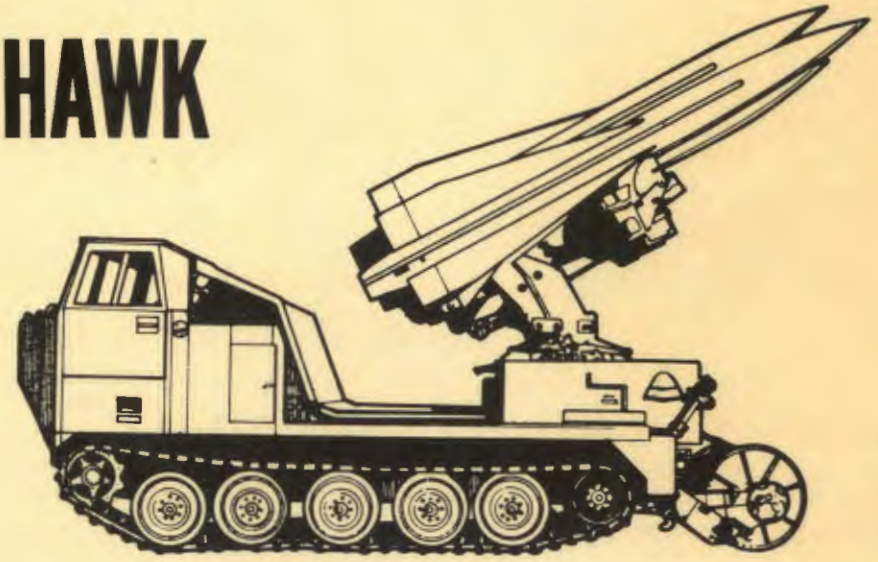
FM 44-96

DEPARTMENT OF THE ARMY FIELD MANUAL

AIR DEFENSE ARTILLERY EMPLOYMENT

HAWK



HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1971

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

PREFACE

This manual is a guide for commanders and staff concerned with the organization, employment, command, and control of Hawk air defense artillery units.

By presenting doctrinal guidance peculiar to the towed and self-propelled Hawk units, this manual supplements FM 44–1.

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

This manual differs from the superseded manual (April 1968) in that it—

Deletes applicatory information that is adequately covered in other FM; i.e., Logistics, 29-series manuals; Environmental Considerations, FM 44–1 and 31-series manuals; Standing Operating Procedures and Clutter and Coverage—FM 44–1; Movement by Air, Water, and Rail, TB 55–46 and 55-series manuals.

Has major revisions to text and illustrations to update organization, command and control, communications, employment concepts, reconnaissance, selection and occupation of position, active and passive defense of a Hawk unit, and USSTRICOM air defense artillery battalion organization.

Applies standard tactical mission terms to Hawk operations.

Summarizes each chapter, emphasizing the main points of discussion, so that a ready reference is available to the reader.

Users of this 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, U.S. Army Combat Developments Command Air Defense Agency, ATTN: CSGAD–M, Fort Bliss, Texas 79916.

FIELD MANUAL
No. 44–96

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *9 March 1971*

AIR DEFENSE ARTILLERY EMPLOYMENT, HAWK

*This manual supersedes FM 44–96, 19 April 1968.

CHAPTER 1

ORGANIZATION AND TACTICAL MISSIONS

Section I. ORGANIZATION

1-1. General

Hawk is classed as the low-to-medium air defense (LOMAD) member of the family of air defense artillery weapons. The Hawk battalion is a tactical and administrative unit composed of a headquarters and headquarters battery and assigned firing batteries. There are two basic battalion types, towed and self-propelled (SP).

1-2. Air Defense Artillery Battalion, Hawk (Towed)

Personnel and equipment are listed in TOE 44-235 (Hawk battalion), TOE 44-236 (headquarters and headquarters battery), and TOE 44-237 (Hawk firing battery). There are three versions of the towed Hawk series TOE, *mobile, fixed,* and *semimobile.*

a. Mobile. The mobile towed Hawk battalion has sufficient organic transportation to displace all components of the battalion at the same time. It is organized to perform its own tactical and administrative functions, and is capable of independent employment. However, it is capable of only limited defense against ground attack and may require augmentation in the event such attacks are likely. Hawk units allocated to provide air defense in an anticipated fluid situation should be of the mobile type.

b. Fixed. The fixed battalion has the same capabilities as the mobile battalion, except that transportation includes only those vehicles required for administrative purposes. The fixed battalion may be employed in situations where mobility is not required, as in the defense of installations such as ports and airfields.

c. Semimobile. When the fixed battalion is augmented with a transportation section, it is 25 percent mobile. The semimobile battalion is employed in situations where movement is anti-

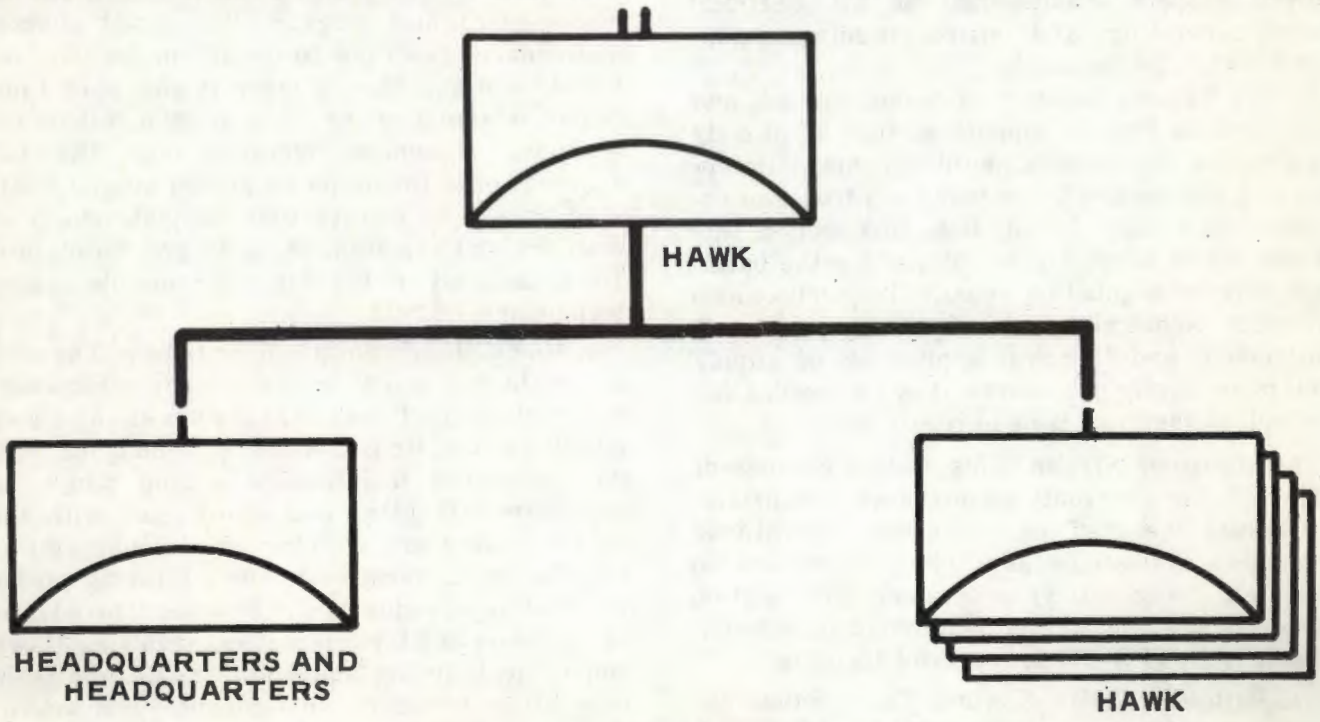


Figure 1-1. Hawk battalion (towed) organization.

cipated, but can be accomplished by moving one Hawk battery at a time.

1–3. Headquarters and Headquarters Battery, Air Defense Artillery Battalion, Hawk (Towed)

The headquarters and headquarters battery is organized to perform the normal command, administrative, supply, and maintenance functions for the Hawk battalion. In addition, the headquarters and headquarters battery contains the specialized elements listed in *a* through *c* below.

a. Support Platoon. The support platoon contains the platoon headquarters, ground guidance equipment support section, missile and ground handling equipment support section, power and air-conditioning support section, and the air defense command, control, and coordination system support section.

(1) The ground guidance and the missile and ground handling equipment support sections provide the personnel and equipment for direct support maintenance of Hawk-peculiar ordnance equipment. This maintenance includes repair of assemblies and chassis to the maximum extent authorized and the care and use of special test equipment required for the repair of designated critical assemblies and chassis which, after repair, require critical realinement.

(2) The power and air-conditioning support section provides the personnel and equipment for direct support maintenance of all electrical power-generating and air-conditioning equipment within the battalion.

(3) The air defense command, control, and coordination system support section is directly responsible for direct/general support maintenance of the electronic command, control, and coordination system. In addition, this section furnishes direct support maintenance for the battalion defense acquisition radar. This section also provides technical assistance teams to present instruction and technical application of supply and maintenance procedures. It is responsible for receipt, storage, and issue of repair parts.

b. Electronic Section. This section consists of the battalion electronic maintenance technicians. It assists the staff in performing operational readiness evaluations and other inspections to maintain firing battery proficiency. This section also provides and maintains an engagement simulator (AN/TPQ–21) for operator training.

c. Battalion Radar Section. This section operates a defense acquisition radar (AN/GSS–1 or AN/GSS–7) for the battalion. Targets detected by the radar section appear on plan position indicators (PPI) in the battalion operations central (Bn OC).

1–4. Battalion Staff

The Hawk battalion staff organization is similar to the organization of other military staffs (FM 101–5), and functions in the same general manner. Duties of Hawk battalion staff officers not described in FM 101–5 are listed in *a* through *d* below.

a. S3. The S3 is the battalion operations and training officer, with duties similar to those listed in FM 101–5 for an ACofS. G3. He has one officer assistant. The principal duties of the S3, in addition to those listed in FM 101–5, are to—

(1) Design, analyze, and evaluate air defense for the battalion.

(2) Prepare and maintain a tactical SOP including measures for air defense control of the battalion.

(3) Supervise day-to-day operations in the battalion Army Air Defense Command Post (AADCP) to include responsibility for the training of both Air Defense Command, Control and Coordination System (ADCCCS) and radar personnel.

