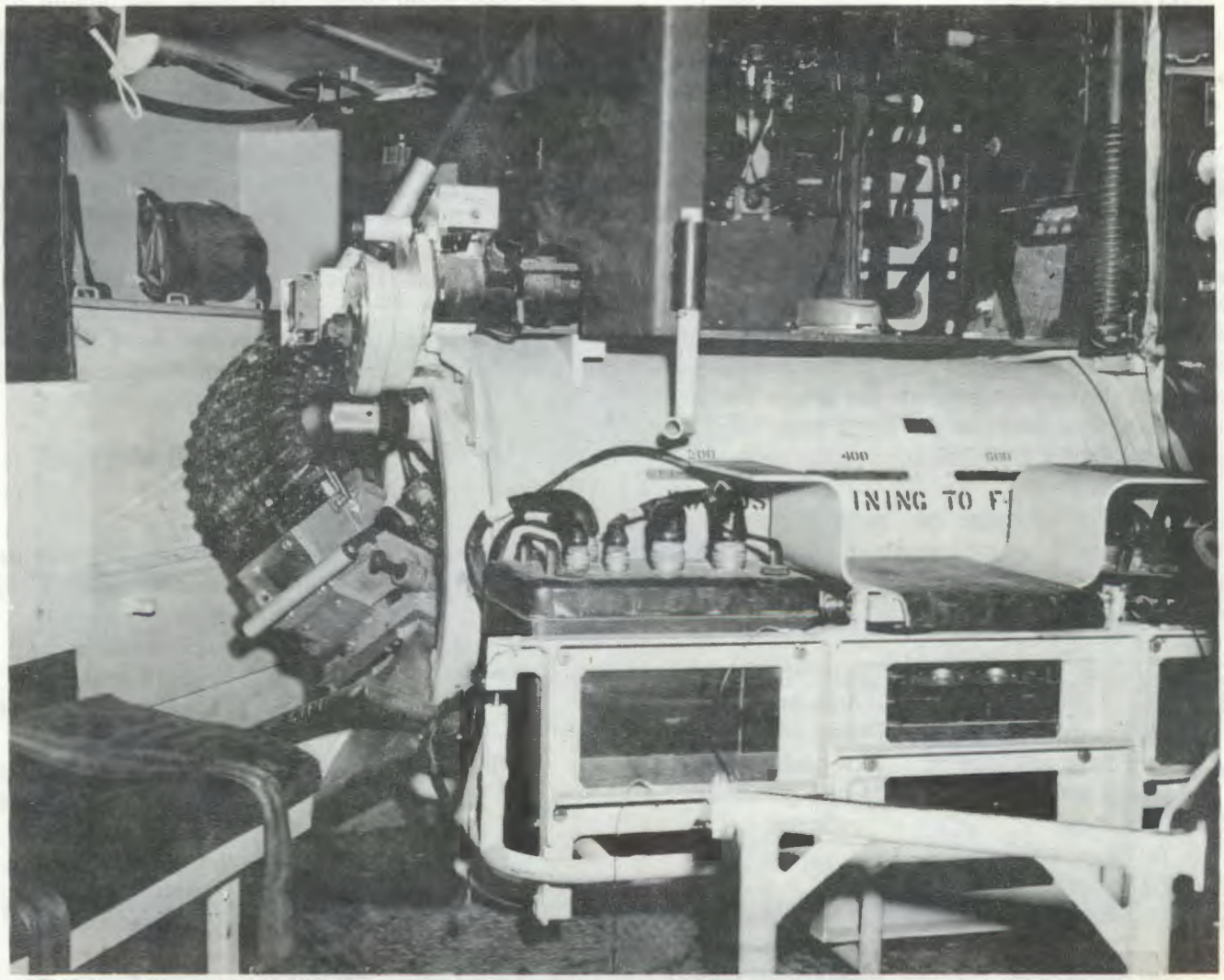


Figure 2-2. SP Vulcan linkless feed system.

d. Weapon Characteristics. By means of the FIRING RATE switch, the gunner may select either a low rate of fire (1,000 rounds per minute) with no burst limit or a high rate of fire (3,000 rounds per minute) with burst limits of 10, 30, 60, or 100 rounds. When the gunner selects the low rate of fire, the weapon will continue to fire until the trigger is released, or the ammunition is expended. The high rate of fire is used for both air and ground targets so that the number of rounds to be expended can be controlled. For air targets, the gunner normally selects the 60 round burst. For ground targets, the gunner usually selects 10- or 30-round bursts; however, if sustained fire is desired, he may select the low rate. The weapon characteristics are—

(1) Number of barrels	6
(2) How operated	Electrically driven
(3) Modes of operation	Radar Manual External Ground
(4) Rates of fire:	
High (3,000 rounds/minute)	10, 30, 60, or 100 rounds per burst
Low (1,000 rounds/minute)	sustained (no burst limit)
(5) Maximum effective range	(see FM 44-1A)

(6) Traverse limits ..... unlimited (360°)
(7) Elevation limits ..... +80° to -5°
(8) Barrel life ..... Estimated 12,000 rounds per barrel

e. Fire Control System. The Vulcan fire control system consists of a range-only radar (ROR), a gyro lead-computing sight, a sight current generator, and associated controls. The gunner tracks the target in the sight. The ROR determines the target range and range rate. The sight current generator computes the intercept solution, using inputs from the sight and the ROR. The sight current generator automatically inserts magnet and torque current necessary for the sight to generate the proper lead angle and, when all conditions for firing have been met, lights the READY TO FIRE lamp on the sight.

(1) *ROR.* The range-only radar is used to provide range and range rate to the system. (It is not an acquisition or tracking radar.) The radar characteristics are—

(a) Type ..... Coherent pulse doppler
(b) Frequency ..... I-band
(c) Power ..... 1 kw peak power
(d) Antenna ..... 24-inch parabolic reflector
(e) Beam width ..... 4°
(f) Range:
Acquire target ..... 250-5,000 meters
Track tartet ..... 200-5,000 meters
(g) Range rate ..... 10-320 meters per second

(2) *Computer and sights.* The automatic lead-computing sight accepts magnet and torque current from the sight current generator and generates the proper lead and superelevation angles.

f. Modes of Operation. The Vulcan can operate in one of four modes.

(1) *Radar.* The radar tracks the target in range and computes the range rate.

(2) *Manual.* The radar is not radiating. The gunner inserts the *estimated* target range and speed, then fires when ready. (The radar positioning circuitry must be operational as this circuitry is used in computing the lead angle.)

(3) *External.* The squad leader inserts the estimated target range from a remote location (the maximum displacement capability is 50 feet); a standard average target speed is automatically inserted; and the gunner tracks and fires when the READY-TO-FIRE lamp is lit by the squad leader.

(4) *Ground.* Initially, the gunner estimates the range and aims the weapon using the maximum or minimum range points on the reticle of the XM61 sight. He makes subsequent corrections after observing the impact of the rounds.

2-5. Towed Vulcan Description and Characteristics

a. Mobility. The towed Vulcan (fig 2-3) has essentially the same mobility characteristics as the towing vehicle. The mobility characteristics are—

(1) Maximum speed ..... capable of meeting specifications of towing vehicle up to 72 kph (45 mph)
(2) Type towing vehicle .... M561, 1¼-ton vehicle (M35, 2½-ton truck may be used as interim vehicle)
(3) Air transportable ..... by helicopter or cargo aircraft

b. Ammunition. All Vulcan weapons fire the types of ammunition described in paragraph 2-4*b*. The basic load for the towed Vulcan is 4,000 rounds; 300 rounds are carried on the towed mount; the remaining 3,700 rounds are carried on the towing vehicle and on battery ammunition vehicles in boxes of 100 rounds each.

c. Feed System. The towed Vulcan uses a linked feed system. Reload time per 100 rounds of linked ammunition is approximately 1 minute.

Note. The weapon characteristics, fire control system, and modes of operation are the same as SP Vulcan.

Figure 2-3. Towed Vulcan.

Section III. CHAPARRAL

2-6. General

The Chaparral weapon system is a highly mobile missile system designed to counter the high-speed, low-altitude enemy air threat to forward elements and vital areas of the field army. Effective Chaparral fire depends upon visual detection, identification, and tracking by the crew; therefore, weapon effectiveness is dependent upon visibility conditions. The Chaparral system is composed of three major elements, the launching station, tracked carrier vehicle, and Chaparral missiles.

2-7. Mobility

The Chaparral launching station is mounted on the M730 guided missile equipment carrier (fig 2-4). The mobility characteristics are—

a. Cruising range
(approximately) ..... 480 km (300 miles)

b. Maximum speed
Highway ..... 65 kmph (38 mph)
Cross-country ..... 16 kmph (10 mph)

c. Fording depth
without swim kit ..... 1.01m (40 in)
with swim kit ..... swimmable

Figure 2-4. Self-propelled Chaparral.

2-8. Basic Load

The basic load for Chaparral is 16 missiles per fire unit. Each fire unit has the capability of carrying 12 Chaparral missiles on board the weapon system. Four missiles are carried on the launch rails and eight missiles are carried in the storage compartments of the launching station.

2-9. Chaparral Missile

The Chaparral Missile (fig. 2-5) is a supersonic surface-to-air missile that uses passive infrared target tracking and employs proportional navigation guidance. The missile consists of a guidance section, target detecting device, safety and arming device, warhead, rocket motor, wing assemblies, and control fin assemblies. The missile weighs 187 pounts, is 2.9 meters (9.5 feet) long, and is 12.7 centimeters (5 inches) in diameter. (See (S) FM 44-1A and FM 44-4 for details.)

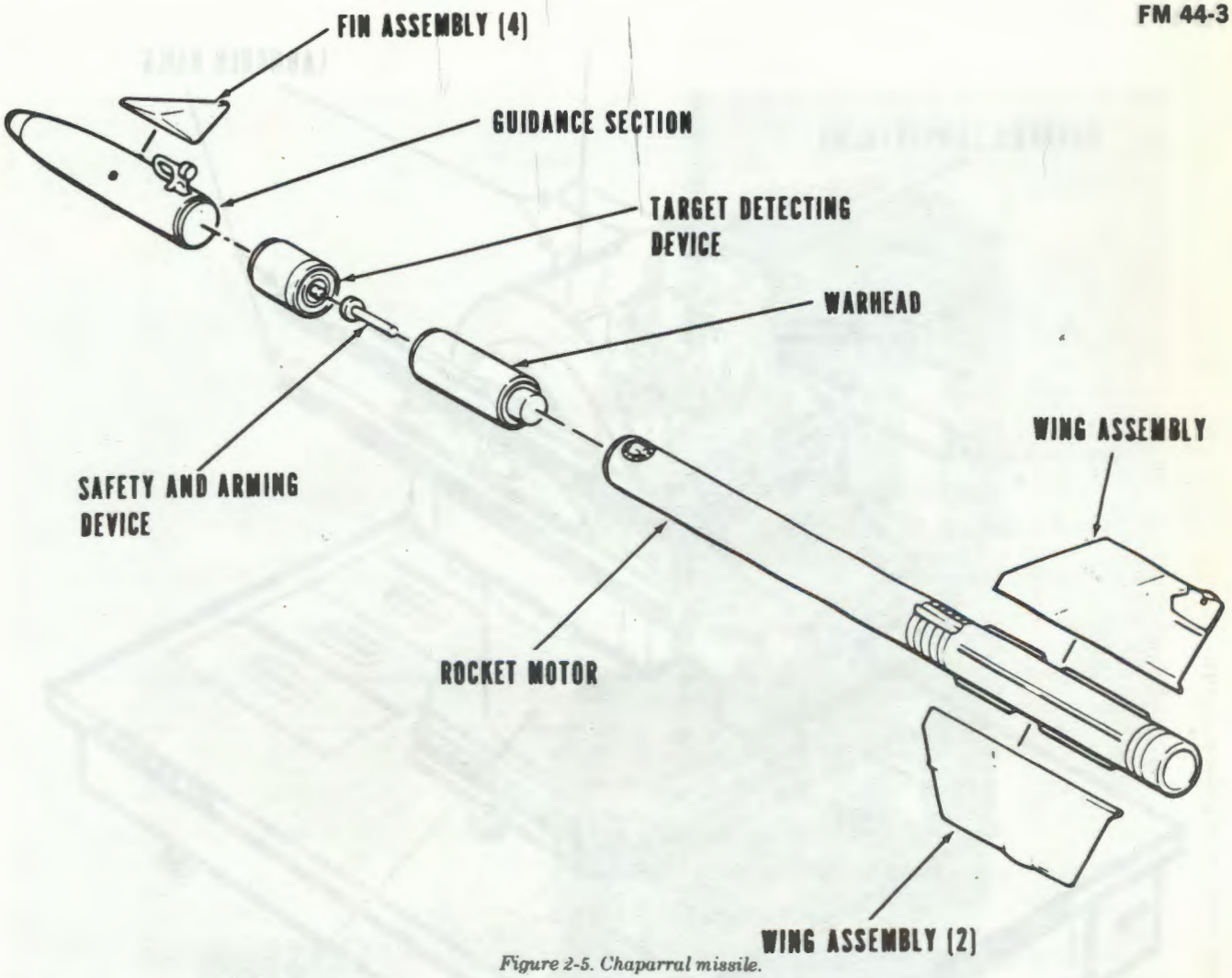


Figure 2-5. Chaparral missile.

2-10. Chaparral Launching Station

a. The Chaparral launching station (fig 2-6) is an independent weapon system capable of launching Chaparral missiles when the station is mated to, or separated from, the carrier. It consists of two major components, a base structure and a mount.

b. The base structure provides a support for the mount. It is normally attached to the vehicle by four bolts, but may be mounted on a ground emplacement kit for firing. Its principal components are—

(1) Main power unit with associated batteries and fuel tanks to supply electrical power to the entire weapon system.

(2) Air compressor and filter to cool the missile seeker.

(3) Mount erection—retraction subsystem for raising the mount to firing position or lowering the mount to traveling position or for loading missiles.

(4) Master control panel.

(5) Communications equipment.

(6) Missile storage compartments, housing four missiles in each of the two compartments.

c. The mount traverses in azimuth and the launcher rails elevate for target acquisition, tracking, and missile firing. A gunner's compartment with a plexiglass canopy is located between the two pairs of missile launcher rails. The gunner's controls enable him to aim azimuth and elevation, acquire a target, and select and fire a missile. The principal components of the mount are—

(1) The gunner's compartment which is equipped with a reflex optical sight, gunner's control panels, control handles, and communications equipment. It provides protection for the gunner from missile blast, toxic gases, noise, and temperature extremes.

(2) A hydraulic power system which drives the mount in azimuth and the launcher rails in elevation.

(3) An air conditioner, heater, and filter unit that supplies cool clean air to the gunner's compartment, and provides a slight overpressure within the compartment to keep out toxic gases generated by missile launch.

(4) Four launcher rails.

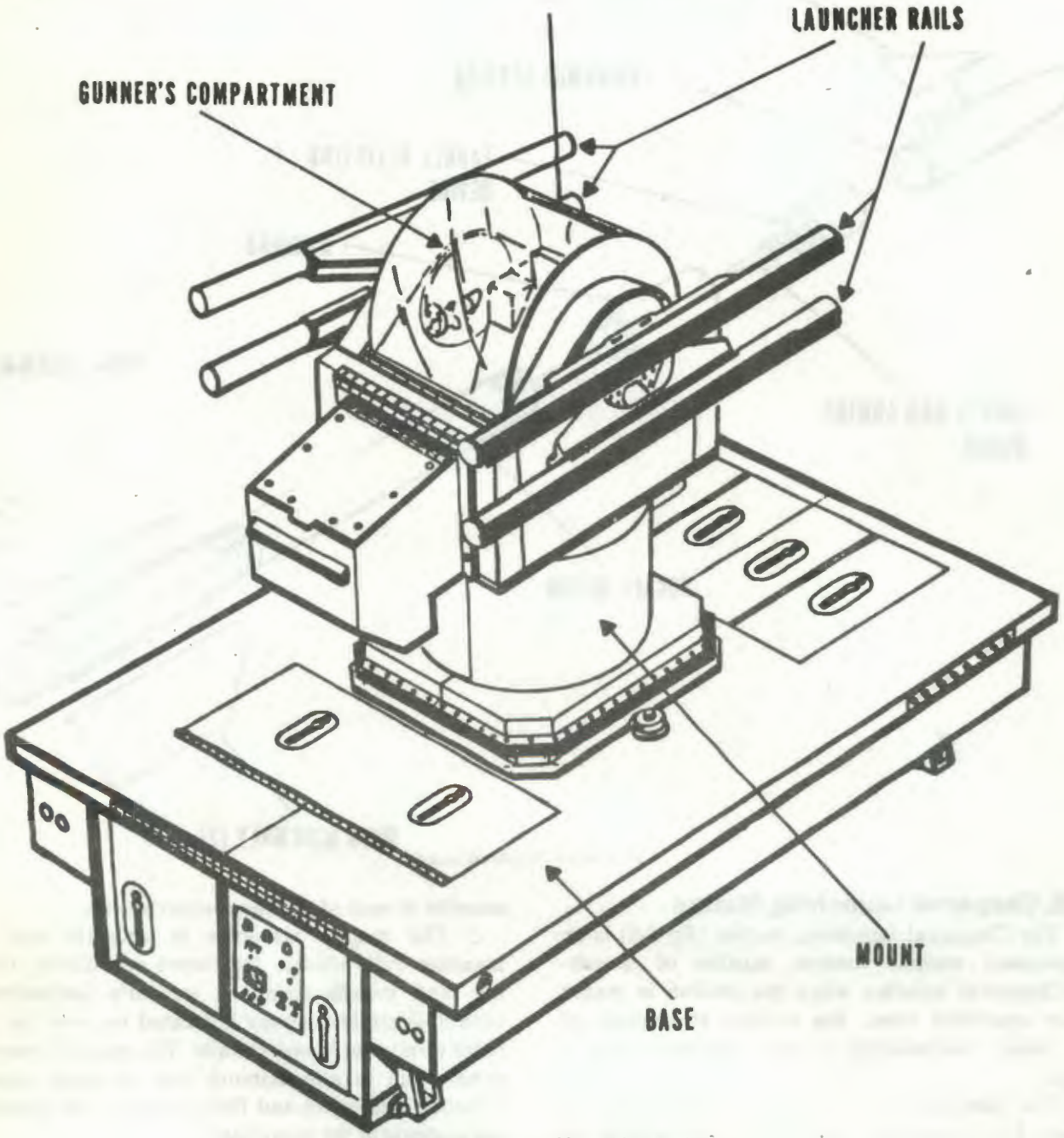


Figure 2-6. Chaparral launching station.

Section IV. FORWARD AREA ALERTING RADAR AND TARGET ALERT DATA DISPLAY SET

2-11. FAAR Description and Characteristics

a. Mobility. The FAAR (fig 2-7) is a mobile, lightweight radar system. The complete system, including the radar antenna and the power source, can be mounted on a M561, 1¼-ton truck with a ¾-ton trailer.

b. Characteristics. The radar is designed to operate in the "D" band of frequency, will provide target detection at very low altitudes, perform well in clutter areas and provide tentative target identification through the use of identification, friend or foe (IFF) radar. The radar system weighs approximately 3,000 pounds and is housed in an S-250 shelter. The antenna is mounted on a telescoping mast for operation; it is disassembled and stowed on the M561 for extended cross-country movement. For short moves, the mast is lowered and the FAAR moves with the antenna in this position.

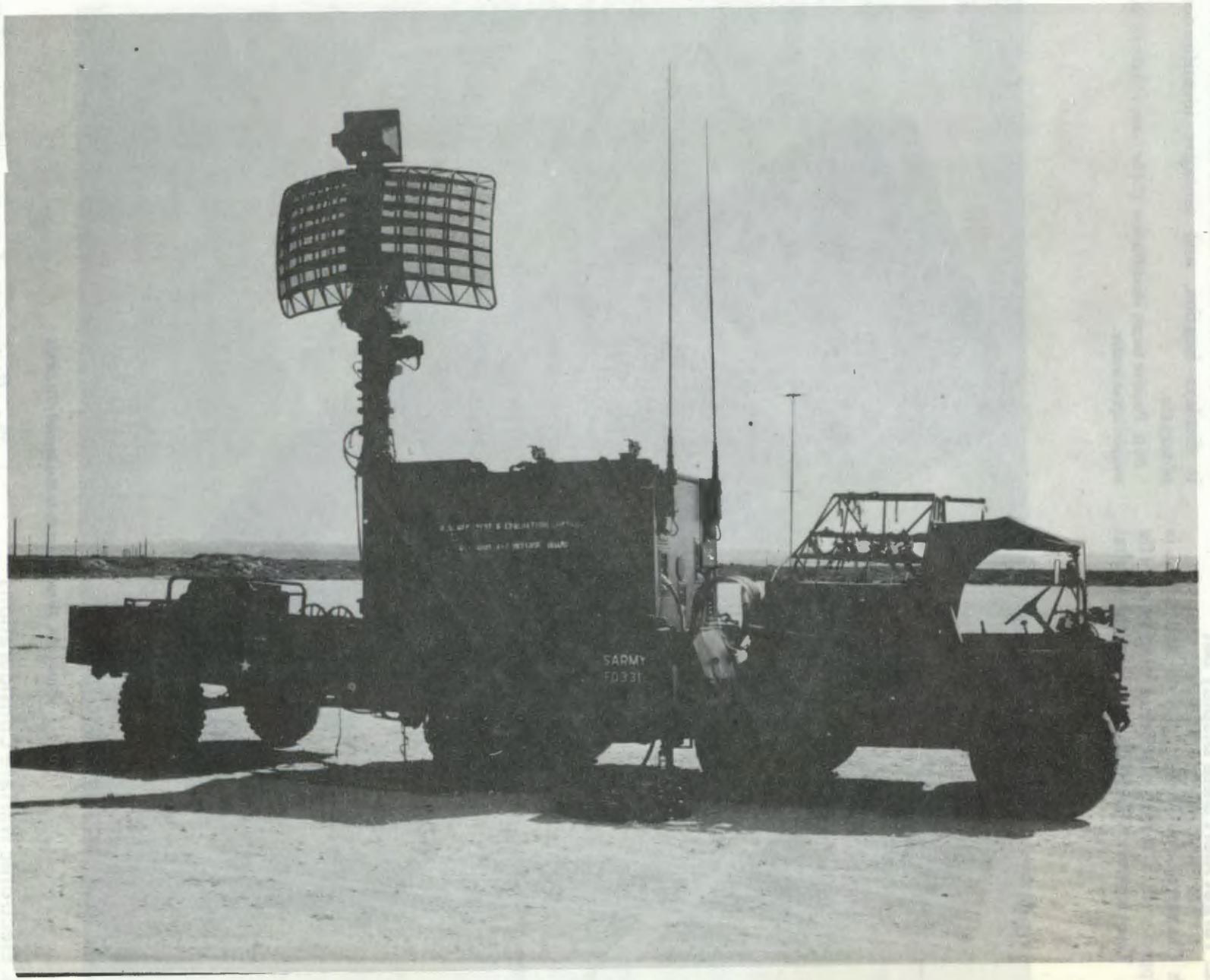


Figure 2-7. Forward area alerting radar (FAAR).

2-12. Target Alert Data Display Set

Each Chaparral and Vulcan platoon and squad is equipped with a target alert data display set (fig 2-8). This receiver (TADDS) provides the digital data link between the FAAR and the weapon squad; it displays location, and tentative identification of targets.

Note. Positive target identification will be made visually by the weapon squad leader.

Figure 2-8. Target alert data display set (TADDS).

2-13. Electronic Warfare Considerations

a. The FAAR and its associated communication and display system are vulnerable to enemy detection and subsequent degradation through electronic countermeasure (ECM) activities; i.e., jamming and deception.

b. The effectiveness of enemy electronic warfare can be reduced through the application of appropriate protective measures. The signal security measures cited in FM 32-5 and in paragraph 4-5*e* hinder the enemy's ability to collect that technical information (e.g., frequency, power output, modulation type) con-

cerning friendly radar and communication systems which he requires for effective ECM activities. Once the enemy initiates ECM, friendly radar and radio operators must react by employing appropriate electronic counter-countermeasures (ECCM). ECCM techniques include manipulation of receiver controls to obtain an optimum signal-to-jamming ratio and, if necessary, changing frequency.

c. A prerequisite to the implementation of ECCM is the equipment operator's ability to distinguish between unintentional interference (accidental or atmospheric) and deliberate jamming or deception. Recognition of ECM and ECCM techniques are discussed in FM 24-18 and (C) TM 11-750 for radio and radar respectively.

SUMMARY

The Vulcan is fielded in two configurations –towed and self-propelled.

This automatic system has a six-barrel, 20mm cannon and a fire control system consisting of a range-only radar, gyrostabilized lead- computing sight, a sight current generator, and associated controls.

The Vulcan can fire 1,000 rounds a minute with no burst limit or 3,000 rounds a minute with burst limits of 10, 30, 60, or 100 rounds.

The towed Vulcan is airportable by helicopter or cargo aircraft.

Vulcan units can provide low-altitude air defense against aircraft or may be employed in the ground fire support role against personnel and lightly armored vehicles.

Since effective fire depends on visual detection, identification, and tracking by the crew, weapon effectiveness varies with visibility conditions.

The self-propelled Chaparral can carry 12 missiles per fire unit –four on launch rails and eight in launching station storage compartments.

The Chaparral is a supersonic missile that uses proportional navigation guidance.

This highly mobile system was designed to counter high-speed, low-altitude air threats. Like the Vulcan, its weapon effectiveness varies with visibility conditions.

The mobile, lightweight (3,000 lbs.) FAAR system is housed in an S-250 shelter.

The radar operates in the "D" frequency band.

The FAAR can detect targets at very low altitudes and provide location and tentative identification through use of IFF.

The TADDS receiver provides the link between the FAAR and the individual Chaparral/Vulcan weapon systems. It displays location and tentative identification of targets.

CHAPTER 3
RECONNAISSANCE, SELECTION, AND OCCUPATION OF POSITION (STANAG 2112)

Section I. GENERAL

3-1. Introduction

Because the mission of ADA Chaparral/Vulcan units is to provide low-altitude air defense, the procedures for reconnaissance, selection, and occupation of position (RSOP) are discussed in this chapter with this mission in mind. In the absence of any air threat, or when supported commanders are faced with a ground threat, Vulcan units may be employed in the ground fire support role; in this case, procedures and siting criteria are modified accordingly. Chaparral fire units cannot be employed in a ground fire support role.

3-2. Reconnaissance of Position

Reconnaissance of position is the examination of terrain as a basis for the location of positions from which weapons and troops can best accomplish the assigned mission. Some of the factors for consideration are location and boundaries of the defended installation or unit; fields of fire; radar sites; aircraft ground observer positions; access routes to, from, and within the position area; likely avenues of aircraft approach; routes of communication; communication capability; location of friendly and enemy troops; probable enemy observer positions; communications and electronic security; and local security. The reconnaissance party should be limited to the personnel and vehicles actually required and will be specified in unit SOP. Types of reconnaissance that may be used are—

a. Map Reconnaissance. As a minimum, RSOP requires a map reconnaissance. This type of reconnaissance is normally used by the battalion commander because the battalion operates over a large area. Because map reconnaissance is general in nature, it should be followed by a detailed ground or aerial reconnaissance by lower echelons whenever time and the enemy situation permits.

b. Ground Reconnaissance. This method provides the best, most detailed examination of routes and potential position areas. It should be employed by commanders at all levels as an essential follow-up to the map reconnaissance unless time or the enemy situation does not permit.

c. Aerial Reconnaissance. Weather and the situation permitting, this method may be used advantageously by commanders to refine a map reconnaissance. An aerial reconnaissance is faster and permits greater area coverage than ground reconnaissance, but it does not provide the detailed information obtainable by ground reconnaissance.

3-3. Selection of Position

Factors affecting the selection of position areas are the mission, size of the defended area, likely avenues of aircraft approach, terrain and weather conditions, weapon characteristics, mutual support and tactical situation. Position areas which afford communications and electronic equipment security, concealment, defilade for nonfiring elements, sufficient disperse elements, and terrain suitable for ground defense of the unit are desirable, but the essential requirement of a position is that it permits the unit to accomplish its mission. Thus, for a Vulcan or Chaparral unit, field of fire is a governing consideration. A 6,400-mil (360°) field of fire for defense against the air threat should be sought for each weapon.

3-4. Classification of Position Areas

Air defense artillery positions are classified tactically as primary, alternate, supplementary, dummy, and decoy.

a. A *primary* position is one from which the ADA unit intends to accomplish its tactical mission. Each such position should be improved to the degree that time permits even though the tactical situation may necessitate displacement at any time.

b. An *alternate* position is one to which the ADA unit moves when the primary position becomes untenable or unsuitable for carrying out its mission. Therefore, it should meet all requirements of the primary position to permit rapid displacement, but distant enough to prevent its being rendered untenable by the same action that affects the primary position. At least one alternate position area should be selected for each primary position, and all preparations necessary for occupation should be made consistent with the time available.

c. A *supplementary* position is a position for firing on targets that cannot be effectively fired upon from the primary position. When a Vulcan squad moves from a primary air defense firing position to another position which improves the capability to engage ground targets, it is moving to a supplementary position. This will often happen when Vulcan squads defending units or installations adjust their locations

at night to improve the local security of the area.

d. A *dummy* position is designed to resemble a real ADA position to mislead the enemy as to the location and number of ADA units; and is constructed as part of an overall deception plan. Engineer units may construct and move dummy equipment as required to counter enemy intelligence systems in consonance with the force commander's plans for counterintelligence and deception. Dummy ADA positions should be tactically integrated with actual ADA positions.

e. A *decoy* position is similar to a dummy position, the difference being in purpose and degree of authenticity. A decoy position is intended to cause the enemy to commit an action which will result in an advantage to friendly forces. For example, a decoy installation may be constructed with the objective of enticing the enemy to mount an air attack against it; the enemy aircraft may then be surprised and destroyed by well-hidden weapons. Engineer units may construct and move decoy equipment as required to counter enemy intelligence system in consonance with the force commander's plans for counterintelligence and deception. ADA decoy positions should be tactically integrated with the actual ADA positions.

3-5. Occupation of Position

The actual occupation of the position area should be orderly, rapid, and quiet. Speed is obtained by planning and organization, a high degree of training, good reconnaissance, careful selection of the position area, and briefing at least one member of each squad about the position occupation plan. Actual occupation of position is directed and supervised by the local commander or executive officer. Primary weapons are emplaced first. Positions are improved progressively, as time permits, to eliminate position signature, such as altered vegetation and trackmarks. When the tactical situation permits, occupation of position should be conducted under cover of darkness.

Section II. SEQUENCE OF RSOP

3-6. General

The sequence of RSOP is generally the same for all units. The requirement to displace may be caused by a change in mission, changes in the tactical situation, or displacement of the defended unit. In the following discussion the sequence considers an entire battalion displacement so that functions of all commanders and staff elements may be described. However, the tactical situation normally requires independent battery, platoon, and squad RSOP to establish defenses.

3-7. Planning and Displacement

When the battalion commander receives a mission order requiring displacement, he issues a warning order to the batteries and instructs the staff to begin preparation of implementing orders and instructions. The S3 begins preparation of defense design, based on map reconnaissance and the mission, so that battery areas and FAAR platoon coverage may be designated and overlays given to battery commanders along with the orders to displace. Battery commanders are then called to the battalion AADCP or instructed to meet at a designated location to receive the warning order. This order should contain, but not be limited to, the tactical situation; position areas for batteries, to include tentative map locations of each primary weapon and FAAR; time of movement; local security instructions; order of march; administrative arrangements; chemical and radiological survey; and communication instructions. According to STANAG 2112 (NATO Standardization Agreement 2112), radiological survey parties will be briefed on the specific objectives of the survey; start time and completion time; the locations at which readings are required; the route to be followed and the spacing of the readings; the maximum dose rate beyond which the party will not proceed; the minimum dose rate below which no record is to be made; methods of communication, marking instructions, and special instructions. The survey party should also be equipped with the necessary chemical agent detector kits to check for chemical agent contamination. A party normally consists of a driver and a monitor and may be part of, or separate from, the reconnaissance party. The composition of the reconnaissance party is a matter of SOP. This reconnaissance party is established for a battalion-controlled RSOP; however, it applies equally well to battery and platoon independent operations by deleting the headquarters elements. Headquarters elements may also utilize this type of party when they displace independently. The normal situation is a decentralized RSOP with platoon or squad leaders selecting the exact positions on the ground. A reconnaissance party may include the following personnel:

a. Headquarters.

(1) Battalion commander.
(2) S3.
(3) Communications officer.
(4) Headquarters battery commander.
(5) Communications personnel.
(6) Representatives from all major staff sections.

(7) Selected personnel for ground security and guides.

(8) Chemical and radiological survey party.

(9) FAAR platoon leader.

b. Firing Batteries (Chaparral and Vulcan).

(1) Battery commander.

(2) Communications personnel (including wiremen).

(3) First sergeant.

c. Firing Platoons (Chaparral and Vulcan).

(1) Platoon leader.

(2) Representative from each squad.

3-8. Planning and Reconnaissance

The battalion commander's task in getting his unit into position includes reconnaissance for and selection of general locations for each weapon squad, command, and logistic installation; issuance of orders to carry out the plan; and supervision of the execution of the plan. The methods of accomplishing these tasks vary according to the time available and composition of the reconnaissance party. When there is sufficient time, the area should be reconnoitered in detail by the commander. When there is little time, the commander must appoint members of his party to perform portions of the reconnaissance. A position may be selected initially by any designated member of the party, but the position finally occupied must be approved by the responsible commander. In planning his reconnaissance, the commander considers the following restrictions:

a. Current mission requirements.

b. New mission requirements.

c. Distance and routes to the new area.

d. Personnel available and additional personnel requirements.

e. Vehicles and equipment required for the reconnaissance and for early preparation of the position (e.g., communications and pioneer equipment).

f. Siting requirements for radar and communications equipment.

g. Size, location, and characteristics of the defended unit or installation.

h. Time available.

i. Tactical situation.

j. Ground security requirements.

k. Chemical and radiological survey requirements.

3-9. Executing the Reconnaissance and Selection of Positions

a. After receiving the movement order, the battery commander assembles his party, explains the situation, shows the map location and route to his party, and proceeds to the new area accompanied by his party. On the way, he notes the condition of the route and considers the use of route markers or road guides. If the Chaparral/Vulcan unit is to defend a unit during the march and static positions or road guides along the route are required, these weapon positions are selected and guides are positioned.

b. On arrival at the area, the battery commander makes a general survey and assigns portions of the reconnaissance mission to the members of his party.

3-10. Planning and Occupation of Position

a. It is desirable to have a guide lead each vehicle to its place during daylight occupations, and it is mandatory that guides be used during limited visibility and nighttime occupation. If personnel are not available, signs may be used. The guides expedite the movement of vehicles from the column to their selected position in the battery area without halting the column or delaying the prompt clearance of the road.

b. Separate entrance and exit routes are desirable. When available, established roads and trails should be used.

Section III. HEADQUARTERS AND HEADQUARTERS BATTERY

3-11. General

a. Procedures for positioning the elements of the command post and in organizing the position vary and depend on the following:

(1) *Policy of commander.* Normally, the battalion commander will direct the headquarters battery commander or the S1 to *organize* the headquarters area. The initial reconnaissance may be made by the battalion commander or his designated representative, normally the S3, who will *select tentative locations* for the various installations.

(2) *Staff section requirements.* The headquarters battery commander and S1 should know the type of location required by each staff section to insure efficient operation, and understand the relationships between the various elements of the headquarters. Due to the peculiarities of communications and electronics (C&E) equipment, the battalion communications officer should provide guidance and recommendations to the headquarters battery commander or the S1 for site location of C&E equipment.

b. After an SOP has been developed, the same general layout of the headquarters should be used in each position. Preserving the same relative positions of the various elements will result in greater efficiency of operation.

3-12. Characteristics of Position Areas

a. General. In planning the organization of the area, the commander considers the space available; cover and concealment; security; and requirements of headquarters battery for mess, maintenance, and bivouac area.

b. Space Requirements. The location of the battalion CP normally is governed by the location of division or supported unit's headquarters and by the necessity for a good communications position. In evaluating the space available, locations are considered for the following elements:

(1) Communications equipment.

(2) AADCP.

(3) Vehicle park near message center for visitors' vehicles.

(4) Headquarters battery installations and bivouac area.

(5) Local security elements.

3-13. Selection of Positions

a. Headquarters Area. The battalion commander selects the general location of the battalion headquarters area. He may also indicate the general area for the AADCP and headquarters battery area.

b. Cover and Concealment. The headquarters area should have sufficient defilade to minimize visual or radar observation by the enemy. In areas of sparse or scattered vegetation, it is necessary to include plans for camouflage to preclude unit identification. In open terrain, such as desert, elements in the CP area should be dispersed in such a manner as to complicate the identity of the installation.

c. Local Security. The position selected should facilitate organization of local security with the weapons and personnel available. The headquarters battery commander should develop local security plans and integrate the defense with adjacent units for mutual protection. The perimeter defense includes pre-

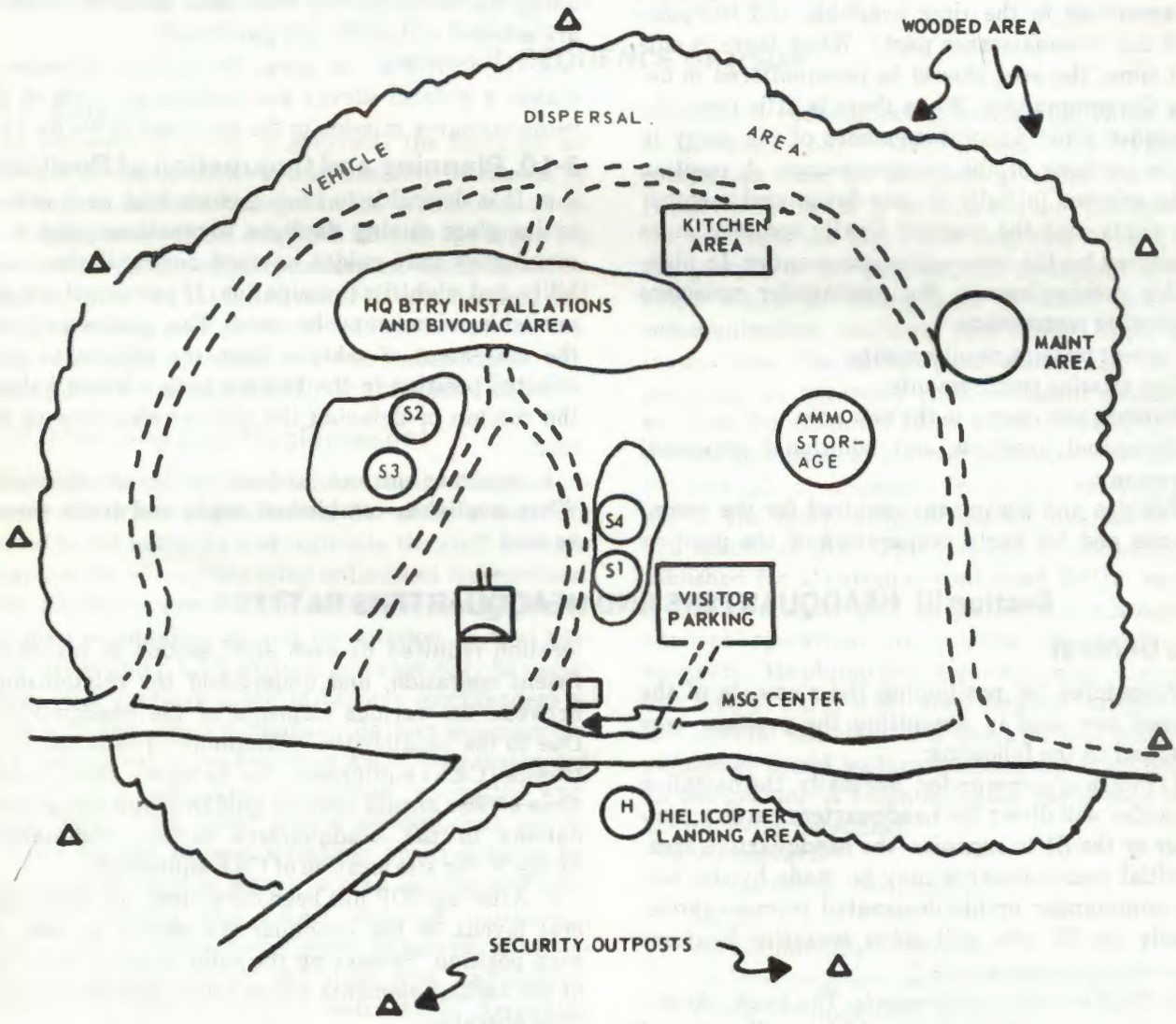


Figure 3-1. Type headquarters and headquarters battery position.

pared positions for defense of the area. Included in this defense area are outposts, alarm devices, and obstacles, all located to provide a flexible, all-round defense of the position area.

d. Headquarters Battery Area.

(1) The location of the battalion headquarters, the tactical situation, security, supply, sanitation, and road accessibility are considerations in locating the headquarters battery area. The area should offer adequate space for vehicle dispersal and maintenance facilities. The elements of the battalion headquarters should be grouped logically for ease of operations; however, protection of the battalion AADCP should be given primary consideration.

(2) *FAAR platoon.* Individual FAAR sites are selected to obtain maximum low-altitude radar coverage and to insure line of sight for digital data transmission to the TADDS at the fire units. Radar positions in relation to fire unit positions 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 the FAAR coverage overlaps the fire units' positions by at least 10 kilometers in the expected direction of air attack. FAAR security (defense against air and ground attack) is enhanced by collocation with a Vulcan fire unit.