(4) Supervise the activities of the liaison, Hawk missile maintenance, and operations officers.

b. Direct Support Platoon Leader. The platoon leader plans and programs the direct support maintenance functions to include inspections, assembly and supply, and other related staff functions pertaining to the Hawk missile system and associated equipment. Working under the staff supervision of the ordnance guided missile (GM) staff officer, he insures that adequate stocks of material and replacement parts are maintained. He is assisted in his duties by missile system technicians.

c. Hawk Missile Maintenance Officer. The missile maintenance officer advises the commander and staff on the technical operation of the Hawk missile system. He is assisted by technicians from the electronics maintenance section which he supervises. He plans and coordinates with the S3 the testing and training of personnel, utilizing the engagement simulator. Working under the staff supervision of the S3 officer, he advises on technical and tactical matters involving Hawk employment, firing, and training. He assists in conducting command maintenance and operational readiness inspections and in developing

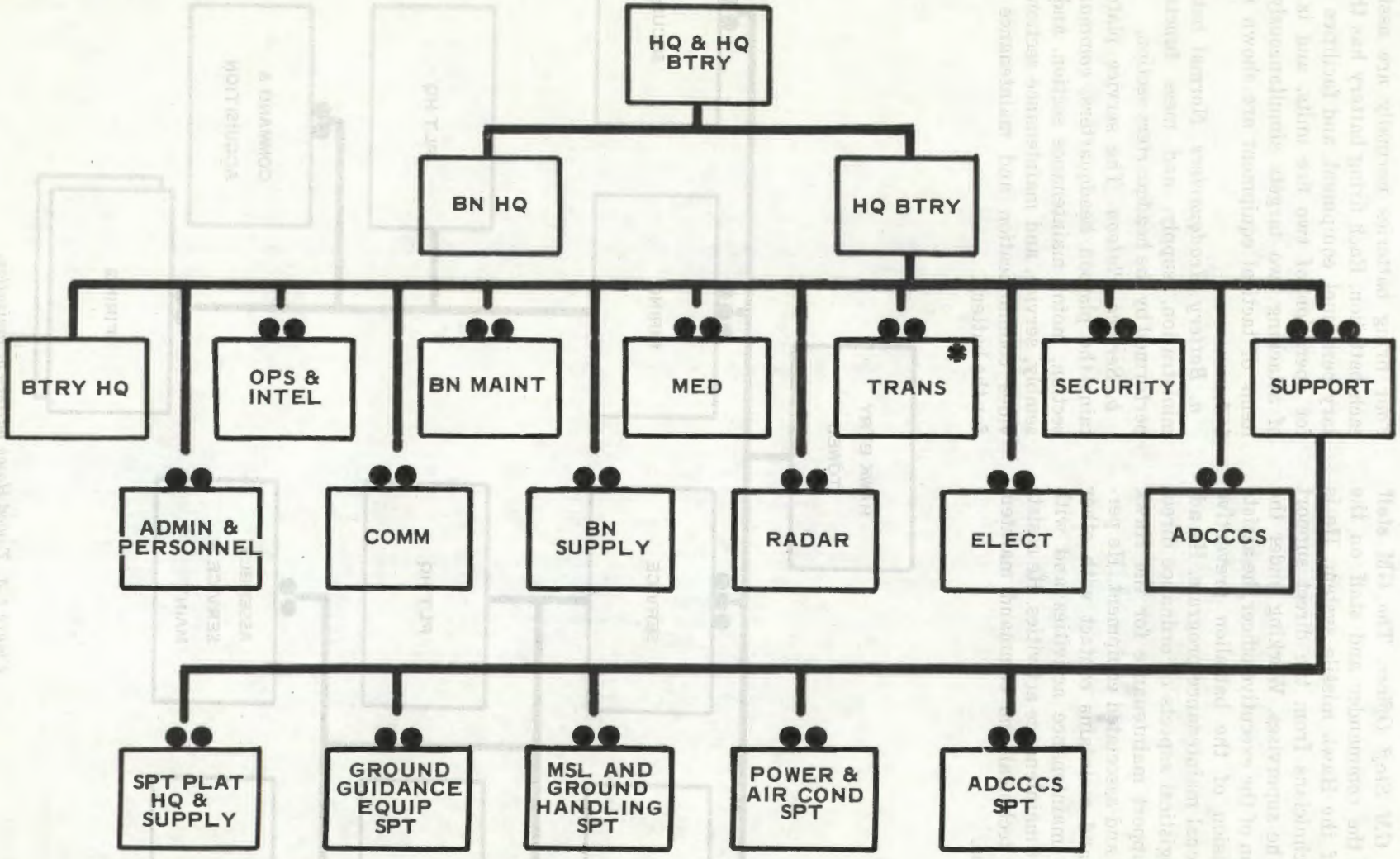


Figure 1–2. Headquarters and headquarters battery, Hawk (Towed), organization.

operational procedures and techniques involving modified equipment and use of new equipment.

d. Ordnance GM Staff Officer. The GM staff officer advises the commander and staff on the maintenance of the Hawk missile system. He is assisted by technicians from the direct support platoon which he supervises. Working under the staff supervision of the executive officer, he assists in the supervision of the battalion preventive and organizational maintenance program. He advises on the logistical aspects of ordnance direct and general support maintenance for the Hawk missile system and associated equipment. He performs liaison and maintains contact with other direct support maintenance activities and with general support maintenance activities. He assists in performing technical and command maintenance inspections.

1–5. Air Defense Artillery Battery, Hawk (Towed)

Four firing batteries normally are assigned to each battalion. Each firing battery has the necessary personnel, equipment, and facilities required for operation of two fire units, and is capable of attacking two targets simultaneously. Major items of tactical equipment are shown in figure 1–4.

a. Battery Headquarters. Normal battery administration, supply, and mess functions are performed by the headquarters section.

b. Service Platoon. The service platoon contains the platoon headquarters, communications section, motor maintenance section, and the assembly, service, and maintenance section. It provides communication and maintenance support for the battery.

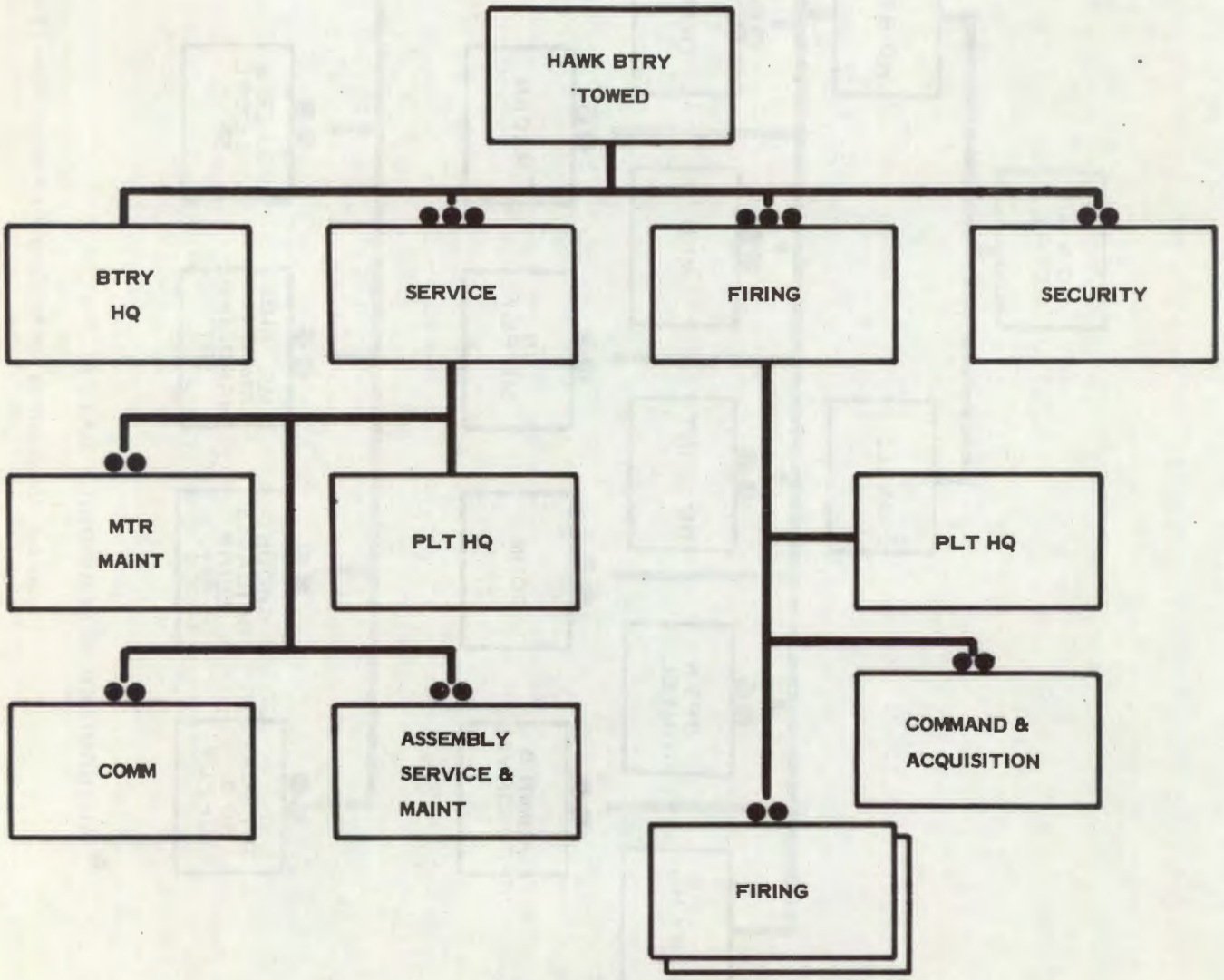


Figure 1–3. Towed Hawk battery organization.

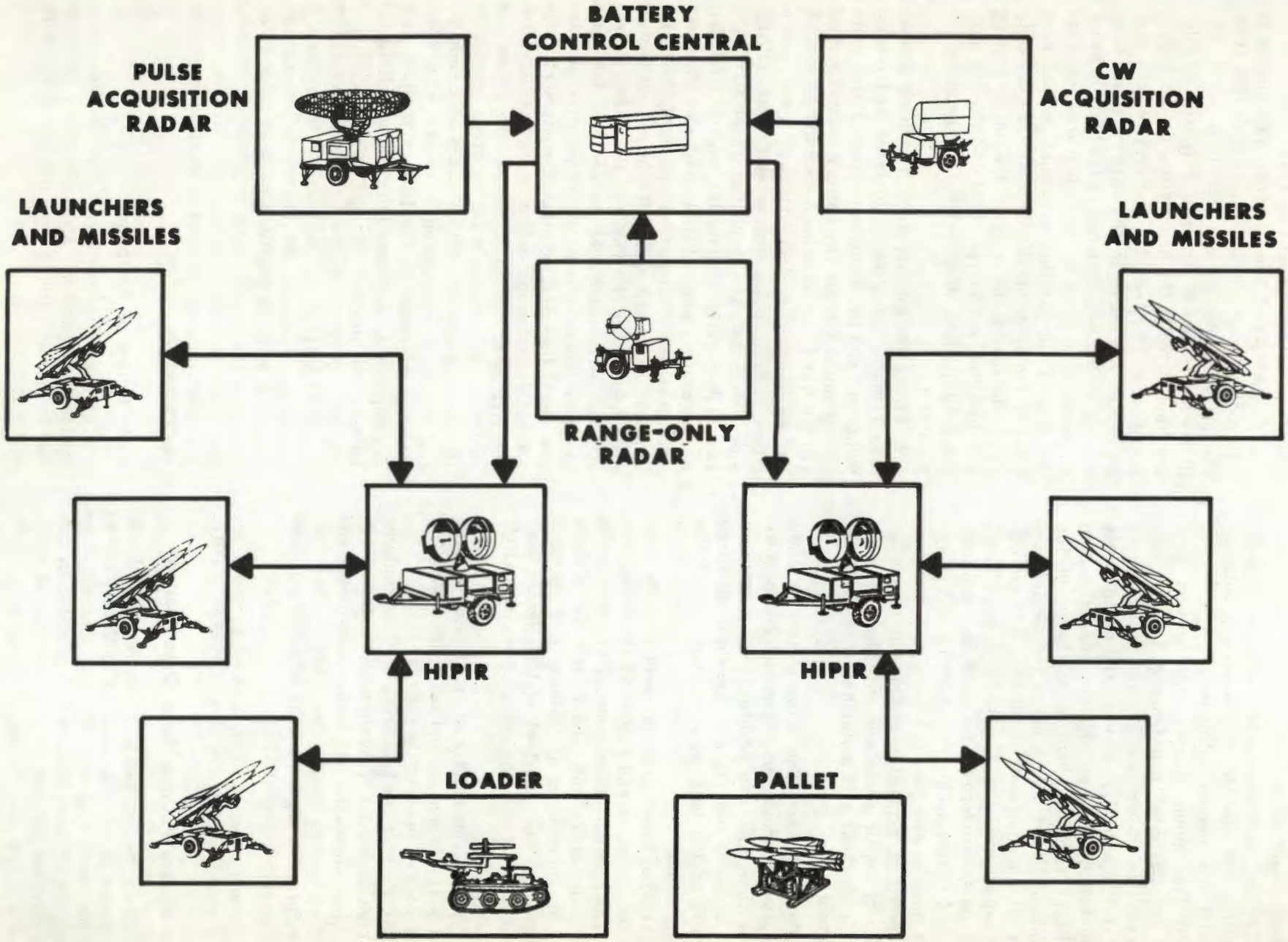


Figure 1–4. Towed Hawk firing battery major items of tactical equipment.

(1) The service platoon headquarters controls support activities.

(2) The communications section installs, maintains, and operates the necessary internal radio and wire communication nets.

(3) The motor maintenance section provides organizational maintenance for the battery's vehicles, trailers, and generators.

(4) The assembly, service, and maintenance section includes two air defense missile system technicians (one of whom is in charge of the section), all Hawk maintenance technicians, engineer missile equipment mechanics, and an ordnance supply specialist. This section stocks Hawk repair parts, performs organizational maintenance, and is responsible for assembly and checkout of missiles and missile resupply. A maintenance shelter is included as section equipment for storage of repair parts and provides the work area for checkout and maintenance of electronic equipment.

c. Firing Platoon. The firing platoon contains the platoon headquarters, command and acquisition section, and two identical firing sections. The platoon is organized to perform all firing activities of the battery, to include assault fire unit operations.

(1) The firing platoon headquarters provides for command and control of the firing platoon. The assistant platoon leader provides depth for 24-hour operations, and assists the platoon leader in supervision of training and operator maintenance. The assistant platoon leader may be sent forward with the assault fire unit (AFU) when necessary.

(2) The command and acquisition section contains the command and acquisition and fire distribution elements of the battery.

(3) Each of the two firing sections contains one high-powered CW illuminator radar (HIPIR), three launchers, one loader-transporter one launching section control box (LSCB), and two generators. One section can be detached and used as an assault fire unit (AFU).

d. Security section. This section provides security guards and sentry dogs for site security.

1–6. Battery Position Area Organization

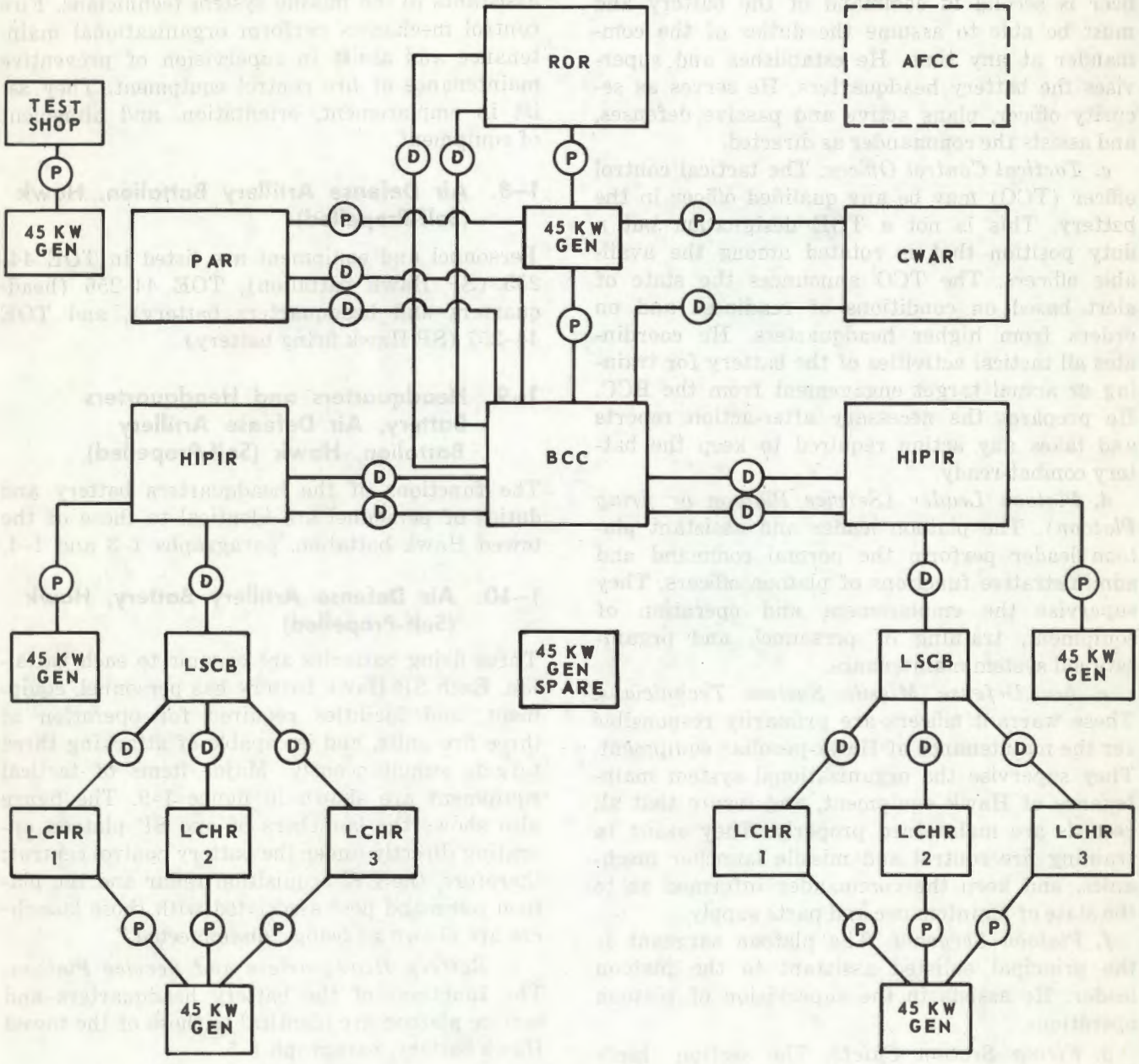
The Hawk battery position area is divided into two major parts, the assembly and service area and the firing and control area. The minimum separation of these two areas is dictated by terrain, dangers inherent in the handling of explosives, and the need to reduce congestion in the firing area. The cable system limits the separation of tactical equipment (fig. 1–5).

a. Assembly and Service Area. The missile is received for assembly and checkout in this area. The prepared missiles are stored on pallets until needed in the firing area. Prepared missiles are transported to the firing areas by the loader-transporter. The assembly and service area may be located anywhere in the battery area; however, it should be positioned to facilitate delivery of prepared missiles to the firing area, decrease the size of the position area, and reduce local security requirements. Strict adherence to safety rules will reduce the danger inherent in storing and handling explosives. (TM 9–1300–206 provides details regarding storing and handling explosives.)

b. Firing and Control Area. The firing platoon area contains the ground guidance and control equipment and the firing equipment. Major items of equipment include the battery control central (BCC) (and its associated command, control, and coordination system equipment), two acquisition radars: pulse acquisition radar (PAR) and continuous-wave acquisition radar (CWAR), two high-powered illuminator radars (HIPIR), a range-only radar (ROR), and six launchers with missiles. Maximum separation of the major items of equipment within the firing and control area is limited to the length of the cables. Extension cables measuring 38 meters (125 feet) are available where unusual siting requirements are prevalent. However, because of equipment characteristics, extension cables cannot be used for the HIPIR or the ROR. Within the firing and control area, priority must be given to placing the continuous-wave (CW) radars on commanding terrain for maximum coverage with minimum interference. If the battery position area is compressed, electronic interference within the battery will degrade the system's capability. It is also desirable to position the pulse acquisition radar (PAR) as far as possible from the CW radars to minimize the electronic interference. Selection of radar positions must be made to accomplish the mission and to minimize unnecessary transmission into enemy-controlled areas. For additional information on electronic security, see TB 380–6–1.

1–7. Duties of Personnel

a. Battery Commander. The battery commander has command and supervisory responsibility for the training, welfare, and functioning of his unit.



NOTE:
THE CABLE SYSTEM CONSISTS OF 18 DATA (D) AND 14 POWER (P) CABLES OF WHICH ONE DATA AND ONE POWER CABLE ARE DESIGNATED AS SPARES.
ALL DATA CABLES ARE 114 METERS (375 FEET) LONG AND ARE INTERCHANGEABLE.
EXTENDED LENGTH CABLES MEASURING 152 METERS (500 FEET) AND EXTENSION CABLES MEASURING 38 METERS (125 FEET) ARE AVAILABLE WHERE UNUSUAL SITING REQUIREMENTS DICTATE.

Figure 1–5. Towed Hawk firing battery cable system.

b. Executive Officer. The battery executive officer is second in command of the battery and must be able to assume the duties of the commander at any time. He establishes and supervises the battery headquarters. He serves as security officer, plans active and passive defenses, and assists the commander as directed.

c. Tactical Control Officer. The tactical control officer (TCO) may be any qualified officer in the battery. This is not a TOE designation but a duty position that is rotated among the available officers. The TCO announces the state of alert based on conditions of readiness and on orders from higher headquarters. He coordinates all tactical activities of the battery for training or actual target engagement from the BCC. He prepares the necessary after-action reports and takes any action required to keep the battery combat-ready.

d. Platoon Leader (Service Platoon or firing Platoon). The platoon leader and assistant platoon leader perform the normal command and administrative functions of platoon officers. They supervise the emplacement and operation of equipment, training of personnel, and organizational system maintenance.

e. Air Defense Missile System Technicians. These warrant officers are primarily responsible for the maintenance of Hawk-peculiar equipment. They supervise the organizational system maintenance of Hawk equipment, and insure that all records are maintained properly. They assist in training fire control and missile launcher mechanics, and keep the commander informed as to the state of maintenance and parts supply.

f. Platoon Sergeant. The platoon sargeant is the principal enlisted assistant to the platoon leader. He assists in the supervision of platoon operations.

g. Firing Section Chiefs. The section chiefs supervise all the activities of the firing sections. These include training, emplacement of launchers, emplacement of HIPIR, transfer of missiles to launchers, cabling, arming and disarming, and preparation of launchers for firing.

h. Chief Missile-Launcher Mechanic. The chief missile-launcher mechanic is the technical assistant for missiles and launchers. He supervises the testing and assembly of missiles and the performance of organizational maintenance on launching equipment.

i. Fire Control Mechanics. These personnel are assigned to the Hawk assembly, service, and maintenance section. A chief mechanic is provided for each type of electronic fire control equipment. These mechanics are the technical assistants to the missile system technicians. Fire control mechanics perform organizational maintenance and assist in supervision of preventive maintenance of fire control equipment. They assist in emplacement, orientation, and alinement of equipment.

1–8. Air Defense Artillery Battalion, Hawk (Self-Propelled)

Personnel and equipment are listed in TOE 44–255 (SP Hawk battalion), TOE 44–256 (headquarters and headquarters battery), and TOE 44–257 (SP Hawk firing battery).

1–9. Headquarters and Headquarters Battery, Air Defense Artillery Battalion, Hawk (Self-Propelled)

The functions of the headquarters battery and duties of personnel are identical to those of the towed Hawk battalion, paragraphs 1–3 and 1–4.

1–10. Air Defense Artillery Battery, Hawk (Self-Propelled)

Three firing batteries are organic to each battalion. Each SP Hawk battery has personnel, equipment, and facilities required for operation of three fire units, and is capable of attacking three targets simultaneously. Major items of tactical equipment are shown in figure 1–9. The figure also shows the launchers of one SP platoon operating directly under the battery control central; therefore, the CW acquisition radar and the platoon command post associated with those launchers are shown as being "disconnected."

a. Battery Headquarters and Service Platoon. The functions of the battery headquarters and service platoon are identical to those of the towed Hawk battery, paragraph 1–5.

b. Firing Platoons. The battery contains three platoons (one towed, and two self-propelled). The towed platoon has a platoon headquarters, and one firing section; and each SP platoon has a platoon headquarters, a support section, and a firing section.