3-14. Planning the Occupation

a. General. After selecting locations for the various elements of the headquarters and verifying the plan for the headquarters battery area, the headquarters battery commander plans for occupation.

b. Equipment. It may be desirable to move and install a certain amount of equipment prior to the occupation. Generally, such equipment will be communications equipment and facilities for shelter.

c. Road Guides. When the headquarters and headquarters battery moves as part of the same march unit as the firing batteries, road guides are usually provided for in the movement order. When the headquarters elements displace alone, the headquarters battery commander is responsible for providing road guides.

3-15. Displacement

a. The headquarters battery commander knows his battery's movement capabilities. If, for any reason, he is unable to move in one echelon, he informs the battalion executive officer and recommends a method of displacement. When a move is imminent, he should be prepared to make recommendations before the battalion commander's plans are made. Therefore, he must be kept informed of all contemplated displacements.

b. The headquarters battery SOP (loading plans) should provide for movement of the battery by echelons as well as by single march column. Specific personnel and equipment should be assigned to each echelon. This method will minimize the detailed instructions required each time a displacement is made.

Section IV. FIRING BATTERY

3-16. General

This section discusses the reconnaissance, selection, and occupation of position of the firing battery and deals with the firing battery under battalion control. If the battery or portions of the battery are attached to a larger unit, then the attached units will perform individual RSOP based upon the guidance of the supported unit's commander.

3-17. Characteristics of Firing Battery Position

a. The position areas for Vulcan batteries will be determined by the configuration of the defended unit or installation and by the weapon characteristics. The battery headquarters, maintenance, and mess facilities will locate within the Vulcan defense, if possible. The battery headquarters may often be collocated with the headquarters of the defended unit or installation.

b. The position area for the Chaparral batteries will depend primarily upon the area of responsibility assigned to the battery. Because the battery normally will be dispersed over a large area, the battery headquarters should be centrally located so that the commander can more readily control the platoons. The battery headquarters may be collocated with one of the platoon headquarters.

c. The firing battery headquarters position includes the battery command post, vehicle dispersal area, ammunition storage area, mess, communications equipment locations, and a platoon command post if the battery is collocated with a firing platoon.

d. The firing battery commander must also consider the emplacement of the FAAR if attached to his battery. The radar should be placed on commanding terrain to fully realize maximum radar coverage and to enable TADDS communication with a maximum number of fire units. FAAR coverage should overlap fire unit positions by at least 10 km in the direction of the expected air attack. FAAR is collocated with Vulcan for air defense and defense against

ground attack. The position and coverage of the radars must be reported to the battalion S3 so that the total battalion radar coverage can be evaluated.

3-18. Receipt of Orders

If the firing battery is to displace on order of the battalion commander, the order is received as outlined in paragraph 3-7. If the battery is operating independently, the order for displacement will be received from the supported unit commander. The order will be essentially the same except that details regarding individual weapon positions will not be provided by the supported unit commander. The battery commander will develop the defense design and specific displacement details of the order.

3-19. Reconnaissance of Firing Battery Position Area

When the battery commander arrives at the new battery position area with his party, he first determines the location and boundaries of the unit or installation he is to defend. He then inspects the surrounding terrain to determine avenues of approach and possible automatic weapon locations; he then begins his ground reconnaissance to select the location of each weapon and the location of the other battery installations. In a rapid reconnaissance of position, decentralization of duties is essential. Reconnaissance party personnel must be capable of performing duties with little or no supervision. Platoon leaders, section chiefs, or squad representatives select the specific weapon locations based on guidance and general areas assigned by the battery commander. Whenever possible, the battery commander should personally select the location of the weapons squads and radar sections. These positions normally are selected before any other part of the reconnaissance is performed. During the ground reconnaissance the battery commander should, time permitting, also determine the—

a. Map coordinates of each primary and alternate weapon position so that defense analysis can begin immediately and necessary adjustments in weapon location can be accomplished quickly. (If platoon leaders select positions, they immediately report weapon map locations and sectors of fire.)

b. Positions of local security weapons to include, if possible, supplementary positions of Vulcan weapons to exploit their firepower against ground targets.

c. Entrance and exit routes to battery headquarters area.

d. Primary and secondary sectors of fire.

e. Location of the command post.

3-20. Selection of Positions

a. Sectors of Fire and Observation.

(1) ADA positions should be selected to provide a maximum of unobstructed fields of fire and observation. Positions on the geographical crest of high terrain normally will meet this requirement. However, commanders must consider the increased vulnerability to detection of weapons so positioned. Individual weapons may not always have a 6,400-mil (360°) field of fire but the entire defense should provide all-round coverage of the defended area.

(2) Because target detection, identification, and engagement depend on visual means, the selected sites should afford maximum observation. Personnel employed as ground aircraft observers should be positioned to provide early warning for the weapon crew.

b. Mutual Support. Within the VA defenses, the adjacent Vulcan squads should be sited within two-thirds maximum effective range of each other. This distance provides for mutual support between adjacent weapons. The distance between Chaparral squads should not exceed 2,400 meters—80 percent of the positive visual identification range.

c. Command Post (Battery and Platoon). The battery/platoon command post should be located to facilitate supervision of the firing units and coordination with the defended unit. Positions that assist line-of-sight radio communications are also a factor, but they are not critical since radio can be remoted to the command post. Defilade and concealment for the command post should be attained.

d. Local Security. All-round ground defense of the battery headquarters should be provided. This is normally possible by establishing a perimeter defense which includes prepared firing positions. Included in this defense are outposts, alarm devices, and obstacles. When Vulcan firing squads are sited nearby, supplementary positions may be selected to enhance the defense of the headquarters area. Also, the battery headquarters should be collocated with the defended unit if possible.

e. Vehicle Dispersal and Maintenance Area. The vehicle dispersal area and maintenance area should be located in an area that is readily accessible and has firm ground, good drainage, concealment, and sufficient space for dispersion of vehicles. When cover is not available, vehicles should be dispersed with a minimum distance of 50 meters between vehicles.

f. Ammunition Storage Area. The ammunition storage area should be located in a concealed defilade position. The area should be readily accessible to ammunition resupply vehicles and its location known to all battery personnel.

3-21. Planning and Preparing for the Occupation of Position

The battery commander formulates his plan for the occupation as he performs his reconnaissance of the battery position. After the reconnaissance and selection of position, he issues his operation order based on the battalion operation order for the occupation of position to the reconnaissance party, and preparation for occupation begins.

a. General Instructions. The battery commander points out the location of each firing squad and identifies the primary and secondary sectors of fire. He gives instructions concerning routes into and out of the battery area, camouflage, and the positions for local security weapons, including supplementary positions of primary weapons.

b. Communication Instructions. The battery commander indicates the location of the battery command post and gives the necessary orders for installation of the battery communications system. When necessary, he gives the communications chief detailed instructions concerning wire lines that must be laid outside the battery area and the establishment of radio nets that deviate from standing operating procedures.

c. Action Prior to Arrival of Battery. After receiving the battery commander's instructions, the reconnaissance party rapidly prepares for arrival of the battery. If possible, marking stakes are used to designate each major piece of equipment. Wire nets are installed and guides are designated to direct each vehicle to its proper location.

3-22. Displacing the Battery

a. When the battery moves as a part of the battalion, march column control usually is exercised by the battalion executive officer who will announce the start point, order of march, rate of march, distance between vehicles and units, and release point. The battery executive officer usually controls the battery march unit. Security measures to be taken on the march and on arrival at the new position should be prescribed in the battery SOP.

b. The formation of the battery column should remain the same regardless of the headquarters controlling the movement. Automatic weapons should be dispersed in the column to provide air defense and ground security. The convoy should be organized so that mission essential elements reach the area first. Radio vehicles should be located as a minimum at the front and rear of the column to provide control.

c. The battery may also displace by single squad (infiltration) or by platoon (echelon). The following conditions usually will dictate squad or platoon displacement:

(1) The defended unit or installation requires continuous air defense coverage.

(2) Route clearances cannot be obtained for the entire battery.

(3) The route is under artillery attack.

3-23. Occupation of Position

a. General.

(1) The actual occupation of position must be thoroughly planned to prevent confusion and save time. The battery and defended installation are extremely vulnerable during the occupation. Therefore, this critical phase must be completed as quickly and efficiently as possible.

(2) When the battery arrives at the position, all vehicles should be moved into the position area without halting or closing the interval between vehicles. Guides should lead each vehicle to its proper location. Equipment should be unloaded quietly, quickly, and in an orderly manner. As soon as vehicles are unloaded, they should be guided to the vehicle dispersal area or some other designated point.

b. Night Occupation.

(1) Practice in night occupation of position is necessary for smooth operation. When time and situation permit, daylight reconnaissance should be made by all key personnel. This may be done in shifts to reduce the size of the party. The number and location of road guides required should be determined, and plans for local security on the march and in the new position should be made. Night occupation of position is facilitated when adequate guides are made available. Guides should know the location of each installation in the area. In making a reconnaissance prior to a night occupation, marking stakes are used to identify fire unit positions. An identifying tag or tape is attached to each position stake. Night occupation may also be facilitated by accomplishing certain other tasks during daylight. Some of these tasks are—

(a) Laying wire.

(b) Preparing defense positions.

(c) Preparing the command post.

(d) Installing night-lighting devices (flashlights) on position-marking stakes.

(e) Marking routes within the positions.

(2) When the position is prepared during daylight for occupancy at night, extreme care must be taken to insure that the position is continuously guarded. Unguarded, prepared positions are extremely susceptible to sabotage and ambush. A

perimeter guard should be posted and continued throughout the occupation of position.

(3) A night occupation requires more time than a daylight occupation; in addition, there is an even greater need for order and efficiency in a night occupation. Particular care is necessary in guiding vehicles during blackout. Immediate corrective action must be taken to overcome violations of light and sound discipline.

Section V. RSOP FOR THE GROUND ROLE

3-24. General

When the ground threat exceeds the air threat or as the force commander elects, Vulcan units may be used in a ground fire role. The methods outlined in this section apply to all types of ground fire support employment, whether in support of infantry units in the offense or defense, in counterguerrilla or stability operations, or in airborne and airmobile operations. The primary consideration is to select weapon positions which will permit optimum utilization of firepower in support of ground operations. When Vulcan units are assigned the ground fire support role, they usually are attached to the units they will support. The ADA commander will act as an advisor to the supported commander and reconnoiter and occupy positions in accordance with the guidance of the supported unit commander.

3-25. Reconnaissance

The ADA commander should be briefed by the supported unit commander on the general plan of operations, fire support required, location of friendly units, location of known and probable enemy targets, and coordinates of desired squad positions. A map reconnaissance will be conducted, followed by a ground reconnaissance, to insure that:

a. Weapons are sited within mutual supporting distance of adjacent air defense automatic weapons and/or weapons of the supported unit.

b. Maximum effective direct fire capability of the weapons against ground targets is utilized.

c. A base of direct fire for the supported unit is provided.

d. Key terrain features are protected.

e. Essential observation is provided.

f. Enemy close observation into the defended area is denied.

g. Positions are located so as not to interfere with fields of fire of other weapons.

h. Maximum advantage is taken of natural cover and concealment.

3-26. Occupation of Position

The occupation of position should be coordinated with the supported units to avoid interference with the movement of other units. Displacements should be conducted to take advantage of maximum cover and concealment. Night occupation of position should be standard procedure.

SUMMARY

When performing a reconnaissance, some factors for consideration are: location and boundaries of the defended installation or unit; fields of fire; radar sites; aircraft ground observer positions; access routes to, from, and within the positions area; likely avenues of aircraft approach; routes of communication; location of friendly and enemy troops; probable enemy observer positions; communications and electronic security; and local security.

The location of the battalion headquarters, the tactical situation, security, and road accessibility are some of the basic considerations in locating the headquarters battery area.

Elements of the battallion headquarters should be grouped logically for ease of operations, but protection of the battalion AADCP should be given primary consideration.

The Vulcan battery position area will be determined by the configuration of the defended unit or installation. The battery headquarters facilities will locate within the Vulcan defense, and may be collocated with the headquarters of the defended unit or installation.

Because the Chaparral battery will be dispersed over a large area, the battery headquarters should be centrally located so that the commander can more readily control the platoons.

Since essential requirement of a C/V position is that it permit the unit to accomplish its mission, field of fire is the governing consideration for a Chaparral or Vulcan unit.

Individual FAAR sites are selected to obtain maximum radar coverage and to insure line of sight transmission of data to the fire units.

Vulcan units assigned the ground fire support role are attached to the units they will support. They will occupy positions in accordance with the guidance of the supported unit commander.

The Vulcan commander must be briefed by the supported unit commander on the general plan of operations, fire support required, location of friendly units, location of known and probable enemy targets, and coordinates of desired Vulcan squad positions.

CHAPTER 4
SURVIVABILITY (STANAG 2047)

Section I. INTRODUCTION

4-1. General

All reasonable measures that *do not degrade* system effectiveness *or interfere* with the accomplishment of the assigned mission should be employed by ADA units to enhance survivability. These survivability measures fall into two general groupings—local security and supplementary measures.

a. Local security measures are those measures, active and passive, taken by ADA units, in conjunction with supported or defended units, to enhance the survivability of the ADA unit. These measures utilize organic forces and resources and, wherever possible, should be integrated with security plans of adjacent units. Examples are the use of patrols, warning devices, improvement of positions, and camouflage.

b. Supplementary measures are those measures which require support of, or coordination with, higher echelons and integration into the overall concept of ground operations. Examples are movement to avoid targeting and construction of dummy positions.

4-2. Relationship of Mission to Survivability

a. Local Security Measures.

(1) *Air defense mission.* When the defended unit or installation is subjected to ground attack, Vulcan units may be required to suspend the air defense mission temporarily in order to defend against the ground attack. In accordance with the commander's local security plan, the ground defense should be developed around Vulcan firepower. This may require movement of Vulcan to appropriate defensive positions, or expansion of the ground defense perimeter to include Vulcan. Chaparral squad members can defend themselves only with their individual weapons.

(2) *Ground fire support mission.* Vulcan units assigned this mission will position the Vulcan weapons on or within the ground defense perimeter of the unit which they are supporting. Sectors of fire will be integrated with the supported unit fire plan. Chaparral units obviously will not be assigned a ground fire support mission.

b. Supplementary Measures.

(1) *Air defense mission.* Chaparral squads will displace frequently to avoid targetings; however, these moves should not degrade the squad's ability to perform the air defense mission. Because of the smoke and dust associated with the firing of Chaparral, the squad should relocate to an alternate position after each firing mission. The nature of targets defended by Vulcan will not permit frequent relocations.

(2) *Ground fire support mission.* When Vulcan squads are in a ground fire support role, they should relocate often to avoid being targeted.

Section II. LOCAL SECURITY

4-3. General

Local security must include all available active and passive measures consistent with the enemy threat. The commander must insure that all necessary active and passive measures are taken to protect the unit from enemy air and ground attack and surveillance.

4-4. Active Measures

All available weapons are sited to achieve maximum effectiveness against air and ground attacks. An effective active defense requires the consideration of unit mission, terrain, resources, enemy threat, and time available. The Chaparral/Vulcan units should be positioned near, and defense forces integrated with, the local defenses of other units. If this is not possible, additional security forces should be made available to the unit. Active defense measures which the Chaparral/Vulcan units should employ are discussed in *a* through *k* below.

a. Reaction Forces. Each battery and battalion should make provisions for a reaction force. If the unit is deployed in a single defense, the reaction force may be used to reinforce any portion of the defense as required. Defenses composed of platoons and sections may require this force from the supported, defended, or adjacent units. The primary purposes of the reaction force are to counterattack and destroy or eject any hostile force which penetrates the defensive position and to restore the defensive position. This force should be organized and equipped to act as an infantry unit.

b. Security Outposts and Listening Posts. Security outposts provide timely warning of ground attack and deny the enemy unopposed close observation of unit areas. Within their capabilities, se-

curity outposts seek to delay and disorganize the attacking force. Security outposts include crew-served weapon positions situated on commanding terrain that provides observation and coverage by fire over all routes of approach into the defended area. The distance from the defensive perimeter to the outposts depends on the terrain in and around the position area. However, the security outposts should be placed far enough from the defensive perimeter (about 200m) to permit implementation of the defense plan after the alert has been given that an attack is imminent. The more distant outposts should be withdrawn into or near the defensive perimeter at night and during periods of poor visibility. When the situation permits, intervals between security outposts are covered with barbed wire, obstacles, and trip flares. Outpost personnel must be briefed on the location of friendly positions and advised of the movements of friendly personnel such as messengers, patrols, and wire crews. Communication between the security outposts and the command post is a requirement. When security outposts are withdrawn at night to consolidate the perimeter defense, listening posts should be established outside the perimeter of the defended area to provide early warning to the unit. They are located along avenues of approach to detect the enemy. They should be dug in, provided communications, and supported by fire from within the position.

c. Patrols. Air defense artillery platoons have insufficient personnel to conduct patrols. Patrols normally will be conducted by personnel from headquarters elements or by the defended unit. When a battery or battalion has established a defensive perimeter, the avenues of approach to the defended area and areas which might provide concealment or cover should be actively patrolled and kept under surveillance. Patrols should cover specific areas and contact as many outposts in that area as possible. If contact with the enemy is made, the patrol should not engage the enemy unless absolutely necessary. The patrol should keep the enemy under surveillance and notify the command post. During hours of darkness, and immediately after dawn, patrolling should be intensified. Patrol activities are coordinated with adjacent units to prevent duplication of effort and to minimize the possibility of friendly patrols firing on one another.

d. Communications. All elements within the perimeter of the defense are placed on a continuous wire circuit (hot loop). Normally, two separate lines are laid over different routes to insure continuous communications. Communications between outposts and the battery or battalion command post must be established for alerting purposes. If radio is used in the defense system, it should be placed within the defended positions and protected. Frequent and scheduled checks with headquarters must be made to insure that radio communications are available if wire lines are cut.

e. Obstacles. Obstacles may be used to reinforce the outpost system and the perimeter defense. Artificial obstacles may be used to supplement natural obstacles. Both must be covered by fire to remain effective. Devices, such as mines, trip flares, and barbed wire, serve both as obstacles and as a part of the warning system. Mines and boobytraps may be used when specifically authorized by higher headquarters.

f. Early Warning.

(1) An effective early warning system can preclude surprise attack, either by aircraft or hostile ground forces. A combination of methods employing observers, FAAR, pyrotechnics, sensors, trip flares, noise-making devices, STANO devices (to include military dogs) and communication for early warning can alert the unit.

(2) To provide a standard method of disseminating emergency warning within the NATO forces operating on land, the United States Armed Forces, together with certain other NATO Armed Forces, have concurred in the provisions of STANAG No. 2047 (Emergency Warning of Hazard on Attack). Details of STANAG No. 2047 are contained in table 4-1.

Table 4-1. Warning Signals

Sound Signals	*Visual Signals*
Nuclear, Biological, Chemical (NBC) Hazard	
A rapid and continuous beating on any metal object which produces a loud noise. A horn or siren signal of 3 short blasts followed by 2 seconds of silence and repeated for 1 minute. Shout "gas" or "spray" after donning protective mask. Automatic alarms should replace above signals insofar as possible.	Donning of protective mask and hood and signaling by extending both hands horizontally, fists clenched, and rapidly bringing the fists up to the mask and back to horizontal several times.
Air Attack Hazard	
Continuous series of short blasts on a vehicle horn, whistle, bugle, or other wind instrument. Long warbling blast on a siren.	Rapid crossing and uncrossing of arms fully extended above head.
Ground Attack Hazard	
Series of long blasts on a vehicle horn, whistle, bugle, or other wind instrument.	Per SOP.

Table 4-1. Warning Signals — Continued

Friendly Nuclear Strike Hazard	
Per SOP	Per SOP.
All Clear	
Orally or continuous sustained blast on a vehicle horn, whistle, bugle, or other wind instrument.	Per SOP.

Notes. 1. If an air ground attack is determined to be a chemical, biological, or radiological hazard, the appropriate NBC hazard alarm should replace or immediately follow the air or ground attack alarm as appropriate.

2. The spoken word (vocal alarm) remains the most effective means of informing the troops in an emergency.

g. Perimeter Sketch. Whenever a new position is occupied or the perimeter defense plan changes, the battery commander forwards an accurate sketch of the battery defense to the battalion executive officer. This sketch is consolidated with those of the other batteries into an overall plan of the battalion defenses. The information to be included on the sketch will be designated in the battalion SOP. Batteries, platoons, and sections attached to other units will submit perimeter sketches with their security plan to the supported unit for coordination. In addition to weapon locations and field of fire, the sketch shows the location of command posts, security outposts, obstacles, and installations which may be sought by messengers or communications personnel.

h. Range Cards.

(1) *General.* The range card is a pictorial representation of the assigned sector of responsibility and is prepared for each crew-served weapon position. The information from the range card is integrated into the battery's defense plan. If the battery is operating as part of a battalion defense, the battery commander forwards a copy of each range card to the battalion executive officer for final approval and for integration of the crew-served weapons into the battalion defense plan.

(2) *Purpose.* The range card contains sufficient information for the gunner to accurately and effectively engage all targets that appear in his assigned sector of responsibility in a minimum amount of time. It also allows the crew to engage targets at night or during periods of limited visibility with predetermined data.

(3) *Preparation.* The range card should be prepared for 360 degrees of azimuth and show the primary target line with left and right limits. Between these limits, ranges should be listed to all prominent terrain features and avenues of approach. Ranges initially are determined by estimation but should be verified by hasty survey, such as pacing or map measurement, as soon as possible.

i. Standing Operating Procedures. Chaparral/Vulcan battery SOP should include procedures to be followed by platoons and sections when these units are operating independently of the battery. The SOP must be flexible to apply in varying situations. Frequent drills must be conducted to insure adequate preparation and to orient new personnel. Planning of security measures must be initiated at the time a new position is selected. Refinement and adjustments to security measures will be made as time and availability of personnel permit. This applies particularly to the integration of the unit ground defense plan with that of defended, adjacent, or supported units. The unit SOP should prescribe the following:

(1) Duties of personnel by TOE position.

(2) Effective protective measures.

(3) Employment of mines, obstacles, and alerting devices.

(4) Communication and warning procedures.

(5) Primary and secondary sectors of fire, safety zones, and range stakes for crew-served weapons.

(6) Protection of crew-served weapons by small-arms fire.

(7) Reserve force.

(8) Responsibility for ammunition supply.

(9) Procedures for patrols and security outposts.

(10) Emergency destruction procedures.

(11) Example diagrams of unit area, perimeter, field of fire, and obstacles.

(12) ADA fire control.

(13) Coordination with Redeye teams.

(14) Reaction force composition and procedures.

j. Ground Defense During Displacement.

(1) *Vulcan.* When moving in convoy, the Vulcan weapon systems are capable of effective self-defense against ground and air attack. The Vulcan automatic gun should be dispersed throughout the column and manned continuously. Sectors of fire should be assigned to each weapon to provide a balanced coverage to each side. Plans must be prepared and disseminated to insure that each vehicle driver knows what action to take when the column encounters enemy forces, roadblocks, or comes under air attack. In the event of air attack, Vulcan will disperse to either side of the road if possible, and begin engagement. During halts, the vehicles should be dispersed and a security perimeter established. When moving with a supported or defended unit, Vulcan weapons should be included in the column security plan. When sufficient weapons are available, they should be dispersed throughout the column. If sufficient numbers are not available, they should be positioned near the front and rear of the column and be prepared to deploy as directed by the column commander.

(2) *Chaparral.* Chaparral is particularly vulnerable to attack during displacement. This vulnerability increases when the fire unit is moving into or out of a position and when it is confined to a road by steep banks that cannot be traversed by the carrier. Chaparral units should be alert for any attack during displacement. Each battery should include plans for defense during the march. These plans should include provisions for coordination with other unit movements for mutual support.

(a) Air attack. If the situation permits, units may move at extended intervals or by infiltration as a passive defense against air attacks. When mission, time, terrain, and available weapons permit, Vulcan should be interspersed throughout the column for immediate fire availability. Moves of Chaparral should be coordinated and by echelon. If terrain permits, the unit should pull off the road and bring the fires of all available weapons to bear on the hostile planes. If the terrain does not permit dispersion, as in a defile, the column should continue to move until it can disperse, halt, and take up more active defense.

(b) Roadblocks. When a roadblock is reported by forward elements, the report should be relayed to battalion and the convoy rerouted if possible. If the unit is halted by a roadblock, all available firepower, including automatic weapons such as Vulcan, should be brought to bear on the barricade. A direct or flanking attack by a security force may also be brought to bear on the barricade. Roadblocks are usually mined or protected by ground troops. An attempt to crash through them with vehicles may result in loss of equipment and personnel and complete blocking of the road by disabled vehicles. Ambushes may be expected in conjunction with roadblocks.

k. Fire Support. An ADA unit requests fire support (field artillery, aerial field artillery, attack helicopter, naval unfire, tactical air support) and mortar fire planning and coordination through the maneuver element/unit to which the ADA unit has been attached, or under whose operational control it has been placed. ADA units do not possess the required channels of communication, personnel, or facilities for requesting fire support.

4-5. Passive Measures

a. General. The passive defense plan is made before a unit moves into a position and is implemented and improved while the unit remains in the position. The following paragraphs discuss passive techniques to improve the survivability of the Chaparral/Vulcan unit.

b. Concealment and Camouflage. Three fundamental factors in the effective use of camouflage are choice of position, camouflage discipline, and camouflage construction and maintenance. The purpose of camouflage is to deny the enemy the location of the position or to mislead the enemy as to the strength, type, and intentions of the unit. In organizing his position area, the commander must prepare a camouflage plan to take advantage of natural concealment and to supplement the natural means by a skillful application of camouflage principles. Natural resources, such as trees, brush, and grass, provide the best camouflage. If natural vegetation is used to conceal vehicles and equipment, care must be exercised to replace such items as they begin to deteriorate. Artificial camouflage consists of nets and paint. Both may be used to break up silhouettes, reduce shine, and blend equipment into the surrounding area. When using camouflage nets, caution must be exercised to prevent interference with the operation of weapons.

c. Blackout. The commander must insure strict adherence to blackout principles and regulations. Problem areas include vehicle running lights, smoking, gun flashes, flashlights, and carelessness in entering or leaving shelters or vans where illumination is being used.

d. Movement. Chaparral is singly deployed throughout the area and should displace after each engagement to prevent targeting. At night and during foul weather, Chaparral should displace into prepared positions within the defense perimeter of the defended, supported or collocated unit. Vulcan may displace, if necessary, for protection against ground attack.

e. Communications Security and Electronic Counter-Countermeasures. The mission of ADA units makes them especially lucrative targets for enemy signal intelligence and electronic warfare exploitation. These units must, therefore, utilize all available communications security and electronic counter-countermeasures devices and procedures to reduce the effects of such exploitation and its impact on unit operations. Excessive and careless use of radio communication and radar should be avoided. Communications-electronics operation instructions (CEOI) and other directives concerning the use of communications and employment of FAAR must be rigidly enforced. When time permits, wire should be laid and buried. Additional measures which contribute to effective communications and electronics security include—

(1) Physical security of CEOI, Communications-electronics standing instructions (CESI), and COMSEC material.

(2) Emergency destruction plans for all classified material and equipment.

(3) Remedial action to eliminate violations of communications and electronics security.

(4) Training of communications and radar personnel in security procedures.

(5) Programed change of communications-electronics frequencies.

(6) Avoiding long or easily associated messages.

(7) Alertness of operators to recognize irregularities in procedures.

(8) Transmitting messages whenever possible without requiring acknowledgement of receipt.

(9) Use of authentication procedures by radio operators.

f. Chemical, Biological, Radiological and Nuclear (CBR) Defense. (References: Detailed information concerning CBR defensive operations and training is contained in FM 3-10, FM 3-12, FM 21-11, FM 21-40, FM 21-41, and FM 21-48.)

(1) *General.* The continued effectiveness of ADA Chaparral/Vulcan units during enemy CBR attack is dependent on the degree and quality of CBR training and on the availability and proper use of chemical protective clothing and equipment. It is imperative that all personnel be thoroughly trained in all aspects of CBR and nuclear defense. The nature of CBR defense operations may cause untrained soldiers to panic at the first sign of enemy CBR attack and cause units to become ineffective. Each battery must designate CBR teams for monitoring and decontamination. ADA Chaparral/Vulcan platoons and sections attached to other units must be provided this capability by the supported unit.

(2) *Chemical.* Chemical agents may take the form of vapors, aerosols, or liquids. They may be delivered by artillery projectiles and missiles, bomblets, or spraying. Many agents will possess no odor or color and can be detected only by detection equipment or by resultant symptoms in personnel. The following procedures will reduce the vulnerability of personnel to the chemical agent:

(a) An effective warning system must be employed and understood by all personnel.

(b) Once chemical operations are initiated or become imminent, all personnel will assume the mission-oriented protective posture (MOPP) (FM 21-40) and take as much protection as the threat, situation, and mission allow. When subjected to artillery attack, bombing, aircraft spray, or enemy smoke, all personnel will take maximum protection.

(c) Wear chemical protective clothing when alerted to the presence of chemical agents.

(d) Avoid contaminated areas, when possible.

(e) Insure that chemical protective and detection equipment function properly.

(f) Personnel in bunkers and buildings should secure windows, doors, and other openings when under chemical attack.

(g) Know and apply self aid and first aid measures.

(3) *Biological.* Biological agents are micro-organisms that can cause death or disease in personnel, plants, or animals, or cause the deterioration of materiel. Since the presence of these agents can be confirmed only by laboratory examination, significant numbers of personnel may become infected before the agents are known to be present. Furthermore, biological agents do not produce immediate casualties because the incubation period may last hours, days, or weeks. Biological agents may contaminate food and water supplies and, in some cases, clothing and equipment, or they may be spread by insects such as mosquitoes, flies, and ticks. The following measures will reduce the vulnerability of personnel to biological agents.

(a) Use masks and chemical protective clothing when biological attack is suspected. Normal field uniform, properly worn with field protective mask, will generally provide an effective covering against biological agents.

(b) Clean breaks in the skin and keep them covered.

(c) Keep food and water supplies protected.

(d) Avoid food and water which may be contaminated. This includes native foods and beverages, fruits, vegetables, and animals.

(e) Maintain high standards of personal cleanliness and sanitation.

(f) Notify medical personnel at the first indication of sickness.

(g) Keep immunizations current—a must for all personnel.

(4) *Radiological and Nuclear.* The effects resulting from detonation of nuclear weapons are classified as blast, thermal radiation, and nuclear radiation.

(a) Blast. The blast effect of a nuclear detonation is caused by the violent changes in air pressure that develop almost instantaneously after the explosion. The high winds and difference in air pressure may cause buildings to collapse, vehicles to overturn, and flying debris to fill the air.

(b) Thermal radiation. Thermal radiation is the heat and light produced by the nuclear explosion. The heat may cause injuries from either flash burns or burns caused directly or indirectly by the explosion. The flash of light may cause dazzle (temporary loss or reduction of vision).

(c) Nuclear radiation. The nuclear radiation produced by the explosion is classified as either initial or residual. Initial nuclear radiation is defined as that nuclear radiation emitted by a nuclear explosion within the first minute after the burst. The nuclear radiation emitted after 1 minute is residual radiation. Residual nuclear radiation results from the surface contamination or from contaminated particles in the atmosphere which gradually settle to earth. Either type of radiation may result in sickness or death.

(d) Defensive measures. The following measures will be helpful in reducing casualties as a result of a nuclear detonation:

1. Take cover immediately. Seek cover behind any obstacle or terrain feature which is immediately available but do not remain standing in order to find shelter. Personnel prone on the ground are better protected than those standing.

2. Cover exposed skin on hands and face.

3. Prepare positions and fortifications as soon as possible.

4. Dig in or revet equipment and weapons. acquaint personnel with its use.

5. Establish an effective warning system and acquaint personnel with its use.

6. Avoid contaminated areas.

7. Thoroughly familiarize personnel with first aid and decontamination procedures.

8. Avoid contact with materiel, food, and water until such items have been checked for radiation and declared free of contamination.

4-6. Use of Nonair Defense Weapons Against Air Attack

a. Concept.

(1) The substantial low-altitude air threat faced by units in the combat theater may be partially countered by aggressive use of the large volume of fire which non-air defense weapons can place against this threat.

(2) Exercise of the individual and collective right of self-defense against hostile aircraft must be emphasized. Hostile aircraft includes all attacking aircraft and those positively identified enemy aircraft which pose a threat to the unit. Large volumes of fire from non-air defense weapons have proven capable of destroying both low- and high-speed aircraft or disrupting their attack. Exercise of this right of self-defense does not demand specialized use of communications and is in consonance with paragraph 306, JCS Pub. 8 (Doctrine for Air Defense from Oversea Land Areas).

(3) Indiscriminate use of non-air defense weapons must be prevented due to the resulting danger to friendly aircraft and troops and the requirement to place in proper perspective the technique of withholding fire to preclude disclosure of positions. Effective and safe employment of these weapons necessitates Army-wide training. Engagement of hostile aircraft in immediate self-defense will be most frequent and training emphasis should reflect this.

(4) Situations may arise wherein the exercise of the right of self-defense would be temporarily suppressed, or when more freedom in the use of non-air defense weapons against aircraft should be encouraged. The former case involves a local decision that prevention of position disclosure is paramount. No tice of such restriction is disseminated through command channels. The latter case should be based on a theater-level decision.

b. Rules 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 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.

c. Techniques. The following techniques should maximize the destructive and/or deterrent effect against aircraft. Aircraft may be divided into two categories, low- and high-speed. Low-speed aircraft includes helicopters and liaison, reconnaissance, and observation fixed-wing propeller aircraft. High-speed aircraft includes all other propeller aircraft and all jet fixed-wing aircraft. This distinction will result in simplified engagement procedures.

(1) *Engagement of low-speed aircraft.* In accordance with the rules of engagement, engage low-speed enemy aircraft with aimed fire, employing the maximum weapon rate of fire. Aerial gunnery techniques (less lead) generally applicable to all small arms and automatic weapons are presented in FM 23-65 and 23-15.

(2) *Engagement of high-speed aircraft.* In accordance with the rules of engagement, engage high-speed enemy aircraft with maximum fire aimed well in front of the aircraft, and above its flightpath, to force it to fly through a pattern of fire. This technique is not unaimed barrage fire, but requires a degree of aimed fire. It does not, however, call for careful estimation of aircraft speed and required lead.

(3) *Use of tracer ammunnition.* Automatic weapons should utilize the highest practical proportion of tracer ammunition to enhance the deterrent or disruptive effect.

(4) *Massed fire.* Units should employ a massed-fire technique when using small arms and automatic weapons in an air defense role.

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

(1) *Applicability.* (Include operators of designated weapons.)

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

(3) *Relation to passave 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 and to engage all other hostile aircraft on orders through the unit chain of command, subject to the rules of engagement and rules for withholding fire.)

(5) *Rules of engagement.* (Normally, self-defense only against all attacking aircraft and those positively identified hostile aircraft which pose a threat to the unit.)

(6) *Rules for 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.* (See FM 44-1. Applicable only to weapons specifically assigned an air defense role; 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.)

Section III. SUPPLEMENTARY MEASURES

4-7. General

In addition to the specific security measures discussed in paragraphs 4-3 through 4-6, the ability of air defense artillery units to survive can be enhanced by use of the procedures discussed in paragraphs 4-8 and 4-9. Supplementary measures have implications broader in scope than those which pertain solely to local security. These procedures will require approval of the force commanders and coordination with forces in whose areas the procedures are implemented.

4-8. Dummy and Decoy Positions

A dummy installation is an object or activity which reproduces a limited number of selected characteristics of the installation, object, or activity which it simulates. Dummy equipment reproduces visual or sonic characteristics. Dummy activity may reproduce appearance, sound, or timing. A decoy installation, equipment, or activity is used to draw the attention of hostile forces to keep the enemy from acting against the position it is intended to cover. Location of dummy and decoy positions must be planned to properly support the overall concept of operations. The effectiveness of this technique can be improved by periodic interchange of dummy and actual units. Approval authority for the installation of dummy positions rests with the force commander. The air defense commander insures that construction of ADA dummy positions is integrated in the force deception plan an takes necessary steps to secure engineer support for construction of these positions.

4-9. Movement to Avoid Targeting

Chaparral/Vulcan and FAAR positions primarily in the forward combat area lend themselves to detection and observation by hostile forces. The longer these positions are occupied, the greater is the probability that they will be subjected to field artillery or air attack. To reduce this danger, weapons and command posts should be displaced at irregular intervals to alternate positions which have been repared in advance. Movement to alternate positions will be appropriate after Vulcan firing if it is suspected that weapon positions have been located by the enemy. These alternate positions should be so selected that, when occupied, no measurable degradation will result in the overall defense.

SUMMARY

All reasonable measures, active and passive, which do not degrade system effectiveness or interfere with the accomplishment of the assigned mission should be employed by C/V units to enhance survivability.

All available weapons are sited to achieve maximum effectiveness against air and ground attack.

Security outposts and listening posts are employed.

Communications (hot loop) are established with perimeter elements and elements within the perimeter.

Obstacles are used to reinforce the outpost system and the perimeter defense.

An effective early warning system must be initiated to preclude surprise attack by aircraft or ground forces.

The C/V battery SOP specifies procedures to be followed by platoons and sections operating independently of the parent unit.

The commander must prepare a camouflage plan to take advantage of natural concealment and to supplement the natural means by a skillful application of camouflage principles. He must also insure strict adherence to blackout principles and regulations.

Displacing to previously prepared positions may be necessary to avoid targeting.

Excessive and careless use of radio communications and radar must be avoided.

The quality of training and the availability and proper use of chemical protective clothing and equipment will determine the effectiveness of the unit during a CBR attack.

CHAPTER 5
COMMAND AND CONTROL

Section I. COMMAND RESPONSIBILITIES

5-1. General

The principles of command and control of theater air defense operations and a detailed listing of Army air defense officer functions at all levels are presented in FM 44-1. Only those functions applicable to a Chaparral/Vulcan battalion will be presented in this chapter.

5-2. Field Army and Corps Commanders

a. Command of the ADA units required for defense of designated vital areas in the field army service area is retained at field army level and this command is exercised through the field army air defense organization, normally an ADA brigade.

b. Command of the ADA units required for defense of designated vital areas in the corps area may be retained at either field army or corps level. This command is exercised through the field army air defense organization or through the corps air defense organization (normally an ADA group), as appropriate.

5-3. Division Commanders

a. Division organization for combat is the prerogative of the division commander. The organic Chaparral/Vulcan battalion is normally retained under division control.

b. The normal ADA organization for air defense of the division retains all units in the Chaparral/Vulcan battalion. ADA units with the primary mission of air defense are given appropriate standard tactical missions (para 1-6*c*). Attachment of ADA elements with an air defense mission to division elements is required only if the mission of the supported unit is such that attachment is necessary for successful accomplishment of that mission. For example, a supported maneuver brigade conducting a separate semi-independent operation under conditions which make air defense control by the parent Chaparral/Vulcan battalion quite difficult.

c. Attachment of Vulcan batteries, platoons, or squads (fire units) to division elements is normal when the Vulcan unit is assigned the *primary* mission of ground fire support. The supported unit may assign an appropriate ground fire support tactical mission in accordance with FM 6-20-1.

d. An order attaching an ADA unit must fully cover the functions to be performed by the gaining commander and those to be retained by the ADA commander. When an ADA unit is attached, orders directing the attachment must provide for adequate logistical support of the ADA unit.

e. An ADA unit may be put under the operational control (OPCON) of another unit. In this case, the ADA organization retains the command, administrative, and logistical functions not included in operational control (FM 44-1).

5-4. ADA Chaparral/Vulcan Unit Commanders

a. When an ADA unit is assigned or attached to another unit for defense of that unit, the ADA unit commander is a subordinate commander of the gaining unit commander. A possible exception, which must be either provided for or prohibited in the division SOP, is that ADA commanders may receive restrictive orders regarding control of air defense fires via air defense channels. These orders may be received directly from the parent ADA organization or indirectly through the unit to which attached. The former method takes advantage of the established quick reacting air defense communications nets.

b. An ADA commander who has all firing elements further attached will position his command post to best advise and assist the headquarters to which his unit is assigned or attached, will maintain any radar surveillance capability not further attached or assigned, and will plan for change in mission and command arrangements.

5-5. AADCP

The AADCP is the air defense commander's command post. The Chaparral/Vulcan AADCP is not supported by an electronic command, control, and coordination system. (See FM 44-1-1 for detailed procedures for manual AADCP'S.) The commander exercises control through the use of SOP and voice communications. The battalion operations and intelligence section and communications section are the primary functioning sections in the AADCP. These sections maintain current situation maps, intelligence maps, and future operation plans. All incoming tactical and intelligence information is processed and evaluated in the AADCP. The battalion S3 or assistant S3 supervise the operations of the primary AADCP. Provisions also must be made for the establishment of an alternate AADCP at one of the firing batteries if the ACE cannot function as the alternate. This is an emergency measure only and is not suitable for prolonged operations.

Section II. CONTROL MEASURES

5-6. General

The basic measures used to control Chaparral/Vulcan elements are mission assignment, air defense priority assignments, control of deployment, and control of ADA fires. Control is exercised through dissemination of detailed unit SOP based on theater air defense policies and procedures and by provision of liaison and communications.

5-7. Mission Assignment

Chaparral batteries are assigned the primary mission of air defense. Vulcan batteries may be assigned the primary mission of air defense, the primary mission of air defense and a *secondary* mission of ground fire support, or the primary mission of ground fire support. The latter mission is normally assigned only when the current air threat is relatively negligible.

5-8. Air Defense Priority Assignments

The ADA means available to the division or supported unit may not be sufficient to defend all high value assets; therefore, the air defense officer must be prepared to recommend air defense priorities based on the division commander's concepts and values placed on the division's military assets. *As the number of available fire units decreases, the assignment of air defense priorities becomes more important.* Detailed information concerning asset values and air defense priorities is contained in paragraph 10-3 and appendix B, FM 44-1.