(1) The towed platoon is authorized equipment required for exercising command and control of all the firing sections. The firing section of the towed platoon contains one PAR, one CWAR, one BCC, one ROR, one HIPIR, three launchers, one loader-transporter, one launching section control box, and four generators.

(2) An assistant platoon leader is authorized in each SP platoon to provide depth for con-

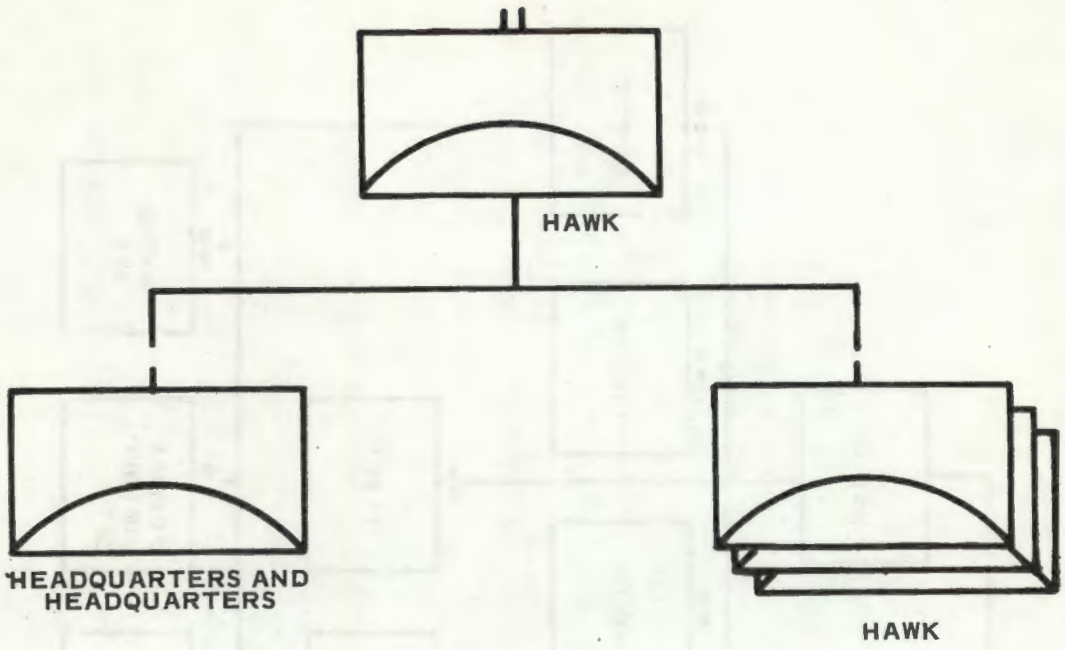


Figure 1–6. Self-propelled Hawk battalion organization.

tinuous operation. Each of the self-propelled platoons contains one HIPIR, one CWAR, a platoon command post, one loader-transporter, an interconnecting box, and three self-propelled launchers. A 60-KW generator is incorporated into each launcher, and each launcher is capable of transporting three missiles.

1–11. Battery Position Area Organization

The SP Hawk firing battery position area is divided into four major parts: the assembly and service area, the towed platoon and fire control area, and two self-propelled platoon areas. The minimum separation of these areas is dictated by terrain, dangers inherent in the handling of explosives, and the need to reduce congestion in the firing area. The cable system governs the maximum separation of tactical equipment within a position area (fig. 1–10).

Figure 1–10 shows the launchers of one SP platoon operating directly under the battery control central; therefore, the CW acquisition radar and the platoon command post associated with those launchers are shown as being "disconnected." A detailed discussion of self-propelled Hawk battery organization of positions is contained in chapter 7.

a. Assembly and Service Area. See paragraph 1–6*a*.

b. Towed Platoon and Control Area. This area contains the ground guidance and control equipment and the firing equipment. Major items of equipment include the BCC (and its associated command, control, and coordination system equipment), two acquisition radars (PAR and CWAR), one HIPIR, one ROR, very-high-frequency (VHF) communication equipment, and three launchers with missiles. When determining maximum separation between major items of equipment within the firing and control area, priority must be given to placing the CW radars on commanding terrain for maximum coverage with minimum interference. If the battery position area is compressed, electronic interference within the battery will degrade the system's capability. It is also desirable to position the PAR as far as possible from the CW radars to minimize the electronic interference.

c. Self-propelled Platoon Area. This area contains the platoon ground guidance and control equipment and the platoon firing equipment. Major items of equipment include the platoon command post (PCP), one CWAR, one HIPIR, an interconnecting box, and three self-propelled launchers. Maximum separation of the major items of equipment within the self-propelled area is limited by the length of the tactical cables. (Chap 7 contains a detailed discussion of self-propelled Hawk platoon position area requirements.)

1–12. Duties of Personnel

Duties of self-propelled Hawk battery personnel are similar to those described for the towed Hawk battery in paragraph 1–7.

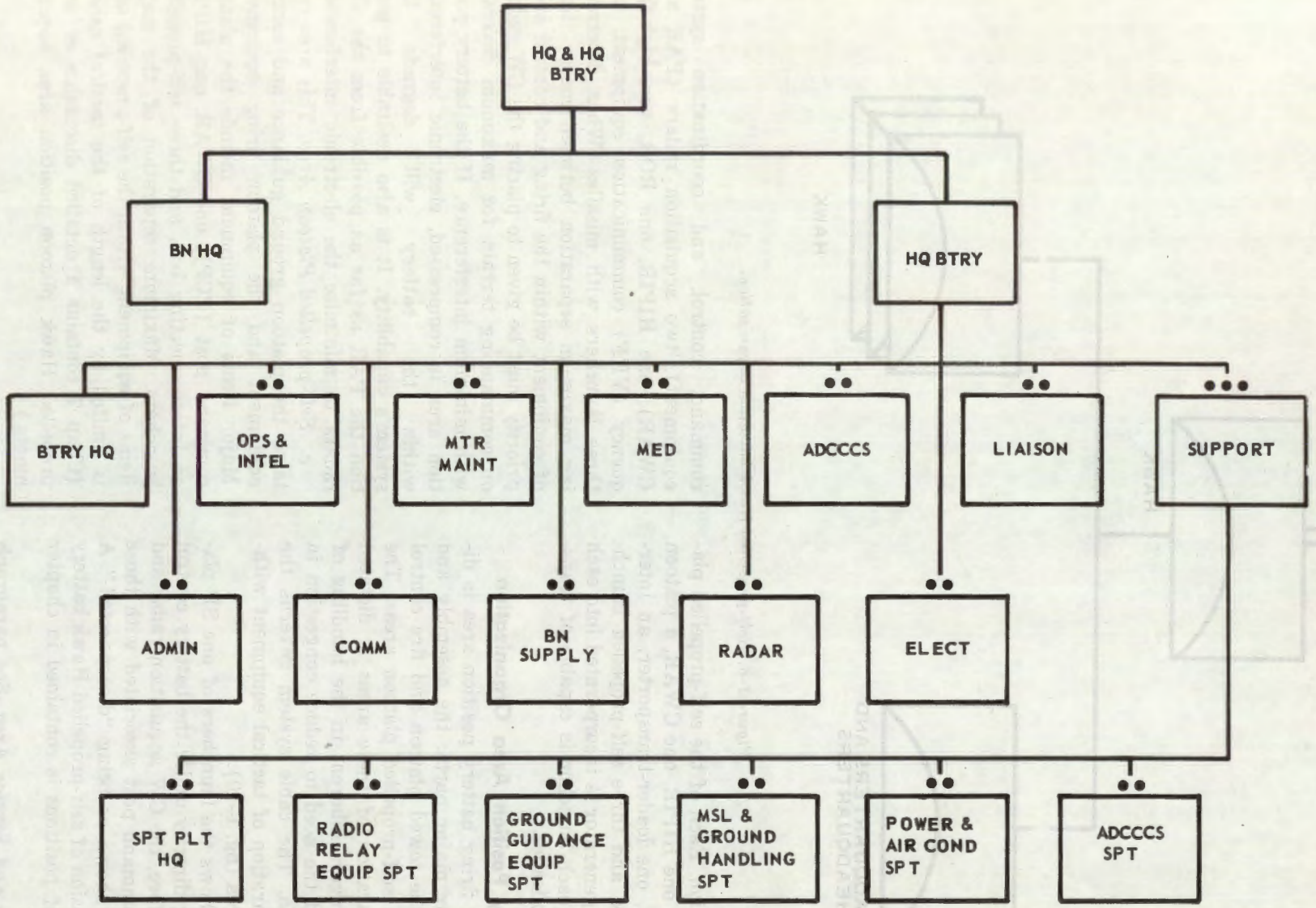


Figure 1-7. Headquarters and headquarters battery organization (SP Hawk).

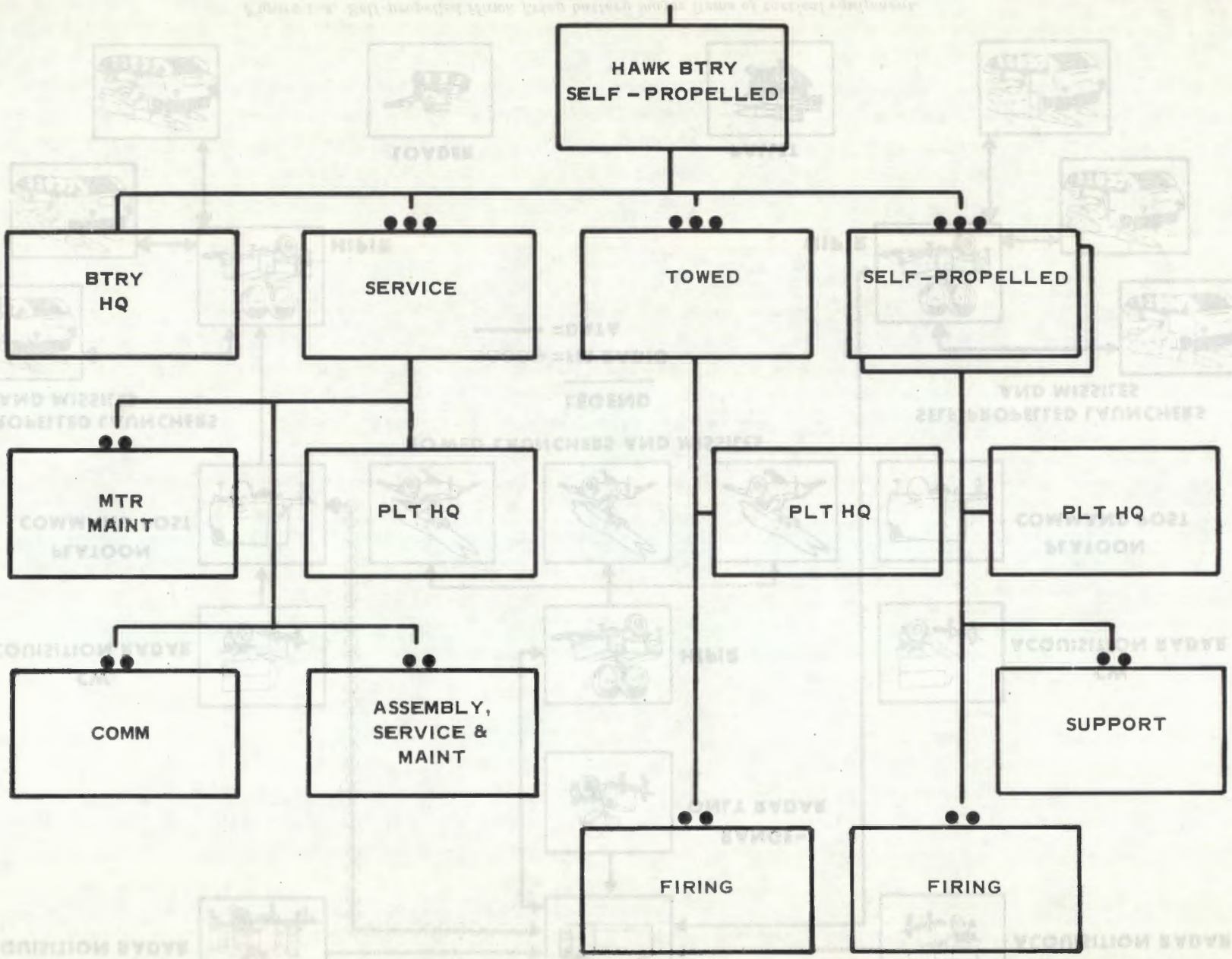


Figure 1–8. Self-propelled Hawk battery organization.

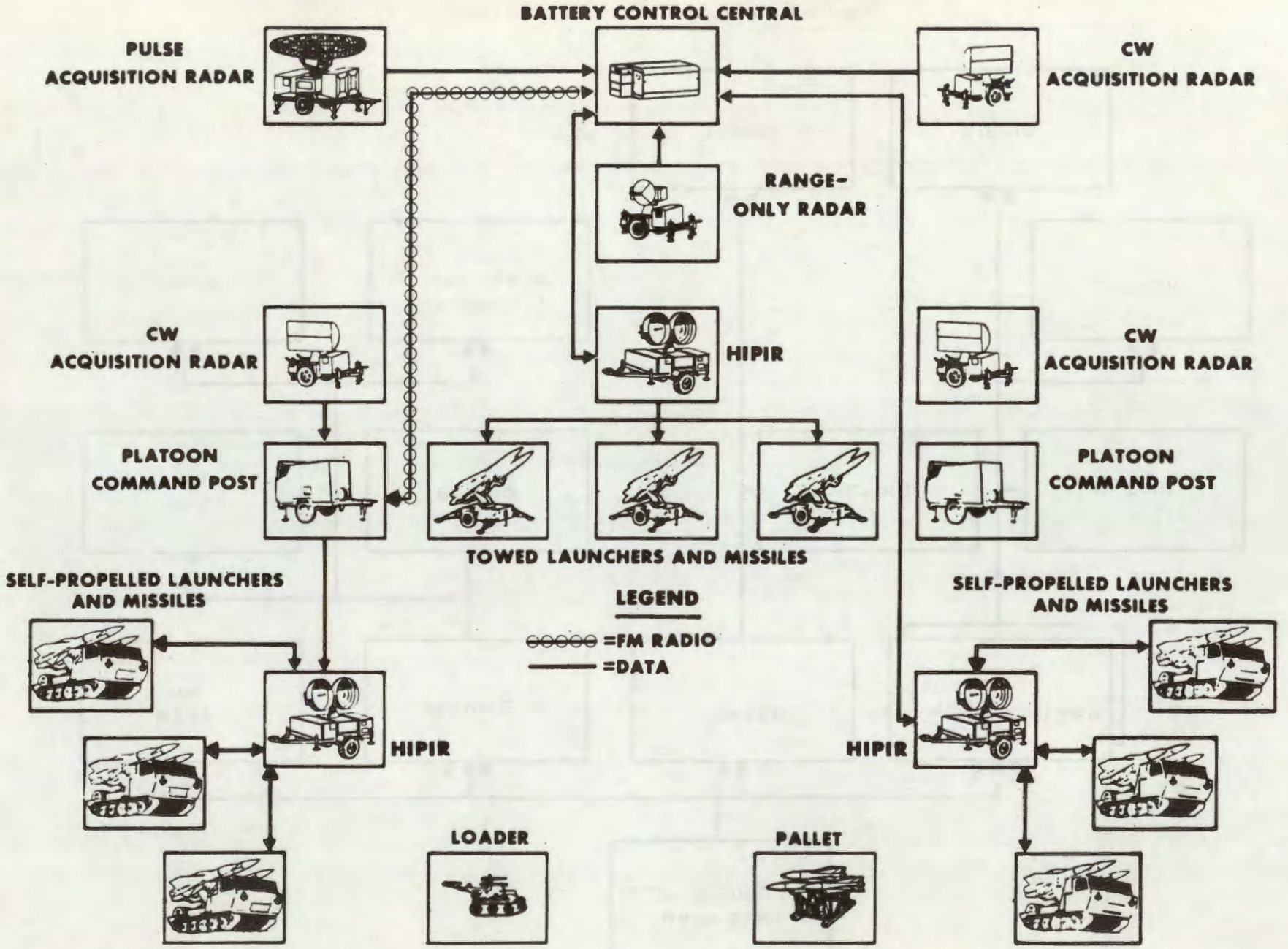
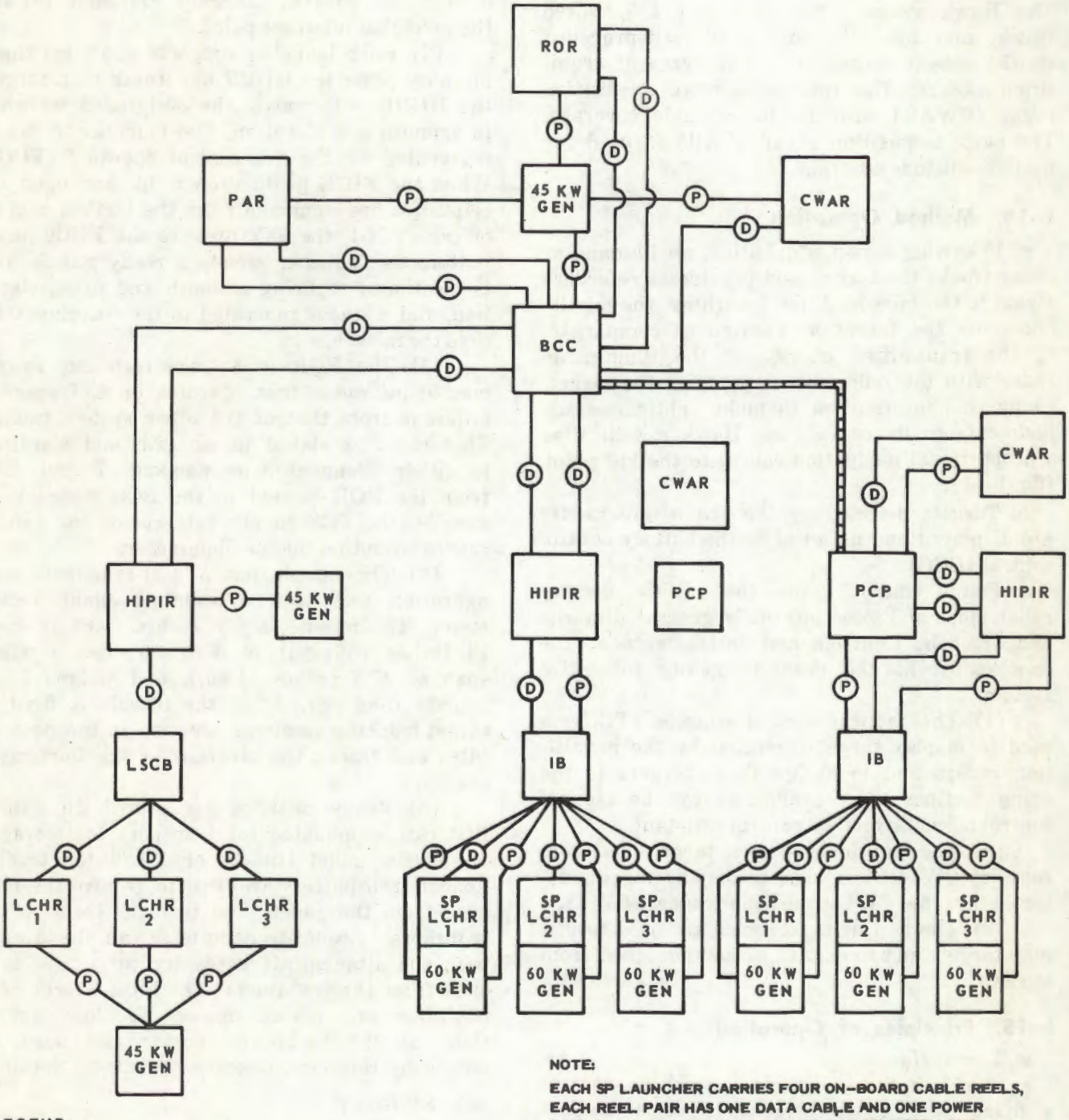


Figure 1–9. Self-propelled Hawk firing battery major items of tactical equipment.



LEGEND

- FM RADIO OR WIRE LINK
- (D) - DATA CABLES (375 FEET LONG)
- (P) - POWER CABLES (375 FEET LONG)

NOTE:

EACH SP LAUNCHER CARRIES FOUR ON-BOARD CABLE REELS, EACH REEL PAIR HAS ONE DATA CABLE AND ONE POWER CABLE. ALL SP LAUNCHER CABLES ARE 375 FEET LONG. SP PLATOON POWER IS SUPPLIED BY ANY ONE OF THE THREE ON-BOARD GENERATORS. THE GENERATOR SUPPLYING POWER MUST USE TWO CABLES AS SHOWN ON LAUNCHER 1. BOTH SP PLATOONS MAY BE LINKED TO THE BATTERY CENTRAL BY FM RADIO DURING SEMI-INDEPENDENT OPERATIONS.

Figure 1-10. Self-propelled Hawk battery cable system.

Section II. METHOD OF OPERATION AND SYSTEM DESCRIPTION

1-13. General

The Hawk system (figs. 1-4 and 1-5, towed Hawk, and figs. 1-9 and 1-10, self-propelled Hawk) detects targets with two types of acquisition radars. The continuous-wave acquisition radar (CWAR) provides low-altitude coverage. The pulse acquisition radar (PAR) is used for medium-altitude coverage.

1-14. Method Operation

a. Following target acquisition, an illuminator radar tracks the target, and provides a reference signal to the missile. After launching, the missile homes on the target by continuous comparison of the transmitted energy of the illuminator radar with the reflected energy from the target. Using this information to make continuous adjustments in its course, the Hawk missile flies a proportional navigation course to the kill point (fig. 1-11).

b. Targets detected by the acquisition radars are displayed and assigned in the battery control central (BCC).

c. Four consoles in the BCC display radar video and some internally generated marks and symbols. Controls and instruments at the consoles provide the means to operate the entire system.

(1) The tactical control console (TCC) is used to display targets detected by the acquisition radars and to assign those targets to the firing sections after evaluation by the tactical control officer or tactical control assistant.

(2) The continuous-wave target detection console (CWTDC) is used to display targets detected by the CW acquisition radar (CWAR).

(3) The two firing consoles are used to display targets and to engage targets assigned from the TCC.

1-15. Principles of Operation

a. Towed Hawk.

(1) Each firing console is used to control a firing section which consists of a trailer-mounted, high-powered illuminator radar (HIPIR), three launchers, one loader-transporter, one launching section control box, and two generators. The launching section control box electrically connects from one to three launchers to an illuminator. The HIPIR is a CW radar that searches for, locks on, and tracks a designated target. It provides the missile with a reference signal and a target-reflected CW signal for the trajectory computation. It computes lead angle to aim the selected launcher (missile) toward the predicted intercept point.