5-9. Control of Deployment

The Chaparral/Vulcan battalion, battery, and platoon commanders deploy their forces as necessary to accomplish the assigned tactical missions. Air defense coordination requirements may be imposed through the field army ADA organization.

5-10. Control of ADA Fires

a. Control of Chaparral/Vulcan units differs from the procedures established for the longer range Nike Hercules and Hawk missile systems. The more sophisticated missile systems, with their long-range acquisition radars and electronic command, control, and coordination systems, have sufficient early warning and reaction time to allow for centralized influence on their fires. With the Chaparral/Vulcan, the elapsed time from detection and identification of a target to flyover is measured in seconds rather than minutes. Therefore, *the control of fires cannot be effectively accomplished higher than fire unit level and the authority to engage must be delegated to the fire unit, subject to rules of engagement.* When Chaparral/Vulcan fire units are placed under the operational control of a maneuver unit, the maneuver unit commander will control the fires of the C/V units. The control, subject to the theater rules of engagement and weapon control status, will be in accordance with unit orders and SOP and the personal directives of the maneuver unit commander.

b. Concepts.

(1) The right of self-defense against air and ground attack is never denied.

(2) ADA squads during wartime normally make air defense engagement decisions based on the rule that aircraft positively identified as hostile will be engaged. This rule may be changed to allow relatively unrestricted engagement or to impose increased fire restrictions. This concept for control of fires is dependent on existence of a clear and detailed air defense SOP covering the items discussed in *c* through *j* below, and communications to allow higher echelons to modify air defense rules and procedures as the situation demands.

(3) ADA Vulcan units assigned a ground fire support mission deliver surface-to-surface fires in accordance with the force commander's decisions.

c. Theater Alert System. The theater commander insures an orderly transition from peace to war through use of an alert system.

(1) *Conditions of readiness.* Conditions of readiness are the means used by specified authorities to maintain the theater air defense at a state of preparedness compatible with the real or apparent imminence of attack. The terms, defense readiness conditions (DEFCON) or defense readiness posture (DEFREP), are frequently used in relation to conditions of readiness. In response to each condition of readiness, the Chaparral/Vulcan battalion SOP may prescribe a required state of alert for subordinate ADA units. The commander exercising operational control of the battalion normally defines its state of alert, based on theater policy.

(2) *Air defense warning.* Air defense warnings are normally issued after the air defenses have reached their highest conditions of readiness, and represent the air defense commander's evaluation of the probability of air attack. There are three levels of air defense warning—RED, attack imminent or in progress; YELLOW, attack probable; and WHITE, attack not probable. The conditions of readiness ((1) above) and the air defense warnings serve as a basis for implementation of the air defense rules and

procedures of the regional air defense commanders. These rules of engagement and procedures are established in operation orders or SOP.

(3) *Response to alert system.* Chaparral/Vulcan battalions respond to the alert system of the tactical ground units to which assigned or attached. In addition, conditions of readiness and air defense warnings which are applicable to all air defense units may be received through early warning nets or liaison channels.

d. Rules of Engagement.

(1) The following rules of engagement are considered typical for ADA operations:

(a) During conditions short of war, engagements are conducted only in self-defense or as ordered by designated commanders.

(b) During wartime, engagements are conducted in accordance with current orders, SOPs, the prevailing ADA weapon control status (*e* below), and the hostile criteria (*f* below). *The right of self-defense is never denied in peace or war.*

(2) Implementation of the rules by ADA Chaparral/Vulcan squads requires that visual determination be made of the friendly or hostile character of each aircraft; therefore, the rules are based on use of detailed visual identification criteria. Visual identification is discussed further in *i* below.

e. ADA Weapon Control Status. Each ADA weapon control status indicates the degree of air defense fire restriction imposed. A normal wartime status for ADA should be specified in the theater rules. Authority to change or modify ADA weapon control status, if any, should also be specified. Frequently, only the authority to temporarily impose additional restrictions is delegated. The ADA weapon control status terms defined and discussed below may be combined. For example, more freedom to fire at fixed-wing aircraft and less freedom to fire at helicopters may be authorized.

(1) *Weapons free.* Fire at any aircraft not identified as friendly. Under this status, "unknowns" or "doubtfuls" may be engaged.

(2) *Weapons tight.* Fire only at aircraft positively identified as hostile. This should be the normal ADA weapon control status for ADA Chaparral/Vulcan squads in wartime. Theater rules of engagement will specify exact criteria for declaring an aircraft hostile when operating under this status. Examples of hostile criteria are presented in *f* below.

(3) *Weapons hold.* Do not fire. Due to the difficulty of transmitting accurate flight information to ADA Chaparral/Vulcan squads, it may be necessary to have this ADA weapon control status apply to these units within a designated area in terms of time and basic aircraft type (e.g., weapons hold, 1400-1430, rotary wing; or weapons hold, 1400-1430, F-105 strike). This status should only be specified if safeguards over and above those inherent in the normal weapons tight status are desired.

f. Hostile Criteria. The theater rules of engagement will define criteria by which an aircraft may be designated hostile. For example, the rules of engagement may classify as hostile those aircraft which are—

(1) Attacking friendly elements.

(2) Responding improperly to electronic IFF interrogation.

(3) Discharging spray or smoke over friendly elements without prior coordination.

(4) Dropping flares over friendly territory without prior coordination.

(5) Discharging parachutists or unloading troops in numbers in excess of the normal aircraft crew without prior coordination.

(6) Engaging in minelaying operations without prior coordination.

(7) Operating at prohibited speeds, altitudes, or directions.

(8) Performing improper or unauthorized entry into an area designated as restricted or prohibited.

(9) Engaging in improper departure from an area or corridor designated as "safe."

(10) Dropping electronic countermeasure devices; e.g., chaff and reflectors over friendly territory without prior coordination.

(11) Bearing the military insignia or having the configuration of an aircraft employed by a known enemy nation.

Notes: 1. Although rules (1) and (11) above, are to be the primary rules considered for visually-directed air defense weapons, the remaining rules may provide useful indicators for focusing attention on probable hostiles.

2. Care must be taken to insure that coordination responsibilities are clearly defined and that hostile criteria are disseminated to Army aviation units operating in the area.

g. ADA Methods of Control.

(1) *General.* The rules of engagement may specify or imply the required ADA method of control. There are two methods of control, centralized and decentralized. However, units should be trained and prepared to operate autonomously if communications are interrupted.

(2) *Centralized.* Under this method of control, an air defense commander may require that each engagement be conducted only after receipt of specific permission from a designated higher air defense echelon. The right of unit self-defense is not denied.

This method of control *is not normal* for ADA Chaparral/Vulcan squads.

(3) *Decentralized.* Under this method of control, engagement decisions are made at the ADA squad level, based on the rules for engagement and subject to any temporary engagement restrictions imposed by higher echelons. Normally, decentralized control is used for ADA Chaparral/Vulcan squads assigned air defense missions.

(4) *Autonomous operation.* When communications with higher headquarters have been lost, Chaparral/Vulcan squads, batteries or battalions may continue to engage targets based on the rules for autonomous operations prescribed by higher headquarters.

h. Fire Coordination. Fire coordination in an ADA defense is achieved through proper defense design, assigning each ADA squad one primary and one or more secondary sector(s) of fire, and is further insured by personal orders or unit SOPs. Target appearing in the primary sector receive priority over those in secondary sectors of fire. (As many fire units as possible should be brought to bear on every target unless ammunition is limited.)

i. Firing Techniques.

(1) *Vulcan.*

(a) Radar mode. An engagement begins when the aircraft is initially detected. The weapon will be in the radar mode. When a target is observed, the operator slews the turret to visually acquire the target in the gunsight. Having acquired the target, the gunner depresses the "radar radiate" foot switch and continues to visually track the target. When the target is within the engagement envelope and the proper lead is developed, the READY-TO-FIRE lamp on the gunsight is lighted. The gunner can then commence firing, when the target has been identified as hostile, by pressing the firing button on the gunner's handgrip. The gunner will continually correct his sight picture throughout an engagement aiming at the center of target mass. The gunner must press the firing button each time he wishes to fire a burst. Firing will continue until the target is destroyed or exceeds maximum engagement range. If the RADAR READY lamp or the gunsight READY-TO-FIRE lamp fails to light, or if it blinks or goes out during an engagement, the gunner will select the manual mode, and proceed as indicated in *(b)* through *(d)* below.

(b) Manual mode. When a target is observed and identified as hostile, the gunner will estimate the target speed and range-at-fire and set these values on the appropriate firing panel dials. After he is tracking the target smoothly and when the target is at the estimated firing range, the gunner presses the firing button. The READY-TO-FIRE lamp remains lighted at all times in manual mode. After a burst, the gunner will again estimate the firing range and set this on the firing dial, smoothly track the target, and fire the weapon. The gunner will aim and track at the center of target mass. If the gunner loses the correct sight picture, he will cease firing, reacquire the target, and proceed in the engagement process as stated above.

(c) External mode. This mode is similar to the manual mode, but requires an observer, external to the turret, to estimate range of the target at which the weapon is to be fired and turn the range knob on the external range unit to the estimated value. The gunner slews the turret to visually acquire the target and continuously tracks the target while aiming at the center of target mass. The observer will turn on the gunsight READY-TO-FIRE lamp when the estimated target range corresponds to the handset range. When the gunsight READY-TO-FIRE lamp is lit and the gunner has a correct sight picture, the gunner will press the firing button. The observer can continually change the range setting at his discretion. The gunner must press the trigger each time he desires to fire a burst. This procedure will be repeated until the target is destroyed or is out of range.

(d) Ground fire mode. The gunner will normally select the high rate of fire in the ground mode and fire bursts of 10 or 30 rounds, but the low rate of fire may be used for sustained fire. In the ground fire mode, the radar and computing feature of the sights are not used. The sight is mechanically caged and a super-elevation of 7 mils is automatically inserted into the sight. This will allow for engagement of targets at ranges of about 500 to 1,000 meters when the target is sighted in the center of the sight's inside-ring reticle. For ranges greater than 1,000 meters, a break in the bottom of the inside-ring reticle has been provided for target sighting. When a stationary hostile ground target is observed, the gunner slews the turret to visually acquire the target in the center of the gunsight reticle. He estimates the range as less than, or greater than, 1,000 meters. If it is less than 1,000 meters, he fires at the target and adjusts his impact point so that the preponderance of the round is placed on the apparent center of target mass. If the gunner estimates that the apparent center of target mass is greater than 1,000 meters, he elevates the weapon to center the target within the 3-mil gap in the 6 o'clock position of the inside-ring reticle, fires the weapon and adjusts the impact point to place the preponderance of rounds on the target. The

gunner fires in short bursts of 10-30 rounds each; he continues to fire until the target is destroyed, or out of range or the squad leader commands him to cease fire.

(2) *Chaparral.* The method of fire for the Chaparral squad varies with the target performance and number of aircraft in the raid. For detailed information see FM 44-4.

(a) Single target. Against all single-target raids a *SHOOT* (one missile)—*LOOK—SHOOT* method of fire is employed. This method involves a hasty kill assessment at the time of smoke clearance. If, after smoke clearance from the previous launch, the target has not been killed, another missile will be launched immediately. The squad leader will make the kill assessment and order cease fire when a kill is observed.

(b) Multiple target. A SHOOT—NEW TARGET—SHOOT method of fire will be employed for multiple targets. This method varies from the SHOOT—LOOK—SHOOT method in that successive launches are against different elements of the multiple target raid.

j. Visual Identification. Chaparral/Vulcan operations under the concept for control of the fires of visually-directed air defense weapons involves visual aircraft identification by the squad leader. It is essential that all weapon crew personnel be continually trained in visual aircraft recognition with emphasis placed on recognition of aircraft common to the particular operating area. Members of the crew may give tentative aircraft identification; however, the final identification is the responsibility of the squad leader.

5-11. Coordination of Operations

a. General. ADA operations must be fully integrated into all operations of the defended/supported force. Coordination with all elements/units involved in the operation will enhance area air defense. Coordination is accomplished through use of liaison personnel and communications. Integration is enhanced through collocation of command posts whenever feasible.

b. Liaison. Liaison requirements vary with force organization. As a general rule, commanders of ADA battalions, batteries, and platoons should establish personal liaison with the force to which they are assigned, or supporting, whenever the force and ADA command posts are not collocated. ADA liaison personnel usually operate in the force operations center and are responsible for assuring that the force commander and staff are informed of Chaparral/Vulcan tactics, techniques, and employment and that the Chaparral/Vulcan commanders represented are kept abreast of changes in air defense requirements and the ground tactical situation.

c. Communications. Communications are also required for rapid receipt of changes for air defense control of fires. These communications follow air defense artillery channels to a designated area air defense operations center from which they are passed to the lowest echelon AD units. Lower echelon ADA elements, when assigned or attached to other units, may find it necessary to establish a portion of the control of fires network through the communications network of the unit to which they are assigned or attached. However, communications for coordination or control of fires through ADA channels are preferred.

Section III. TYPES OF COMMAND ARRANGEMENTS

5-12. General

Air defense artillery command arrangements are tailored to each force organization and situation. Figures 5-1 through 5-3 depict several types of structures which are discussed in the following paragraphs.

5-13. ADA Chaparral/Vulcan Battalion Organic to Division

a. The Division Area.

(1) *C/V units at divisional level.* The divisional Chaparral/Vulcan battalion normally functions directly under the command of the division headquarters as a major subordinate command of the division (fig 5-1). The battalion is organized and equipped to furnish ADA personnel to the airspace control element (ACE) operating in the division tactical operations center (DTOC) (para 1-4*a*(12)). The battalion also furnishes a liaison section to either the Hawk battalion, which furnishes the low- and medium-altitude air defense to the division, or to an air defense artillery group, whichever is appropriate. Command of the divisional Chaparral/Vulcan battalion is exercised by the division commander within the air defense rules and procedures imposed by higher headquarters. The battalion normally operates under a standing operating procedure that contains the standard air defense rules and procedures. The ADA personnel furnished to the ACE coordinate ADA battalion operations with those of the other combat and combat support elements of the division. The liaison

section furnished to the Hawk battalion or ADA group headquarters performs the normal liaison duties in addition to the coordination and integration of the divisional ADA battalion air defense plans with the field army or corps air defense plan. This section also has the responsibility for relaying to the battalion any restrictive fire control measures imposed upon the air defense artillery battalion through air defense channels. Usually the ADA battalion is under the command and control of the battalion commander through the battalion AADCP. If the support mission in the division operation order does not indicate a different command and control arrangement, the above relationship is assumed.

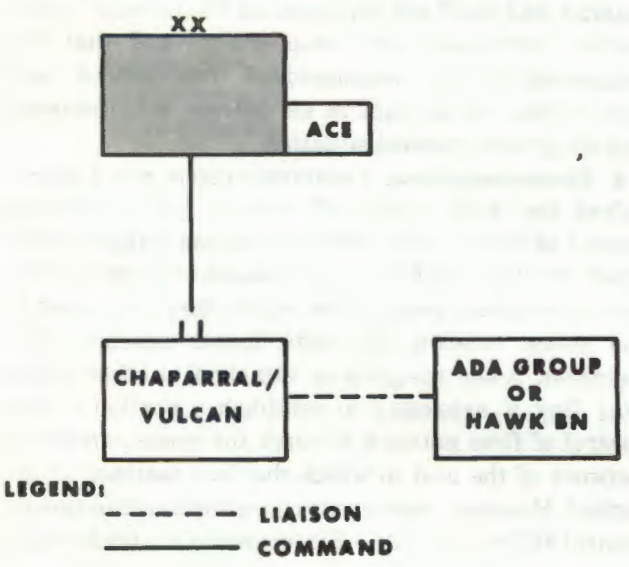


Figure 5-1. Type ADA command and control structure.

(2) *ADA units attached to a maneuver brigade or lower echelon unit.* To support certain types of division operations, it is sometimes necessary to alter the command and control relationship of the divisional ADA battalion to its subordinate elements and the forces being supported. Some tactical situations may require that a divisional brigade commander have the authority to exercise command, within the air defense rules and procedures, over elements of the Chaparral/Vulcan battalion supporting his operation. This situation is likely to occur when the brigade operates outside the division area, or when the divisional air defense artillery battalion would be overextended in attempting to support the brigade mission and the division primary mission resulting in a number of the ADA units being attached to the brigade. Figure 5-2 shows the command and control relationship that should exist for such a condition. To create this arrangement, the division directs attachment of elements of the ADA battalion to the brigade or task force. The attachment carries with it command to include mission-order designation and logistic support, except Chaparral/Vulcan-peculiar support, which normally will be furnished by the Chaparral/Vulcan battery or battalion. The elements of the ADA battalion may be organized into a composite Chaparral/Vulcan battery. This sort of an arrangement is often associated with the division's requirement to tailor a task force for a specific mission which requires decentralization of command to the brigade task force level. The composition of the attached elements would depend on the expected low-altitude threat to the task force, the type and effectiveness of the low- and medium-altitude area air defense in the task force area of operations, and the density of small vital areas expected in that area. The divisional ADA battalion is organized to react readily to any requirement for cross-attachment of Vulcan and Chaparral weapon squads and platoons. In this situation, the attached battery commander becomes the brigade task force air defense officer and advises the brigade task force commander on the design and conduct of the air defense of the task force. The attached battery commander must be provided sufficient additional personnel and equipment to enable him to establish and maintain a battery command post on a 24-hour basis and coordinate his activities with the ADA battalion AADCP. Conditions could be such that the attached battery would be required to operate autonomously at times; however, every effort must be made to maintain coordination with the battalion AADCP at all times. The attached ADA battery commander will provide a liaison officer to the brigade task force headquarters. Whenever possible, coordination of air defense rules and procedures should come to the attached ADA battery commander through two channels of communications—direct from the battalion AADCP to the ADA battery and from the ACE through the task force channels to the ADA battery.

b. Maneuver Brigade Operational Control. The situation may exist in which the maneuver brigade has a mission requiring more directly responsive air defense capability than the organic all-arms weapons afford. This situation may arise when a brigade has an extremely vulnerable low-altitude

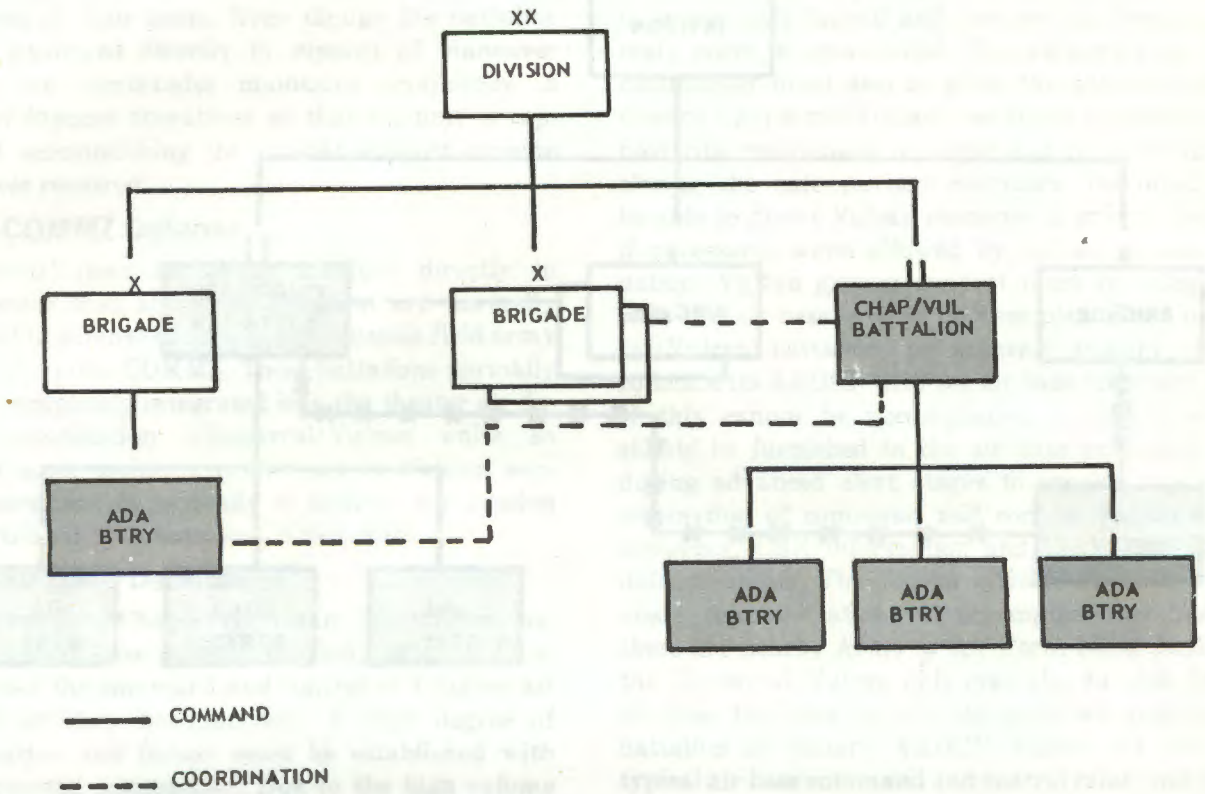


Figure 5-2. ADA battery attached to maneuver brigade.

avenue of approach which is relatively separate from the overall divisional area air defense plan. When this occurs, a portion of the ADA battalion may be placed under the operational control of the brigade commander. Figure 5-3 shows the command and control relationship that exists in this situation. OPCON gives the brigade commander the authority to control the maneuver of the air defense units supporting him and the authority to designate priority of defense within his area of operation. However, the brigade is not responsible for air defense logistics and other functions not included within operational control. Essentially, this method of command and control requires the ADA battery commander supporting the brigade to react to the defense priorities as they are changed by the brigade commander and keep the ADA battalion commander informed of the changing defense plans. The ADA officer at the brigade being supported closely monitors the brigade maneuver and air defense plans and advises the brigade commander on air defense matters.

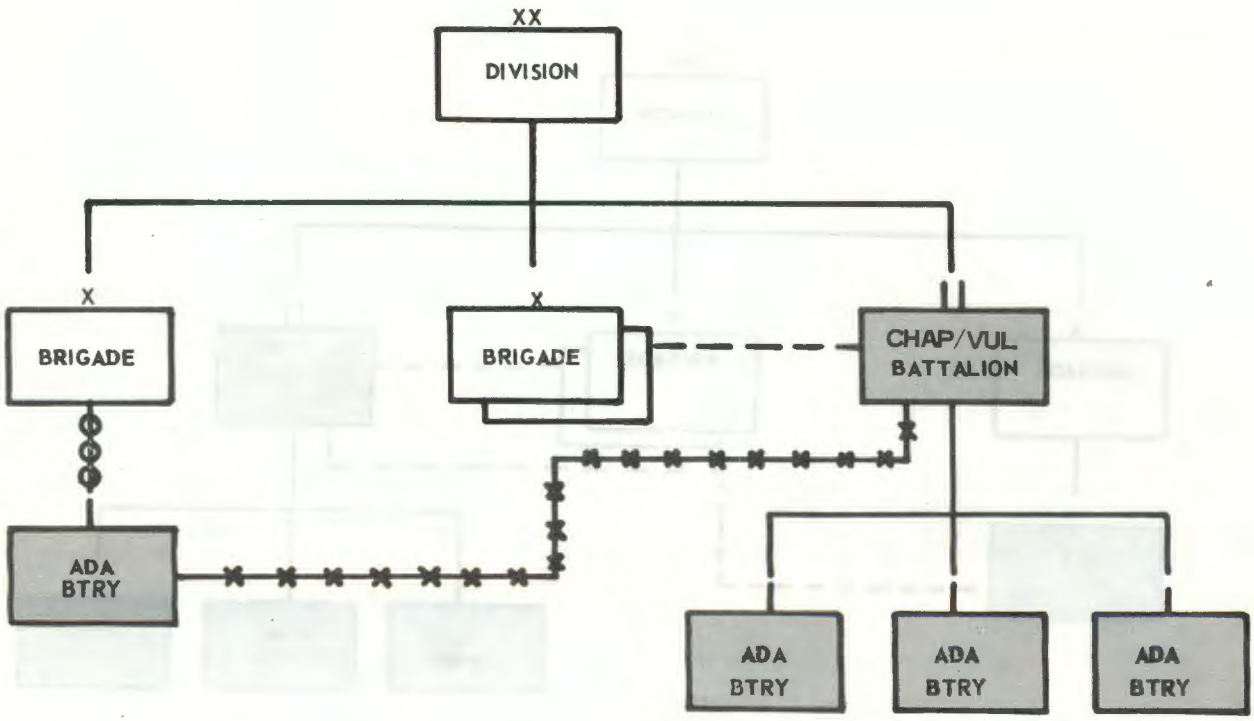


Figure 5-3. Brigade operational control of ADA battery.

5-14. Corps Rear Area and Field Army Service Area Defense

a. Tactical Environment. The type of force being supported by the ADA battalion determines the tactical environment surrounding its operations. Those units involved in the air defense of the field army service area as a part of the overall field army air defense will not be affected directly by any given ground combat operation. The areas being defended are relatively stable regardless of the type of operation. The ADA unit commanders must be prepared to receive and execute a mission of supporting divisional ADA battalions.

b. Field Army Service Area Defense. The Chaparral/Vulcan battalions assigned or attached to the field army air defense artillery brigade are employed with longer range air defense artillery units (Nike Hercules/Hawk) as a part of the overall air defense of the field army. Their mission is the low-altitude defense of specified vital complexes located in the service area of the field army. The battalion functions under the command and control of an air defense artillery group. The Chaparral/Vulcan battalion mission, as a part of a composite defense, is spelled out in detail by the ADA group operation order. The battalion commander and his staff work closely with the group staff as well as the commander of the vital area in planning the defense. Once planning is accomplished and firing positions are occupied, the commanders and staff can concentrate on the supervision of training, maintenance, ground security, improvement of firing po-

sitions, and other functions to improve the combat readiness of their units. Even though the battalion is not employed directly in support of maneuver forces, the commander maintains proficiency in division support operations so that his unit is capable of accomplishing the combat support mission whenever required.

5-15. COMMZ Defense

Chaparral/Vulcan battalions assigned directly to the theater area air defense system are normally deployed in defense of vital targets outside field army areas, i.e., in the COMMZ. These battalions normally will be completely integrated into the theater air defense organization. Chaparral/Vulcan units so utilized must maintain proficiency in division support operations to be ready to assume the mission of a divisional ADA battalion, if necessary.

5-16. Air Base Defense

Non-divisional Chaparral/Vulcan battalions assigned an air base defense mission normally function under the command and control of a higher air defense artillery headquarters. A high degree of coordination and liaison must be established with the supported commander. Due to the high volume of air traffic, safe passage corridors and procedures to insure safe launch and recovery of friendly aircraft must be established. The supported air base commander must also be given the authority to influence Chaparral/Vulcan operations by prescribing hold fire restrictions or areas and by opening and closing the safe passage corridors. He must also be able to divert Vulcan elements to ground defense if necessary, when allowed by the air defense situation. Vulcan ground support must be integrated with the air base ground defense plan. The Chaparral/Vulcan battalion, or separate battery should collocate its AADCP with the air base command post. If this cannot be accomplished, a liaison officer should be furnished to the air base command post during advanced alert stages to provide rapid dissemination of command and control measures, intelligence, CBR information and Chaparral/Vulcan defense status. The liaison officer must have adequate communications to accomplish this task. If there are nearby Army or Air Force radar facilities, the Chaparral/Vulcan unit may also furnish liaison to these facilities, to provide early warning to the battalion or battery AADCP. Figure 5-4 shows a typical air base command and control relationship.

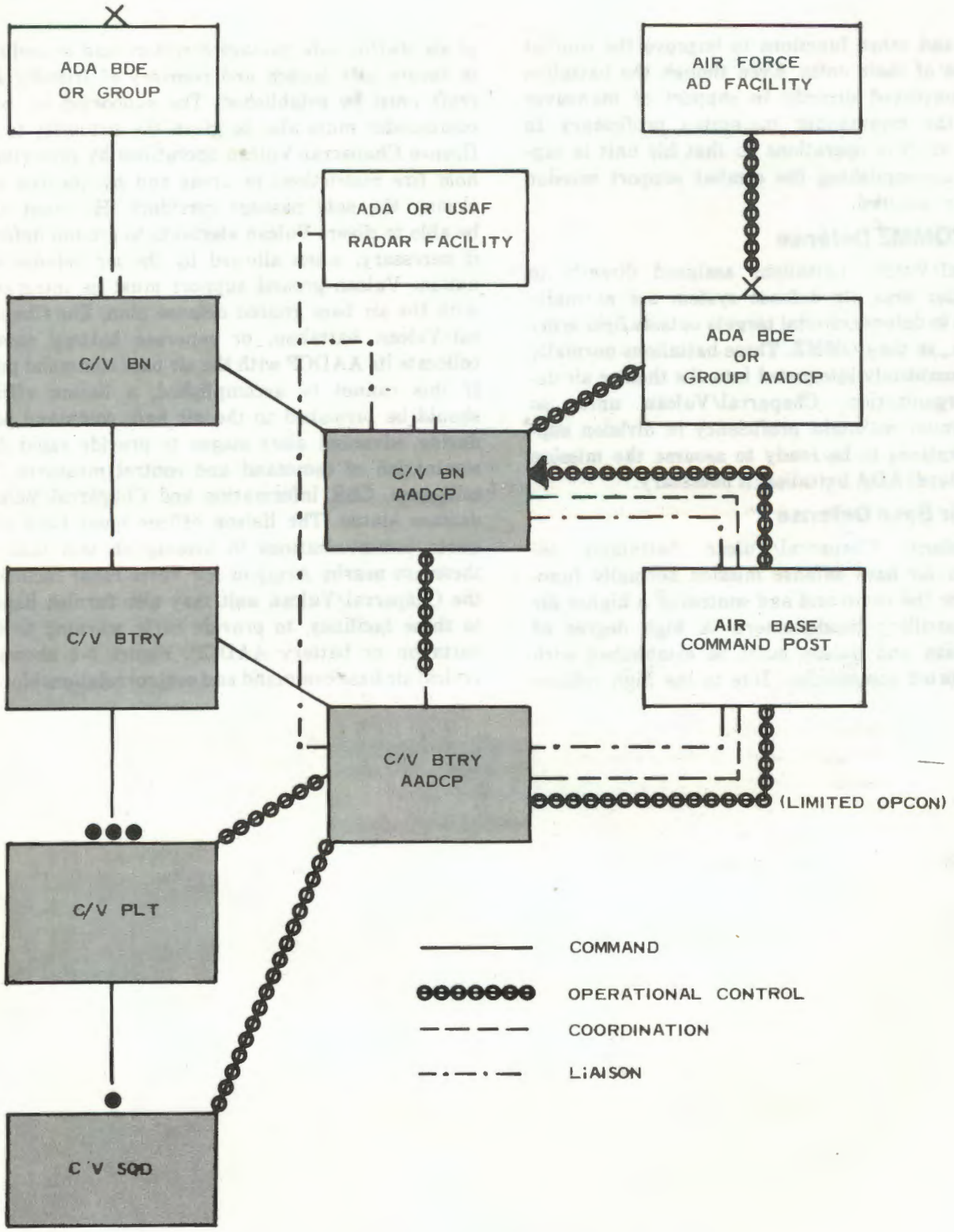


Figure 5-4. Command and control of ADA battalion and battery assigned an air base defense mission.

SUMMARY

Command of ADA units in the field army service area is exercised through the field army ADA organization, normally an ADA brigade.

Command of ADA units in the corps area is exercised through the field army or corps ADA organization, as appropriate.

Division ADA units are retained under division control, with command being exercised through the Chaparral/Vulcan battalion commander.

The Chaparral/Vulcan commander exercises command and control through the use of SOP and voice communications via his command post.

The basic measures used to control C/V elements are mission assignment, air defense priority assignments, control of deployment, and control of ADA fires.

Chaparral batteries are assigned air defense missions only.

Vulcan batteries may be assigned a primary mission of air defense only; or a primary mission of air defense and a secondary mission of ground fire support; or a primary mission of ground fire support when the air threat is relatively negligible.

The division air defense officer recommends air defense priorities based on the division commander's concepts and values placed on the division's military assets.

C/V battalion, battery, and platoon commanders deploy their forces as necessary to accomplish the assigned mission.

Because the elapsed time from detection and identification of a target to flyover is measured in seconds rather than minutes, the control of Chaparral/Vulcan fires cannot be accomplished higher than fire unit level. The authority to engage must be delegated to the fire unit, subject to compliance with conditions of readiness, air defense warnings, rules of engagement, ADA weapon control status, hostile criteria, and methods of control.

CHAPTER 6
COMMUNICATIONS

6-1. General

a. Radio and wire communications are used by Chaparral/Vulcan units to facilitate command and control. Because the Chaparral/Vulcan fire units are widely dispersed and subject to frequent and rapid moves, radio is the primary means of communication during employment and operations. To enhance security and counterintelligence, wire and messengers or liaison officers are the primary means of communication during planning. Radio nets are supplemented and paralleled by wire nets when the length of time in position permits. TOE communications equipment will meet requirements for tactical and administrative voice and teletype nets.

b. The critical use of and reliance on radio communications for command, control, and early warning render Chaparral/Vulcan operations especially vulnerable to exploitation of friendly transmissions by hostile collection and electronic countermeasure activities. Communications planners must give special and continuous attention to provisions for communications security and for effective ECCM to cope with the potential threat or the actual use of hostile jamming or deception. Electronic warfare is discussed in FM 32-20; radio ECCM techniques are contained in FM 24-18.

c. The commander is responsible for providing effective communications and for insuring continued unit operations through SOP should communications fail.

d. The unit communications-electronics staff officer is responsible to the commander for—

(1) Advising him on matters pertaining to the employment of communications equipment.

(2) Informing him of additional communications requirements.

(3) The proper installation, operation, and maintenance of unit communications equipment.

6-2. Radiotelephone Procedure

a. All unit personnel must be thoroughly familiar with proper radiotelephone procedure and comply with instructions contained in unit CEOI and CESI.

b. Unnecessary and improper transmission must be avoided to prevent the enemy from obtaining information. Effective communications security requires constant supervision by commanders and a high state of training on the part of personnel using communications. Communications security is discussed in chapter 4 as a survivability measure.

c. All unit personnel should be thoroughly trained in the proper application of electronic counter-countermeasures to reduce the effectiveness of enemy attempts to deny or degrade communications through jamming or deception. For details, see FM 24-18 and FM 32-20.

6-3. Battalion External Radio Nets (fig. 6-1)

a. Division Commanding General—Command Net (FM-Voice). The battalion commander and battalion executive officer monitor this net and enter as needed. (The battalion commander's vehicle is also equipped with an AM station to operate in the DTOC net.)

b. Division Operations/Intelligence Net (Radio teletypewriter (RATT) Net). The battalion operations section operates in this net in the AADCP to receive operations and intelligence instructions and information.

c. Division General-Purpose Net (RATT Net). The battalion communications section operates in this net for the exchange of administrative and logistical information.

d. Supported Unit Command Net (FM-Voice). The battalion S2, S3, Operations and Intelligence section monitor and enter as needed, the command net of any divisional unit that is being supported by the battalion.

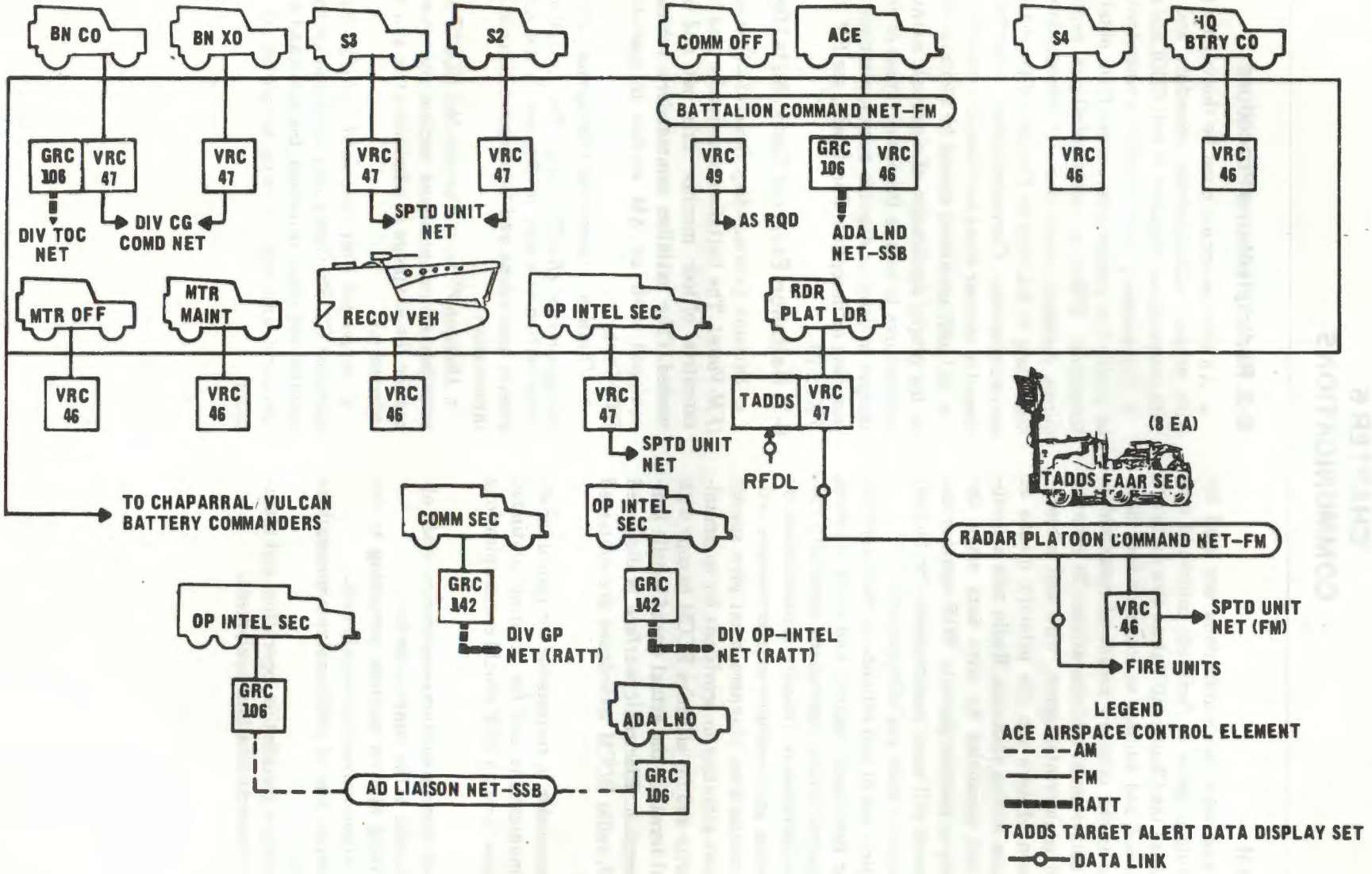


Figure 6-1. Types of Chaparral/Vulcan battalion radio nets.

6-4. Battalion Internal Radio Nets (fig. 6-1)

a. Battalion Command Net (FM-Voice). The battalion commander, executive officer, S2, S3, operations and intelligence section, communications officer, AD section of the ACE, S4 headquarters battery CO, firing battery COs, and firing battery executive officers operate in this net, which is controlled by the battalion communications section. The motor maintenance section, recovery vehicle, and FAAR platoon leader monitor this net and enter as needed.

b. Air Defense Liaison Net (AM-Voice). The liaison officer and the air defense section in the ACE operate in this net which is controlled by the battalion operations section in the AADCP. This net is used to exchange air defense operations and intelligence information between the battalion headquarters and the nearest ADA group or Hawk battalion AADCP; and between the battalion headquarters and the ACE.

c. Target Alert Data Display Set Data Link (One-Way Digital). This is a one-way digital data link from the FAAR sections to the Chaparral and Vulcan platoons and fire units. The link provides location and tentative identification alerting information on FAAR-acquired targets. There is an alternate provision in the TADDS for additional information to be transmitted by voice in place of digital data. Use of the voice alternative must be controlled by SOP.

d. Forward Area Alerting Radar Platoon Command Net (FM-Voice). The eight FAAR sections operate in this net which is controlled by the FAAR platoon.

6-5. Chaparral and Vulcan Battery Radio Nets (figs. 6-2 and 6-3)

a. Battalion Command Net (FM-Voice). The battery commander and the executive officer operate in this battalion net.

b. Target Alert Data Display Set Data Link (One-Way Digital). The platoon leaders and fire units monitor the TADDS (para 6-4c).

c. Supported Unit Command Net (FM-Voice). The battery CO, executive officer, platoon leaders, and fire units monitor and enter as needed, the command net of any divisional unit which the unit is ordered to support.

d. Battery Command Net (FM-Voice). The battery CO, executive officer, and platoon leaders operate in this battery net which is controlled by the battery communications section. The system maintenance and ammunition section and the recovery vehicle monitor this net and enter as needed.

e. Platoon Command Net (FM-Voice). The fire units operate in this net which is controlled by the platoon.