(2) Each launcher supports and aims three missiles. After the HIPIR has locked on a target, the HIPIR will control the designated launcher in azimuth and elevation. The launcher to fire is designated by the fire control operator (FCO). When the FIRE pushbutton is lit, and upon receipt of a fire command from the tactical control officer (TCO), the FCO presses the FIRE pushbutton, the launcher selects a ready missile and is positioned to firing azimuth and firing elevation, and a signal generated in the launcher then fires the missile.

(3) The ROR is a quick-response, range-measuring radar that operates on a frequency different from that of the other system radars. This radar is slaved in azimuth and elevation to either illuminator on demand. Target data from the ROR is sent to the BCC where it is used by the FCO to generate range and range-rate information for the illuminator.

(4) The missile has a dart-cruciform configuration and uses a solid-propellant rocket motor. The missile is 198 inches (5.03m) long, 14 inches (36.6cm) in diameter, has a wingspan of 47.4 inches (1.2m), and weighs 1,295 pounds (588 kg). After the missile is fired, a target-tracking receiving antenna in the nose locates and tracks the target-reflected illuminator energy.

(5) Ready missiles are stored on pallets that can be mounted for transport (or storage) on missile pallet trailers or 2-1/2 ton trucks. Loader-transporters are used to remove the missiles from the pallets and transfer them to the launchers. Loader-transporters can be rigged with the attachments necessary to remove missiles from the containers. The total weight of a container and missile exceeds the load limitations of the loader-transporter and must be moved by the 5-ton wrecker organic to the unit.

b. SP Hawk.

(1) The SP Hawk battery has three firing platoons (two SP and one towed) only two of which may be connected to the BCC at one time. Because the towed platoon has no other means of control, it is always controlled by the BCC.

(2) Each of the SP platoons is equipped with a CWAR, HIPIR, and a platoon command post (PCP). The CWAR provides target acquisition data and the PCP contains the electronic

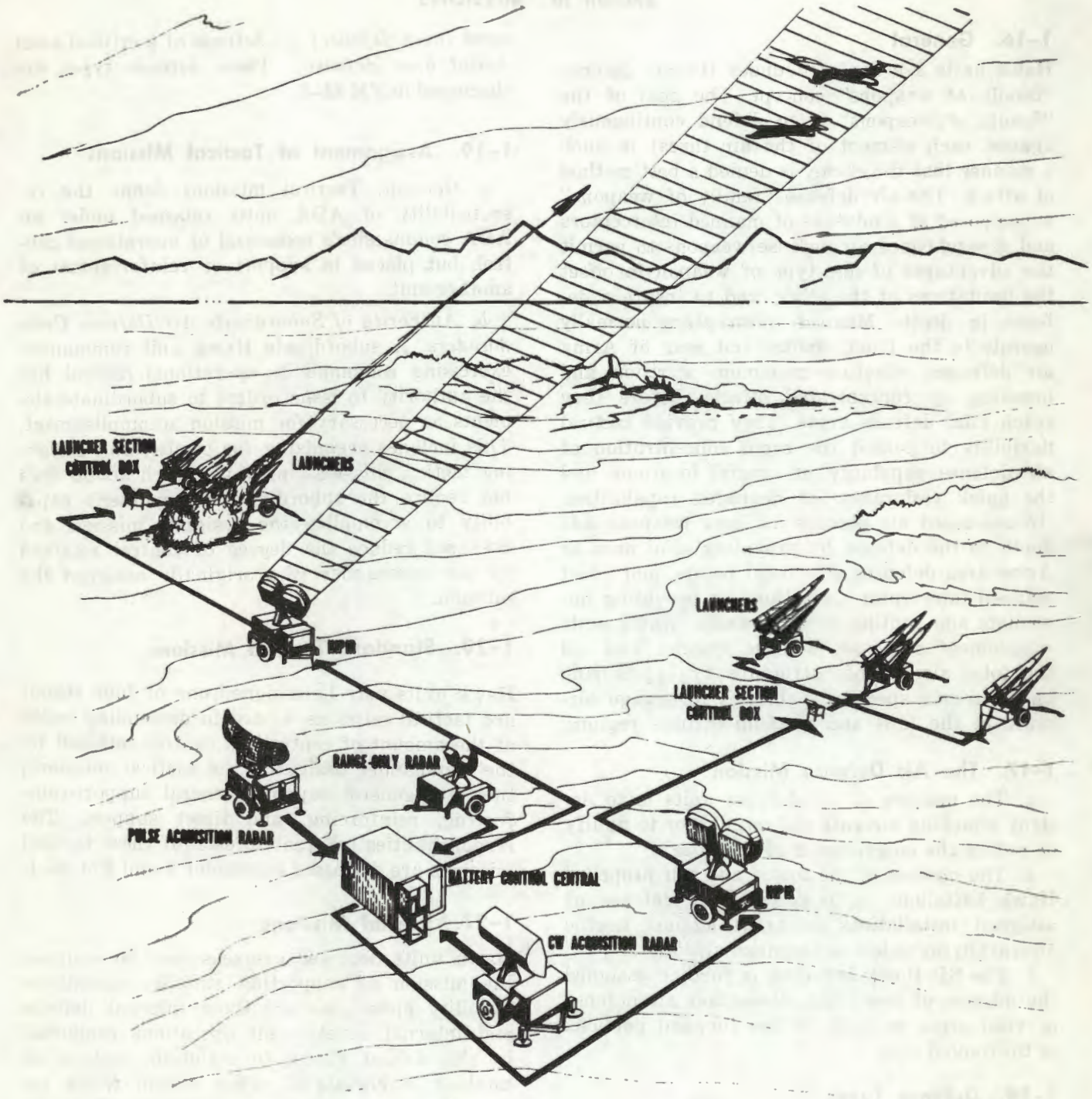


Figure 1–11. Hawk system method of operation.

equipment needed to monitor and control platoon firing operations. Information from the radars, launchers, and missiles is displayed on a fire control console (FCC) in the PCP. The PCP also contains the communication equipment necessary to maintain contact with the BCC and to take advantage of AADCP information.

(3) When the firing equipment of an SP platoon is connected to the BCC in addition to that of the towed platoon, operation is similar to that of the towed battery.

Section III. MISSIONS

1–16. General

Hawk units are deployed under the air defense "family of weapons" concept. The goal of the "family of weapons" 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 mixture 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 normally operate to the front, flanks, and rear of Army air defenses, exacting maximum attrition and breaking up concentrated attacks before they reach vital defense areas. They provide tactical flexibility to permit the rapid concentration of air defense capability at crucial locations and the quick restoration of degraded capabilities. Ground-based air defense artillery weapons add depth to the defense by providing vital area or Army area defenses at critical points, and offset manned interceptor limitations by providing immediate and continuous air defense. Hawk units complement other air defense systems and aid the total air defense structure by capitalizing on their own special capabilities to engage aircraft in the low- and medium-altitude regions.

1–17. The Air Defense Mission

a. The mission of air defense units is to destroy attacking aircraft and missiles or to nullify or reduce the effectiveness of the attack.

b. The mission of the towed and self-propelled Hawk battalions is to provide air defense of assigned installations or areas against hostile aircraft flying at low and medium altitudes.

c. The SP Hawk battalion is further assigned the mission of providing all-weather air defense of vital areas or units in the forward portions of the combat zone.

1–18. Defense Types

Hawk battalions may be assigned one of two basic types of defense—defense of an operating area (*area defense*), or defense of a critical asset (*vital area defense*). These defense types are discussed in FM 44–1.

1–19. Assignment of Tactical Missions

a. General. Tactical missions define the responsibility of ADA units retained under an ADA commander's command or operational control, but placed in support or reinforcement of another unit.

b. Authority of Subordinate Air Defense Commanders. A subordinate Hawk unit commander exercising command or operational control has the authority to issue orders to subordinate elements as necessary for mission accomplishment. This includes organizing for combat and assigning tactical missions, providing such action does not reduce the subordinate commander's capability to accomplish the assigned mission and does not reduce the degree of control retained by the commander who originally assigned the mission.

1–20. Standard Tactical Missions

Hawk units may be assigned one of four standard tactical missions. Listed in descending order of the amount of centralized control retained by the commander assigning the tactical missions, they are general support, general support-reinforcing, reinforcing, and direct support. The responsibilities inherent in each of these tactical missions are discussed in chapter 4 and FM 44–1.

1–21. Special Missions

Hawk units deployed overseas may be assigned the mission of supporting stability operations. Stability operations are those internal defense and internal development operations conducted by the Armed Forces to maintain, restore, or establish a climate of order within which responsible government can function effectively and without which progress cannot be achieved. (FM 31–23 contains details).

CHAPTER 2

CAPABILITIES AND LIMITATIONS

2–1. General

General capabilities and limitations of the Hawk missile system are included in this manual. Classified capabilities and limitations are contained in FM 44–1A. The Hawk system is mobile and is designed to operate with combat elements. Its equipment is rugged and compact and is air, sea, and rail transportable.

a. Towed Hawk. The towed Hawk firing battery is capable of operating as two fire units. However, the battery normally should be employed as a complete unit to realize the full capabilities of the system. For special operations, such as helicopter and amphibious assaults, or when movement by echelon is desired, part of the Hawk battery can be detached and used as an assault fire unit (AFU). The assault fire command console (AFCC) is the fire control central for the assault fire unit. The AFCC combines the features of the continuous-wave target detection console and some of the features of the firing console of the battery control central (BCC). It weighs 450 pounds and is approximately 3 feet square, giving it the capability of being carried short distances by four men. The assault fire unit is completely transportable by helicopter. The assault fire unit with its unusually rapid emplacement time and firepower fills the requirements of assault troops for protection against strafing and low-altitude bombing. The basic AFU consists of one HIPIR, one launcher with three missiles, LSCB, the AFCC, and two generators. This basic AFU may be augmented by a continuous-wave acquisition radar, two additional launchers, one additional generator, and additional fully loaded pallets.

b. Self-Propelled Hawk. The self-propelled Hawk firing battery is capable of operating as three fire units. Due to the fluid field army situation and Hawk's relative proximity to the forward edge of the battle area (FEBA), the Hawk battery must be capable of moving on short notice. The SP Hawk platoon, being more mobile than the towed Hawk AFU, is ideally suited for forward area deployment. A comparison of the vehicles required for a towed Hawk augmented AFU and the firing section in a SP Hawk platoon is shown in figure 2–1.

2–2. Capabilities

The Hawk battery is capable of—

a. Simultaneously engaging two (towed battery) or three (SP battery) targets rapidly within a large area and on a wide front without displacing.

b. Accurately delivering fires under all conditions of visibility, weather, and terrain from fire units emplaced laterally and in depth throughout the zone of action.

c. Displacing rapidly by echelon to new positions.

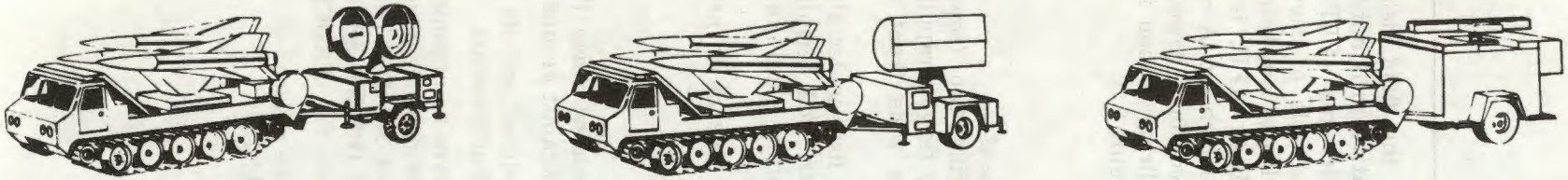
2–3. Limitations

a. Its effectiveness is reduced when the unit is required to defend itself against ground attack.