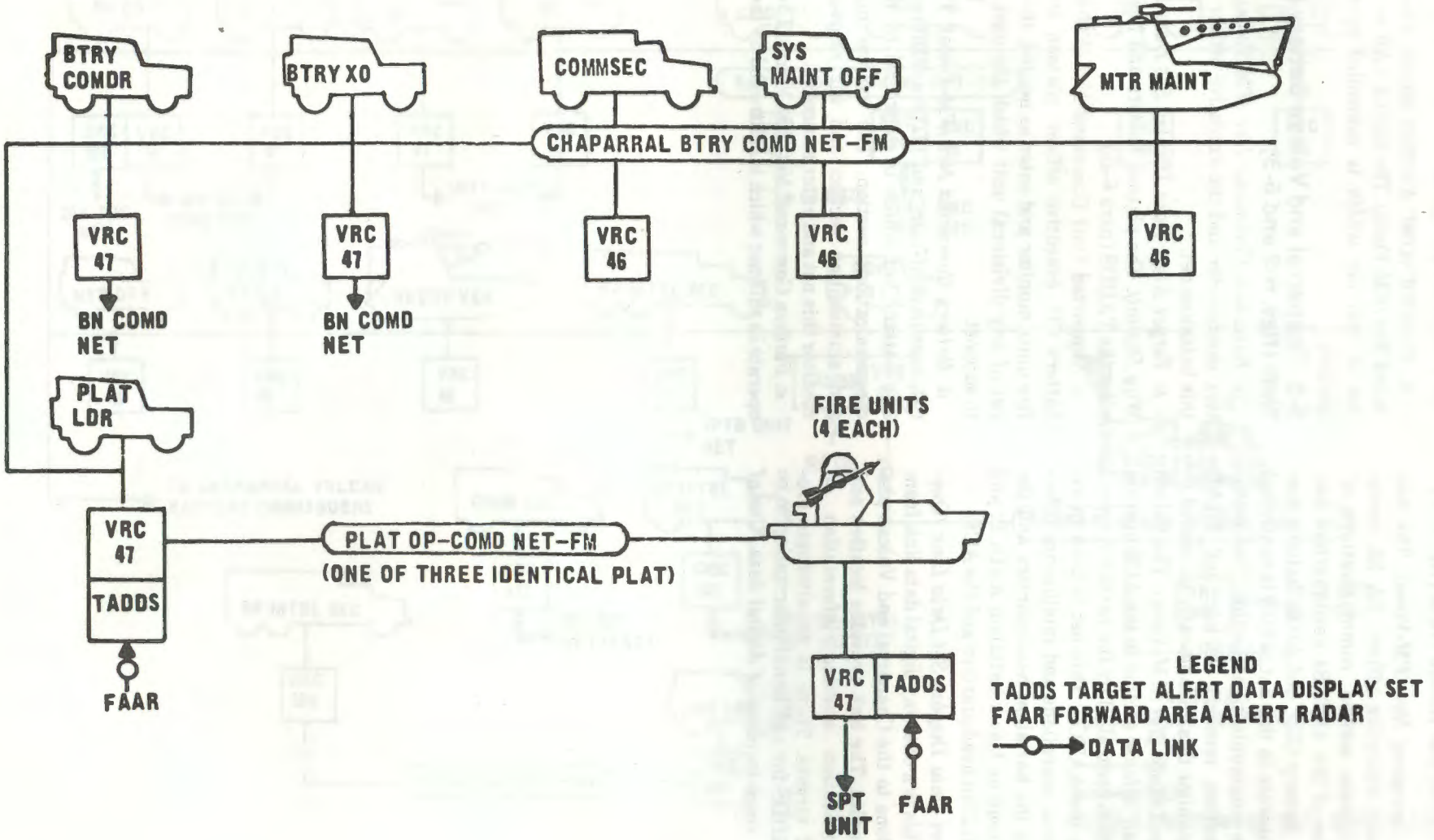


Figure 6-2. Type Chaparral battery radio nets.

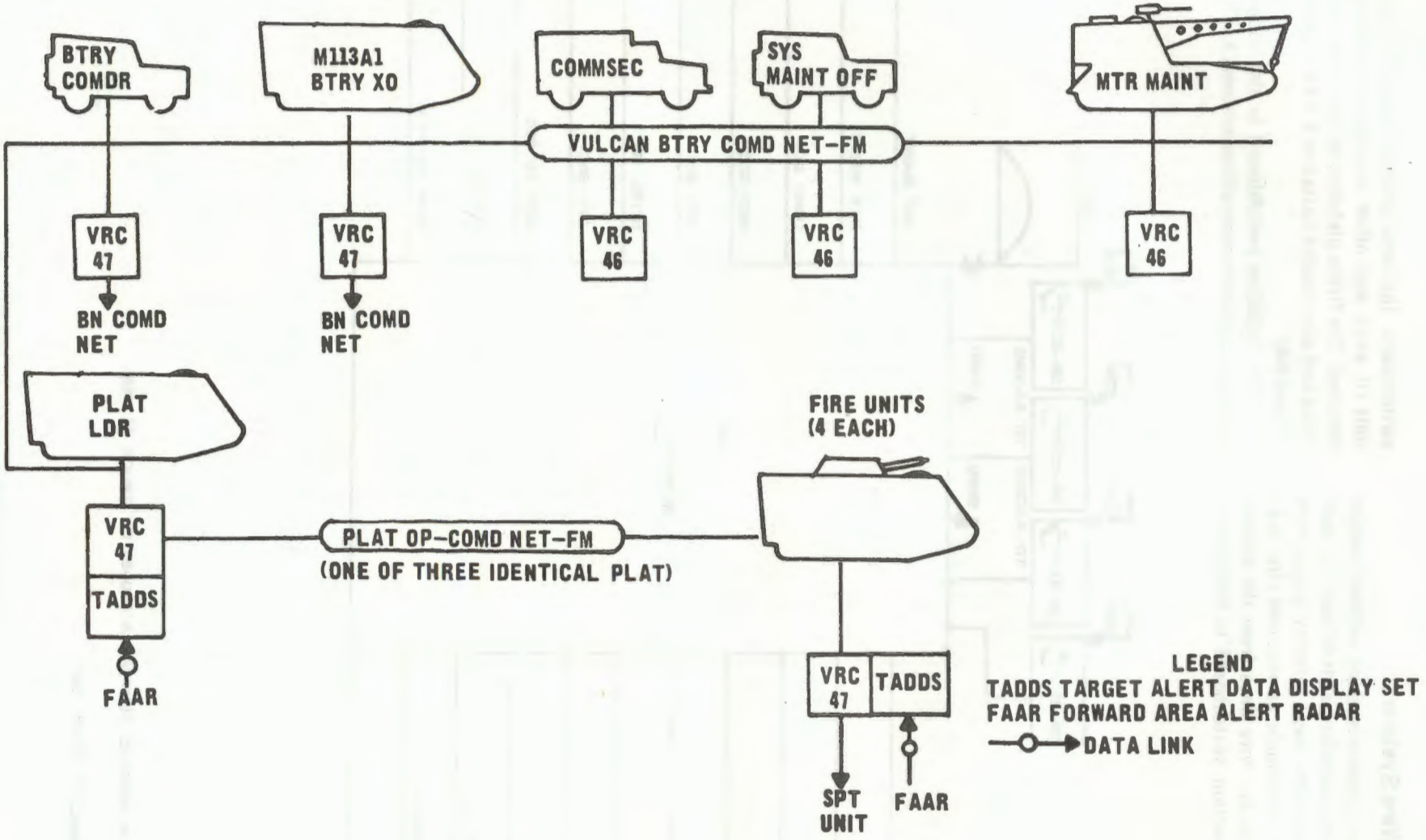


Figure 6-3. Type Vulcan battery radio nets.

6-6. Battalion Wire System

a. The battalion communications section installs wire lines from the battalion switchboard to each headquarters section, the local security loops, each battery, and other terminals as required (fig 6-4). The firing batteries lay wire lines from the battery communications section switchboard to the platoon switchboard, the local security loops, the supported unit (if any), and other intrabattery terminals, as required. The firing platoons lay wire lines to the fire units and any nearby battalion FAAR sections (figs 6-5 and 6-6).

b. The battalion switchboard is also connected to the Army area communications system (AACOMS).

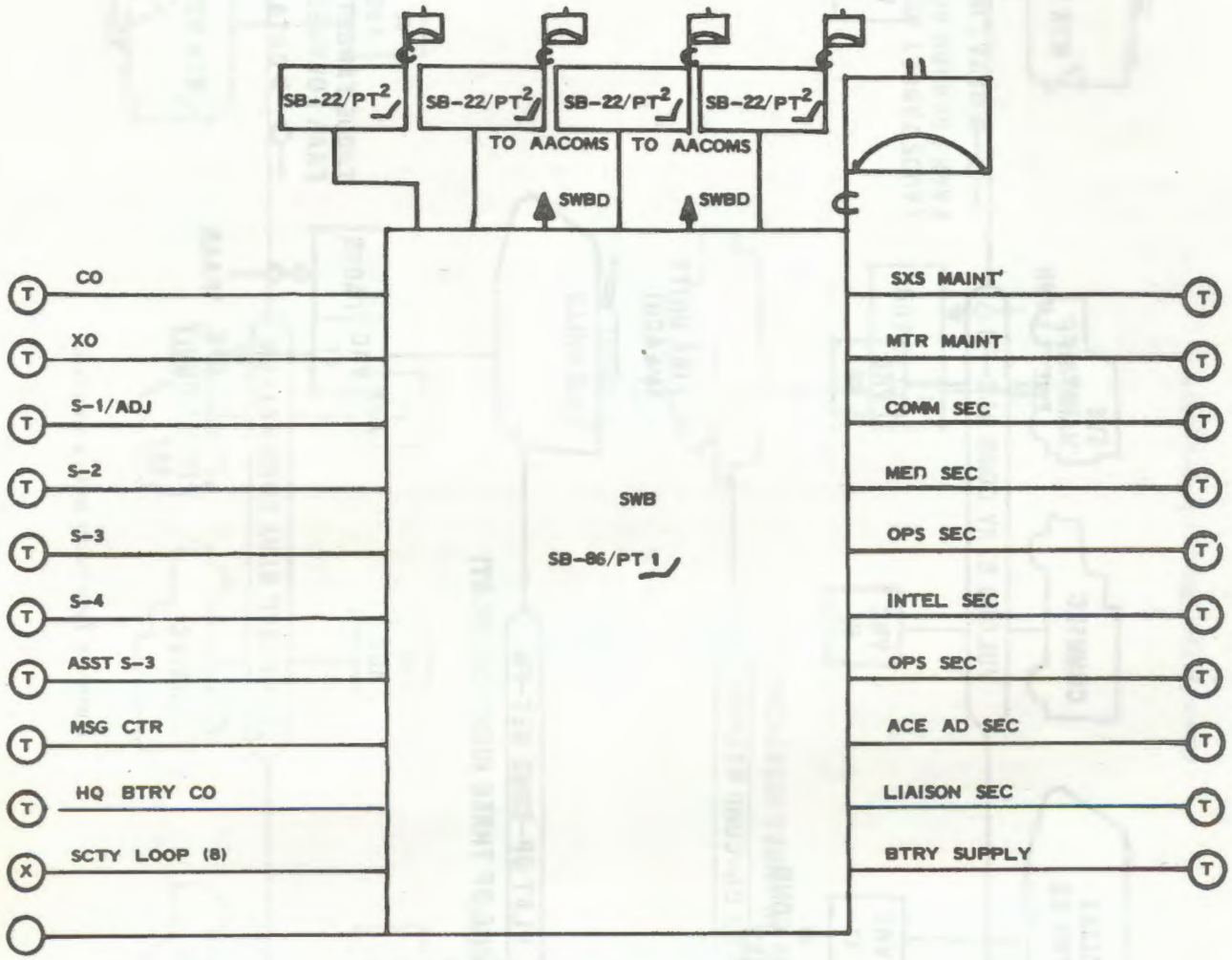


Figure 6-4. Type wire system, Chaparral/Vulcan battalion.

c. When the tactical deployment of batteries, platoons, FAAR sections, or fire units make wire laying impractical (because of distance, terrain features, etc.), those elements may tie into the nearest division communications system facility or the switchboard of any adjacent unit and employ common-user communication facilities to communicate with their parent units.

d. Wire communication lines within the ADA Chaparral/Vulcan battalion are laid only when the tactical situation makes such action feasible. In many situations, radio and messenger will be the only means of communication.

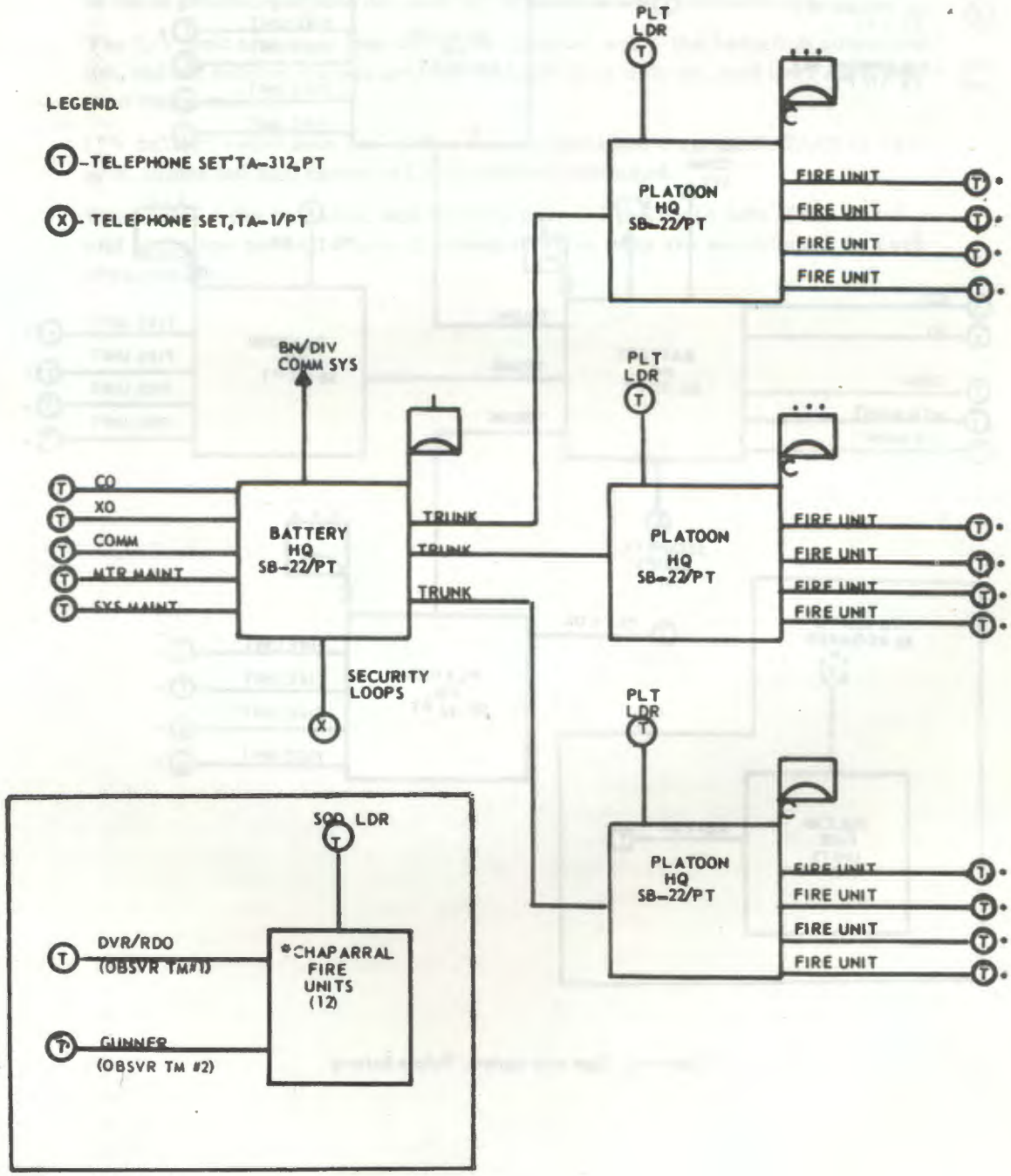


Figure 6-5. Type wire system, Chaparral battery.

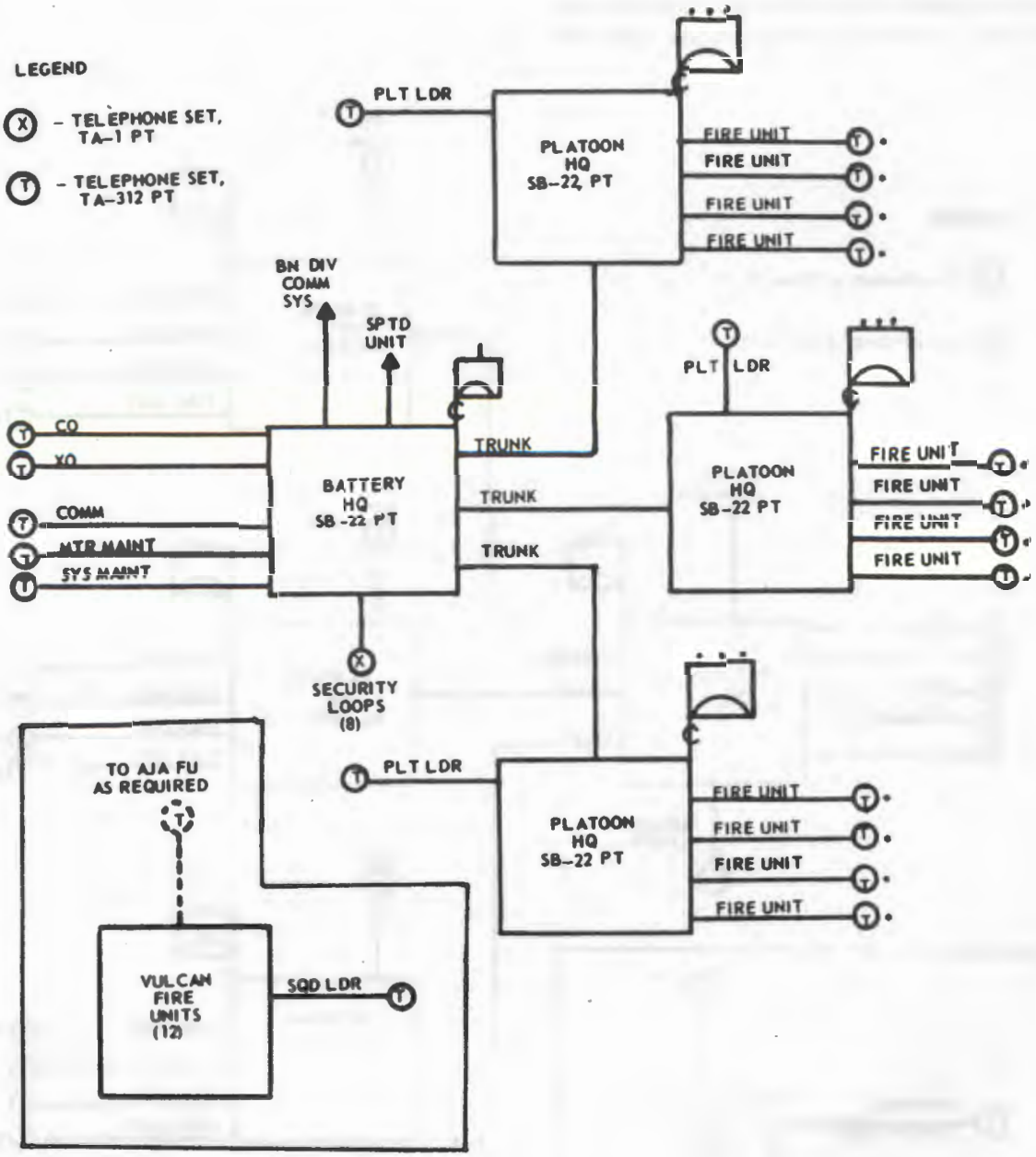


Figure 6-6. Type wire system, Vulcan battery.

SUMMARY

Because divisional C/V fire units are widely dispersed and subject to frequent moves, radio is used as the primary means of communication. Wire nets may be used when the length of time in position permits, as during missions performed by nondivisional or STRAF type battalions.

There are four types of battalion external radio nets – the division commanding general-command net, the division operations/intelligence net, the division general-purpose net, and the supported unit command net.

The C/V unit also uses four battalion internal nets –the battalion command net, the air defense liaison net, the TADDS data link net, and the FAAR platoon command net.

C/V battery radio nets are of five types –battalion command, TADDS data link, supported unit command, and platoon command.

Wire nets in the battalion and battery parallel the radio nets if the mission and situation permit. Normal administrative nets are established in each organization.

CHAPTER 7
FUNDAMENTALS OF CHAPARRAL/VULCAN EMPLOYMENT

Section I. General

7-1. Introduction

Chaparral and Vulcan units are deployed under the air defense "family of weapons" concept. The purpose of this concept is to defend continuously against each element of the air threat in such a manner that the enemy is denied a best method of attack. The air defense family of weapons is composed of a mix of manned interceptors and ground-based air defense weapons to permit the advantages of one type of weapon to offset the limitations of the other, and to insure a defense in depth. Manned interceptors operate to effect maximum attrition and to break up concentrated attacks before they reach vital areas. Ground-based air defense weapons add depth to the defense by providing terminal defense of priority positions and vital areas. Chaparral and Vulcan units complement other air defense systems and aid the total air defense structure by capitalizing on their capabilities to engage targets in the low-altitude forward area air defense regions. The position occupied by Chaparral and Vulcan units in relation to other ADA units is illustrated in figure 7-1.

7-2. Mission Considerations

a. Roles. The role, air defense or ground fire support, in which ADA elements are employed is determined by the force commander to which these elements are organic or attached. This determination is based on the force commander's assessment of the greatest threat to the success of his overall mission. Employment of ADA Vulcan elements in a ground fire support role in the face of an air threat degrades the air defense of priority units and installations in direct proportion to the number of weapons withdrawn for ground fire support. The process of balancing threat, mission, and priorities with air defense resources is continuous. The force commander is advised and assisted in this process by the air defense artillery commander.

b. Vulcan Air Defense Missions. Vulcan units can provide two basic types of low-altitude air defense—defense of mobile units and defense of vital areas.

(1) *Defense of mobile units.* Vulcan units can provide air defense for deploying (moving) combat and combat support units. When so employed, the Vulcan squads will accompany the defended units. In this type of defense, detailed planning and coordination with the defended unit is of the utmost importance.

(2) *Defense of vital areas.* This type of defense includes (but is not limited to) airfields, bridges, logistic installations, and large command posts. Usually, detailed planning, deliberate reconnaissance, selection and occupation of position, and optimum siting of weapons are possible.

c. Chaparral Air Defense Missions. Chaparral units are most effective when deployed in an area defense pattern. The fire units should be positioned to provide early destruction along the low-altitude routes of approach and to favor defense of the critical divisional elements. The Chaparral "area defense" should not be taken to imply Chaparral coverage over every square kilometer of the division area. There will be some uncovered areas. The term as used with Chaparral simply implies that Chaparral fire units are spread out in a deployment pattern aimed at giving maximum benefit to the maximum number of divisional elements rather than clustering fire units around particular vital targets. Chaparral may also be utilized to protect moving units within the forward area. Detailed coordination and planning will be necessary to insure correct placement of fire units along the route of march to provide the necessary air defense.

7-3. Employment Considerations

Certain basic steps should be followed when establishing defenses. These steps are—

a. Determination of Priorities. Since allocations of ADA units are normally limited, the force commander must establish an order of priority for air defense of his assets against low-altitude attack. The Chaparral/Vulcan battalion commander, as the division air defense officer working in conjunction with the force staff, will recommend to the commander an order of priorities. In establishing such priorities, consideration will be given to possible Nike Hercules and Hawk system coverage and to the effectiveness of passive air defense measures. The ADA unit commander obtains the priorities for defense from the force commander and plans the employment of his resources on the basis of these priorities.

b. Resources. The ADA unit commander will employ his resources in the manner which best meets the force commander's requirements. Critical considerations are the established priorities for defense, the number of weapons required, and the number

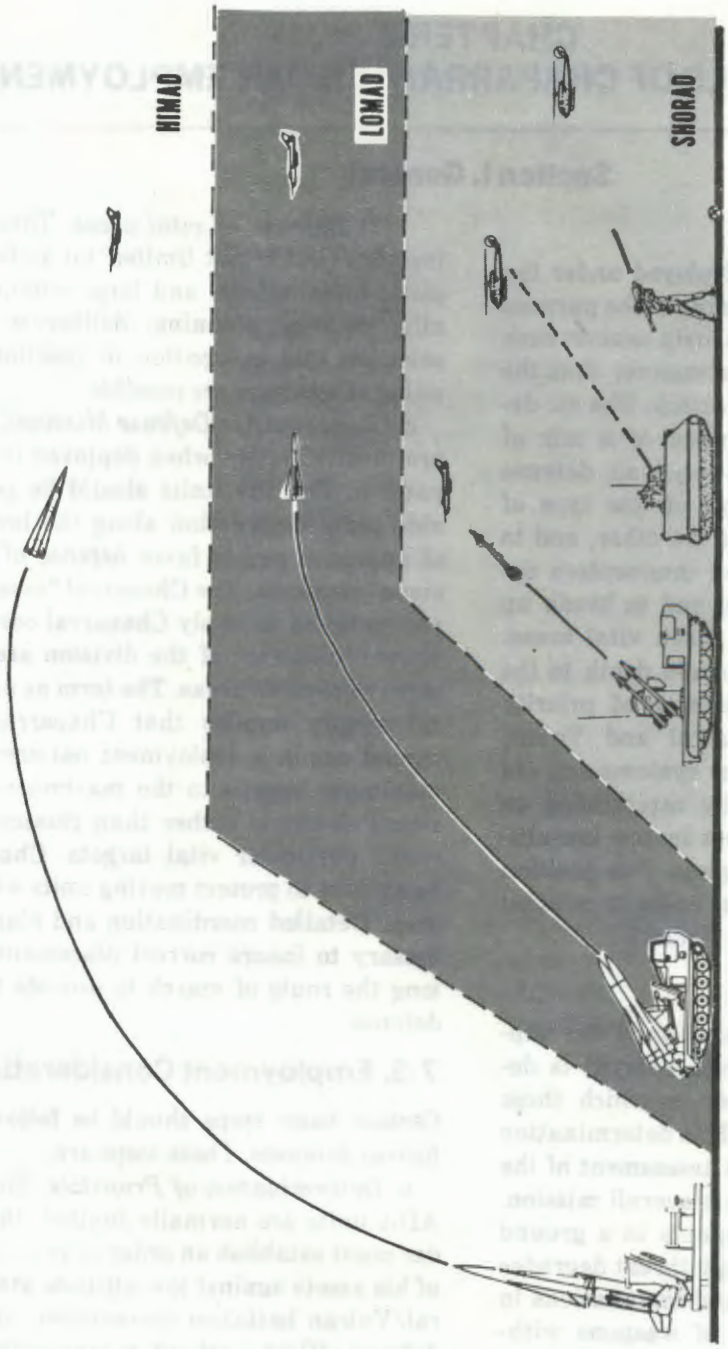


Figure 7-1. Type field army ADA "family of weapons."

available. If the number of weapons available does not permit all priority requirements to be satisfied, the air defense artillery commander must recommend the best utilization of his resources.

c. Defense Design. In designing the defense, balance, mutual support, early engagement, and weighting along likely avenues of approach should be considered. To make the best use of available weapons, initial defense design should be made with design templates and maps to determine tentative positions for weapons. However, the mission, terrain, nature and shape of the vital area, and availability of fire units will be final determining factors in the design. *See FM 44-1-1 for defense design details.*

d. Readjustment of Positions. After initial deployment of weapons, minor readjustment of positions may be required to improve fields of fire, mutual support, communications, and security.

Section II. PRINCIPLES AND FACTORS INFLUENCING AIR DEFENSE DESIGN

7-4. Principles Influencing Air Defense Design

a. General. Once air defense priorities are established by the force commander, the ADA commander must determine how best to use his resources. ADA squads must be deployed to provide effective air defense for as many of the force commander's assets as possible and in descending order of priority. While factors such as the expected threat, terrain, number of available weapons, and the size, shape, and proximity of other defended installations may tend to arrange the principles influencing air defense design into some order of relative importance, it is desirable that each principle be applied to the maximum extent possible. The principles influencing air defense design are covered in *b* through *f* below.

b. Balanced Defense. In general, enemy aircraft capable of attacking from any direction will seek the most favorable direction of attack, and will attempt to exploit any weakness in the defense. Therefore, the defense should be balanced to cope with attacks from any direction with about the same volume of fire. Exceptions arise when attack along certain avenue(s) is forced or probable (*e* below), during defense of march columns, or in an area defense. Vulcan squads sited to provide all-round defense of the vital area are depicted in figure 7-2. A minimum of four Vulcan squads should be employed to defend a small vital area.

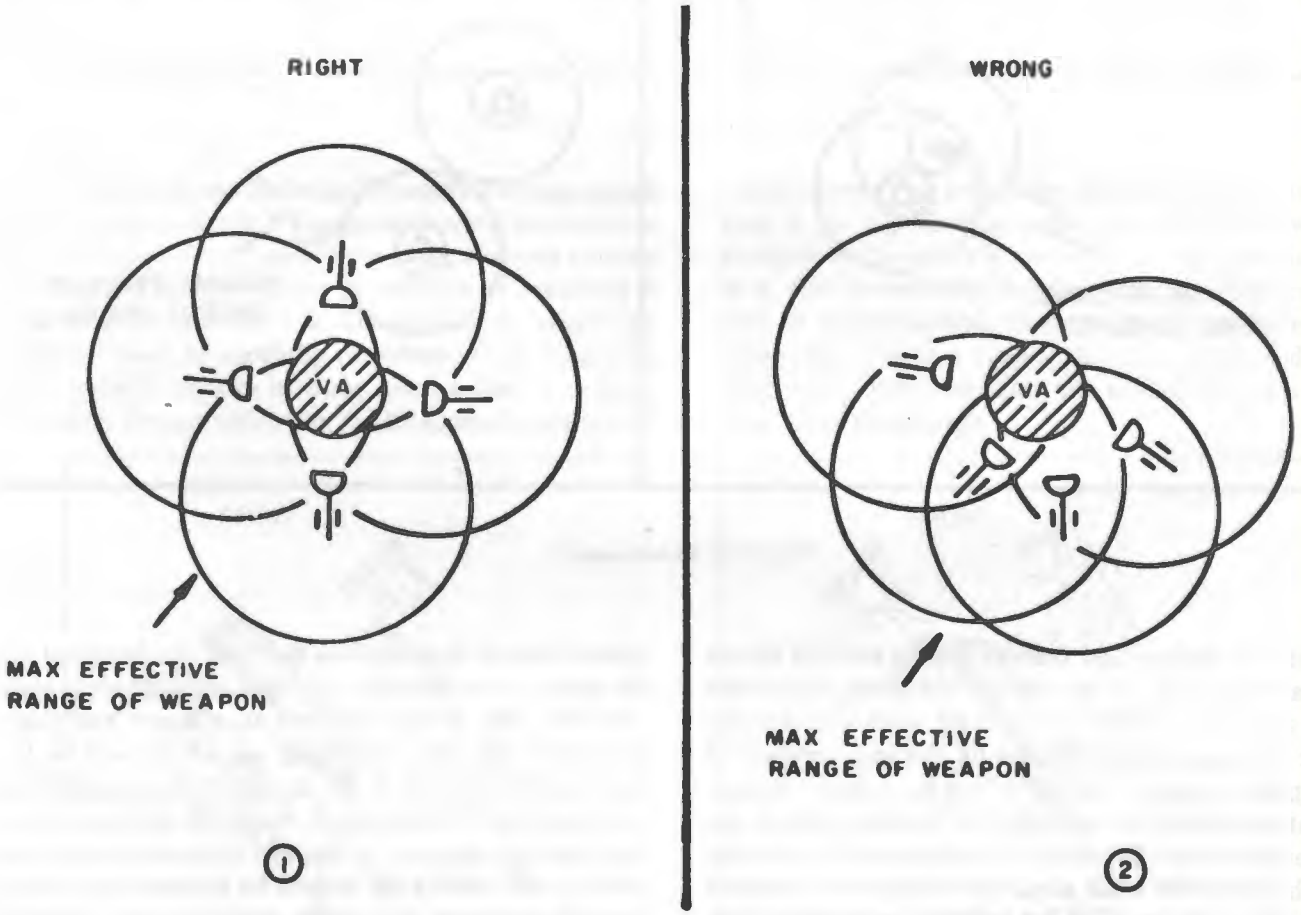


Figure 7-2. Balanced defense.

c. Mutual Support. This principle is applied by positioning each ADA squad so that its dead zone is within the engagement capability of at least one adjacent squad (fig 7-3), thus increasing the volume of fire possible in the space mutually covered. To be mutually supporting, Vulcan squads should not be separated by more than two-thirds maximum effective range of the weapon. Because the Chaparral system has a range capability beyond the maximum positive visual identification range (3000 meters) for low-flying aircraft, the mutual support distance is determined by using a range of 80 percent of the positive visual identification range (2,400 meters) as the maximum mutual support distance. Weapons crews must be capable of detecting targets at maximum distances in order to provide mutual support. Complete mutual support throughout the weighted Chaparral area defense or a balanced vital area defense may not be possible; in that case the squads must strive for overlapping fire.

d. Early Engagement. The object of early engagement is to engage and destroy hostile aircraft before the aircraft releases its ordnance. Because the enemy has such a wide choice of aircraft, ordnance, and attack variations, specific rules for the emplacement of weapons to maximize the principle of early engagement cannot be formulated. The degree of early engagement must, therefore, be determined by the size of the defended vital area, the number of weapons available, and the need for balance, mutual support, and the other principles discussed here. Vulcan squads should be located as far from the defended vital area as possible, yet maintaining total vital area coverage and mutual support to enhance early engagement (fig 7-4). Chaparral squads should be located as far forward in the defended area as possible, yet maintain the required weighted coverage over the low-level avenues of attack. Ground aircraft observers and the FAAR should be situated in advantageous locations to provide early warning further facilitating early engagement.

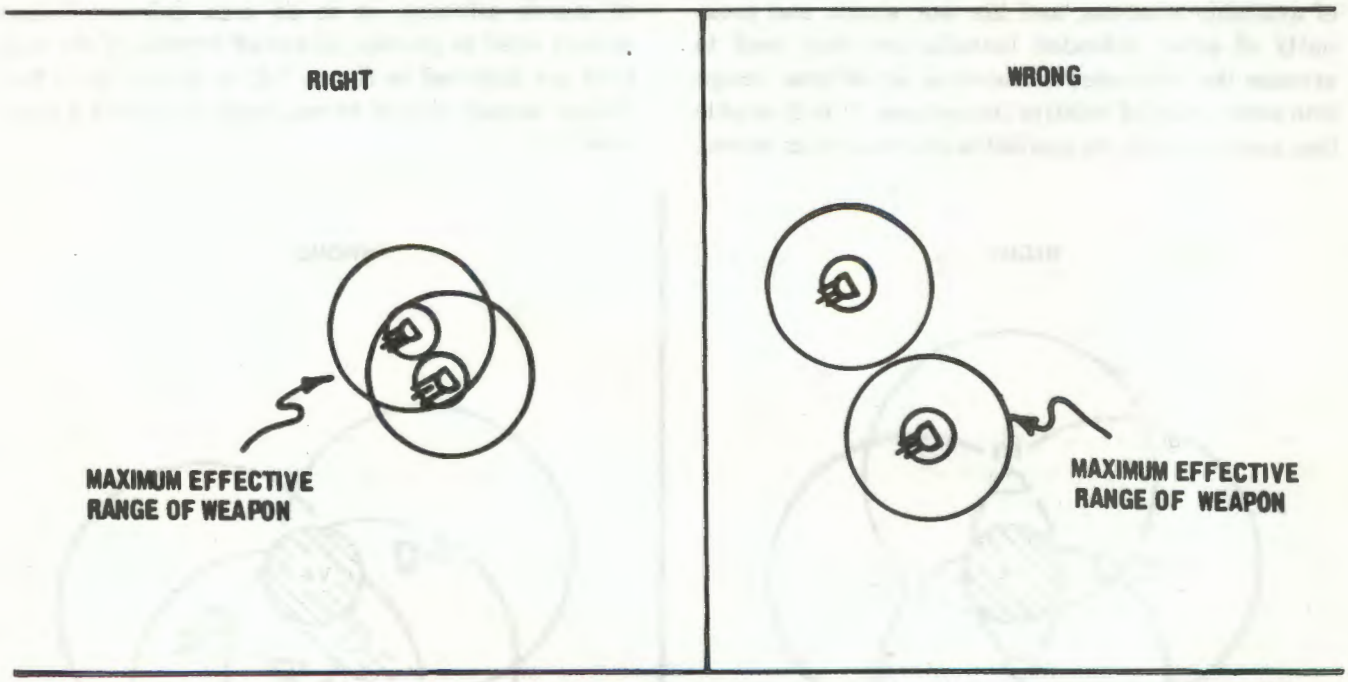


Figure 7-3. Mutual support.

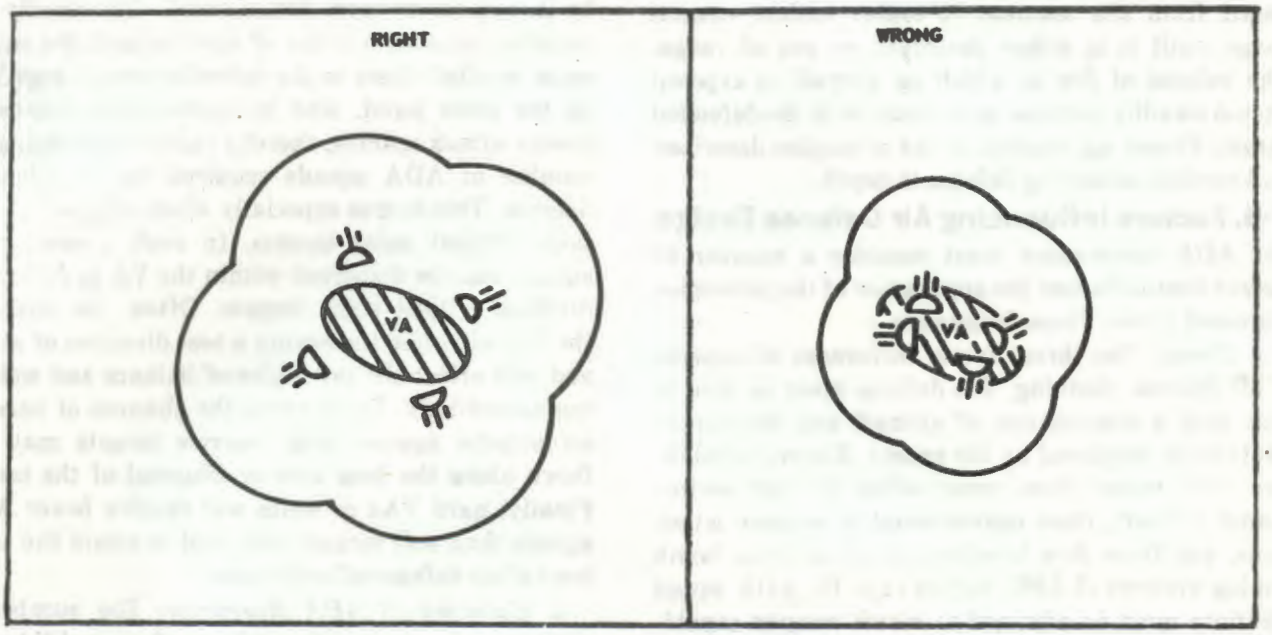


Figure 7-4. Mutual support to enhance early engagement.

e. Weighting the Defense. Chaparral/Vulcan squad deployments should be weighted toward low-altitude air avenues of approach since these avenues usually offer the enemy a higher probability of executing a successful attack (fig 7-5). The decision to weight the defense must be carefully considered since weighting unavoidably results in some degradation in defense balance. Proper weighting for Chaparral usually will require fewer fire units to be deployed, providing balance is not a governing factor. In some cases, where probable or forced air avenues of approach leading into a vital installation exist, weighting these routes may be more desirable than achieving a balanced defense (e.g., where a vital installation is located in a deep valley which reduces the probability of attack from some directions).

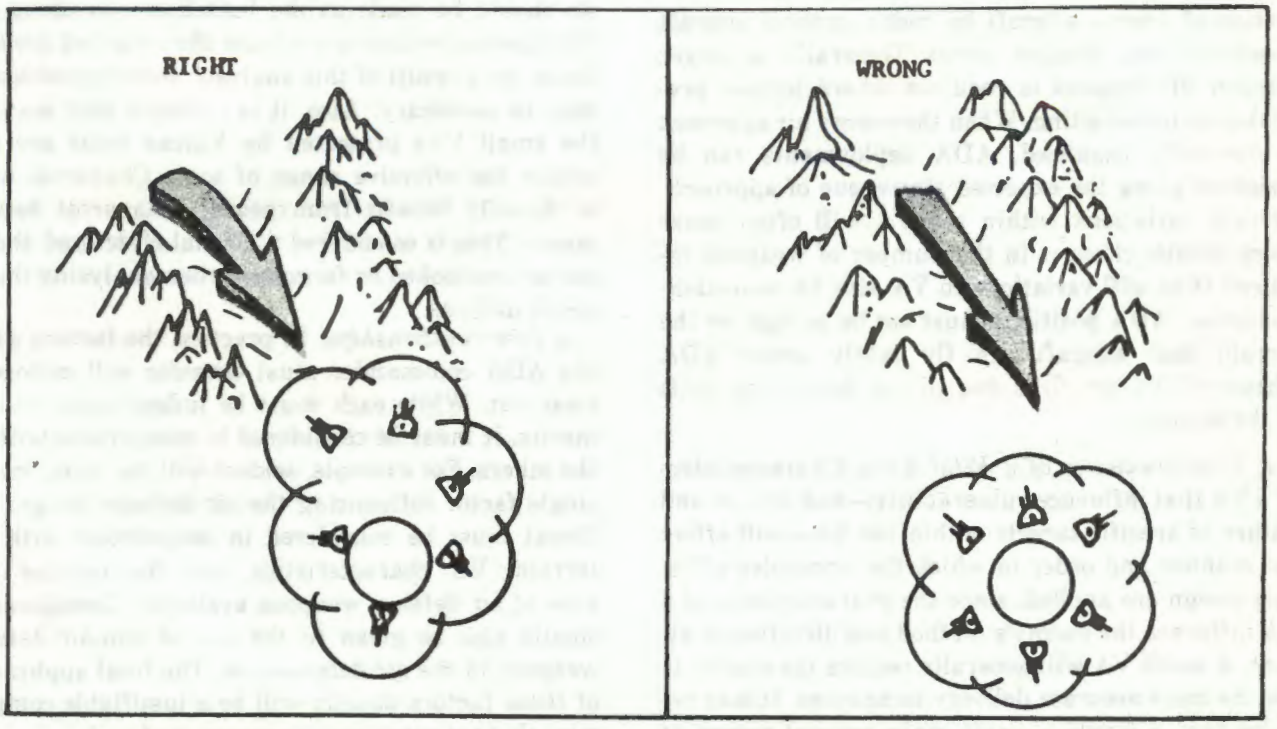


Figure 7-5. Weighted defense.

f. Defense in Depth. Enemy aircraft should be engaged from the moment it comes within weapon range until it is either destroyed or out of range. The volume of fire to which an aircraft is exposed should steadily increase as it closes with the defended target. Proper application of the principles described will result in achieving defense in depth.

7-5. Factors Influencing Air Defense Design

The ADA commander must consider a number of factors that influence the application of the principles discussed above. These factors are—

a. Threat. The threat factor influences all aspects of air defense planning. The defense must be able to cope with a combination of aircraft and techniques likely to be employed by the enemy. Enemy capabilities may range from rotary-wing to high-performance aircraft, from conventional to nuclear munitions, and from dive bombing to low-altitude bomb aiming systems (LABS) tactics (app B). ADA squad positions must be adjusted to match weapon capabilities as much as possible with enemy tactics and ordnance.

b. Terrain. Terrain will influence both the type and direction of enemy attack and the location of ADA squad positions. Because Vulcan and Chaparral are visually directed weapons, the terrain should afford maximum observation and unrestricted fields of fire. Terrain may limit the number of suitable positions available without adversely affecting the enemy, or it may compel the enemy to approach the target from certain directions. It may complicate detection of enemy aircraft by radar, ground aircraft observers, and weapon crews. Generally, a larger number of weapons is required where terrain precludes optimum siting. When the enemy air approach is obviously canalized, ADA deployments can be weighted along the expected air avenue of approach. Terrain variations within the VA will often cause more drastic changes in the number of weapons required than will variations in VA size. In mountainous areas, ADA positions must not be so high on the terrain that aircraft can fly safely under ADA Chaparral/Vulcan fires due to the depression limit of the weapons.

c. Characteristics of a Vital Area. Characteristics of a VA that influence vulnerability—size, shape, and nature of specific targets within the VA—will affect the manner and order in which the principles affecting design are applied, since the characteristics of a VA influence the enemy's method and direction of attack. A small VA will generally require the enemy to use the more accurate delivery techniques. It may require that a single aircraft make several passes at the target, or that the number of attacking aircraft be increased, or both. While small VAs usually will require a smaller number of ADA squads, the squads must be sited closer to the defended area. Large VAs, on the other hand, tend to increase the number of enemy attack options, thereby rapidly increasing the number of ADA squads required for an adequate defense. This is true especially when a large VA contains critical point targets. In such a case, ADA squads may be dispersed within the VA to defend individual critical point targets. Often, the shape of the VA will offer the enemy a best direction of attack and will affect the principles of balance and weighting accordingly. To increase the chances of success, air attacks against long, narrow targets may be flown along the long axis or diagonal of the target. Finally, hard VAs or units will require fewer ADA squads than soft targets will need to attain the same level of air defense effectiveness.

d. Economy of ADA Resources. The number of ADA squads required for defense of several VAs can sometimes be reduced when the defenses for one VA begin to develop and offer some protection to another. In such cases, consideration should be given to combining these VAs and designing an integrated defense which treats the separate installations or units as a single VA. The resultant relocation of ADA squads usually will free some weapons for employment elsewhere. When a defense is so integrated, it normally should be placed under a single commander. When all Chaparral squads have been sited, an analysis should be made at the battalion operations and intelligence section to evaluate the weighted area defense. As a result of this analysis, some repositioning may be necessary. Also, it is probable that many of the small VAs protected by Vulcan units are also within the effective range of some Chaparral units or directly benefit from nearby Chaparral deployments. This is considered a normal effect and should not be overlooked or forgotten when analyzing the total air defense.

e. Interrelationships. In practice, the factors which the ADA commander must consider will seldom be clear cut. While each must be judged upon its own merits, it must be considered in comparison with all the others. For example, seldom will the threat be the single factor influencing the air defense design. The threat must be considered in conjunction with the terrain, VA characteristics, and the number and type of air defense weapons available. Consideration should also be given to the use of non-air defense weapons in the air defense role. The final application of these factors usually will be a justifiable compromise that reflects a certain measure of each.

SUMMARY

The role in which ADA elements are employed –air defense or ground fire support –is determined by the force commander to which these elements are organic or attached.

Vulcan units can provide two basic types of low-altitude air defense – defense of mobile units and defense of vital areas. Vulcan may also be used in the ground fire support role when the ground threat is greater than the air threat.

Chaparral units are most effective when deployed in an area defense pattern. They may also be used in the defense of mobile units by being prepositioned along the route of march.

As the division air defense officer, the C/V battalion commander recommends an order of priorities to the division commander.

If the number of weapons available does not permit all priority requirements to be satisfied, the C/V commander must recommend the best utilization of his resources.

Balance, mutual support, early engagement, and weighting along likely avenues of approach must be considered in designing the defense.

The defense should be balanced to cope with attacks from any direction with about the same volume of fire.

To aid mutual support, each ADA squad is positioned so that the dead zone of the weapon is within the engagement capability of at least one adjacent ADA weapon.

The object of early engagement is to engage and destroy hostile aircraft before the aircraft releases its ordnance. Governing factors in early engagement are the size of the defended area, the number of weapons available, and the need for balance and mutual support.

Chaparral/Vulcan squad deployments should be weighted toward low-altitude avenues of approach since these avenues increase the enemy's probability of executing a successful attack.

The volume of fire to which an aircraft is exposed should steadily increase as the aircraft closes with the defended target.

The defense must be able to cope with a combination of aircraft and techniques likely to be employed by the enemy.

Terrain will influence both the type and direction of enemy attack and the location of C/V squad positions.

The size, shape, and nature of specific targets within the VA will affect the manner and order in which the principles affecting design are applied, because the characteristics of a VA influence the enemy's method and direction of attack.

CHAPTER 8
CHAPARRAL/VULCAN COMBAT OPERATIONS

Section I. GENERAL

8-1. Introduction

The general mission of the division ADA Chapparral/Vulcan battalion is to provide air defense for maneuver elements and other assets of high military value in the division area. Specific guidance for the ADA commander is received in the form of mission orders stated in the division operation order. Standard division missions will appear in the division operation order as brief mission statements. Although additional implementing instructions may be received by the battalion, the mission statement in the operation order should be sufficient for the battalion to plan and execute the air defense of the division. In addition to securing priority areas or vital areas within the division, the battalion commander and his staff must give the army area air defense posture every consideration. This is necessary to insure that the low-altitude airspace over the division area does not offer an easy avenue of approach for hostile aircraft en route to vital targets in the army rear. The air defense officer (Chaparral/Vulcan battalion commander) under the general staff supervision of the G3, and in coordination with other division staff elements, will have evaluated the air threat. Should the air threat be such that the battalion needs additional air defense capability, the division may request additional air defense units from corps, based on the recommendations from the air defense officer. The division operation order will indicate the type and number of augmenting units and the command arrangements. The battalion commander and his staff can be expected to participate as necessary with the division staff during the planning phase. Upon receipt of the mission, the battalion commander and his staff draw up the battalion course of action. Should any obvious weaknesses in the capability to accomplish the mission be identified during the development of the battalion course of action, the division staff should be so informed. ADA unit employment is basically the same in offense, defense, retrograde, and special operations. The primary differences are changes in priorities required by the changing military value of various elements of the defended unit, and in the phasing of air defense artillery forces into special combat operations.

8-2. Organization for Combat

a. Independent Corps Operations. The ADA Chaparral/Vulcan battalions organic or attached to divisions in independent corps operations support the divisions with air defense in the same manner as described for divisional battalions in a field army. When the Chaparral/Vulcan battalion is part of a composite defense in the independent corps service area, it is employed by using the same principles and concepts as those used for defense of the field army service area.

b. Independent Division Operations.

(1) *General.* Independent division operations are normally associated with stability operations conducted by a joint US force. As the Army element of US joint operations, the independent division is augmented by the attachment of certain elements not organic of the division. It can be anticipated that the division's entry into such an operation will be unopposed; however, preparations must be made to meet opposition from the outset if the situation demands. Because of the nature of stability operations, a division may be required to deploy in any number of ways when it enters the operations area. Usually brigades are deployed so as to be mutually supporting but not necessarily contiguous.

(2) *Air defense of the independent division operation.* Air defense units must be available to the force when the threat demands. Air defense weapons organic to the division (Vulcan, Chaparral, and Redeye) may be augmented by attaching a Hawk battalion to the division, thus giving it a capability for all-weather, long-range air defense. However, it is more probable that the Hawk battalions will be retained under control of the joint force air defense commander for provisions of overall area defense of the entire force. The rules of engagement and coordination of airspace for air defense units operating with the independent division will be determined by the air defense commander of the joint force, normally the air component commander. In a stability operation, these rules are likely to be stringent and restrictive. A Hawk battalion may be attached to the division for an independent operation so as to defend the airspace over the division and to insure the Army force component of a higher altitude de-

fense than is possible with organic division air defense weapons. In such situations, an air defense artillery battalion group is usually formed with the attached Hawk battalion and the organic Chaparral/Vulcan battalion.

Section II. OFFENSIVE OPERATIONS

8-3. General

The division offensive is characterized by a high degree of centralized planning and decentralized execution. (See FM 61-100.) In offensive operations, each commander and leader must be highly trained in the knowledge and use of standing operating procedures, especially those that pertain to the control of fires. At times, SOP may be the only means of maintaining control over the firepower of the battalion. Of the three basic forms of maneuver employed by the division in the offensive (penetration, envelopment and frontal attack), envelopment and penetration require the greatest amount of decentralization and offer the highest probability for autonomous operations.

8-4. Planning the Attack

When the division commander receives or develops the division mission, he issues planning guidance to the staff, later receives a briefing on the staff estimates and recommendations, makes his estimate, and arrives at a decision. After stating his decision, he may provide the staff with his concept of how the operation will be conducted. On the basis of the commander's decision and concepts, the staff develops plans for implementing the attack. The airspace coordination element of the DTOC and Chaparral/Vulcan battalion commander and his staff should provide advice and assistance to the division staff during the entire decisionmaking and planning process.

8-5. Offensive Operation

a. Movement to contact. The division may have little or no information of how or where the enemy is disposed; therefore, the tactical situation may require a movement to contact. In this case the formation chosen for the move will depend largely on terrain and weather conditions in the area of operations. A typical formation for a division movement to contact is shown in figure 8-1. Chaparral units are placed with the covering force, flank, and rear guard elements so as to be in the best locations for defending the main body. Vulcan is placed with main body elements. If the division is moving through mountainous terrain that offers natural low-altitude air avenues of approach into the division area along the route of march, the ADA battalion commander may deploy and direct the displacement from one approach to another as the division uncovers these approaches. The air threat, available early warning, and the rate of march of the division are factors that would influence this method of operation. It is important that the divisional ADA battalion command post maintain radio communications with the firing elements of the battalion, even if they have been placed under the control of other units. This is necessary for fire coordination and fire control as required by higher and adjacent air defense elements and to provide long-range early warning to the fire units.

b. Meeting Engagement. Because seizing and maintaining the initiative is the basic principle in the conduct of a meeting engagement, the divisional ADA battalion commander must be prepared to react quickly to any change of orders. As soon as the tactical situation indicates that a meeting engagement is imminent, the divisional ADA battalion commander is directed, usually by fragmentary orders, to establish the air defense of the division operating area. During the engagement the division rate of march slows or ceases, depending on the strength and intentions of the enemy force. The ADA battalion commander, having knowledge of fire unit disposition, evaluates the defense from the existing disposition of fire units. Unless serious defects exist in the defense, redeployment of the air defense element is kept to a minimum during the meeting engagement, because the force plan of attack cannot be fully developed at this time.

8-6. Reconnaissance in Force

Reconnaissance in force is an attack to discover and test the enemy's position and strength or to develop intelligence. All-arms air defense weapons (Redeye) should furnish sufficient self-protection against enemy air for such an attack. If air defense units are required, the Vulcan is the best candidate for the mission because it can provide both air defense and ground fire support. Chaparral is not normally assigned a reconnaissance in force mission.

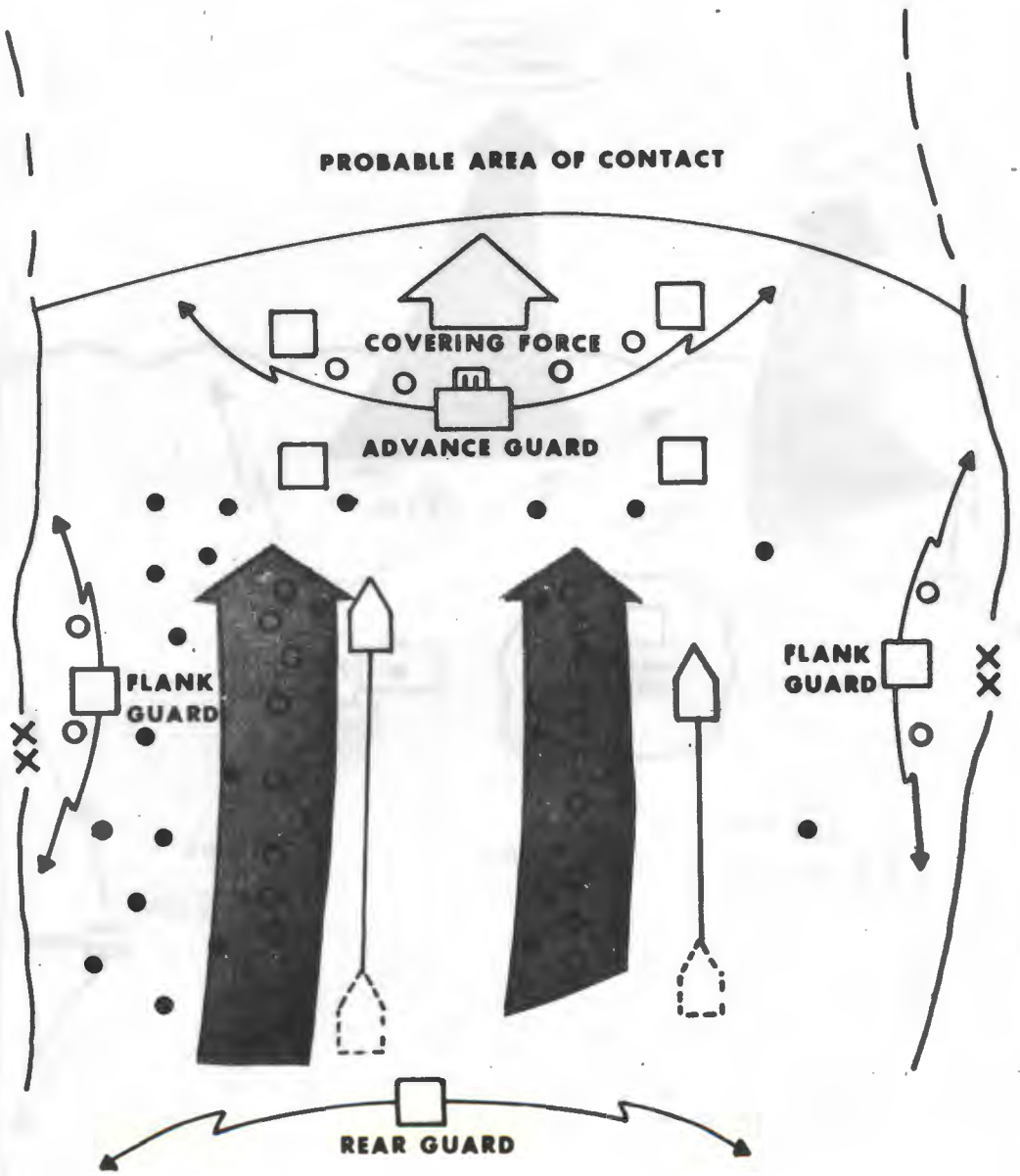


Figure 8-1. Chaparral/Vulcan battalion in movement to contact.

8-7. The Coordinated Attack

a. General. The coordinated attack is always planned as thoroughly and carefully as time will permit; however, when it follows a meeting engagement, it is usually hastily planned and executed so as to maintain momentum and initiative. the ADA battalion must be prepared to react rapidly once the choice of combat maneuver is decided. The basic forms of offensive maneuver—penetration, envelopment, and frontal attack—have variations as necessary to meet a particular tactical situation facing the division. The mission order and organization for combat for the ADA battalion may vary with each form of maneuver selected.

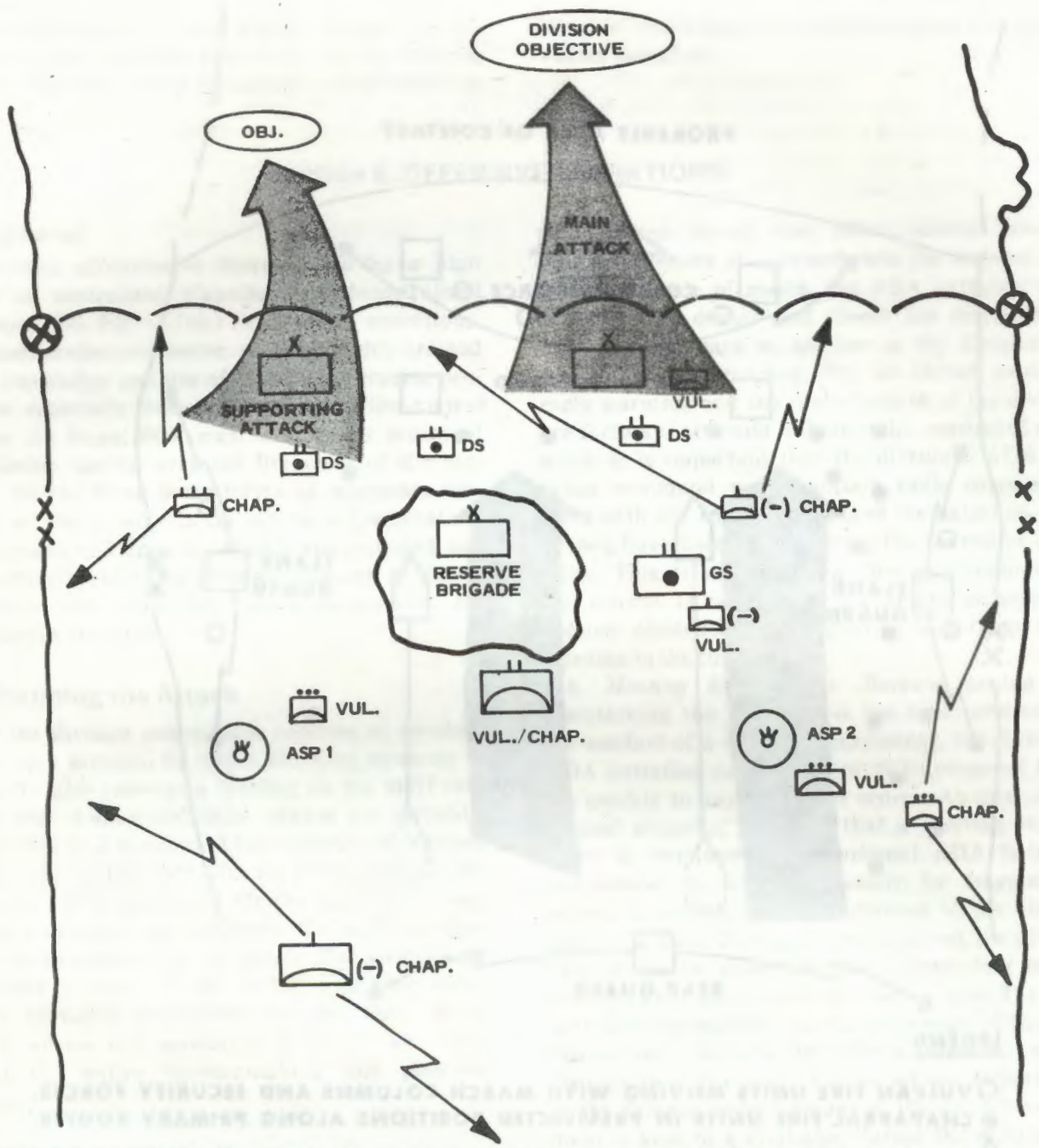


Figure 8-2. The penetration attack, Chaparral/Vulcan unit deployment.

b. The Penetration. The penetration consists of three stages—rupture of the enemy defensive position, widening the gap, and the securing of objectives. Figure 8-2 shows a type situation of a division conducting a penetration. In this situation, the division commander's guidance may have epxressed his concern over the possibility of enemy counterattack, using close air support against the main attacking force, especially after they have reached the division objective. There also may be concern about the possibility of enemy air using the low-altitude air avenues of approach into the division to attack the fire support means being used to support the main attack. There is also concern about the vulnerability of the reserve. The operation plan developed from this guidance would specify the priorities of units or areas to be protected by the ADA battalion. Before assigning the ADA battalion mission, the division staff would evaluate the all-arms air defense offered by Redeye. With this information, it is evident that the mission of the ADA battalion is to defend the low-altitude air avenues of approach into the divi-

sion area and to defend the various vital areas. The Chaparral batteries are designated to complete the area defense of the division by defending the low-altitude air avenue of approach into the division vital areas where SP Hawk has limited capability. As the main attack ruptures the enemy defenses, it will be moving from within an area defense into an environment of progressively weaker defense against the low-altitude attacks. Therefore, it is necessary to establish small vital area defenses for these elements. Vulcan units are selected for this mission. The reserve has the capability of self-defense from air attack with its organic Redeye teams and also is within the area coverage of Hawk and Chaparral units. However, when the reserve is committed, it moves outside the area coverage provided by the Chaparral/Vulcan elements. Therefore, consideration must be given to the defense of the reserve brigade when the reserve is committed.

c. The Envelopment. In the envelopment, the main or enveloping attack passes around or over the enemy's principal defense positions. This type of maneuver is encouraged by obvious weaknesses in the enemy defense such as assailable flanks or weak defenses against airmobile formations. To give the enveloping force a good low-altitude air defense, both Vulcan and Chaparral units should be attached to the enveloping task force. Since the division area air defense must be maintained, it is likely that some assistance from the corps ADA battalion will be needed.

d. The Frontal Attack. In this type of offensive maneuver, in which the line of contact advances more or less uniformly, the ADA units should move in conformity with the close-combat forces they defend. Vulcan fire units accompany the supported units; Chaparral units are moved as suitable areas come under friendly control.

8-8. The Exploitation

The primary function of the exploitation is the seizure of the objectives deep in enemy rear, cutting lines of communication, surrounding and destroying enemy combat support and combat service support facilities and forces, and destroying enemy reserve. The mission and organization for the Chaparral/Vulcan battalion will be similar to the movement to contact (para 8-5).

8-9. The Pursuit

The pursuit may follow the exploitation in order to complete the destruction of the enemy force. Figure 8-3 shows a division in a typical pursuit action. In this situation, the divisional ADA battalion mission and organization for combat would be similar to that of an envelopment with the direct pressure forces requiring the same type of support as the supporting attack forces of the envelopment. The encircling force would probably require an attachment as in the case of the enveloping task force.

8-10. Night Combat

The night attack or attack during periods of limited visibility if an integral part of all operations. Although the divisional ADA battalion has a limited firing capability during these periods, commanders must be especially alert to the changing situation and maintain a readiness to defend, as their mission requires.

8-11. Infiltration

Infiltration is a movement technique used in conjunction with offensive operations. The very nature of the exercise indicates that infiltrating forces will seldom become a lucrative target for enemy air. Normally other elements of the division will take priority for air defense over infiltrating forces. Figure 8-4 shows a typical infiltration maneuver. The all-arms weapons of the infiltrating brigade should satisfy any air defense requirement in the attack position and should be used only in actual self-defense so as not to give the operation away. The link-up force may require the attachment of Vulcan units to strengthen the all-arms defense in the objective area.

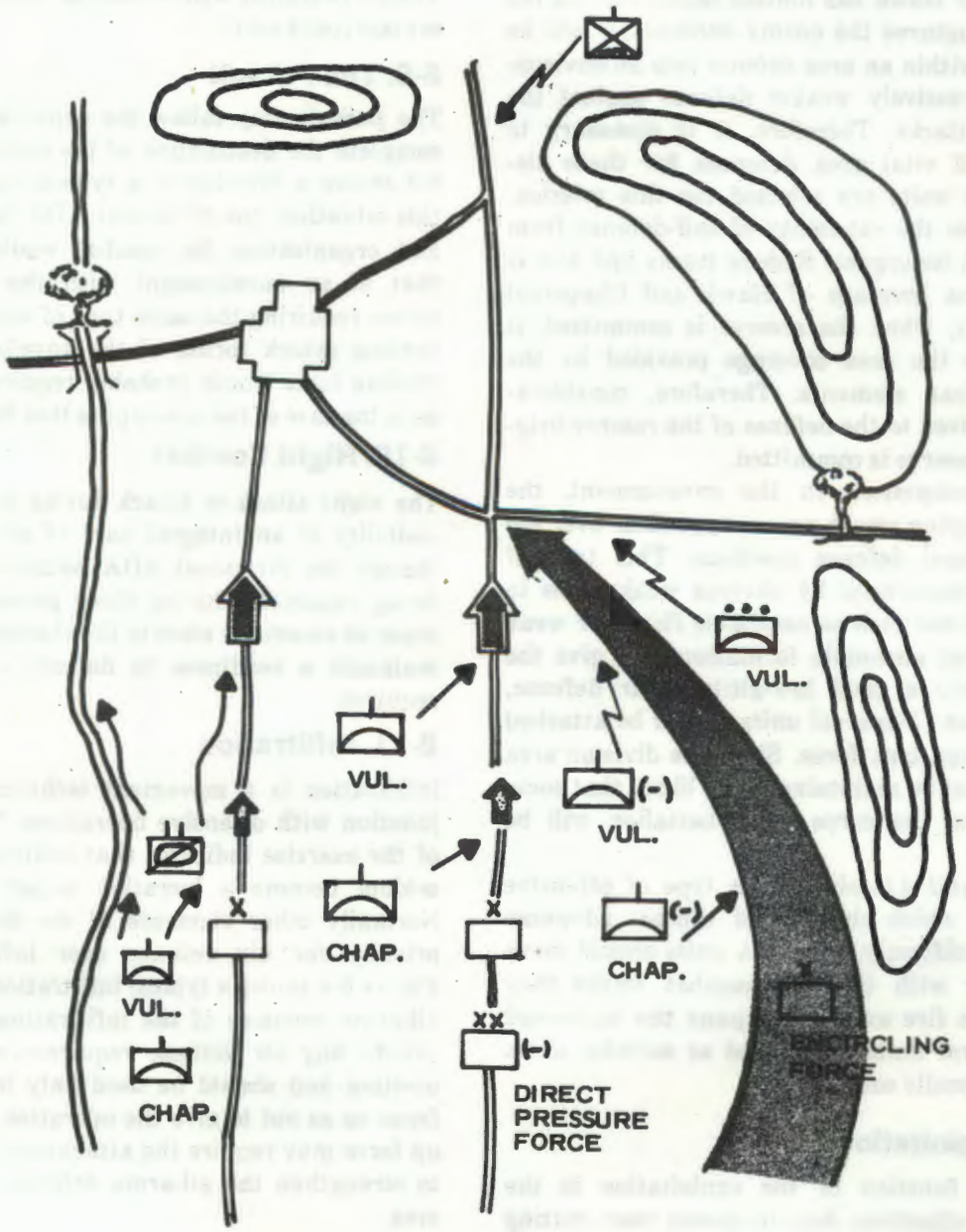


Figure 8-3. Division conducting a pursuit.

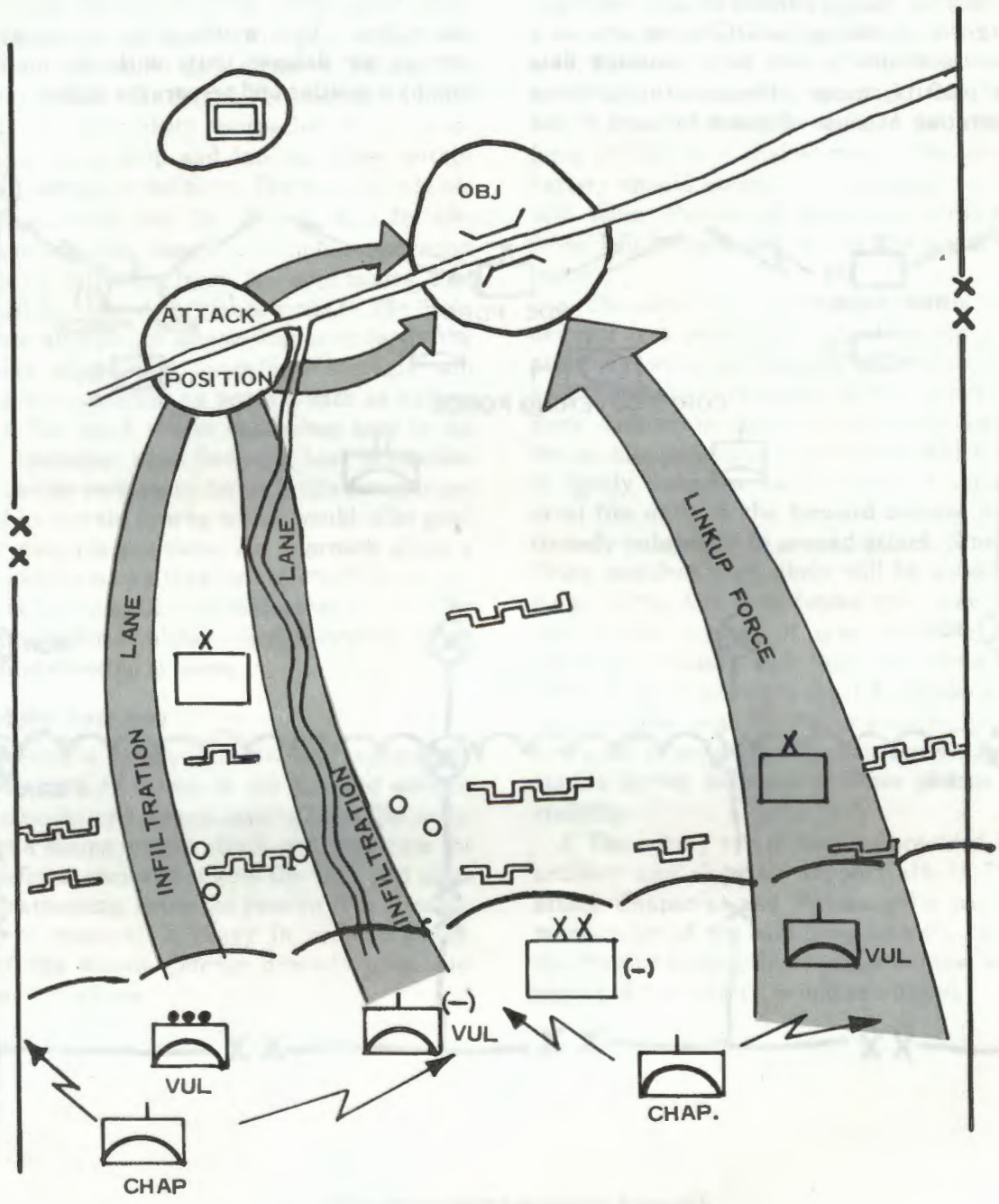


Figure 8-4. Division attacking subsequent to infiltration.

8-12. Division as Covering Force

A division with a covering force mission normally advances with the bulk of its combat battalions forward and on a broad front. Figure 8-5 shows a typical division covering force action. In this situation, medium- and high-altitude air defense of the covering force is the responsibility of the main force. The headquarters directing the division mission must specify clearly the air defense headquarters with which the divisional battalion must coordinate.

The surveillance capability of the divisional ADA battalion is of prime importance to the air defense of the force being covered. Detection of enemy aircraft passing over the covering force en route to objectives in the area of the main force will allow maximum early warning to defenses of the main force. The eight FAAR should be employed to cover the low-altitude air avenues of approach into each area. In addition, the observer with each weapon squad will visually detect and pass information of

enemy air activity during periods of good visibility. The battery and battalion AADCPs use available voice communications to pass early warning data back as a priority matter. Because the covering force is operating at some distance forward of the main force, early warning may be provided to the main force. This would allow sufficient time for moving air defense units with the main force to occupy a position and prepare for action.

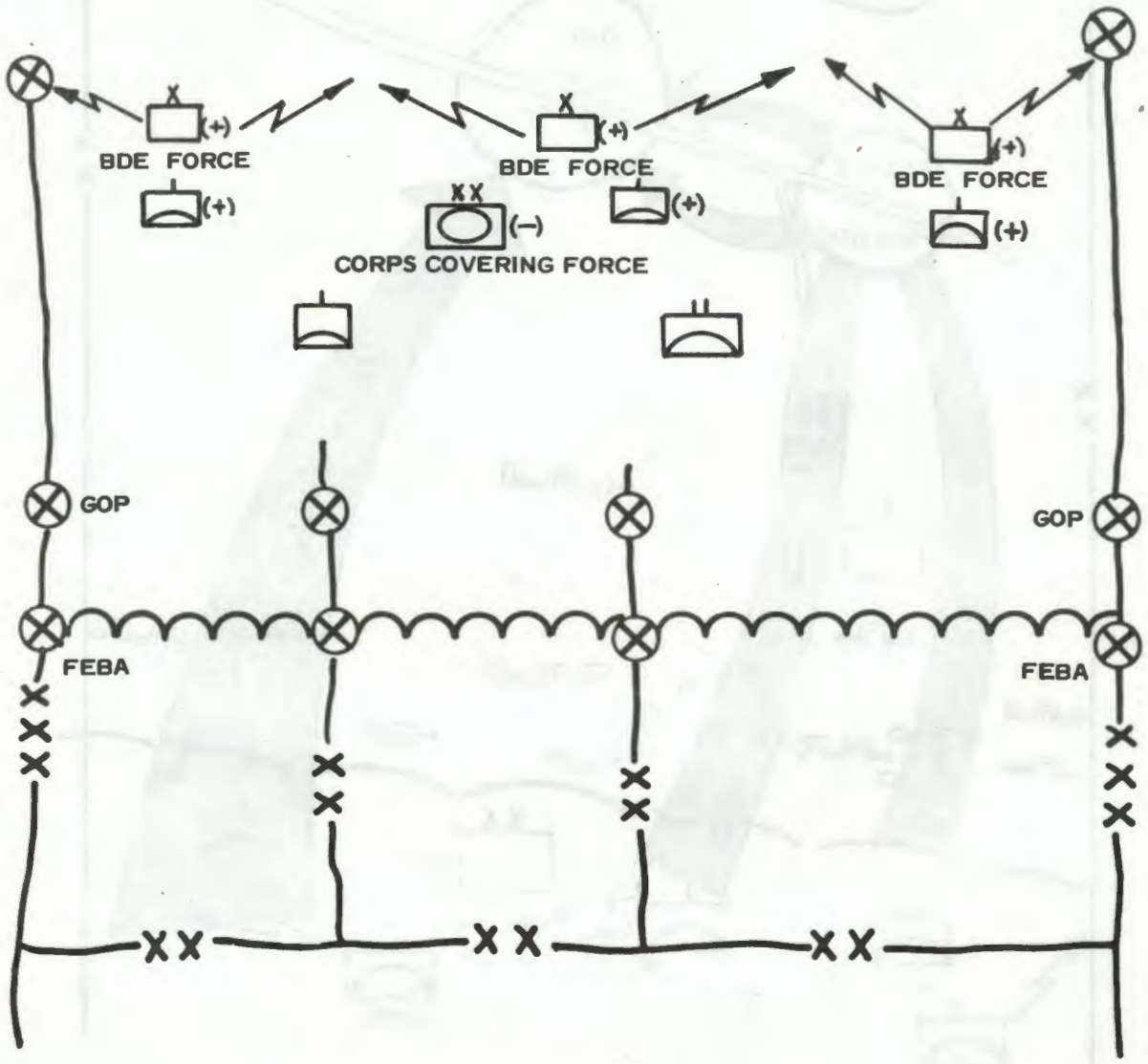


Figure 8-5. Division as a corps covering force.

Section III. DEFENSIVE OPERATIONS

8-13. General

a. The ground defense is composed of three defensive areas—security area, forward defense area, and reserve area. The security area begins at the forward edge of the battle area (FEBA) and extends as far to the front and flanks as security elements are employed. The forward defense area extends rearward from the FEBA to include that area organized by the forward committed brigades. The reserve area extends rearward from the forward defense area to the division rear boundary and contains those uncommitted forces held under division control.

b. Employment of the ADA Chaparral/Vulcan battalion in support of defensive operations is, in general, more centralized and controlled at the ADA battalion level than the support of offensive operations. The two fundamental forms of defense used by the division are the mobile defense and area defense. In the mobile defense ground security of ADA fire units is more of a problem than when the division is conducting an area defense.

c. In addition to close air support and shallow interdiction attacks, the air threat will also include the probability of airmobile and airborne attacks. In planning the division air defense, consideration must be given to the most likely approaches to the probable location of airdrop and landing zones within the division defensive positions. The low-altitude air avenues of approach into the division area for aircraft supporting the enemy's airmobile operation may be quite different from the approaches that may be used by high-performance aircraft. The high-performance aircraft, in attempting to underfly the longer range, all-weather, air defense systems, will use approaches protected by terrain, such as valleys and passes. The much slower helicopters used in the airmobile operation may find the best protection from approaches over heavy forest if this forest is not overlooked by terrain nearby which would offer good automatic weapons positions. An approach along a heavily wooded plateau may be preferred by an airmobile force to the valley approach that would offer the most protection to higher velocity aircraft trying to avoid radar-directed systems.

8-14. Mobile Defense

a. In the mobile defense, the division commander uses relatively light forces in the forward defense area and constitutes a strong reserve force. He anticipates that a strong enemy attack will penetrate the forward defense area and selects the time and place for counterattacking, using the reserve. The counterattack force (reserve) is heavy in combat power. Success of the mobile defense depends upon successful use of this force.

b. The ADA battalion mission for such an operation in most situations would be to utilize the Chaparral batteries in an area-type defense, weighing the low-altitude avenues of approach. One Vulcan battery normally should be utilized for vital area defense of vital divisional elements. The second Vulcan battery should normally be attached to the reserve task force. Figure 8-6 shows a typical mobile defense being supported by the divisional ADA battalion.

c. Chaparral fire units operating in the forward defense area must establish and maintain communications with the nearest maneuver element to keep abreast of changes in the tactical situation. Such communications are especially important in the mobile defensive situation in which the FEBA is lightly defended. In this type of defense, Chaparral fire units in the forward defense area are extremely vulnerable to ground attack. Since optimum firing positions very likely will be outside the perimeter of the defending forces, they may be occupied only during periods of good visibility. Less than optimum positions will, therefore, often have to be selected. Arrangements must be made with the defending force near the firing position for Chaparral fire units to occupy firing positions inside their perimeters during darkness or other periods of limited visibility.

d. The enemy attack may be preceded by a heavy artillery and close air support attack. During this attack Chaparral and Vulcan units within engagement range of the attacking aircraft, reinforced by the fires of Redeye and non-air defense weapons deployed in the vicinity, would be utilized.

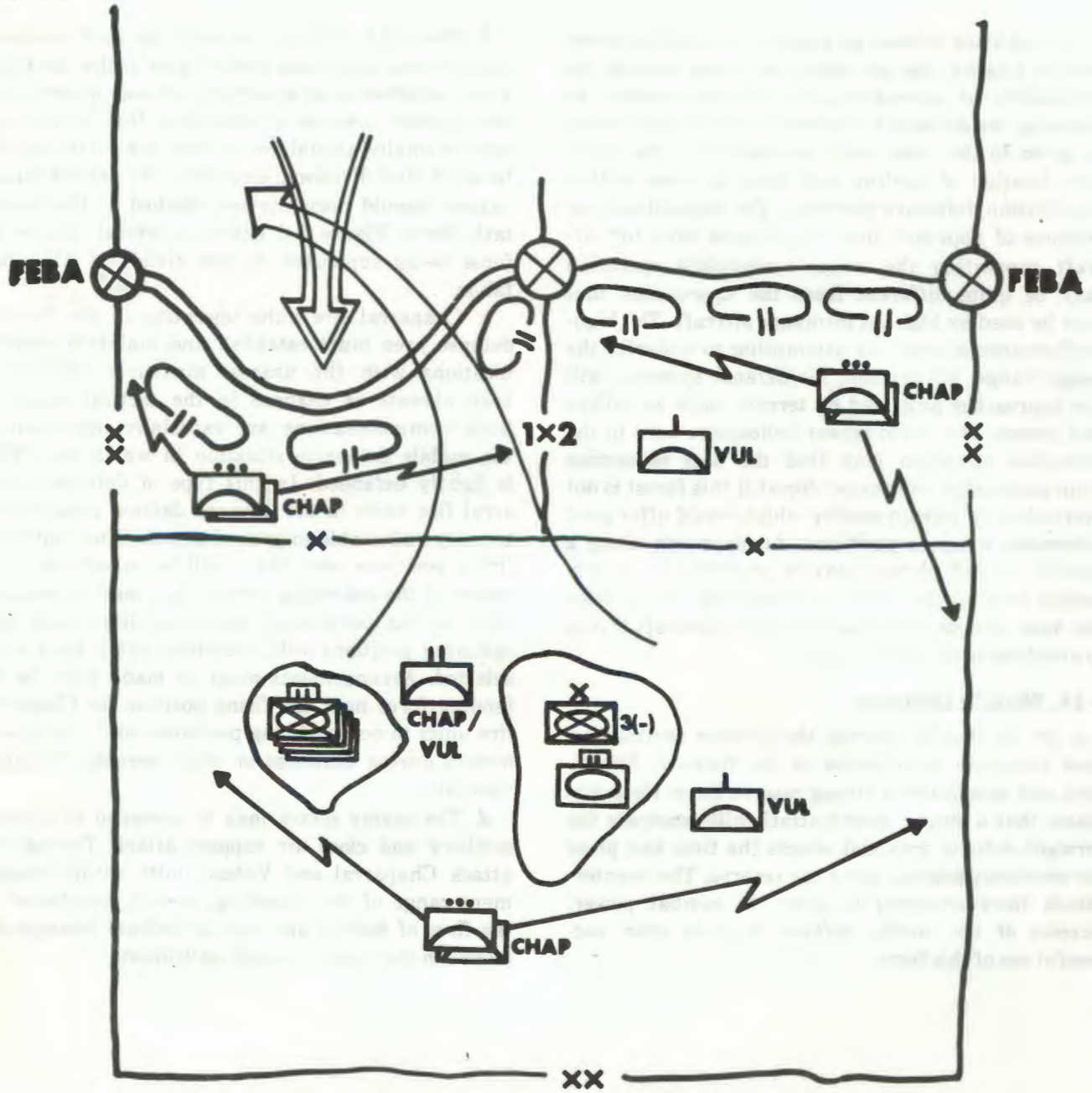


Figure 8-6. Mobile defense supported by Chaparral/Vulcan battalion.