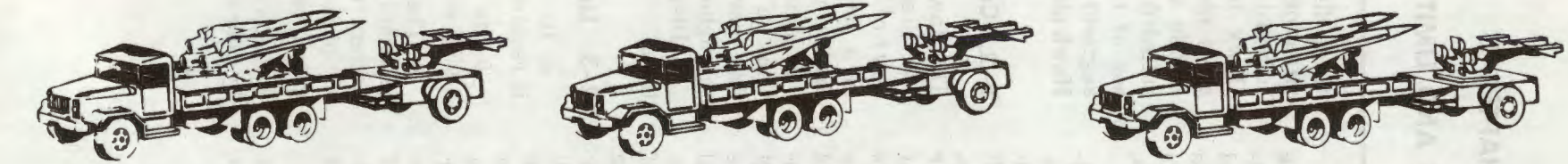
b. Its effectiveness is reduced and its vulnerability is increased during displacements.

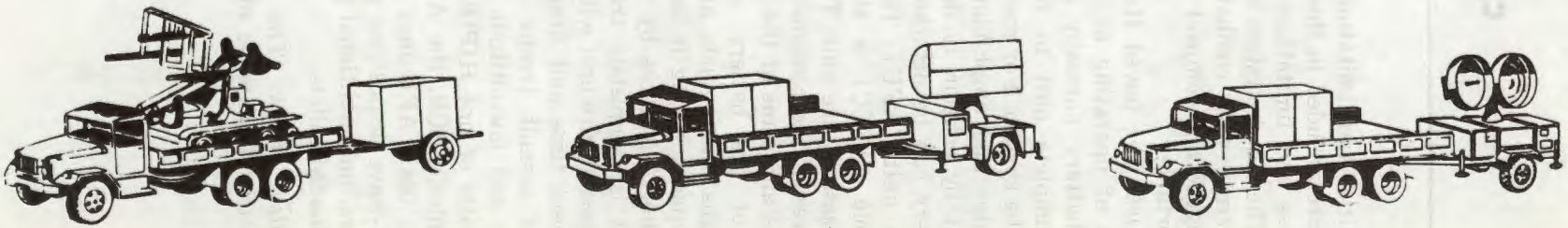
c. The AFU or AAFU have no organic ability to identify aircraft and are dependent upon the battery minus for IFF and AADCP data. The SP platoons are authorized IFF but are dependent upon the towed platoon for AADCP data.

d. Its effectiveness may be reduced or nullified by poor signal security (FM 24–1).



SELF-PROPELLED HAWK PLATOON FIRING SECTION





TOWED HAWK AUGMENTED ASSAULT FIRE UNIT

Figure 2–1. Comparison of SP Hawk firing sections and towed Hawk augmented assault fire unit.

CHAPTER 3
FUNDAMENTALS OF EMPLOYMENT

Section I. GUIDELINES

3-1. General

Basic Hawk doctrine is generally applicable under conditions of both nuclear and nonnuclear war; however, some changes in tactics and techniques may be required when operating in a nuclear environment. The impact of nuclear weapons on a battlefield is considered to require primarily increased emphasis on dispersion. Hawk missions will remain essentially unchanged and will continue to include the employment of Hawk units as part of an area defense and/or in defense of vital areas containing critical assets or installations. In either case, the successful employment of Hawk is dependent upon certain fundamentals. The degree of success obtained in the use of these fundamentals depends largely on the manner in which they are applied by commanders and their staffs.

3-2. Fundamentals

There are three basic employment guidelines: *early destruction along low-altitude routes of approach, defense in depth,* and *position requirements.*

a. Early Destruction Along Low-Altitude Routes of Approach.

(1) *Early destruction.* Hawk units are deployed at a distance behind the FEBA which allows for early destruction but still provides the Hawk units with some protection from enemy artillery fire. When defending critical assets located in the field army rear area, the Hawk units can be located farther out along likely avenues of approach because of less concern with enemy artillery (fig. 3-1).

(2) *Low-altitude routes of approach.* Attacking at low altitudes to avoid detection imposes a limitation upon the enemy. He must attack along routes of approach which provide flat, low, cleared terrain. The avenues of approach to a field army will be through the forward edge of the battle area and exposed flanks. Critical assets within the field army may also have such avenues of approach. Hawk is deployed to provide air defense coverage along the more critical low-altitude routes (fig. 3-1).

b. Defense in Depth. Defense in depth is achieved by positioning Hawk units at distances from each other which provide for continuous fire and flexibility against mass or multiple attacks. The field army deployment builds a defense in depth for all or most of the area by positioning units to defend routes of approach and to achieve early destruction, keeping separation distances which permit mutual support, or, when insufficient units are available, some overlapping fires.

c. Position Requirements. Position requirements are those tactical and technical considerations which affect the actual location of the various items of equipment on the ground. These include access routes, suitable terrain to minimize radar masking, previous occupancy by other units of desirable Hawk locations, communications requirements, enemy observation, and mutual support. These tactical considerations determine the precise locations for the elements of Hawk battery. Tactical considerations are discussed in detail in chapter 6. Technical considerations are discussed in chapters 1 and 7.

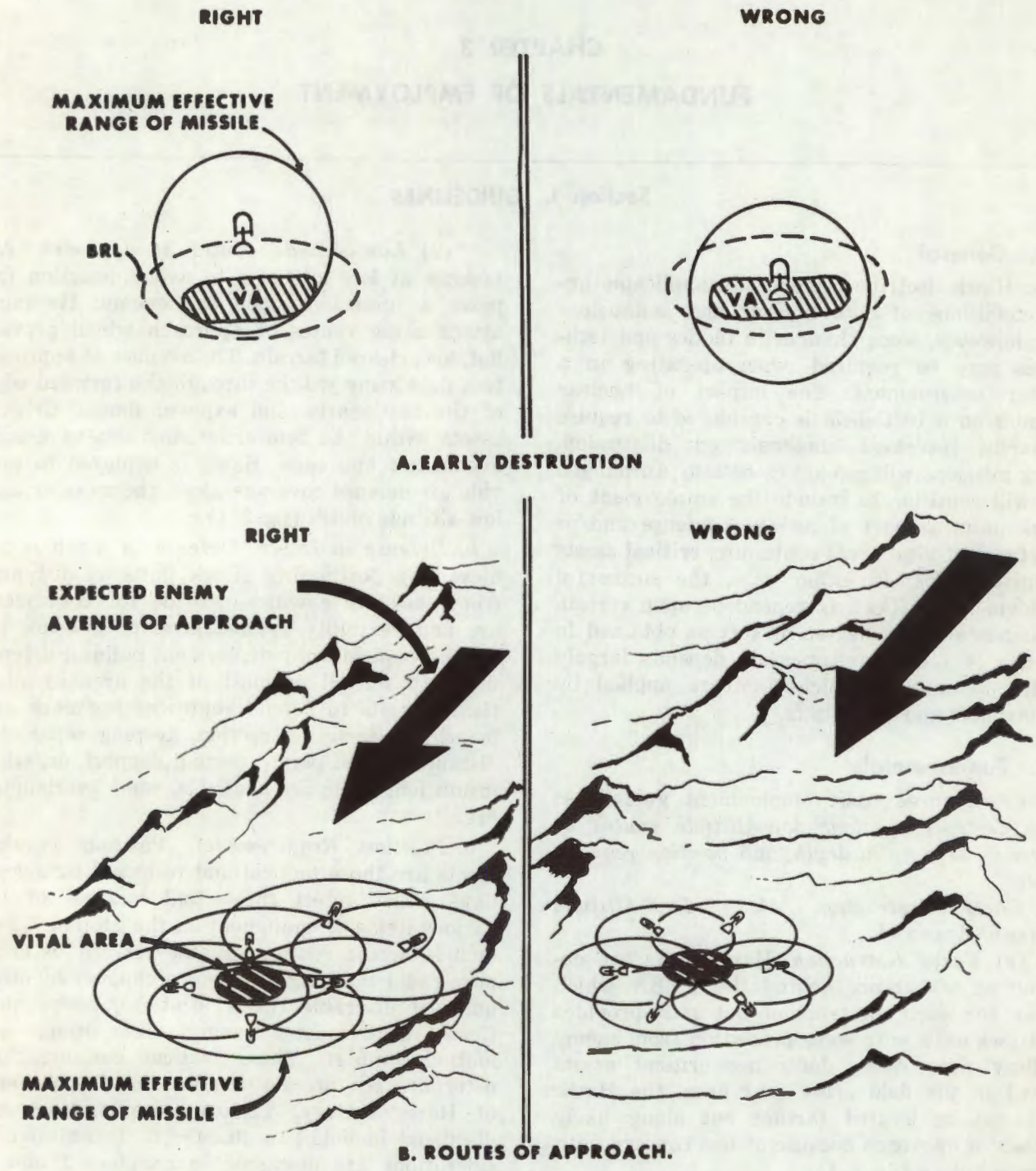


Figure 3–1. Early destruction along low-altitude routes of approach.

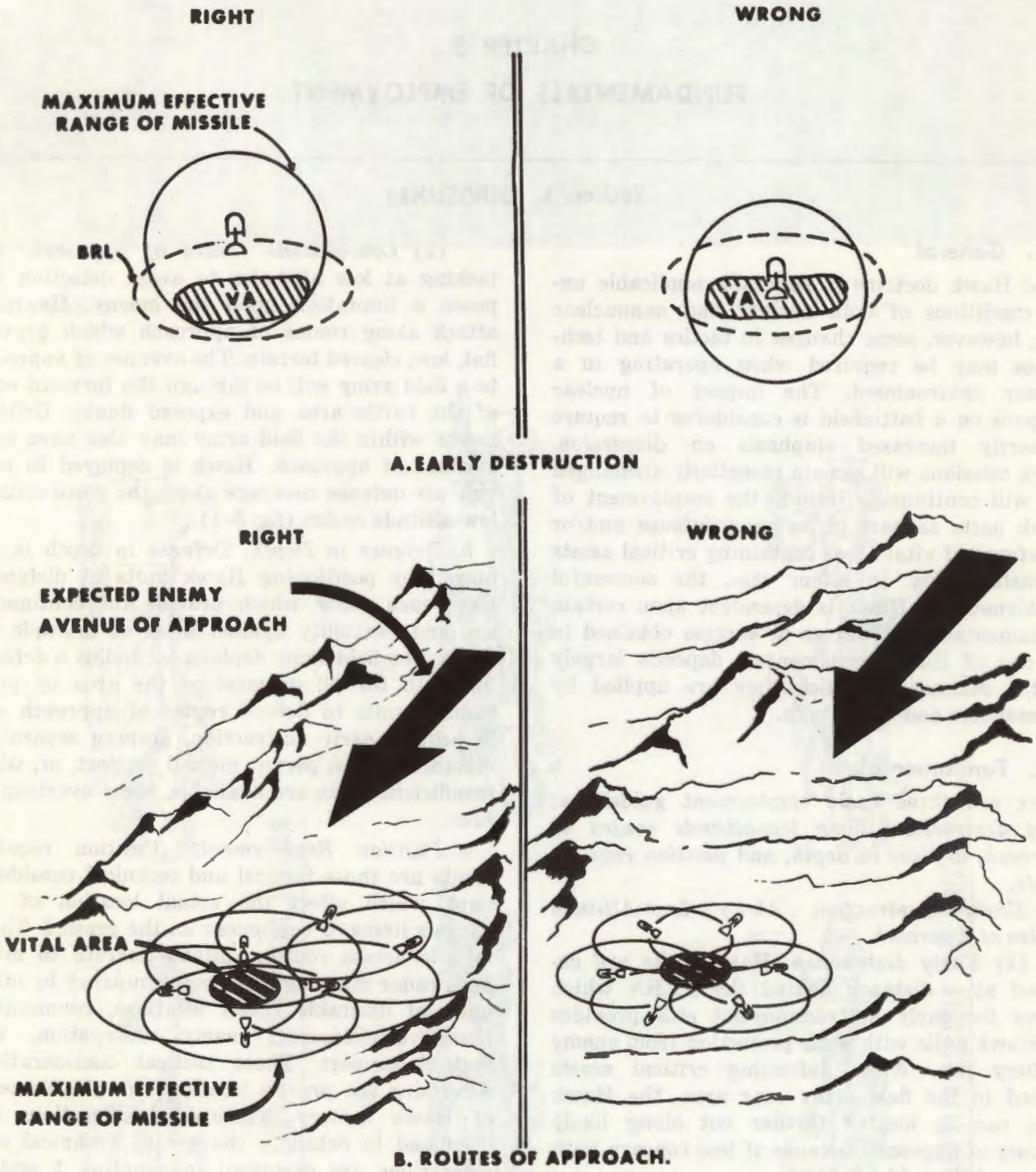


Figure 3–1. Early destruction along low-altitude routes of approach.