8-15. Area Defense

In the area defense, emphasis is placed on defending avenues of approach through the FEBA and defending in depth to hold the terrain. This concept of ground defense by the division lends itself most readily to the area concept of air defense for the division. Almost without exception, Chaparral will be deployed in a division area type of defense with Vulcan defending small vital areas designated by the division commander.

Section IV. RETROGRADE OPERATIONS

8-16. General

A retrograde operation is a movement away from the enemy. The mission of the air defense artillery battalion is to protect the vital areas directed by the division mission and to conduct air defense of the area in which the division is operating to deny hostile aircraft observation of division activities and their capability to attack and disrupt movements of the division. The retrograde operation is conducted by using three methods—withdrawal, delaying action, or retirement.

8-17. Withdrawal

a. General. Withdrawal is an operation in which a deployed division disengages from the enemy. It may be executed under any condition of visibility and may be a withdrawal not under enemy pressure or a withdrawal under enemy pressure.

b. Withdrawal Not Under Enemy Pressure. This type of withdrawal under conditions of limited visibility is preferred. A detailed plan for accomplishing it will be needed. Vulcan batteries are directed to move to critical bridges and river crossings and establish air defense of the bridges. Chaparral batteries maintain the area defense from positions occupied before the withdrawal begins. As the withdrawal begins, air defense artillery units maintain their defensive posture and displace only for survivability. The air defense artillery units are displaced to rearward positions on order of the ADA battalion commander. In this manner, the division area air defense is rolled up with the forward security ground elements and allows maximum air defense protection of the divisional elements moving to the rear.

c. Withdrawal Under Enemy Pressure. In this type of withdrawal, division elements fight their way to the rear, using delaying tactics on successive positions. Success of such an operation depends on mobility, control, effective employment of covering forces, and local control of the air. Each of these is difficult to attain since the withdrawal is under pressure of the enemy. The division covering force is normally provided by the division reserve. When the covering force is constituted, Chaparral/Vulcan units deployed in the forward defense area are placed under the operational control of the covering force commander who will assign a mission. Any administrative or logistic support required by ADA elements must be written into the order by the headquarters assigning operational control. These ADA elements remain under the operational control of the covering force until the covering force is withdrawn. Other elements of the ADA battalion remain under the direct control of the ADA battalion and are displaced as required by the tactical situation. In a withdrawal under enemy pressure, divisional air defense units are displaces only that distance to the rear required for survival and operation. It is necessary to maintain the most effective air defense possible in the forward area to assist maneuver forces in breaking contact.

8-18. Delaying Actions

A delaying action is a retrograde operation in which maximum delay and damage are inflicted on an advancing enemy without decisively engaging in combat. It is the type of action normally fought by covering forces and security detachments. The division accomplishes a delaying mission by delay on successive positions, alternate positions, or a combination of both. The Chaparral/Vulcan battalion provides air defense to the division in a manner similar to that used for the withdrawal.

8-19. Retirement

A retirement is a retrograde operation in which a force moves away from the enemy to avoid combat under existing conditions. It may be made following a withdrawal or when there is no contact with the enemy. Air defense of the retirement is conducted in the same manner as defense of movement to contact with the exception that, in air defense of a retirement, Vulcan units are depolyed well ahead of the movement to protect critical points along the route of march.

Section V. RELIEF OPERATIONS

8-20. General

Relief of committed units is accomplished by a relief in place or by a passage of line. Relief operations are well-planned and are normally conducted during periods of limited visibility. When supporting the relief of elements within the division, air defense artillery units are concerned primarily with maintaining a close command and liaison relationship with supported force commanders and their staffs during the operation. When the division is the relieving force, close coordination is required with the divisional ADA battalion being relieved.

8-21. Relief in Place

The relief in place is conducted when the unit to be relieved is on the defense. The combat mission and area of operations of the outgoing unit are assumed by the incoming unit. When the relief in place involves only elements subordinate to the division, the ADA battalion mission remains unchanged, and the ADA units may remain in place and not be relieved. However, if the ADA units are to be relieved, the ADA liaison officer with the unit being relieved must thoroughly brief the incoming ADA unit on the mission, disposition, and plans of the div-

isional ADA battalion. When the division is the relieving force, the following details must be coordinated with the ADA battalion of the incoming force:

a. Exchange of Plans and Liaison. The incoming battalion commander and staff must be thoroughly briefed on the existing division air defense plan and its relationship to the army area air defense plan. The battalion commander and selected staff officers should visit the higher air defense headquarters with which the divisional battalion maintains liaison (ADA group or Hawk battalion). This visit should be accomplished before the relief takes place if time permits. To insure complete transfer of information, liaison personnel of the outgoing battalion remain with the incoming unit for a short period of time after the relief is complete.

b. Sequence of the Relief. To maintain maximum possible effectiveness, the relief is executed in stages. The two commanders determine a sequence of relief that will be least degrading to the defense should an air attack occur during the relief operation.

c. When "Command is to Pass." The time or circumstances under which the incoming AD commander assumes responsibility for the defense is normally determined by the division commancer. Other plans by the AD commanders must be formulated on a time basis to meet the division passage of command requirements.

d. Reconnaissance. The incoming unit must conduct a thorough daylight reconnaissance of the position areas, relief routes, and combat service support installations.

e. Security. Every effort must be made to avoid compromise of the relief operations to the enemy. Reconnaissance parties must be kept small. Reconnaissance must be conducted so that it will not create an unusual amount of activity in the area. Radio nets of the incoming unit should not be used until the relief is complete.

f. Enemy Threat Information. The outgoing unit must thoroughly brief the incoming unit on the current air threat.

g. Rules of Engagement. All personnel of the incoming unit must be thoroughly familiar with the rules of engagement and any control procedures and techniques that are in effect.

h. Combat Service Support. The incoming unit commander must be familiar with the operation of those agencies from which he received combat service support.

8-22. Passage of Lines

A passage of lines is an operation in which an incoming unit attacks through a unit which is in contact with the enemy or in which one unit withdraws through another unit occupying a rearward position.

a. Forward Passage of Lines. The ADA battalion commander of the attacking division must make early contact with the commander of the ADA battalion of the division on line in order to obtain all data possible that will assist him in supporting the attack. The type of attack being conducted will govern the organization for combat of the divisional ADA battalion. However, as a general rule, the ADA battalion defends the division during the forward passage of lines in about the same manner as during movement to contact.

b. Rearward Passage of Lines. The various forms of retrograde operations (delay on successive position, delay on alternate position) are applicable to rearward passage of lines. In general, the divisional ADA battalion gives up its defensive positions only when required to in order to survive or upon completion of the passage of lines. In this manner of operation, maximum protection can be afforded the supported force when it is most vulnerable to air attack.

SUMMARY

In movement to contact, Vulcan units are placed with main body elements. Chaparral units are placed with the covering force, flank, and rear guard elements to be in the best locations for defending the main body.

If air defense units are required in reconnaissance operations, the Vulcan is the best type of weapon for the mission because it can provide both air defense and ground fire support.

In coordinated attacks, the C/V battalion must be prepared to react rapidly whether the combat maneuver is penetration, envelopment, or frontal attack. Vulcan units generally accompany the supported units and Chaparral units are moved as suitable areas come under friendly control.

In exploitation, the C/V battalion's mission and organization will be the same as in movement to contact.

In pursuit, the C/V battalion's mission and organization for combat is the same as in an envelopment with the direct pressure forces requiring the same type of support as the supporting attact forces of the envelopment.

Infiltrating forces will seldom become a lucrative target for enemy air. The all-arms (Redeye) weapons of the infiltrating force should satisfy any air defense requirement.

In mobile defense operations, the C/V battalion may use two Chaparral batteries in an area type of defense, weighting the low-altitude avenues of approach.

One Vulcan battery may be employed for vital area defense of specified divisional elements; the second is normally attached to the reserve task force.

In the area defense, Chaparral is deployed in a division area type defense with Vulcan defending small vital areas designated by the division commander.

In a withdrawal not under enemy pressure, Vulcan units establish air defense of critical bridges and river crossings, while Chaparral units maintain area defense from positions occupied before the withdrawal begins. C/V units maintain defensive positions and displace only for survivability or when the forward security ground elements reach their position.

In a withdrawal under enemy pressure, C/V units must maintain air defense in forward areas to assist maneuver forces in breaking contact.

CHAPTER 9
STRAF AIR DEFENSE BATTALION (CHAPARRAL/VULCAN/HAWK), PROVISIONAL

9-1. General

This chapter briefly describes employment concepts for the STRAF air defense battalion, provisional.

9-2. Mission

The battalion will provide air defense for designated air bases against attack by low- and medium-altitude hostile aircraft and may attack surface targets by using the Vulcan gun system in the ground fire support role.

9-3. Organization

This special type battalion is CONUS-based and allocated to the Strategic Army Force, a component of the US Readiness Command (REDCOM) for employment on a contingency basis throughout the world to defend designated airbases. The basic battalion is composed of a headquarters and headquarters battery, two Hawk batteries (towed), and one composite Chaparral/Vulcan battery (six Chaparral, six Vulcan squads, and two FAAR sections), figure 9-1. Organizational tailoring will often be required to fit the defense needs of specific airbases or installations.

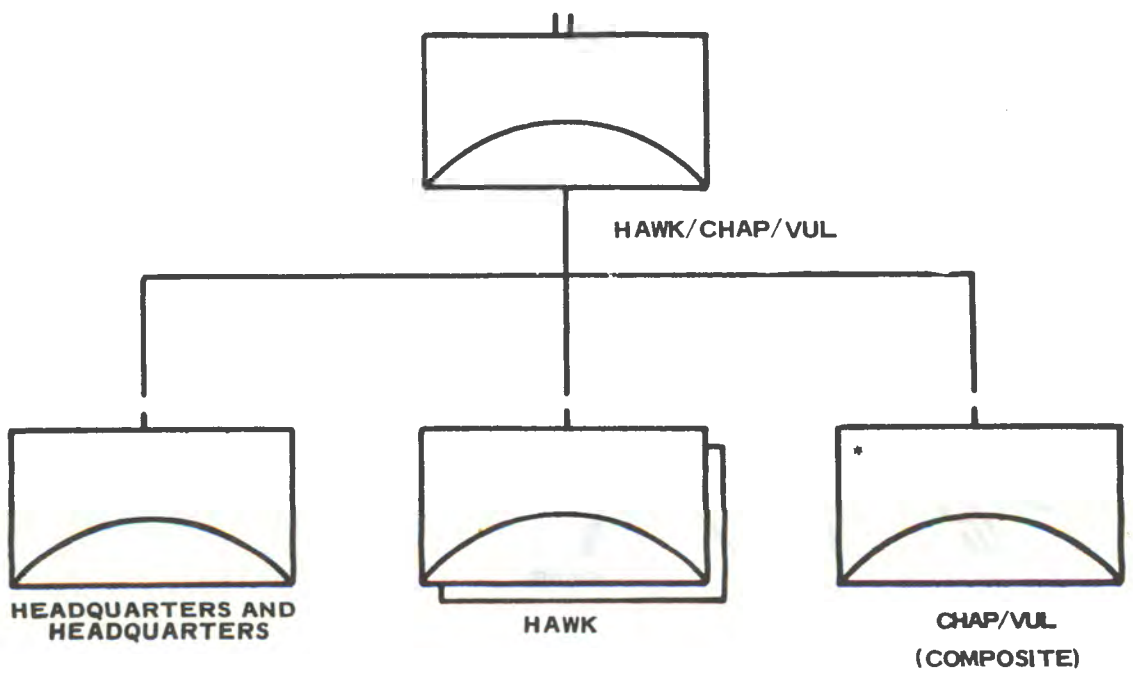


Figure 9-1. STRAF air defense battalion (Chaparral/Vulcan/Hawk), provisional.

9-4. Deployment

a. Hawk. Hawk fire units are positioned to insure early engagement of low/medium altitude attachers. Normally, balanced 360° coverage is sought. When deployed in an area covered by the area air defense system, Hawk placement is coordinated with the appropriate area air defense commander to insure an integrated defense. On-base deployment will often provide adequate coverage and will simplify the local security problem; however, mission and terrain considerations may force an off-base deployment.

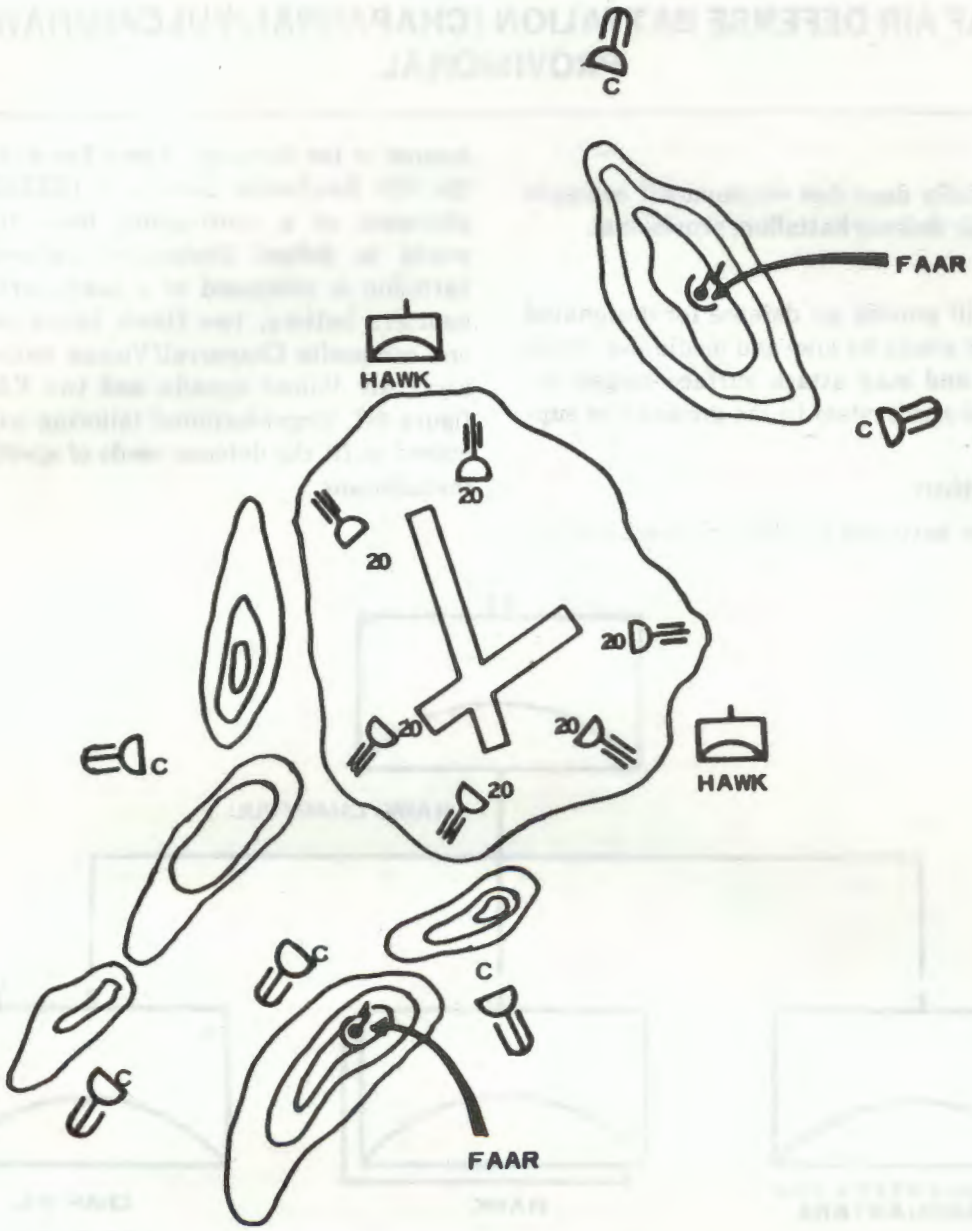


Figure 9-2. Airbase air defense artillery deployment.

b. Chaparral. The Chaparral weapons and the two FAAR normally will be deployed off-base in a perimeter defense. The primary consideration in emplacing Chaparral fire units and FAAR is to offset weaknesses in Hawk coverage of the most probable low-altitude routes of enemy approach. Although an unbalanced Chaparral defense may result, at least overlapping fields of fire between Chaparral fire units should be maintained. The FAARs deployed in the vicinity of the Chaparral units are sited to achieve the best coverage of the critical routes of enemy air approach. Special ground security arrangements must be made for Chaparral and radar elements situated off-base.

c. Vulcan. The Vulcan fire units are employed within the confines of the airbase for mutually supporting defense of the airbase complex. The defense is weighted to cover weaknesses in the combined Hawk-Chaparral deployments, areas designated as priority by the airbase commander, or towards likely low-altitude avenues of approach.

9-5. Command and Control

a. Command. The airbase commander, when responsible for all or part of the air defense of his airbase, designates a single airbase air defense commander responsible to him for airbase air defense. All air defense units assigned the mission of air-

base defense are responsive to this commander. When the airbase defense is considered as a part of the area air defense system, airbase air defense deployments are coordinated with the appropriate area air defense commander.

b. Control. The two basic elements of control are: control of deployments and control of fires.

(1) *Control of deployments.* The deployments and redeployments of Army air defense units committed to defense of an airbase are planned and executed under the command of the airbase Army air defense commander in response to priorities and concepts established by the airbase air defense commander. When the airbase defense is to be integrated into the area air defense system, deployments and redeployments are coordinated with the responsible area commander.

(2) *Control of fires.* All airbase air defense engagement operations are conducted in accordance with theater-promulgated rules of engagements, hostile criteria, and modifications approved by the area air defense commander or higher authority for airbase air defense operations. The possiblity of declaring the airbase as a *restricted area* out to the maximum Hawk range should be considered.

9-6. Warning System

The airbase defense warning system is comprised of the—

a. Area air defense system (primary warning source).

b. Airbase radars.

c. Hawk radars.

d. Forward area alerting radars.

e. Visual observer teams.

f. Airborne aircraft under airbase control.

9-7. Communications

Types of airbase air defense communications concepts are illustrated in figure 9-3. All nets are ratio (voice or digital, as indicated) with wire backup where possible.

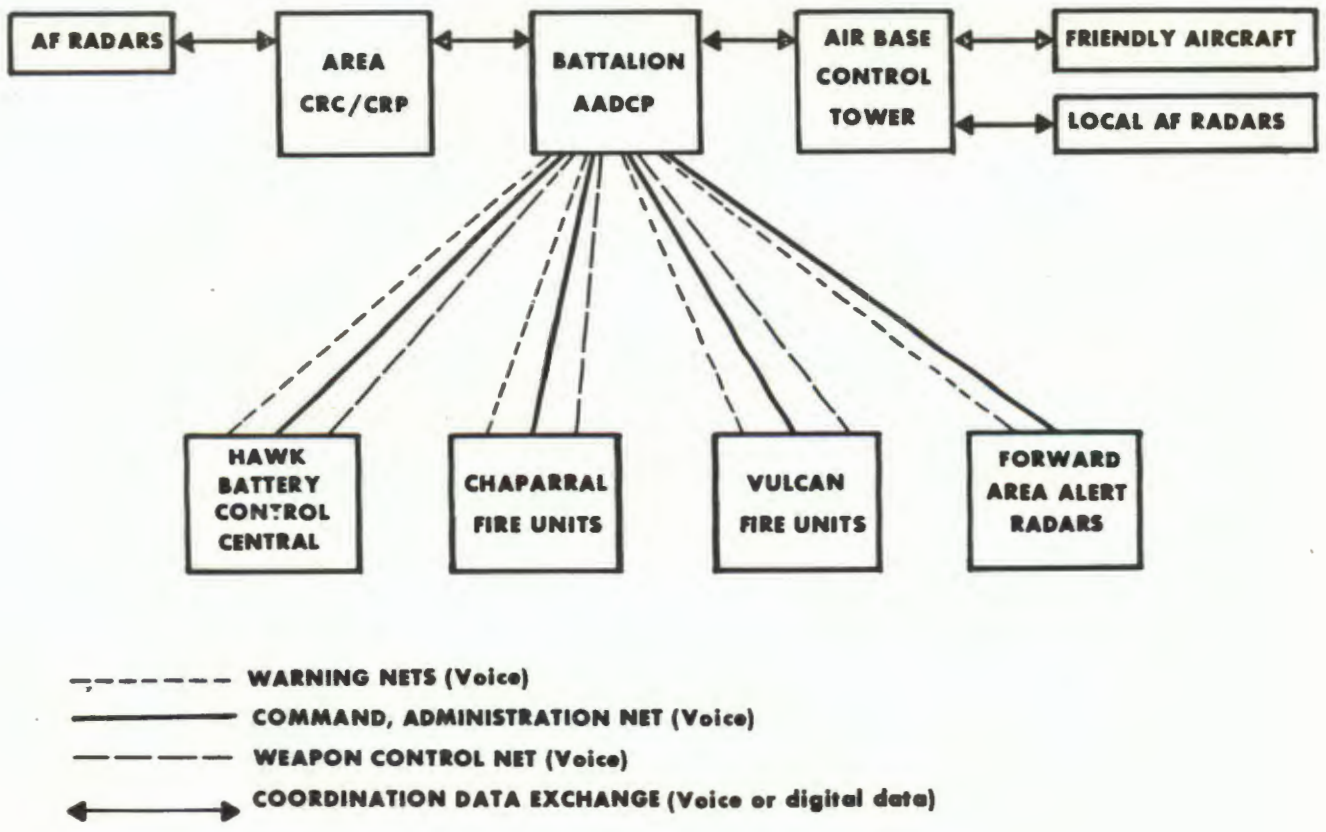


Figure 9-3. Airbase air defense communication concepts.

SUMMARY

The STRAF battalion will provide air defense for designated air bases against low- and medium-altitude hostile aircraft and may attack surface targets by using the Vulcan gun system in the ground fire support role.

This special type of battalion is CONUS-based and allocated to the Strategic Army Force, a component of REDCOM, for employment on a contingency basis throughout the world.

The battalion consists of a headquarters and headquarters battery, two Hawk batteries (towed), and one composite SP Chaparral/Vulcan battery. The composite C/V battery consists of six Chaparral, six Vulcan squads, and two FAAR sections.

The Hawk fire units are positioned to insure early engagement of low/medium-altitude attackers.

The Chaparral weapon and the two FAAR's are deployed off base in the most probable low-altitude routes of enemy approach.

The Vulcan weapons are positioned to cover weaknesses in the combined Hawk/Chaparral deployments.

APPENDIX A
REFERENCES

A-1. General

Department of the Army pamphlets of the 310-series should be consulted for latest changes or revisions of references listed in this appendix, and for new publications relating to material covered in this manual.

A-2. Army Regulations (AP)

310-25	Dictionary of United States Army Terms.
310-50	Authorized Abbreviations and Brevity Codes.
380-series	Security

A-3. Department of the Army Pamphlets (DA Pam)

310-series	Military Publications (as applicable).

A-4. Field Manuals (FM)

3-10	Employment of Chemical and Biological Agents.
3-12	Operational Aspects of Radiological Defense.
6-20-1	Field Artillery Tactics.
11-50	Signal Battalion, Armored, Infantry, and Infantry (Mechanized), and Airmobile Divsions.
21-11	First Aid for Soldiers.
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.
23-12	Technique of Fire of the Rifle Squad and Tactical Application.
23-15	Browning Automatic Rifle, Cal. 30, M1918A2.
23-65	Browning Machinegun, Caliber .50, HB, M2.
24-1	Tactical Communications Doctrine.
24-18	Field Radio Techniques.
(C) 32-5	Signal Security (SIG SEC) (U).
(C) 32-20	Electronic Warfare (U).
44-1	US Army Air Defense Artillery Employment.
(S) 44-1A	US Army Air Defense Artillery Employment (U).
44-1-1	US Army Air Defense Artillery Operations.
44-4	Procedures and Drills for Chaparral Self-Propelled Weapon System.
44-5	Procedures and Drills for Vulcan Self-Propelled Weapon System.
44-6	Procedures and Drills for Forward Area Alerting Radar.
44-10 (Test)	Army Airspace Control Doctrine.
44-62	Air Defense Artillery Automatic Weapon Gunnery.
44-100	Procedures and Drills for Vulcan Towed Weapon System.
61-100	The Division.
101-5	Staff Officers Field Manual-Staff Organization Procedure.

A-5. Technical Manuals (TM)

9-1440-585-12	Operator and Organizational Maintenance Manual: Intercept—Aerial, Guided Missile System XM-54 (Launching Station) (Chaparral Air Defense Guided Missile System).
9-2350-300-10	Operator's Manual: Gun, Antiaircraft Artillery, Self-Propelled: 20-mm, XM163 (Vulcan Air Defense Artillery System).
11-750	Radar Electronic Counter-Countermeasures for the Operator.

A-6. Tables of Organization and Equipment (TOE)

44-325	Air Defense Artillery Battalion, Chaparral/Vulcan, Self-Propelled.
44-326	Headquarters and Headquarters Battery, Air Defense Artillery Battalion, Chaparral/Vulcan Self-Propelled.
44-327	Air Defense Artillery Battery, Vulcan, Self-Propelled.
44-328	Air Defense Artillery Battery, Chaparral, Self-Propelled.
44-425	Air Defense Artillery Battalion, Vulcan, Towed, Airborne Division.
44-426	Headquarters and Headquarters Battery, Air Defense Artillery Battalion, Vulcan, Towed, Airborne Division.
44-427	Air Defense Artillery Battery, Vulcan, Towed, Airborne Division.
44-435	Air Defense Artillery Battalion, Vulcan, Towed, Airmobile Division.
44-436	Headquarters and Headquarters Battery, Air Defense Artillery Battalion, Vulcan, Towed, Airmobile Division.
44-437	Air Defense Artillery Battery, Vulcan, Towed, Airmobile Division.
44-725	Air Defense Artillery Battalion, Chaparral (Self-Propelled)/Vulcan (Towed).
44-726	Headquarters and Headquarters Battery, Air Defense Artillery Battalion, Chaparral (Self-Propelled)/Vulcan (Towed).
44-727	Air Defense Artillery Battery, Vulcan, Towed.
44-728	Air Defense Artillery Battery, Chaparral, Self-Propelled.
44-225	STRAF Air Defense Artillery Battalion, (Hawk/Chaparral/Vulcan), Provisional.
44-226	Headquarters and Headquarters Battery, STRAF Air Defense Artillery Battalion, (Hawk/Chaparral/Vulcan), Provisional.
44-227	STRAF Air Defense Artillery Battery, Hawk, Provisional.
44-228	STRAF Air Defense Artillery Battery, Chaparral/Vulcan, (Self-Propelled), Provisional.

A-7. Training Texts (TT)

44-10-1	Army Airspace Coordination Techniques.

APPENDIX B
THREAT CHARACTERISTICS

B-1. Enemy Capability

The enemy capability is a factor affecting the employment of Chaparral/Vulcan units. A thorough study of enemy capabilities must be conducted to determine the most effective defense design. The major portion of this study is based on intelligence to determine the amount of airborne equipment in the enemy inventory and their operational characteristics, size, and probable employment.

B-2. Speed and Altitude

Knowing the operational characteristics of enemy airborne equipment, the best speed and altitude of attack against a particular ground target can be determined with reasonable accuracy. The defense design is influenced by this optimum speed and altitude, particularly for manned aircraft, because these two factors greatly affect the ability of Chaparral/Vulcan units provide sufficient air defense for a given target.

B-3. Weapons and Delivery Means

Intelligence can determine the optimum weapon that the enemy has available for use against a particular target; however, the Chaparral/Vulcan defense design must be based on delivery means (aircraft/missiles) rather than on the weapon. The aircraft employed by the enemy will vary with the numbers available, their payload, weather conditions, and launching base-to-target considerations.

B-4. Attack Technique

The enemy, using a low-altitude approach (fig B-1) may employ a number of attack techniques as discussed below.

a. Basic Aircraft Tactic. A basic fighter aircraft tactic is to attack at maximum speed and minimum altitude, thus compressing the time available to the Chaparral/Vulcan units for acquisition, identification, and engagement of the attacking aircraft. This *shortened exposure time* is the attacker's greatest advantage.

b. Basic Low-Altitude Tactics. The enemy is assumed to employ tactics similar to those used by the US Air Force. For these tactics, the aircraft is flown at minimum altitude and high speed and is pulled up abruptly into a climbing attitude 1½ to 7 kilometers before reaching the target. The distance from the target at which the pull-up is executed and altitude attained varies with the type of attack—strafing, rocket, or dive-bomb runs.

(1) *Low-angle strafe (fig B-2).* The aircraft makes a low-altitude approach (60 meters) to a point 1½ to 2½ kilometers from the target. At this point the aircraft climbs to an altitude of 150 to 250 meters, and assumes an attack angle of 5° to 6° and a speed of about 400 knots.

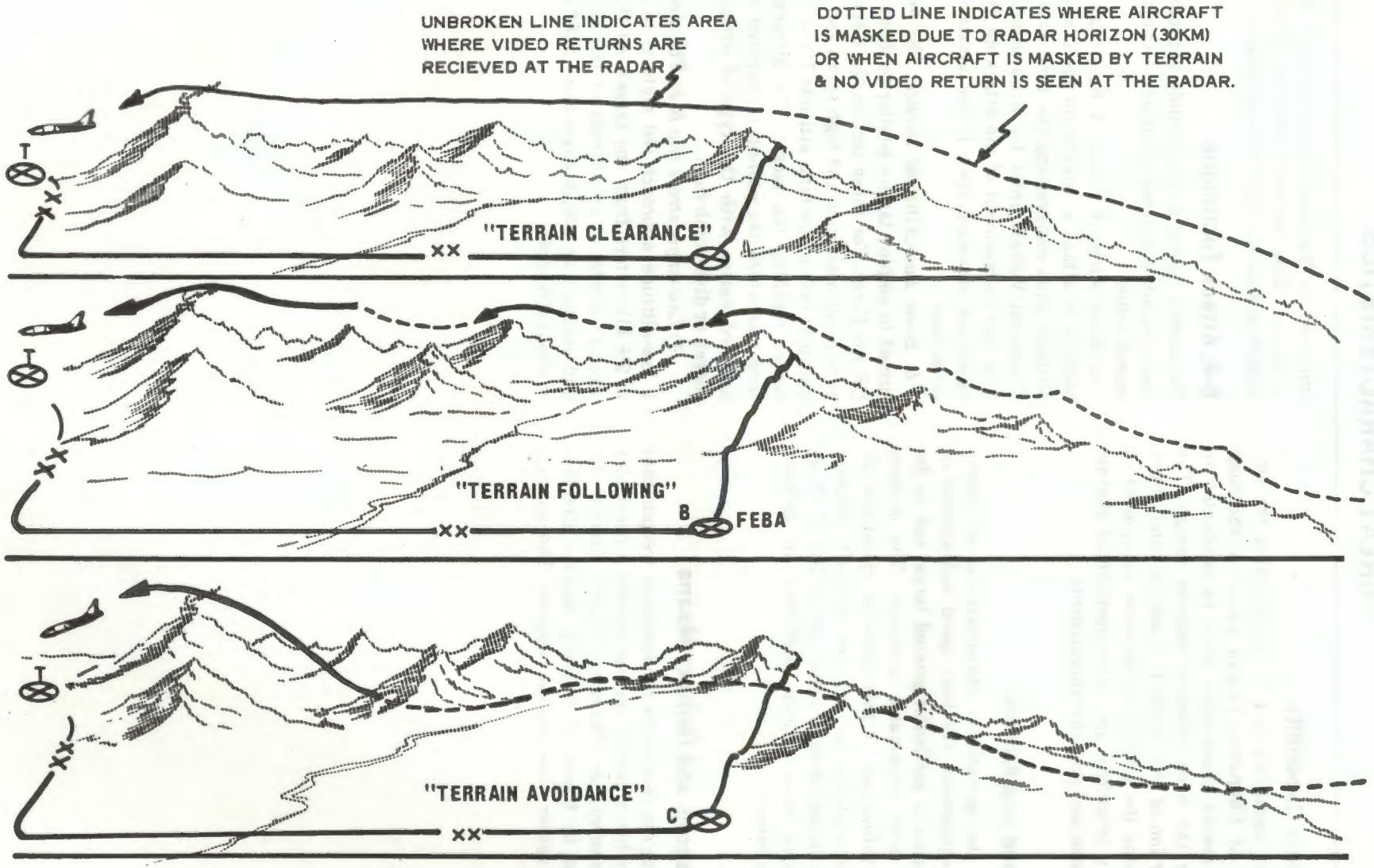


Figure B-1. Low-altitude approach techniques.

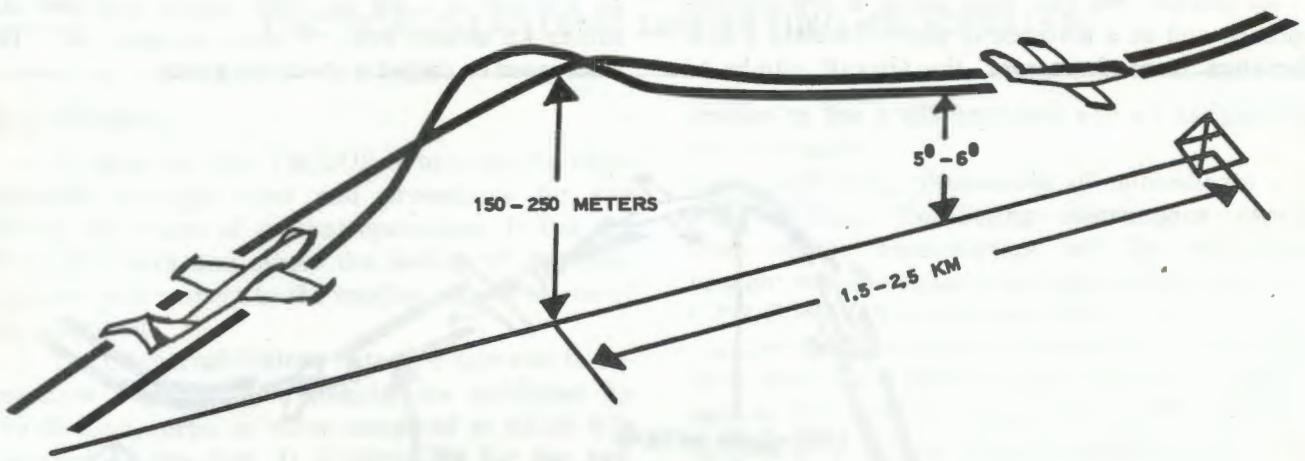


Figure B-2. Low-angle strafe.

(2) *Dive-bomb (fig B-3).* The aircraft makes a low-altitude approach, then pulls up into a climbing attitude of 40° to 45°. At an altitude of 2,500 to 3,000 meters, the aircraft turns toward the target and assumes an attack angle of approximately 45°. The final speed on target is about 400 knots.

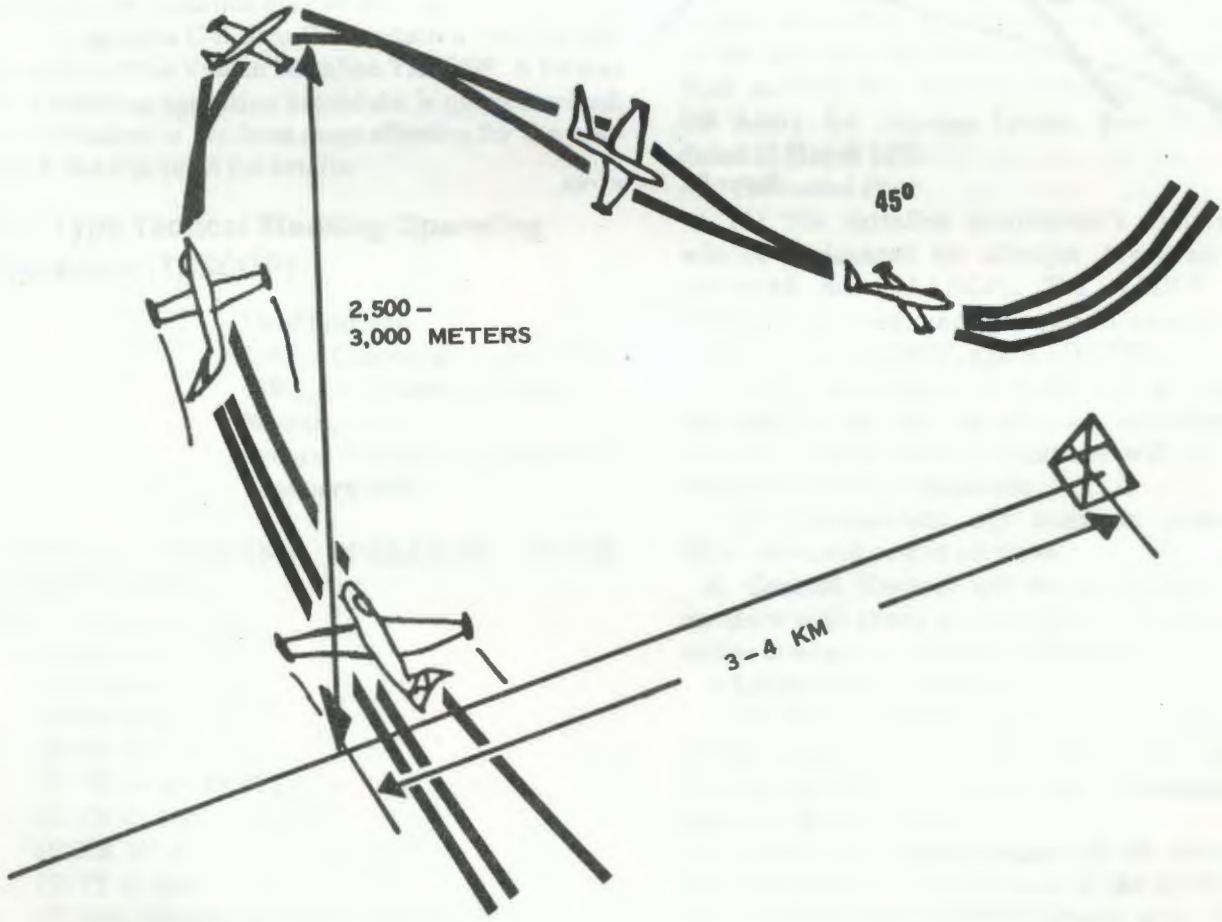


Figure B-3. Dive Bomb.

(3) *Rocket run (fig B-4).* After a low-altitude approach and at a distance of approximately 4 to 5 kilometers from the target, the aircraft climbs to an altitude of 1,500 to 2,000 meters and then assumes an attack angle of approximately 30°. The final speed on target is about 400 knots.

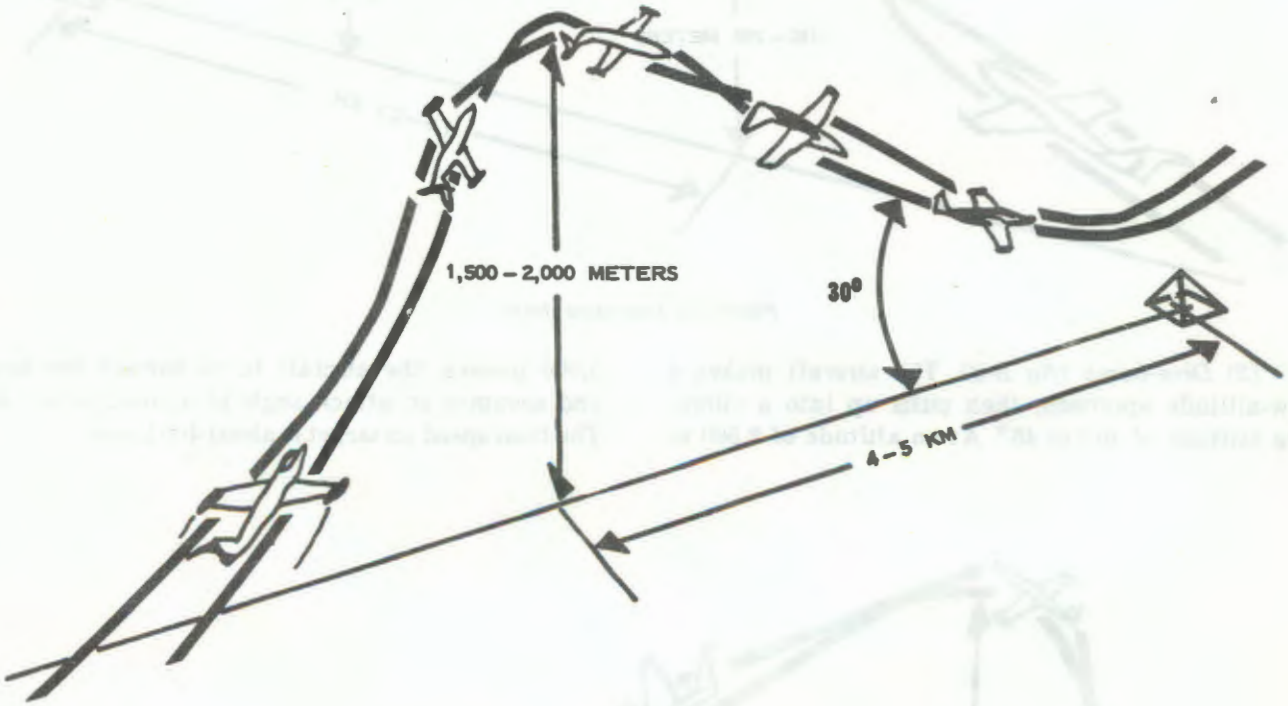


Figure B-4. Rocket run.

APPENDIX C
TACTICAL STANDING OPERATING PROCEDURE

C-1. General

a. The purpose of a TACSOP is to prescribe standardized doctrine rules and procedures for use during all phases of combat operations. It has the force of orders and states the desires of the commander with respect to the conduct of operations of his command.

b. The Chaparral/Vulcan battalion operates in accordance with the SOP/Regulations published by the division, corps, or other command to which it is assigned or attached. It is advisable for the battalion to publish an SOP based on the higher headquarters SOP/Regulations for the following reasons.

(1) The battalion can include items not included in the division/corps SOP.

(2) The battalion can elaborate on division/corps SOP items.

(3) Items in the division/corps SOP which do not pertain to the battalion may be deleted.

c. Paragraphs C-2 thru C-5 contain a type format for a Chaparral/Vulcan battalion TACSOP. A format for a standing operating procedure is not prescribed; it is published in the form most effective for the command. See FM 101-5 for details.

C-2. Type Tactical Standing Operating Procedure (TASCOP)

Headquarters
1st Bn (Chaparral/Vulcan, SP),
439th Air Defense Artillery
Munich,
Federal Republic of Germany
1 January 1972

TACTICAL STANDING OPERATING PROCEDURE (TACSOP).

C-2-1. GENERAL.

a. References.

(1) FM 44-1.
(2) FM 44-3.
(3) FM 44-1-1.
(4) FM 44-10 (TEST).
(5) FM 61-100.
(6) FM 101-5.
(7) TT 44-10-1
(8) 20th Infantry Division Field SOP.

b. Purpose and Applicability. Prescribe standardized doctrine, rules, and procedures for use during all phases of combat operations. This TACSOP applies to the 1/439 battalion and all assigned and attached units.

c. Conformity. Procedures of subordinate units will conform. Conflicting instructions received from higher headquarters will be immediately brought to the battalion commander's attention.

C-2-2. COMMAND AND CONTROL.

a. Mission. The primary mission of the battalion is to defend the 20th Infantry Division against attack by low-altitude hostile aircraft. The secondary mission is to provide ground supporting fires when not engaged by the air threat or as directed by the commander of the supported force. The normal battalion tactical mission is division general support (GS), with frequent assignment of the brigade direct support (DS) tactical mission to the Vulcan batteries and Chaparral/Vulcan battery task organizations.

b. Organization. The 1st Battalion (Chaparral/Vulcan, SP) 439th Air Defense Artillery is organic to the 20th Infantry Division and is organized under TOE 44-325H and General Order 32, Headquarters, US Army Air Defense Center, Fort Bliss, Texas, dated 10 March 1970.

c. Command Post.

(1) The battalion commander's command post will be designated the division Army air defense command post (AADCP). The AADCP will be manned, equipped, and operated in accordance with annex A, this TACSOP, and AADCP SOP.

(2) Battery command posts will be reported to the AADCP as soon as they are established. Platoon and squad position locations will be reported immediately after occupation.

(3) Commanders will maintain contact with their command post at all times.

d. Control. Control will be accomplished in accordance with annex A, this TACSOP, written orders, and as directed by battalion commander.

e. Liaison and Coordination.

(1) The battalion liaison section will provide liaison to the 1st Battalion (Hawk, SP), 458th Air Defense Artillery, or as directed. Procedures are in annex A, this TACSOP.

(2) The air defense section of the airspace control element (ACE) will locate in the division tactical operation center (DTOC) where, with the Army aviation section of the ACE, it will form the division ACE and assist in coordination of current operations in the division airspace under general super-

vision of the division G3. 1/458 Hawk ADA Battalion normally supports the 20th Infantry Division and provides liaison to operate with the DTOC ACE. Annex B of this TACSOP provides detailed ACE procedures.

(3) Batteries or battery task organizations attached to, in direct support of, or under operational control of, the brigades will provide liaison and communications to the brigade fire support element (FSE) or, if formed, the brigade ACE (BACE).

(4) Battalion commander maintains personal liaison with tactical air control party (TACP) commander.

f. Signal Communications. Annex C, this TACSOP.

g. Orders and Reports.

(1) *Combat orders.* Fragmentary combat orders will normally be issued unless time permits published written orders. Maximum use will be made of overlays. Complete written orders will follow fragmentary orders when directed by the commander. Formats per FM 101-5.

(2) *Reports.* Annex E, this TACSOP.

C-2-3. COORDINATION OF TACTICAL OPERATIONS.

a. Intelligence.

(1) *Prisoners of war.* Procedures for handling POWs are in annex E, this TACSOP.

(2) *Local civilians and civilian internees.* Procedures for handling civilians are in annex F, this TACSOP.

(3) *Captured documents.* Procedures for processing captured documents are included in annex F, this TACSOP.

(4) *Technical intelligence.* Designation of enemy materiel required for examination, and processing instructions, may be found in annex F, this TACSOP.

(5) *Communications and electronics intelligence.* The S2 will coordinate this activity with division G2.

(6) *Maps.* Maps will be requisitioned through battalion S2. S2 will, as feasible, maintain maps to support operations for all battalion elements. When sufficient maps are not available, operations orders will include locally-procured strip maps and route sketches as necessary. Distribution of maps and sketches will be down to platoon level. Basic issue per annex F, this TACSOP.

(7) *Weather.* Weather intelligence requirements and instructions for inclement weather operations are in annex F, this TACSOP.

(8) *Counterintelligence.* Instructions concerning routine and special counterintelligence measures will be coordinated by battalion S2. Specific instructions are in annex F, this TACSOP.

(9) *Fallout, radiological monitoring, and survey.* Procedures are included in annex G, this TACSOP.

(10) *Attached and supporting intelligence specialists and units.* Related activities coordinated and supervised by battalion S2.

b. Operations.

(1) *Procedures.* Air Defense and ground support operations will be conducted in accordance with annex A, this TACSOP.

(2) *Coordination agencies.*

(a) For battalion. As outlined in annex A (this TACSOP), and as designated in tactical mission assignment.

(b) For ACE. As detailed in annex B, this TACSOP.

c. Special Considerations.

(1) *Action to minimize effects of nuclear attack.* Required active and passive measures are covered in annex H, this TACSOP.

(2) *Night operations.* Instructions for fire units equipped with night vision devices are in annex I, this TACSOP.

(3) *Motor movement.* Procedures for tacitcal motor convoys are outlined in annex J, this TACSOP.

(4) *Movement of the headquarters.* Procedures, moving, and organizing the battalion headquarters are in annex K, this TACSOP.

(5) *Reconnaissance, selection, and occupation of position (RSOP).* Complete RSOP procedures are in annex L, this TACSOP.

(6) *Safety.* Special safety policies are included in annex M, this TACSOP.

C-2-4. COORDINATION OF ADMINISTRATIVE SUPPORT OPERATIONS.

a. General. The battalion executive officer is responsible for supervision and coordination of all administrative support operations. Administrative orders will normally be prepared by the S4 in coordination with other staff sections. Administrative reports and formats are contained in annex E, this TACSOP.

b. Logistics.

(1) *Responsibility.* The S4 is responsible for coordinating all logistic activities within the battalion under executive supervision.

(2) *Procedures.*

(a) Supply and maintenance. Procedures are covered in annex D, this TACSOP.

(b) Transportation. Batteries will furnish their own transportation to the maximum extent possible. Requests for additional transportation will be submitted to the battalion motor officer. Priorities are in annex D, this TACSOP.

c. Medical Evacuation and Hospitalization.

(1) One aidman from the battalion medical section will be disignated by the battalion medical section to support each battery. Duties of these aidmen are specified in annex N, this TACSOP.

(2) At battery level, persons requiring mdical attention beyond the capability of assigned aidmen will normally be evacuated to the closest aid station. When personnel are evacuated to an aid station other than the battalion aid station, the S1 will be notified.

d. Personnel and Administration.

(1) Maintenance of unit strength.

(a) Strengths, records, and reports will be processed as prescribed by annex E, this TACSOP.

(b) Replacements will be assigned by the battalion commander or his designated representative.

(2) Personnel management.

(a) Personnel actions. All personnel actions will be handled by the personnel section. Individuals will make necessary requests through their battery headquarters. All personnel requests will be handled by message unless physical presence of an individual is required. Battery headquarters will be notified by the personnel section when an individual's presence is required at battalion headquarters.

(b) Civilian personnel. Policies and procedures for personnel management of US and indigenous civilians will be established in accordance with division regulations or SOP.

(c) Prisoners of war and civilian internees. POWs will be handled as outlined in annex F, this TACSOP. Civilian internees will be segregated from military prisoners but will be handled in the same manner.

(3) Morale and personnel services.

(a) Authorized absences. Leave, and rest and recuperation (R&R) quotas will be filled as the tactical situation allows. The pass policy will be as announced.

(b) Decorations and awards. Commanders will insure that all acts of heroism, exemplary military service, and service to the indigenous population by personnel of this command are considered for decorations or awards. Recommendations for decorations and awards will be submitted on DA Form 638 to the battalion S1. Submission of recommendations will be timely; however, such actions should not interfere with operational requirements. Presentations of decorations and awards will be made at an appropriate ceremony.

(c) Mail. Each battery's mail clerk will pick up his unit's mail from the battalion mail room as scheduled or announced by the S1 section. The battalion clerk will be located in the battalion message center.

(d) PX supplies and facilities. Exchange items, when available, will be distributed with Class I supplies. Mobile PXs, when available, will be in the unit area on schedules announced by the battalion S1 section.

(e) Religious activities. Religious activities will be announced by Chaplain.

(4) Graves registration services.

(a) Dead will be removed from the battlefield as soon as possible. As the tactical situation permits, remains will be covered and transported to the collecting point designated by the battalion S4. At no time will the remains of US or allied personnel be left unattended.

(b) Personal effects will accompany remains to the collecting point.

(c) Isolated burials will be accomplished only when evacuation to the battalion collecting point is not practical. Location of graves, plus name, grade, and service number of the deceased, will be reported to the battalion S1 as soon as possible.

(d) Remains will not be transported in ambulances, or vehicles transporting troops or Class I supplies.

(5) Maintenance of discipline, law, and order.

(a) Battalion personnel will be in the prescribed uniform and maintain high standards of personal appearance and conduct at all times.

(b) Stragglers within the battalion area will be brought to the S1 section by the first available transportation. The S1 will take the necessary action to return stragglers to their proper organization.

(c) Courts-martial. Court-martial charges will be prepared and forwarded to the battalion S1 as expeditiously as possible. Personnel awaiting trial will remain with their unit unless pretrial confinement is authorized.

(6) Public information and community service.

(a) Public requests for information about US forces will be referred to the Battalion Public Information Office (Bn X0) for action. Release of military information of any kind will not be made without prior approval of this headquarters.

(b) Battalion personnel will respect local customs and comply with local laws.

ANNEXES:

A—Air Defense and Ground Fire Support
B—Airspace Control Element
C—Communications (omitted)
D—Logistics

E—Reports and Orders (omitted)
F—Intelligence (omitted)
G—Chemical, Biological, and Radiological (omitted)
H—Action to Minimize Effects of Nuclear Attack (omitted)
I—Night Operations (omitted)
J—Motor Movements (omitted)
K—Movement of the Headquarters (omitted)
L—Reconnaissance, Selection, and Occupation of Position (omitted)
M—Safety (omitted)
N—Medical Evacuation and Hospitalization (omitted)
O—Personnel and Administration (omitted)
P—Distribution (omitted)

DISTRIBUTION: Annex P
OFFICIAL:
Signature
Name
S3

Signature
Name
Commanding

C-3. Annex A (Air Defense and Ground Fire Support) to TASCOP 1 Bn (C/V, SP) 439 ADA

C-3-1. GENERAL.

a. Purpose and Scope. Prescribe doctrine, rules, and procedures governing combat operations in accordance with the policies of the CG, 20th Infantry Division. Provisions of this Annex are applicable to all units of this battalion and units assigned and attached.

b. Missions.

(1) *Primary mission—air defense.* To defend 20th Infantry Division elements against low altitude air attack with the objective of limiting the effectiveness of enemy offensive air efforts to a level permitting freedom of action for the division.

(2) *Secondary mission—ground fire support.* To provide Vulcan supporting fires for elements of the division as directed.

(3) *Tactical mission.* The battalion is normally in division general support, (GS) as part of division troops, with frequent assignment of the brigade direct support (DS) tactical mission to Vulcan or composite Chaparral/Vulcan batteries.

(4) *Other missions.* As directed.

c. Supporting Forces. The 1/458 (Hawk, SP) ADA Battalion (or elements thereof) normally supports the division.

C-3-2. RESPONSIBILITIES.

a. Battalion Commander.

(1) Commands the 1/439 and any nondivisional ADA attached for division air defense. Provides air defense priorities, sectors of fire, and positioning guidance to any nondivisional ADA reinforcing the 1/439.

(2) Develops and implements doctrine for division air defense operations in accordance with current directives.

(3) Administers, trains, and evaluates the battalion and coordinates logistical support.

(4) Serves as division air defense staff officer, with duties per paragraph 9-5, FM 44-1, paragraph 8-1, FM 44-3 and paragraph 4-13, FM 61-100.

(5) Provides the air defense section of the airspace control element (ACE) for operations in the DTOC.

(6) Provides liaison to the nearest element of the field army air defense system, normally the 1/458 ADA Hawk Battalion.

b. Executive Officer

(1) Exercises overall supervision of the battalion staff.

(2) Exercises overall staff supervision of the battalion AADCP.

(3) Coordinates and supervises the displacement of the battalion.

(4) Coordinates the establishment and organization of the battalion headquarters area.

c. S3.

(1) Maintains and supervises day-to-day operations of the battalion AADCP.

(2) Prepares air defense annexes to division plans, orders, and SOP.

(3) Maintains this TACSOP.

(4) Plans and supervises training, to include monitoring the state of training of divisional Redeye sections.

(5) Plans, designs, and evaluates the battalion's air defense coverage of the division's air defense priorities, except as such functions are delegated to subordinate units. Provides coverage information to the ACE.

(6) Recommends the assignment of tactical missions to subordinate units.

(7) Supervises liaison activities.

(8) Determines supply and maintenance priorities.

(9) Maintains current information on unit status, location, mission and state of training, and provides status and location information to the ACE.

(10) Provides FAAR locations and TADDS data link frequency to the ACE.

(11) Relays all instructions and information affecting division operations received through higher echelon air defense channels to the battalion commander and the ACE.

d. Senior ADA Officer, ACE.

(1) Supervises the Air Defense Section of the ACE.

(2) Detailed ACE procedures are included in annex B, this TACSOP.

e. Liaison Officer.

(1) Coordinate liaison with the nearest element of the field army air defense system, normally the 1/458 ADA Hawk Battalion, or as directed.

(2) Furnishes, to the host agency, as a minimum, the following information; 1/439 capabilities and limitations, fire unit locations, and fire unit statuses.

(3) Relays, as a minimum, the following information to the 1/439: ADA control measures (DEFCONS, AD warnings, weapon control statuses, etc), early warning information, ground warning information, and any other information of tactical significance to the division.

f. (Line) Battery Commanders and Platoon Leaders.

(1) Command the unit and those elements assigned or attached.

(2) Conduct tactical operations, exercise control in response to this TACSOP and instructions received from the battalion AADCP, and function autonomously when required.

(3) Insure that liaison/coordination are executed, as required.

g. (Fire Unit) Squad Leaders.

(1) Command the squad (fire unit).

(2) Insure that squad operations and engagements are executed in accordance with existing directives.

(3) Insure proper visual identification of aircraft.

(4) Function autonomously when required.

(5) Position fire unit to accomplish the mission.

C-3-3. TACTICAL READINESS SYSTEM.

a. General. Determination of requirements for maintenance of tactical readiness is a division prerogative; however, division field SOP prescribes that the 1/439 will maintain states of alert appropriate to the CG 15 TAF (area air defense commander) DEFCON and Air Defense Warnings (ADW) unless otherwise directed by CG, 20th Infantry Division.

b. Operational Criteria. An operational fire unit must have the following equipment in proper operating condition.

(1) Chaparral.

(a) Missiles.

(b) Communications—radio primary.

(c) Main power unit.

(d) Hydraulic power system.

(e) Master control panel.

(f) Mount erection—retraction subsystem.

(g) Launching rails.

(h) Prime mover.

(i) Air compressor and filter system.

(j) Gunner controls.

(k) Gunner firing circuitry.

(2) Vulcan.

(a) Ammunition.

(b) Communications—radio primary.

(c) Auxiliary power generator.

(d) Gun.

(e) Batteries.

(f) Sight. Fire units without the ROR will be considered operational but with significantly reduced capabilities in the air defense role.

(g) Prime mover.

c. Defense Readiness Conditions (DEFCON). DEFCONS are issued by CG, 15 TAF, based upon his appraisal of the threat, to progressively prepare units for combat. They may also be issued by the ACE, as approved by G2—G3 element. DEFCONS will normally be relayed to the battalion through air defense communications channels (i.e., CRC-ADA group-Hawk-C/V) or through the ACE at the TOC. There are five DEFCON levels, numbered 5 to 1, each requiring a higher air defense posture, and AIR DEFENSE EMERGENCY, which is the highest air defense posture.

(1) DEFCON levels:

LEVEL	*EXERCISE TERM*
DEFCON FIVE	FADEOUT
DEFCON FOUR	DOUBLETAKE
DEFCON THREE	ROUNDHOUSE
DEFCON TWO	FAST PACE
DEFCON ONE	COCKED PISTOL
AIR DEFENSE EMERGENCY	BIG NOISE

(2) Air Defense Emergency. This defense posture represents the highest state of air defense preparedness and is normally issued after DEFCON ONE has been declared but may be used out of sequence. When issued out of sequence, AIR DEFENSE EMERGENCY requires that all DEFCON requirements be met.

d. Air Defense Warnings (ADW). Air Defense Warnings are used by the CG, 15 TAF to declare the imminence of an attack by hostile aircraft and are issued after a high DEFCON or AIR DEFENSE EMERGENCY has been declared, and will be disseminated by the ACE or AADCP (whichever receives it first) over the division broadcast net. The ACE may also originate ADW appropriate for the division situation, after G2—G3 element approval. Air defense warnings are announced as:

(1) AIR DEFENSE WARNING WHITE: Hostile

air attack is not considered imminent or probable. Exercise term: SNOWMAN.

(2) AIR DEFENSE WARNING YELLOW: Hostile air attack is probable. Exercise term: LEMON JUICE.

(3) AIR DEFENSE WARNING RED: Hostile air attack is imminent or in progress. Exercise term: APPLE JACK.

e. States of Alert. States of alert conform to division requirements and prescribe the period of time within which an air defense artillery unit must be capable of engaging a target. State of alert requirements are issued by the battalion AADCP in response to a change in DEFCON.

(1) Definitions.

(a) Battle stations. Fire unit must be capable of firing within 60 seconds. Exercise term: BLAZING SKIES.

(b) Five minute (standby) alert. Fire unit must be capable of assuming battle stations and target engagement within five minutes.

(c) Released. Weapons system may be in non-operational condition but capable of being at battle stations within one hour. Missiles and Vulcan ammunition are off-loaded.

(2) *Use.* A state of alert is specified for each DEFCON. The following states of alert are SOP for all units of the battalion during all periods of tactical operations. The only authority for decreasing the state of alert for any fire unit in the battalion is the CO, XO, or S3.

(a) Battle stations. During Air Defense Emergency, DEFCON 1, and any tactical motor movement.

(b) Five minute alert. During DEFCONs 5, 4, 3, and 2.

(c) Released. When authorized by CO, for maintenance which cannot be performed at night or for training purposes.

(3) Equipment and personnel requirements for each state of alert are shown below:

CHAPARRAL
Personnel/Equipment Status

	Battle Stations	*Five-Min Alert*	*Released*
Full crew present	Yes	No	No
*Minimum crew present	No	Yes	No
Communications manned	Yes	Yes	Yes
Equipment in standby	No	Yes	No
Equipment in ready	Yes	No	No

*Minimum crew includes one gunner and one observer/driver.

VULCAN
Personnel/Equipment Status

	Battle Stations	*Five-Min Alert*	*Released*
Full crew present	Yes	No	No
*Minimum crew present	No	Yes	No
Communications manned	Yes	Yes	Yes
APV or vehicle running	Yes	No	No

*Minimum crew includes one gunner and one observer/driver.

f. Application to Redeye. The division policy of response to DEFCON and ADW applies. States of alert are determined by the using units.

C-3-4. CONTROL OF FIRES.

a. Concept. The concept for control of battalion fires is based on centralized direction and decentralized execution.

b. Rules of Engagement. The following rules of engagement have been prescribed for rigid application by all air defense units (includes Redeye) in the 20th Infantry Division:

(1) During conditions short of war, engagements are conducted only in self-defense or as ordered by the division commander.

(2) During wartime, engagements are conducted in accordance with the prevailing ADA weapon control status (*c* below) and hostile criteria (*d* below). Paragraphs *c* and *d* below are considered to be an integral part of the rules of engagment.

(3) In peace or war, the leader of any unit under attack by a hostile or unidentified aircraft has authority to engage with all available weapons regardless of existing air defense control measures.

c. Weapons Control Status. The weapons control status is established by this TACSOP to define the levels of firing freedom. The statuses are:

(1) *Weapons free.* Fire at any aircraft not identified as friendly. "Unknowns" and "doubtfuls" may be engaged. CG, 20th Infantry Division, is the sole weapons free authority in the division.

(2) *Weapons tight.* Fire only at aircraft *positively* identified as hostile in accordance with the hostile criteria (*d* below). Do *not* engage "unknowns" and "doubtfuls." Lacking instructions to the contrary, all division air defense units assume this status

whether or not communications are intact. Supported unit commanders are authorized to revert to this status from a prevailing weapons free status, but may not revert to this status from a weapons hold status imposed by higher headquarters.

(3) *Weapons hold.* Do *not* fire, except in self-defense. All supported unit commanders are delegated weapons hold authority, regardless of prevailing weapons control status. Weapons hold orders will be time, area, and aircraft class limited. The ACE is the normal source of weapons hold orders although, in an emergency, such orders may be received by the AADCP via area air defense system channels in which case the ACE will be immediately informed. The ACE will obtain division G2—G3 element approval before the AADCP disseminates the weapons hold order.

(4) *Combinations.* Combined weapon control statuses may be used; for example, weapons hold on single helicopters and weapons tight for all other aircraft.

d. Hostile Criteria. Hostile criteria are a set of standards for use by *all division air defense units* for determination of the hostile character of an aircraft. CG, 20th Infantry Division is the *sole* division authority for deviations. An aircraft may be judged hostile if it is positively meeting one or more of the following criteria.

(1) Attacking friendly elements.

(2) Discharging spray or smoke over friendly elements without prior coordination.

(3) Dropping flares over friendly territory without prior coordination.

(4) Discharging four or more parachutists or unloading four or more troops without prior coordination.

(5) Bearing the military insignia or having the configuration of an aircraft employed by any of the following nations: _____, _____, _____.

e. Weapons Free Area. Units in a weapons free area declared by the ACE (via the AADCP) automatically assume that status, unless otherwise ordered by the (ACE) AADCP (para C-3-5*e*).

f. Safe Zone/Corridor. Units will not fire into safe zones or corridors declared by the ACE (via the AADCP), unless ordered by the AADCP (paras C-3-5*f* & C-3-5*g*).

g. Identification. The fire unit (squad) leader has the ultimate responsibility for visual aircraft identification. Any member of the squad may identify an aircraft; however, if conflicting identifications occur the senior person present will command "WEAPONS HOLD" until he personally determines the true identity of the aircraft. Fire units will use the established hostile criteria (*d*, above) as the standard for determination of identity.

h. Methods of Control. Methods of control indicate the commander's intent regarding the level from which direct control of ADA fires is to be accomplished. Three methods are available:

(1) *Decentralized.* The squad leader selects targets to be engaged based upon rules and procedures contained in this TACSOP. This is the normal mode of operation for all fire units of the battalion.

(2) *Centralized.* Direct target-to-battery assignments are made by the AADCP. This mode will seldom be used in this battalion.

(3) *Autonomous Operations.* When communications with higher headquarters have been lost, squads, batteries or battalion may continue to engage targets based on the rules of engagement in effect at the time communications were lost. After 20 minutes, units will automatically revert to the weapons tight status and assume the highest state of alert.

i. Sectors of Fire and Target Lines. Sectors of fire will be established for each weapon and indicated on a defense overlay to be submitted to the AADCP. Target lines may be established in a compact defense as a further aid to target selection and fire distribution. Fire unit commanders must know their sector boundaries and target lines.

(1) *Primary.* Primary sectors of fire will be assigned each fire unit. Sectors in a compact defense will be approximately equal in size and overlap each other by a minimum of 200 mils. Primary target lines (PTL) may be established to emphasize particular avenues of low altitude approach or may be arbitrarily designated to aid in fire distribution in a compact defense.

(2) *Secondary.* The area not included in the primary sector is the secondary sector. Secondary target lines (STL) may be established per (1) above.

j. Rules for Target Selection and Fire Distribution. Rules for target selection/fire distribution insure that the greatest threat is engaged first and that the fire units are adequately distributed. Applicable rules, in priority, are:

(1) Engage in self-defense.

(2) Engage the unengaged hostile aircraft nearest the defense and in the primary sector of fire (nearest the PTL, if established).

(3) Engage unengaged hostile aircraft in the secondary sector of fire (nearest an STL, if established).

(4) Engage hostile aircraft being engaged by other fire units.

k. Methods of Fire. Methods of fire prescribed to insure efficient engagements are as follows:

(1) Vulcan methods of fire:

(a) Radar mode: This is the normal mode for active air defense operations. An engagement begins when the aircraft is initially detected. The weapon will be in the radar mode. When the target is observed and tentatively identified as hostile or unknown, the gunner slews the turret and visually acquires the target in the gunsight, depresses the "radar radiate" footswitch, and continues smooth tracking. He fires when positive as to aircraft identity and after the READY-TO-FIRE lamp on the gunsight has illuminated.

(b) Manual mode. For use when ECM or other considerations preclude use of the radar mode. The gunner estimates the aircraft speed and range-at-fire and sets these values on the control panel. He tracks the target smoothly and begins firing after the aircraft has been identified as hostile and has reached the estimated range set. (The READY-TO-FIRE lamp remains lit at all times in the manual mode.)

(c) External mode. This mode is similar to the manual mode, but requires an observer external to the weapon to estimate the range of the target at which the weapon is to be fired and to turn the range knob on the external range unit to the estimated value. The observer turns on the READY-TO-FIRE lamp when the target has reached the estimated range. The gunner acquires and tracks the target and fires when the READY-TO-FIRE lamp lights and the aircraft is identified as hostile.

(d) Burst limits. Burst rate and length guidance is presented below:

ROLE	BURST RATE (RPM)	BURST LENGTH (RDS)	
		Jet Aircraft	Other Aircraft
Air Defense—All modes	3000	100	60
Ground Fire	3000	10-30	

(2) Chaparral methods of fire:

(a) SHOOT-LOOK-SHOOT: Begin fire as soon as possible, after target identification. Assess kill after intercept. An aircraft kill is defined as an aircraft that disintegrates or is out of control within 6 seconds after missile intercept. If target is not killed, shoot again. Cease fire when infrared (IR) lock is lost or target is outside of launch boundary.

(b) SHOOT-NEW-TARGET-SHOOT: Begin fire as soon as possible after target identification. Shoot, select a new target, and shoot again. This method will give maximum total effectiveness against multiple targets. The firing process if repeated until all aircraft are engaged by one missile each or the ammunition is exhausted. Gunners will engage targets in the order specified by squad leaders.

m. Doctrine for Non-AD Weapons.

(1) Individuals under direct attack by hostile aircraft may engage such aircraft without awaiting orders (self-defense).

(2) Individuals NOT under direct attack will engage low-flying, positively identified hostile aircraft only after such fire is authorized by the platoon leader or higher authority. Maximum engagement of hostile aircraft with non-air defense weapons is directed whenever such action will not seriously conflict with the primary mission.

(3) Special consideration will be given to air defense positions for caliber .50 and M60 machineguns and small arms during movements; secondary consideration will be given to the suitability of positions for air defense when units are in a normal defense posture.

(4) Firing techniques.

(a) Lead/tracking technique. This technique of firing will be used to engage low-performance enemy aircraft (slow propeller-driven aircraft and helicopters). The gunner will engage enemy aircraft by: (establishing the aircraft as a reference point; estimating the appropriate range to the aircraft; applying the appropriate lead angle; and firing and adjusting lead as required. The aiming distance ahead of the aircraft or lead is explained in FM 23-12.

(b) Pattern-of-fire technique. This technique is the simplest to employ and will be used primarily to engage high-performance enemy aircraft by: establishing the aircraft as a reference point; estimating that the aircraft is in range; establishing a fixed lead of ten aircraft lengths; and firing at the maximum rate of fire at the fixed point of space.

C-3-5. AADCP OPERATIONS.

a. General.

(1) The AADCP is the tactical command post of the battalion commander, and is where his staff exercises continuous and efficient control, coordination, and integration of the tactical operations of the air defense units assigned or attached to provide air defense for the division.

(2) The AADCP is the battalion commander's means of exercising centralized *direction* of all operations of the battalion. Engagement *execution* authority is habitually decentralized to the fire unit leve.

b. AADCP Non-TOE Equipment.

(1) *Operations board.* The operations board will consist of several 1:50000 topographical maps that adequately cover the battalion operational area. It

will depict the current friendly and enemy situation and other information the commander desires.

(2) *Early warning plotting board.* The early warning board will cover the same area as the operations board plus an additional area to permit display of early warning information. The board will be marked with the normal military grid reference system and the GEOREF system superimposed so hostile/unidentified tracks can be plotted and the position immediately passed in accordance with paragraph *h* below, using the common grid reference system (division field SOP). The GEOREF system will not be used below the battalion level.

(3) *Status board.* This board will show the current operational status of all the firing systems in each battery and the physical location of each weapon and FAAR (coordinates and vehicle bumper number). The board will contain current information regarding DEFCON, AD warnings, weapons control status, and states of alert.

c. AADCP Organization. The AADCP will include elements of the operations and intelligence section, the communications section, and the battalion command group. The detailed internal organization is outlined in the AADCP SOP.

d. Procedures. The AADCP will:

(1) Provide 24-hour-a-day operation in two 12-hour shifts, unless otherwise directed by the S3. The night shift may be lightly manned. Detailed internal operations are outlined in AADCP SOP.

(2) Control the readiness and operations of all air defense units assigned or attached by disseminating applicable states of alert and weapon control information.

(3) Coordinate unit maintenance schedules to permit major items of equipment to be withdrawn from the defense or to stand down to a lesser status with minimum impact on the air defense effectiveness of the battalion.

(4) Provide the commander with current information on the employment of the weapon systems and the evaluation of the defense.

(5) Perform or assist in the performance of routine functions such as the preparation of operation orders, journals, records and reports.

(6) Perform collection, evaluation, and dissemination of tactical intelligence as discussed in *h*, below.

e. Weapons Free Area. A weapons free area is an area in which fire units are authorized the weapons free weapons control status. CG, 20th Infantry Division is the sole weapons free authority in the division and will notify the AADCP, via the ACE, of any weapons free areas. The AADCP will plot the areas on the operations board, and will place *only* those fire units affected in "weapons free."

f. Safe Passage Corridors. Safe passage corridors may be established by the division, via the ACE, to permit guaranteed safe passage of friendly aircraft. The AADCP will plot the corridors on the operations board will place only the affected fire units under "weapons hold." Safe corridors will be time and space limited and will avoid the bulk of the defense, whenever possible, because the existence of the corridor also gives the enemy relatively free passage.

g. Safe Zones. Safe zones may be established by division, via the ACE, to permit guaranteed safe scramble and recovery of friendly aircraft in a recovery area. The zone will normally be 10 km in diameter, centered on the recovery point (usually an airfield). The zone will be plotted on the AADCP operations board, and the AADCP will place only those fire units affected on "weapons hold." Establishment of safe zones protects friendly aircraft but destroys defense effectiveness in a large area. Therefore, the zones must be severely time-limited or, if semipermanence is visualized, the ACE should arrange special air defense and aircraft control procedures with the aviation units involved.

h. AADCP Plot-Tell.

(1) *Up.* Hostile/unidentified tracks originated by the defense will be passed to the liaison officer at the 1/458 (Hawk SP) ADA Battalion (ACE monitors) on the "initial occurrence" and subsequent summary basis (ACE monitors). No attempt will be made to report closely following tracks, unless this can be done without interfering with other AADCP tactical operations.

(2) *Down.* Hostile/unidentified tracks originated *externally* to the defense (usually by the 1/458—monitored by the ACE); i.e., the track is well outside FAAR range, will be plotted on the AADCP early warning board and, when the track approaches the battalion area of responsibility, will be disseminated to the fire units using the common grid system specified in division field SOP.

(3) *Identification.* The AADCP currently has no inherent identification capability and will normally relay hostile/unidentified track identification as received.

(4) *Friendlies.* Friendly track-tell will not be accomplished except as directed by the ACE or the S3 in very special cases. Advance "friendly air movement information disseminated by the ACE normally sufficies to inform the battalion of friendly air movements.

i. AADCP Communications. The AADCP must

establish a receive *and* transmit capability in the following nets, as a minimum:

(1) Division operation/intelligence.

(2) Battalion command net (FM).

(3) Battalion liaison net (AM) (NCS).

(4) See annex C, this TACSOP, for communications details.

C-3-6. VULCAN GROUND FIRE SUPPORT OPERATIONS.

a. Basic Concepts.

(1) *Mission.* The primary mission of the Vulcan in the ground fire support role is to provide supporting fires against ground targets as directed by the supported unit commander.

(2) *Methods of fire.* Direct fire is the normal method of fire. It may be observed or unobserved.

(3) *Mutual support.* Mutual support between fire units and the massing of fires should be sought. The mutual support distance for Vulcan fire units will be 100 to 1000 meters.

(4) *Organization for combat.*

(a) Vulcan will normally be employed by platoon with a direct support tactical mission for ground fire support operations; however, the situation may require that ADA units be attached to units or the supported force.

(b) The Vulcan platoon employed for ground fire support consists of the basic platoon augmented by battalion and/or battery combat service support capabilities. Combat service support responsibilities of the Vulcan platoon, the supported unit, and the parent ADA organization will be specified in the mission order if other than normal.

b. Duties of Key Personnel.

(1) *Platoon leader.* The platoon leader is responsible for the platoon's training, employment, and combat service support. He will normally receive his orders from the commander of the supported force. He makes recommendations for the employment of his platoon to the supported force commander, and selects and directs the preparation of firing positions and areas for the platoon firing sections. He will also act as a special staff officer to the supported unit commander, under the supervision of the supported unit S3. He will normally remain with the supported force headquarters.

(2) *Platoon sergeant.* The platoon sergeant will assume command of the platoon in the absence of the platoon leader. He will supervise the platoon transportation and resupply of ammunition and supplies. He may also be designated to accompany the platoon, or a portion of the platoon on a mission in order to assist the squad leaders in matters of fire control and coordination with the supported unit. If required by the situation, he may also command specified fire units which have been further attached.

c. Communications Requirements.

(1) *Platoon leader.* The platoon leader must be capable of operation in the following radio nets:

(a) Platoon command net.

(b) Supported unit command net.

(2) *Fire units.* The fire units must be capable of operation in the following nets:

(a) Platoon command net when operating under platoon control; or,

(b) Supported unit command net when attached.

d. Alternate and Supplementary Positions.

(1) *Alternate positions.* An alternate position is a position to which a fire unit moves when the primary position becomes undesirable. It must offer approximately the same characteristics as the primary position. The authority for a fire unit to move to an alternate position is delegated to the squad leader.

(2) *Supplementary positions.* Supplementary positions are those for firing on targets which cannot be fired upon effectively from the primary posotion. Movement to a supplementary position is normally made on the order of the supported unit commander. Supplementary positions will be designated if required for both primary and alternate positions.

e. Selection of Primary, Alternate, and Supplementary Firing Positions for the Ground Fire Support Role. Primary, alternate, and supplementary positions will be selected to provide for the following:

(1) Mutual support with adjacent fire units.

(2) Maximum utilization of effective direct fire capabilities of the fire unit against ground targets.

(3) Assistance in providing a base of direct fire support for the supported unit.

(4) Assistance in the protection of key terrain features or the coverage of enemy avenues of approach.

(5) Essential observation and fields of fire.

(6) Denial to the enemy of close observation into the defended area.

(7) Tie-in with the supported unit fire plan and not interfere with the fields of fire of other weapons.

(8) Maximum advantage of natural cover and concealment.

(9) See also annex L of this TACSOP.

f. Fire Unit Security. Squad leaders will provide their own local security through utilization of crewmen not engaged in firing and handling am-

munition, and by positioning their fire units within the security of the supported force.

g. Ammunition Resupply. Vulcan ammunition resupply normally is the responsibility of the unit commander unless the unit is further attached. The platoon vehicles and other designated vehicles of the supported unit may be used. Platoon attachment orders will provide vehicles for ammunition resupply to the platoon from the parent battery and battalion. Resupply procedures will be implemented as soon as possible, as when needed and as allowed for by the tactical situation. Vehicles delivering ammunition will be off-loaded as quickly as possible and returned to the trains area.

h. Types of Ground Fire Support and Combat Operations. Operations involving Vulcan in the ground fire support role are described in the following references:

(1) FM 44-2, para 142-147.

(2) Division Field SOP.

C-3-7. EMPLOYMENT OF FARR/TADDS.

a. The battalion S3 will position all the radar sections retained under battalion control, and will exercise staff supervision over all other radars.

b. Each radar section will report its actual position, radar coverage, and data link frequency to the battalion AADCP as soon as possible after occupying a position.

c. FAAR coverage should overlap fire unit positions by at least 10 km in the direction of the expected air attack. FAAR security is enchanced by collocation with a Vulcan fire unit.

d. Radar sections should be located to provide support for Redeye teams located in the same general area.

C-4. Annex B (Airspace Control Element) TO TASCOP 1 Bn (C/V, SP) 439ADA

Note: Portions of this annex pertaining to required inputs from external sources must also appear in the SOPs governing these external sources; e.g., TASE, FSE, FCC, aviation unit SOPs.

C-4-1. PURPOSE. Prescribe procedures for operation of the airspace control element in the division tactical operations center. Procedures are applicable to both the air defense and aviation sections of the ACE.

C-4-2. MISSION AND FUNCTIONS.

a. Mission. The ACE coordinates the use of the airspace over the division area.

b. Basic Operating Functions.

(1) Serves as the division focal point during operations for coordination of airspace use; resolution of conflicts among organic, attached, and supporting airspace users in accordance with established procedures; and issuance of airspace coordination clearances.

(2) Coordinates Army air traffic and Army air defense with other current operations.

(3) Originates, relays, and/or recommends changes to the control and coordination instructions and procedures.

(4) Provides intelligence, air defense/aviation status, and friendly air movement information to interested parties.

c. Corollary Functions.

(1) Maintains informational displays, records, and journals.

(2) Provides briefings and briefing inputs.

(3) Prepares airspace utilization annexes or inputs to other documents, when directed.

C-4-3. ORGANIZATION AND EQUIPMENT.

a. Personnel.

Duty Position	*RANK*	*MOS*	*Provided by*	*Shift No.*
SR AD Off	MAJ	1174	1/439 ADA	1
Sr Avn Off	MAJ	—	20 Avn Bn	2
Avn Op Off	MAJ	—	20 Avn Bn	1
AD Op Off	CPT	1174	1/439 ADA	2
Avn Op Sgt	MSG	—	20 Avn Bn	1
AD Op Sgt	SFC	16M40	1/439 ADA	2
Asst Avn Op Sgt	SSG	—	20 Avn Bn	2
Asst AD Op Sgt	SSG	16M40	1/439 ADA	1
Rdo Op (4)	SP4	05B20	1/439 ADA	(2 per shift)

b. Major Equipment Items.

AD Sta Bd	1/439 ADA
AD Sit Map	1/439 ADA
AVN Sta Bd	20 AVN Bn
Airspace Utilization Map	1/439 & 20 Avn
AN/VRC-46 Rdo w/Remote	(2) 1/439 ADA
AN/GRC-106 Rdo w/Remot	(2) 1/439 ADA
Telephone Set TA-312Pt (4)	(2) 1/439 ADA

Note: The foregoing assumes the division aviation unit provides input to the ACE roughly on a par, except for a lesser radio input, with that of the ADA battalion.

C-4-4. CONCEPTS.

a. The division ACE serves as the single focal point for airspace control and conflict resolution at the interface of division aviation, division air defense, division field artillery, and nondivisional and other Service support during operations. Authority is as defined in this annex.

b. The ACE is a manual operation that cannot and should not be involved in minute-to-minute airspace operations. These are controlled by the division AADCP, FDCs, FOs and USAF TACPs which,

in themselves, provide an emergency backup-coordination system.

c. As a general rule, the ACE coordinates *all* airspace operations; however, time and equipment limitations will normally preclude advance coordination of immediate DS artillery fires and *single* Army aircraft flights flown on short notice. These latter place almost full reliance on the backup system implied in *b* above and discussed in paragraph C-4-5*e*.

d. The ACE operates 24-hours a day on a two-shift basis.

C-4-5. OPERATIONS.

a. General. There are four basic requirements for ACE mission accomplishment.

(1) Availability of *input* information.

(2) Ability to *correlate* information.

(3) Ability to take *action* (conflict resolution, information dissemination).

(4) Access to *channels of communication.*

b. Procedures.

(1) Appendix I lists required inputs, sources, internal actions, outputs, and users.

(2) Appendixes II-VI depict basic display requirements.

(3) Conflict resolution authority.

(a) When time permits, the ACE will attempt conflict resolutions among the users and carry unresolved conflicts to the G2-G3 element.

(b) In emergencies, the ACE resolves conflicts on its own authority and, as soon as possible, informs the G2-G3 element of action taken.

c. Priorities. Priorities for processing of input during periods of information saturation are as follows, unless otherwise directed by G2-G3 element:

(1) Emergency penetrations of aircraft.

(2) Emergency ADA weapon control information.

(3) Incoming USAF penetrations.

(4) Incoming Army penetrations by *multiple* flights.

(5) Outgoing or local USAF flights.

(6) Outgoing or local Army aviation *multiple* flights.

(7) Field artillery airspace usage.

(8) *Single* Army aviation flights.

(9) Position and status data.

d. Channels. Basic channel requirements are sumarized in appendix VII.

e. Backup System. The backup system serves to resolve unforeseen last minute conflicts. It is also the primary means to prevent conflicts between DS artillery fires and uncoordinated Army aviation flights. The system includes the FDCs, aircraft, TACPs and FOs and radio ingerconnection among these users. See field artillery and aviation annexes to division field SOP.

f. Brigade ACE. The battalion must be prepared to supply personnel to the brigade command post, on order, to provide a brigade ACE.

C-4-6. APPENDIXES:

I.	DTOC ACE operations worksheet.	
II.	Airspace utilization map.	Figure C-1
III.	AD situation map.	Figure C-2
IV.	AD status board.	Figure C-3
V.	Avn status board.	Figure C-4
VI.	Army aviation flight board.	Figure C-5
VII.	Communications channels.	Figure C-6

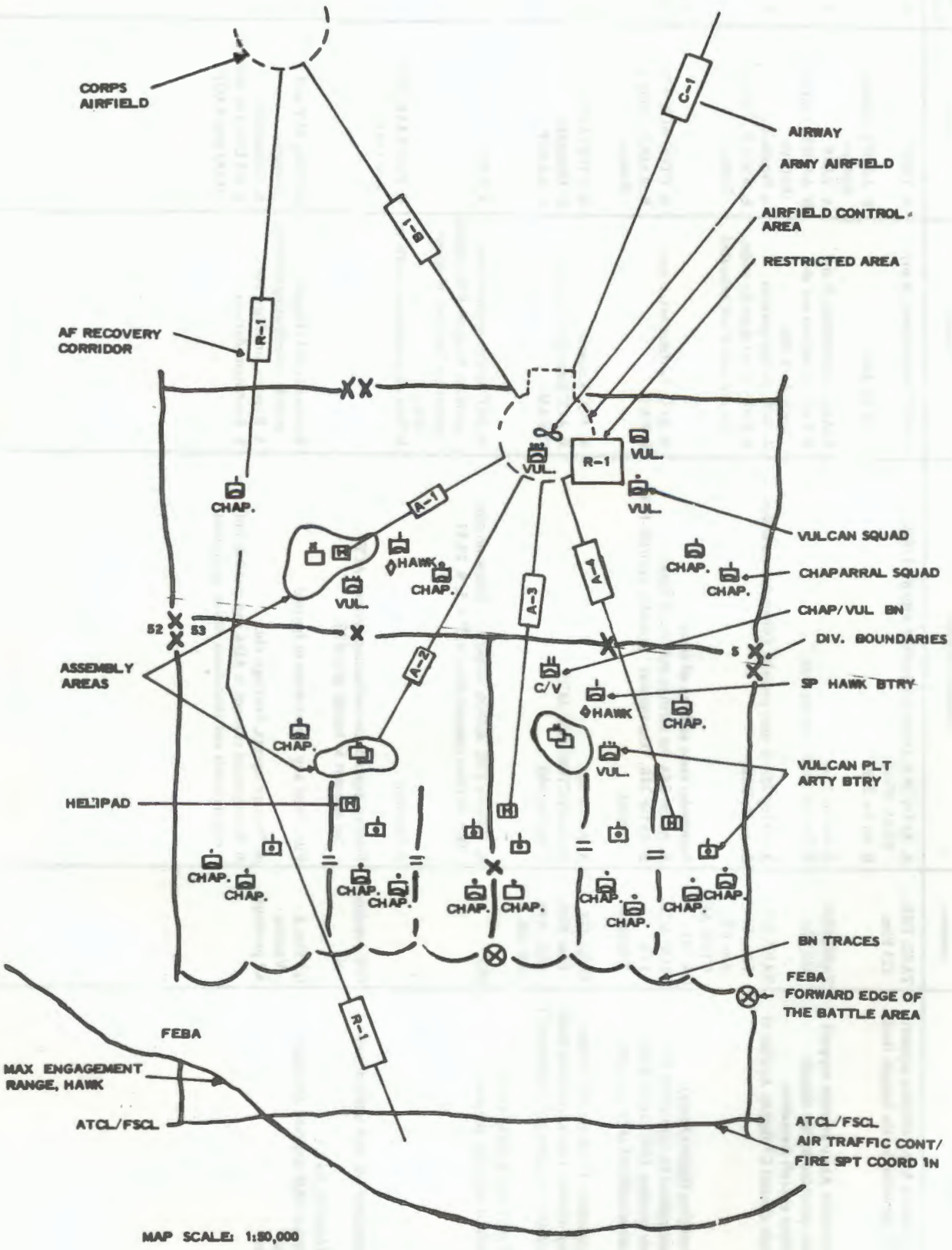
APPENDIX I
DTOC ACE OPERATIONS WORKSHEET

Input	Immediate source(s)	Internal ACE action	Output	User(s)	Supports basic function No.
A. BASIC INFO–AREA & AIRSPACE					
1. Division/Brigade/Battalion Boundaries, and FEBA Trace.	G3 Elm	Plot on AD Sit Map (ADSM) & Airspace Utilization Map (AUM)	Boundary data	AADCP, FCC	A11
2. FSCL Trace.	FSE	Plot on AUM (should be same as ATCL)	Boundary data	FCC, AADCP	A11
3. ATCL Trace.	G3 Elm. FCC alternate.	Plot on AUM (should be same as FSCL)	Boundary data	FCC, Bde, FSE AADCP, TASE	A11
4. Army Airway System Data.	G3 Elm. FCC alternate.	Plot on AUM. Insure no conflict W/ 5, 6, 7, 8.1.	Air route info.	FCC, Bde, FSE AADCP, TASE	A11
5. USAF Recovery Corridors.	G3 Elm. TASE alternate.	Plot on AUM. Insure no conflict w/ 4, 6, 7, 8, 8.1.	Air route info.	FCC, Bde, FSE, AADCP, TASE	A11
6. Restricted/Prohibited Areas	G3 Elm. ACE may recommend.	Plot on AUM. Insure no conflict w/ 4, 5, 7, 8.	Order aircraft to avoid areas.	FCC, Bde, TASE, AADCP, Avn unit CP	A11
7. Weapons Free Areas.	G3 Elm. ACE may recommend.	Plot on AUM. Insure no conflict w/ 4, 5, 6, 8.	Order weapons free for ADA in area. Order aircraft to avoid area.	FCC, Bde, TASE AADCP, Avn Unit CP.	A11
8. Army Airfield Control Zones.	G3 Elm.	Pelt on AUM. Insure no conflict w/ 5, 6, 7, 8.1.	Order weapons hold for ADA in zone.	AADCP, FCC, FSE.	A11
8.1 Free Fire Area	FSE	Plot on AUM. Insure no conflict w/ 4, 5, 8.	Order aircraft to avoid area.	FCC, Bde, TASE Avn Unit CP	A11
B. SITUATION & STATUS INFO					
9. ADA Unit Position/Coverage.	AADCP, C/V	Plot positions to fire unit level on ADSM and AUM overlay. Post coordinates to fire unit level on AD Status Board (ADSB). Plot coverage of Vulcan VA's and Chaparral fire units (circular template) on ADSM and AUM overlay. Also Plot Hawk forward limit line.	Position and coverage data.	G3 Elm, and as requested.	2, 4
10. Field Arty Unit Posn's.	FSE	Plot to battery level on AUM overlay.	Position data.	FCC, Avn Unit CP	1, 2
11. ADA Unit Status.	AADCP	Plot on ADSB. Note those unavailable for AD mission; e.g., grnd spt.	Status & capability	G3 Elm and as requested.	4
12. Aviation Unit Status.	Avn Unit CP.	Post on Avn Status Board (ASB). Note unavailability & unit loc.	Status & capability data	G3 Elm, and as requested.	4
13. FAAR Positions, TADDS Data Link Frequencies.	AADCP	Plot positions and record frequencies on ADSM.	FAAR position/data link info.	Units w/Redeye.	4
C. ADA WEAPON CONTROL					
14. DEFCON/DEFREP	CTOC ACE. C/V LO alternates. ACE may recommend.	Post on ADSB & in journal.	Inform G3 Elm: Action as directed, normally broadcast.	AADCP, Units w/ Redeye.	3
15. AD Warnings Red-Yellow-White.	C/V LO. CTOC ACE alternate. ACE may recommend	Post on ADSB & in Journal.	Inform G3 Elm. Action as directed, normally broadcast	AADCP, Units w/ Redeye.	3

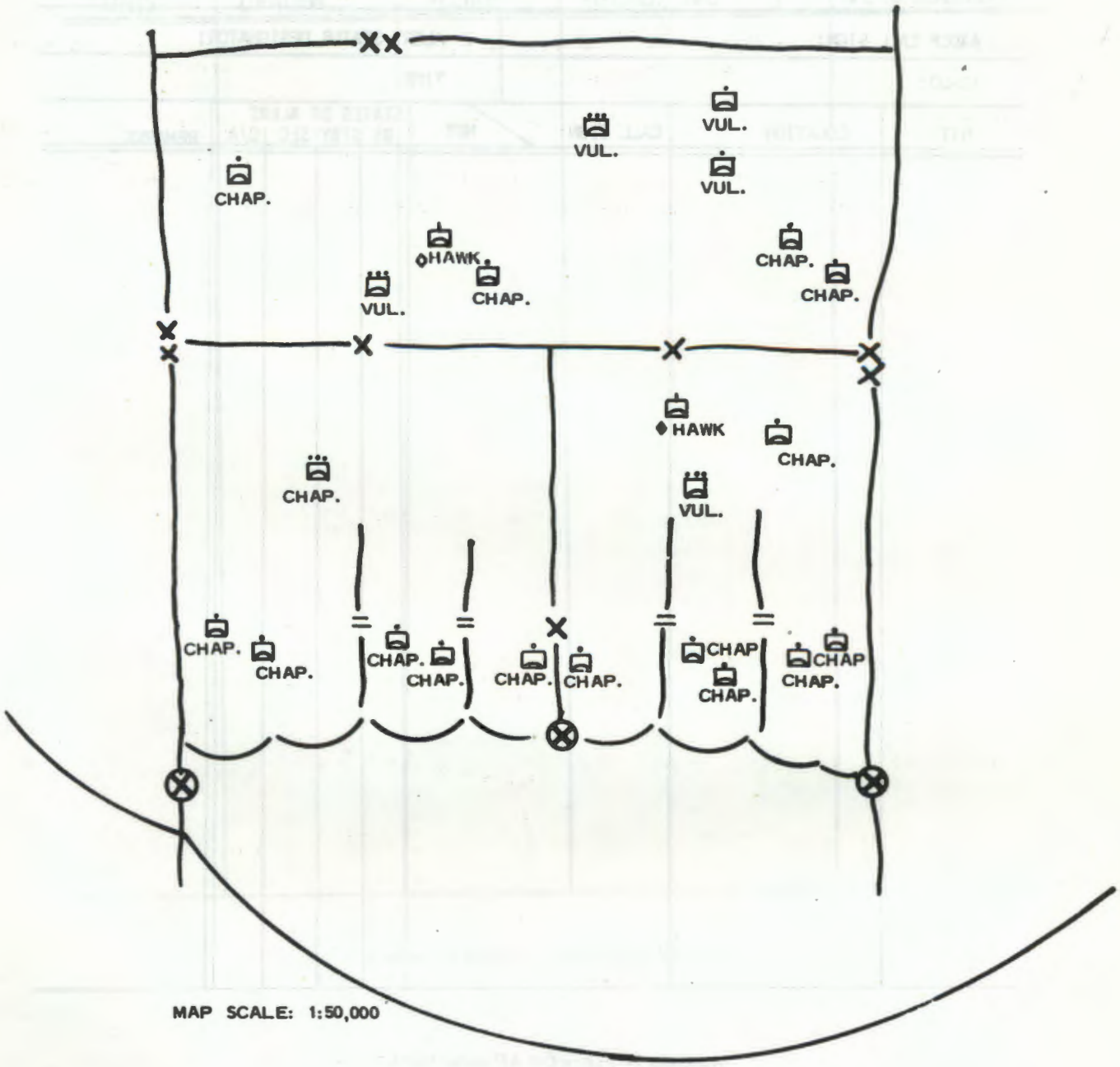
Input	Immediate source(s)	Internal ACE action	Output	User(s)	Supports basic function No.
16. ADA Units States of Alert.	AADCP	Post on ADSB & in Journal.	Information.	As requested.	4
17. Changes in Weapons Control Status.	G3 Elm. ACE may recommend. C/V LO alternate.	Post on ADSB & in Journal.	Inform G3 Elm. Action as directed, normally broadcast.	AADCP, Units w/ Redeye.	3
18. Changes in Hostile Criteria.	G3 Elm. ACE may recommend. C/V LO alternate.	Post in Journal.	Inform G3 Elm. Action as directed, normally broadcast.	AADCP, units w/ Redeye, FCC, TASE, Avn Unit CP.	3
D. ENEMY INTELLIGENCE					
19. Known/Suspected Enemy ADA Positions.	G2 Elm.	Plot on AUM.	Advisories.	TASE, FCC, Avn Unit CP.	4
20. Hostile Aircraft Activity	C/V LO, AADCP, FCC, TACP, Friendly Aircraft.*	Post initial occurrence & summary in Journal. (AADCP has primary action on this.)	Summary info.	G2 Elm, & as requested.	4
21. Enemy Ground Action.	G2 Elm, AADCP	Relay	Information.	AADCP, G2 Elm.	4
E. AIRCRAFT ACTIVITY-FRIENDLY					
22. Info on preplanned USAF air support.	TASE	A. Observe TASE Avn activities display. Insure no conflict of this planned flight with #6-8.1, 23-33.	A. Airspace control clearance (ACC) and/or required restrictions.	A. TASE	A11
		B. Monitor. Await TASE notice of "on-the-way." Again check for possible conflicts.	B. Friendly air movement (FAA) information (grids, time)	B. AADCP, FCC, Avn CP, Units w/ Redeye.	
23. Info on immediate USAF air support.	TASE.	A. Observe TASE aviation activities display. Insure no conflict of this flight with#6-8.1, 22, 24-33. SOP time limit.	A. Automatic ACC if no ACE response within SOP time lapse. Restrictions, if any.	A. TASE	A11
		B. As for 22B	B. As for 22B	B. AADCP, FCC Avn CP, Units w/Redeye.	
24. Info & tasking on preplanned Army aviation, division level aviation resources.	TASE, FSE, G3 Elm.	A. Plot on Aviation Flight Board (AFB). Insure no conflict of this flight with#5-7, 8.1, 22, 23, 25-33.	A. Task statement (ACC implied). Restrictions, if any.	A. Avn CP, FCC.	A11
		B. Monitor. Await unit notice of "on-the-way." Again check for possible conflicts.	B. FAM. Inform aviation unit . of last-minute conflicts.	B. AADCP, Units w/ Redeye.	
25. Info & tasking on immediate Army avn support, using division-level aviation resources.	TASE, FSE, G3 Elm.	A. Plot on AFB. Insure no conflict of this flight unit with#5-7, 8.1, 22, 23, 25-33. SOP time limit.	A. As for 24A. SOP time limit.	A. Avn CP, FCC.	A11
		B. As for 24B.	B. As for 24B.	B. AADCP, Units w/ Redeye.	

*W/added VHF/UHF receivers at ACE (optional).

Input	Immediate source(s)	Internal ACE action	Output	User(s)	Supports basic function No.
26. Info on preplanned Army aviation support for a brigade, provided by the brigade itself.	TASE, FSE, G3 Elm.	A. As for 24A. Insure no conflict with #5-7, 8.1, 22-25, 27-33.	A. ACC. Restrictions, if any.	A. TASE	A11
		B. As for 24B.	B. As for 24B.	B. AADCP, Units w/ Redeye.	
27. Info on immediate Army aviation support for a brigade, provided by the brigade itself–multiple aircraft formation.	TASE, FSE, G3 Elm.	A. As for 25A. B. Do not await "on-the-way."	B. ACC. Restrictions, if any. B. FAM, if bde has not already done this.	A. TASE B. AADCP, Units w/ Redeye.	A11
28. Info on single aircraft C^2 flights. Applies at any level.	TASE, G3 Elm, FCC, Avn CP, CTOC ACE.	A. As for 25A if time permits. Otherwise, no action. B. As for 25B.	A. ACC, if time permits. B. FAM, if not done by someone else and if not saturated.	A. Originator. B. AADCP, Units w/ Redeye	A11
29. Inof on admin/log flights (Army).	G4, TO.	Remainder same as 24 in all cases.			A11
30. Info on penetrations by corps/field army aircraft–any mission. (All, except some single C^2, are considered as same as preplanned.)	CTOC ACE. FCC alternate.	A. As for 24A for division portion of flight. B. As for 24B. "On-the-way" probably via FDC-FCC channel.	A. ACC. Restrictions, if any. B. FAM.	A. CTOC ACE, FCC. B. AADCP, Units w/ Redeye.	A11
31. Info on penetration to the rear by division aircraft–any mission. (all except some single C^2, are considered as same as "preplanned")	TASE, G3 Elm, FSE, FCC, Avn CP, G4.	A. As for 30A. B. Await CTOC ACE ACC. C. As for 24B.	A. ACC Request. B. ACC Restrictions, if any. C. FAM	A. CTOC ACE, FCC. B. Originator. C. AADCP.	A11
F. FLD ARTY ACTIVITY-FRIENDLY					
32. Info on planned field arty support.	FSE	A. Observe FSE activity display. Insure no conflict of these planned fires, w/# 4, 5, 8, 22-31.	A. ACC and/or required restrictions. Request FSE prepare restrictive fire plan, if necessary.	A. FSE	A11
		B. Monitor.	B. Info on last-minute conflicts.	B. FSE, TASE, FCC, Avn Unit.	
33. Info on immediate DS field artillery support.	FSE (optional)	Primary dependence on backup system. ACE can attempt to handle as in #32.			
G. MISCELLANEOUS DATA					
34. Policies, Orders, SOP Reports, Intelligence Summaries.	G3 Elm & Various	File, Enter key report items in Journal.	Recommended changes, include coordinating altitude.	G3 Elm, ACE and various.	3, 4
35. All previous.	All previous.	A. Prepare reports, briefings, etc. B. Recommend changes in ADA nad aviation unit requirements and allocations during operations.	A. Reports, briefings, etc. B. Recommendations.	A. As required. B. G3 Elm, (or, through ADO and AAO).	2, 3, 4



Appendix II. Figure C-1. Airspace utilization map.



Appendix III. Figure C-2. AD situation map.

AIR DEFENSE STATUS BOARD

DEFCON: TIME:	A.D. WARNING: TIME:	WEAPONS CONTROL STATUS: TIME:
AADCP CALL SIGN:		ALERT STATUS DESIGNATOR:
ADAOO:		TIME:

UNIT	LOCATION	CALL SIGN / NET	STATES OF ALERT BS	STBY	SEC	O/A	REMARKS

Appendix IV. Figure C-3. AD status board.

AVIATION STATUS BOARD

UNITS	LOCATION	MISSION	TYPE/NO. A/C	A/C AVAILABILITY

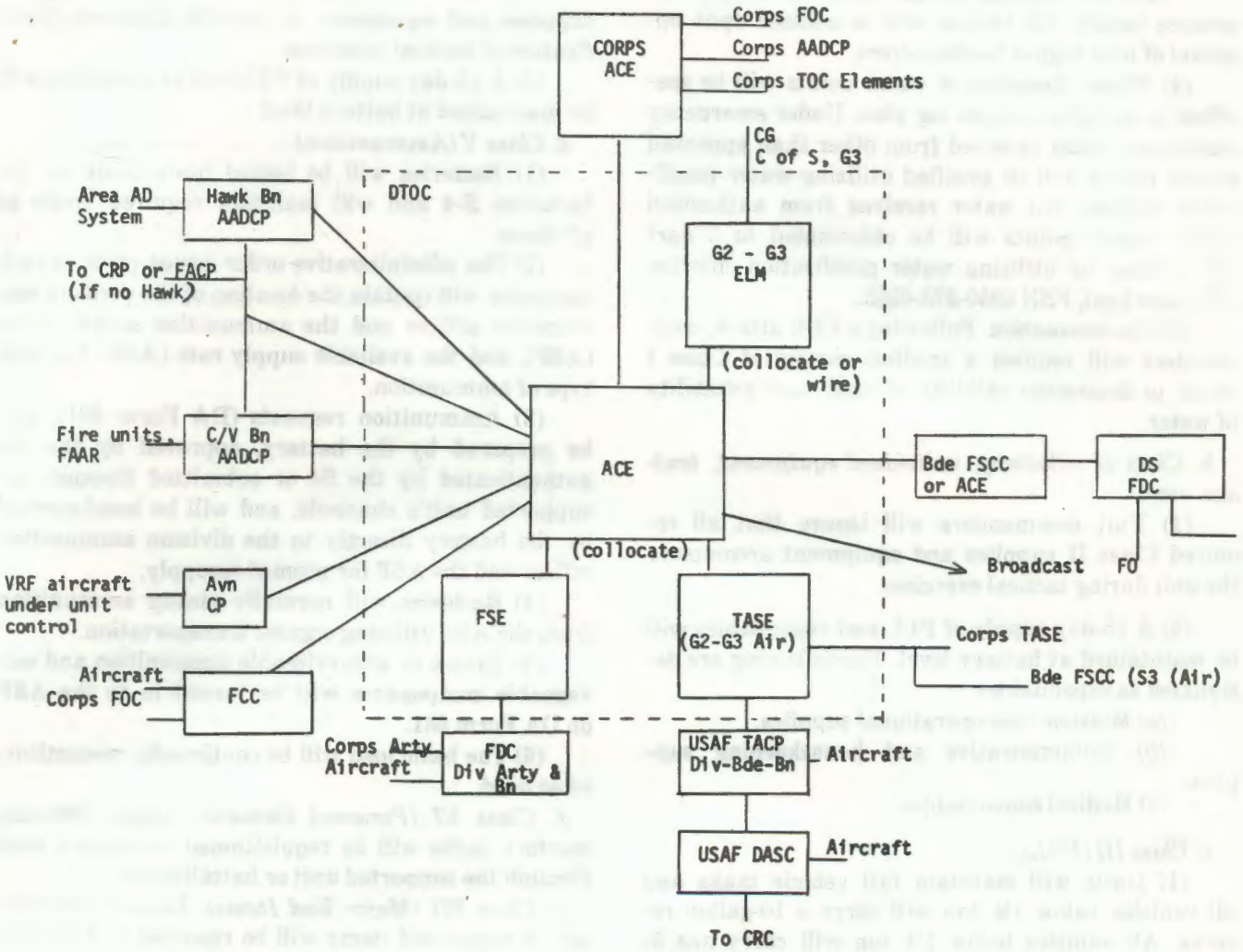
Appendix V. Figure C-4. Aviation status board.

ARMY AVN FLIGHT BOARD

DATE

FLT. NO.	TYPE A/C X-PONDR	ALT.	ETD / ATD	CLEARANCE DATA	ETA / ATA	REMARKS

Appendix VI. Figure C-5. Army aviation flight board.



Appendix VII. Figure C-6. Communications channels.

C-5. Annex D (Logistics) to TASCOP 1 Bn (C/V, SP) 439ADA

C-5-1. PURPOSE. Prescribe logistical procedures to be followed by all elements of this battalion during tactical employment.

C-5-2. GENERAL.

a. Logistical support facilities will be announced by administrative orders which will be published by the S4 for each operation.

b. Under tactical conditions the S4 will establish and maintain:

(1) Logistical situation map, to include location of:

(a) MSR and alternates.
(b) Logistical and support activities.
(c) Hospitals and dispensaries.
(d) Salvage collection points.
(e) POW inclosures.

(2) Status of equipment (SOE) chart on major items of equipment.

(3) Status of ammunition chart, to include:

(a) Caliber, type.
(b) Authorized allowances.
(c) Rounds on hand.
(d) Unfilled transportation orders.

c. Battalion executive officer responsible for supervision and coordination of all logistic support operations.

C-5-3. SUPPLY.

a. Class I (Subsistence).

(1) *Prescribed load.* Three days operational rations. DISCOM will maintain a 2-day operational ration on hand in the supply and transportation battalion.

(2) *Ration requests.* Batteries will submit ration requests IAW Division Field SOP.

(3) *POW rations.* Utilize captured stocks, then procure locally. US rations will be utilized upon approval of next higher headquarters.

(4) *Water.* Location of water points will be specified in battalion admin/log plan. Under emergency conditions, water received from other than approved supply points will be pruified utilizing water purification tablets. All water received from authorized water supply points will be chlorinated to 1 part per million by utilizing water purification chlorine (100-tube box), FSN 6850-273-6225.

(5) *Contamination.* Following a CBR attack, commanders will request a medical survey of Class I items to determine edibility of food, and potability of water.

b. Class II (Clothing, individual equipment, tentage, etc.).

(1) Unit commanders will insure that all required Class II supplies and equipment accompany the unit during tactical exercises.

(2) A 15-day supply of PLL and expendables will be maintained at battery level. The following are designated as expendables:

(a) Mission-type operational supplies.

(b) Administrative and housekeeping supplies.

(c) Medical consumables.

c. Class III (POL).

(1) Units will maintain full vehicle tanks and all vehicles below 1¼ ton will carry a 10-gallon reserve. All vehicles below 1¼ ton will carry one 5-gallon reserve. Sufficient POL products to move a distance of 250 kilometers will be maintained. Sufficient quantities will be maintained to insure continuous operation of stationary fuel consuming equipment for 24 hours.

(2) Batteries will pick up bulk fuel directly from Class III supply points as designated in the battalion admin/log plan.

(3) A 15 day supply of oils and lubricants will be maintained at battery level.

(4) A 60 day supply of specialized POL products (i.e., cutting oil, hydraulic fluid, etc.) will be maintained at battery level.

(5) Care will be exercised when handling bulk fuel on cargo type vehicles so as not to exceed the weight limitations of the vehicle. The weight of gasoline is approximately 6 pounds per gallon and diesel fuel approximately 7 pounds per gallon.

(6) POL products will not be transported in the same vehicle transporting ammunition.

d. Class IV (Construction Material).

(1) Units will deploy with sufficient Class IV supplies and equipment to provide adequate fortification of tactical positions.

(2) A 15-day supply of PLL and expendables will be maintained at battery level.

e. Class V (Ammunition).

(1) Batteries will be issued basic loads by the battalion S-4 and will maintain required levels at all times.

(2) The administrative order issued prior to each operation will contain the location of the division ammunition officer and the ammunition supply point (ASP), and the available supply rate (ASR) for each type of ammunition.

(3) Ammunition requests (DA Form 581), will be prepared by the battery, approved by the S3, authenticated by the S4 or submitted through the supported unit's channels, and will be hand-carried by the battery directly to the division ammunition officer and the ASP for prompt resupply.

(4) Batteries will normally pickup ammunition from the ASP utilizing organic transportation.

(5) Excess or unserviceable ammunition and salvageable components will be turned in to the ASP on DA Form 581.

(6) The basic load will be continually reconstituted as used.

f. Class VI (Personal Demand Items). 100-man comfort packs will be requisitioned at battery level through the supported unit or battalion S4.

g. Class VII (Major End Items). Losses and damage of major end items will be reported to battalion S4.

h. Class VIII (Medical Material).

(1) Unit commanders will insure that all authorized medical supplies accompany the unit when deployed.

(2) Requests for resupply will be forwarded through the supported unit or battalion medical section to the DISCOM medical battalion.

i. Class IX (Repair Parts).

(1) The battalion consolidated PLL will maintain a 15-day prescribed load of non-mission items.

(2) Batteries will be issued fast-moving PLL items by battalion PLL. PLL required but not on hand will be obtained through supported unit or battalion PLL.

(3) A 15-day PLL of mission-essential weapon system repair parts will be maintained by each firing battery. At all times battery commanders will insure that parts are stored in a manner which provides total mobility for the prescribed load. Prescribed loads will accompany the batteries during all tactical and tactical training operations.

(4) The administrative order will contain the location of all Class IX supply points.

(5) Replacement requisitions will be submitted by the battery as parts are used. All authorized repair parts will be on hand or on requisition at all times.

j. Class X (Civil Affairs Material). Material required to support noncombat programs will be requisitioned through supported unit or battalion S4.

C-5-4. CAPTURED SUPPLIES AND EQUIPMENT.

a. Captured supplies and equipment will be:

(1) Safeguarded to the same degree as US supplies and equipment.

(2) Used only on order of division headquarters.

b. Notify battalion S2 or S4 of captured supplies and equipment and evacuate to division salvage point.

c. Captured Class V supplies will not be tampered with until cleared by Explosive Ordnance Demolition (EOD) personnel.

C-5-5. SALVAGE AND ABANDONED MATERIAL

a. Batteries will process all salvaged and abandoned materiel directly to the salvage point.

b. Salvage point location will be specified in the battalion admin/log plan.

C-5-6. TRANSPORTATION.

a. The following priorities are established for tactical battery movements.

(1) Troops.

(2) Class V.

(3) Evacuation of casualties.

(4) Class I and III.

(5) All other support requirements.

b. Battery commanders will establish and publish a traffic control plan for use within the battery area. This plan will include as a minimum:

(1) Road network into the battery perimeter.

(2) Road network to be used within the battery perimeter.

(3) Ammunition supply route to each fire unit.

c. Road networks should make use of existing tracks, paths, roads, or natural lines.

d. Specific transportation guidelines will be published in the battalion admin/log plan.

e. Emergency transportation will be requested through supported unit or battalion S4. S4 will establish priority and arrange for air delivery of ammunition to those batteries requiring such support.

f. Movement and operations will not be conducted in contaminated areas unless absolutely necessary. Proper measures will be taken in contaminated areas to safeguard personnel and supplies.

C-5-7. MAINTENANCE.

a. Organizational maintenance for the weapon system and automotive vehicles is the responsibility of the parent battery.

b. Direct support maintenance will be provided by the DISCOM maintenance battalion.

c. Maintenance priorities will be outlined in the battalion admin/log plan.

d. Unit commanders will insure operator maintenance is performed on a daily basis.

C-5-8. AERIAL RESUPPLY. Requests for aerial resupply will be submitted through supported unit channels or battalion S4. S4 will assign priorities.

C-5-9. DAMAGE CONTROL AND POST ATTACK RECOVERY.

a. Battery Commanders' Responsibilities.

(1) Initial search within their areas of responsibility to locate and evacuate deceased personnel.

(2) Immediate recovery and evacuation of deceased personnel to the collecting point specified in the admin/log plan. If remains are not recovered due to the tactical situation, the specific location of the remains and all pertinent facts will be reported to supported unit or battalion S4.

b. Protection of Personnel.

(1) *Mines and booby traps.* During search and recovery operations every precaution must be taken to protect personnel from mines, unexploded ammunition, grenades, and booby traps.

(2) *Contaminated and contagious remains.* Personnel handling remains contaminated by a chemical agent or possessing a contagious disease will be provided adequate protection. A tag marked with the letter "C" will be attached to each contaminated or contagious body with all available information recorded thereon to indicate the manner by which the body became contaminated or contagious.

c. Atrocity Cases. Personnel recovering remains will be responsible for recording evidence indicating atrocities committed by the enemy. The Record of Recovery of Remains, DD Form 567, will clearly indicate that an atrocity report is attached.

d. Recovery of Remains. Personnel making the initial recovery will not remove clothing, equipment, or personal effects found on the body. Search should be made in the immediate area for articles of identification and value.

e. Identification of Remains.

(1) An attempt should be made to visually identify the deceased at place of recovery or prior to evacuation of remains from the unit area. Personal effects, including identification card, DD Form 2A, and identification tags may be examined for identification purposes, but will not be removed from the remains.

(2) DD Form 565, Statement of Recognition,

when made by a close friend or member of deceased's organization, is helpful in establishing the identity of the remains.

f. Care of Remains. Remains will be covered at all times while being transported. A poncho, blanket, shelter half, or other suitable covering is generally used for this purpose. The human remains pouch will be used if available.

C-5-10. REPORTS

a. Battalion S4 will submit the following reports to Division in accordance with division field SOP.

(1) Current status report.

(2) Nonavailable equipment status report.

(3) Battle loss.

(4) Ammunition use.

b. Batteries will submit reports to battalion S4 in accordance with annex E, this TACSOP.

C-5-11. ADMINISTRATIVE ORDERS. Administrative orders will provide the following information.

a. Location of supply points.

b. Water points.

c. Primary and alternate supply routes.

d. Available supply rate for ammunition (ASR).

e. Field maintenance support locations.

f. Traffic control restrictions.

g. Evacuation instructions.

APPENDIXES:

I. Classes of supply (omitted)

II. Damage control and post attack recovery (omitted)

APPENDIX D
FORWARD AREA ALERTING RADAR (FAAR)

D-1. Mission

To provide alerting information, in the form of general target location and tentative identification, to Chaparral/Vulcan fire units and Redeye teams.

D-2. Position Requirements

FAAR sites are chosen to obtain maximum low-altitude radar coverage and to insure line of sight to the maximum number of in-range fire units for digital data transmission to the target alert data display sets at the fire units. These two basic requirements may conflict. Radar position in relation to the position of the fire units 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 the FAAR coverage overlaps the fire unit position(s) by at least 10 kilometers in the expected direction of air attack. Because the FAAR is an attractive target for air attack, consideration should be given to collocating FAAR at a Vulcan fire unit position whenever position and mission requirements permit. Normally, in the combat zone, the FAAR and the ADA fire unit will be in a maneuver unit commander's area of responsibility. The maneuver unit will also have air defense obligations and airspace management requirements. Therefore, close, constant coordination is a must and all involved should support one another. This mutual support may be in the form of firepower, security, navigational assistance to Army aircraft, or assistance in airspace management.

D-3. FAAR Frequencies and Location

FAAR frequencies and codes used in data transmission to TADDS are contained in the CEOI and identified with specific FAARs that are numbered one through eight. When the FAAR identification has been determined, the fire unit requests the coordinates from the platoon leader. FAAR locations are available to the platoon leader from the AADCP. This method of netting TADDS with FAAR is applicable in both moving and static situations. In either situation, FAAR or TADDS will periodically display—the FAAR to support tactical operations or to enhance survivability, and the TADDS (fire unit) to support tactical operations. It is possible that some TADDS may not receive data from any of the FAARs due to terrain masking. In this event, the TADDS attempts to obtain reception by relocation of position. If reception cannot be obtained after relocation or if relocation is impractical, a report of the situation is made to the AADCP. The reporting of nonreception by several TADDS in the same general area would be sufficient cause to relocate one or more FAARs to provide the required coverage.

D-4. FAAR/TADDS Information

When the TADDS receives data from the FAAR, it will emit an audible tone alerting the observer that target information is being received. Indicators on the TADDS (fig 2-8) show the location of a target within a square of approximately 4 kilometers, and the identity of the target as friendly (green indicator shows a proper IFF response has been received) or unknown (orange indicator shows that a proper IFF response has not been received). The location of both the FAAR and TADDS must be known if the information is to be meaningful because all data are transmitted with the FAAR location represented at the center square of the TADDS. Figure D-1 shows a FAAR located approximately 13 kilometers from the FEBA and indicates the location of fire units and the degree of assistance provided by the FAAR. A target location (T), detected and identified by FAAR, is transmitted to the TADDS-equipped fire units. The observers at the fire units (1 through 6) have been alerted to the need for increased airspace surveillance. Observer No. 1 must perform 360° surveillance to detect the target located in the same square because directional information is unavailable; Observer No. 2 must scan approximately 90°; Observer No. 3—approximately 40°; Observer No. 4—approximately 180°; Observer No. 5—approximately 45°; and Observer No. 6—approximately 35°. If the target flies toward point "A," Observer No. 3 has an excellent probability of detecting the target at maximum visual range as does Observer No. 6 if the target flies toward point "B." Both observers can watch the indicator sequence on the TADDS as each square is traversed. However, a raid of multiple targets that deploys at point "C" for strikes against ground targets at points D, E, and G will cause an indicator sequence that will nullify the capabilities of the observers at fire units 1 through 6. Units (R) located farther to the rear can be alerted and given more time to react and better direction of attack information.

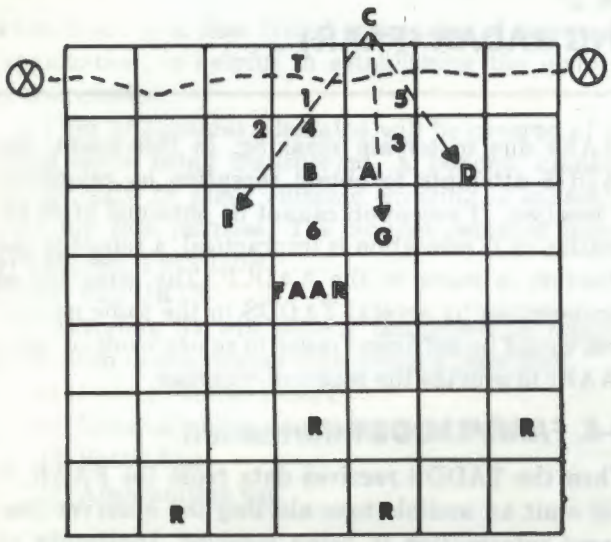


Figure D-1. TADDS display.

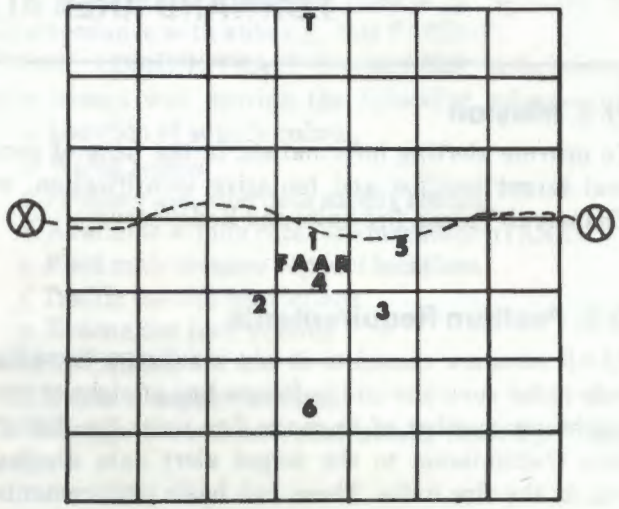


Figure D-2. TADDS display—FAAR close to FEBA.

Some FAARs must be positioned well forward as shown in Figure D-2. The FAAR in this instance is located approximately 2 kilometers behind the FEBA so that surveillance is extended into hostile territory. The fire units are provided earlier alert information and better directional information. The same deployment of observers is made and a target is detected at the same range as in figure D-1. Note that Observers No. 1, 4, and 5 now scan approximately 25° as opposed to 360°, 180°, and 45° in figure D-1 where the FAAR was located farther to the rear. The scan requirement for Observers No. 2, 3 and 6 is reduced from 90°, 40° and 35° to 16°, 17°, and 12° respectively. From this it is apparent that fire units located near a FAAR receive the best quality information, and that a FAAR located close to the FEBA can provide earlier alerting, identification, and data display information.

D-5. FAAR Deployment

The eight FAARs organic to the Chaparral/Vulcan battalion are deployed to provide data to all the C/V fire units. This is accomplished by providing coverage of the low-altitude approaches to the division with priority to the front, flanks, and rear areas. The most forward FAARs are emplaced close to the FEBA to provide the best warning information. These forward radars should be emplaced so as to receive some protection from observation by light foliage or an emplacement similar to hull defilade. Random displacement, coordinated with the C/V fire units, may be used to enhance the survivability of all FAARs, particularly those deployed well forward. FAARs should be deployed no more than 9 kilometers apart to insure mutual support by overlapping coverage and for coverage of dead spaces caused by terrain masks. These radars displace in order to provide continual coverage of tactical operations or on the initiative of the squad leader when the receipt of indirect or direct fire indicates imminent destruction. The FAARs, so threatened, move to a previously selected alternate position and report when they are ready to resume operation.

By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

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Major General, United States Army
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