Section II. FACTORS AFFECTING EMPLOYMENT

3-3. General

a. Hawk should be employed in a manner calculated to make maximum use of its favorable characteristics. This calculation is based on a reasoned analysis of certain factors affecting the employment of Hawk units.

b. These factors are considered within the four paramount groupings of mission, enemy threat characteristics, terrain and weather, and system capabilities and limitations. The tactical environment in which Hawk units are employed is described under these four groupings. The ADA commander must keep these factors constantly in mind to make maximum use of his combat power.

3-4. Mission

a. A mission is a statement of a task and its purpose, which clearly indicates the action to be taken and the reason therefor. Missions will prescribe what is to be done but leave the "how" to the judgment of the subordinate commander.

b. The mission assigned by higher headquarters guides the employment of Hawk units. The success of air defense operations is measured by accomplishment of the mission.

c. The commander studies the mission to insure that he understands it and to determine tasks that are specifically stated. He must analyze the mission in relation to the other factors affecting employment to deduce requirements and tasks which are not stated specifically but which must be done to accomplish the mission. Other implied tasks may be determined during the commander's estimate of the situation.

3-5. Threat

a. The assessment of the threat characteristics and their effect on the overall air defense plan normally is accomplished at levels above the Hawk battalion. However, key Hawk battalion personnel must understand the effect of the threat characteristics on employment because—

(1) Understanding and implementation of directives, mission assignments, and other tasks received from higher headquarters will be enhanced.

(2) In independent division operations, the Hawk battalion commander may be the senior Army air defense representative and, as such, may be required to assist in air defense design and planning.

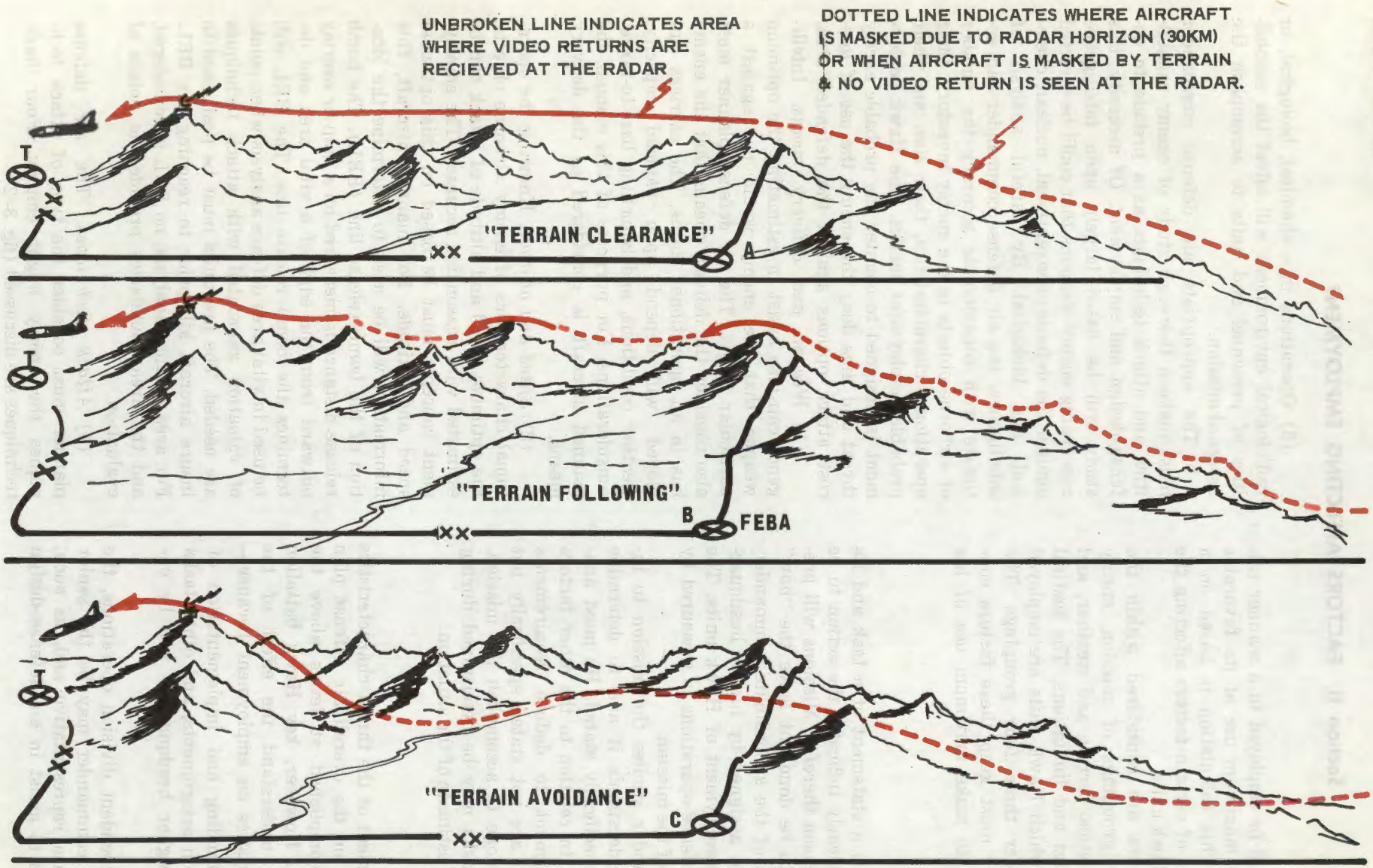
(3) Operations in a chemical, biological, or radiological environment will affect the capabilities of personnel and units to accomplish the assigned mission.

b. The appropriate air defense commander must make a thorough study of enemy capabilities and attack techniques as a prelude to defense design and employment. Of necessity, this study will be based largely upon intelligence concerning enemy weapons that could be directed against the defense: conventional, nuclear, chemical, and biological. By careful analysis of intelligence, the air defense commander can estimate with considerable accuracy the number of airborne objects in the enemy inventory, their operational characteristics, their size, and their probable employment tactics. The Hawk deployment is designed to counter the probable enemy threat and thus deny the enemy the use of low-cost attack options against the defended area.

(1) *Weapon and delivery means.* Intelligence can also assist in estimating the optimum weapon that the enemy would use against a particular target. The air defense planner must also consider the delivery means that the enemy has in an operational status. The carriers employed will depend upon payload capacity, weather conditions, and launching base-to-target considerations. For purposes of this manual, the manned aircraft is considered as the delivery means.

(2) *Speed and altitude.* Knowing the operational characteristics of enemy airborne objects, the optimum speed and altitude of attack can be estimated with reasonable accuracy. The employment concepts must be based on this optimum speed and altitude. For manned aircraft, this information will be used to determine the location of the bomb release line (BRL). The bomb release distance is measured on a map or overlay outward from the edge of a vital area and determines the bomb release line. The BRL will be used in vital area defense analysis when points of valuation associated with attack techniques are needed. The fire units must be positioned to insure aircraft kill prior to reaching the BRL. For area defense analysis, no BRL is considered, and the area boundaries provide the points of evaluation.

(3) *Attack techniques.* The air defense planner must consider the type of attack techniques the enemy might employ. Four basic techniques are discussed (fig. 3-2).



★*Figure 3-2. Attack techniques.*

(*a*) An aircraft employing the high-altitude bombing system, or as it is sometimes called, the "gravity drop" method, would approach a predetermined point. Knowing the speed and altitude of the threat, the horizontal distance the bomb will fall (bomb release distance) can be determined to inscribe a BRL on a map or overlay. The intersections of the BRL and the direction-of-attack lines form points of evaluation where defense analysis is performed for a threat using the high-altitude bombing system. Thus, to preclude damage to the defended area, the threat must not reach the point of evaluation.

(*b*) For the manned aircraft using the low-altitude (toss) bombing system (LABS), the BRL can be determined from the assumed altitude, angle, and speed of enemy aircraft at bomb release, using a mathematical computation of the ballistic trajectory of an object released under these conditions. Lacking estimates upon which to base computations, use of a BRL 20,000 yards (18.3 km) outside the perimeter of the vital area is recommended. The points of evaluation for aircraft using this attack technique are at the intersections of the BRL and direction-of-attack lines.

(*c*) Aircraft employing the laydown bombing system will approach the defended area at a relatively low altitude and will fly directly over the target area. The ordnance released will not travel any appreciable horizontal distance and will be slowed in descent by parachute or other devices or will employ some means of fuze delay to allow the aircraft time to escape the area. A bomb release distance is not considered, and since the threat must penetrate the vital area, the points of evaluation are at the intersections of the direction-of-attack lines and the edge of the vital area.

(*d*) An aircraft equipped with air-to-surface missiles can stand off beyond the effective range of the Hawk system and release missiles against the area defended. The missile then becomes the threat, and it must penetrate the vital area to damage the defended area. The points of evaluation for this standoff technique are intersections of the direction-of-attack lines and the edge of the vital area.

(*e*) Low-altitude approach techniques which may be used prior to executing basic attacks are shown in figure 3–3.

(4) *Electronic warfare tactics.* Jamming or deception may be combined with speed changes and attack techniques in an attempt to degrade radar tracking effectiveness or to confuse tracking circuits and radar operators. Air defense personnel should anticipate such tactics as self-protective, on-axis, or standoff jamming and screening or deceptive chaff drops to be used in conjunction with side-step maneuvers, speed changes, and multilevel formations of attacking aircraft.

3–6. Terrain and Weather

a. General. The terrain, and to a lesser extent, the weather, are important factors in Hawk operations. The commander makes a thorough analysis of the terrain to determine the advantages it offers and to evaluate the advantages it may afford the enemy. The Hawk system is considered as an all-weather system, but weather may affect the movement of Hawk units and combat service support operations.

b. Terrain.

(1) *Observation and sectors of fire.* The effect of observation on friendly forces and detection of enemy aircraft is considered. High ground that affords radar line of sight over defended areas is of particular importance. The Hawk commander employs all detection means to keep under constant surveillance. Good sectors of fire along primary target lines are essential for the effective employment of Hawk weapons. Sectors of fire are analyzed in connection with the nature of the defended area and likely avenues of approach.

(2) *Obstacles.*

(*a*) The effect of obstacles, either in hindrance or support of air defense operations, is considered.

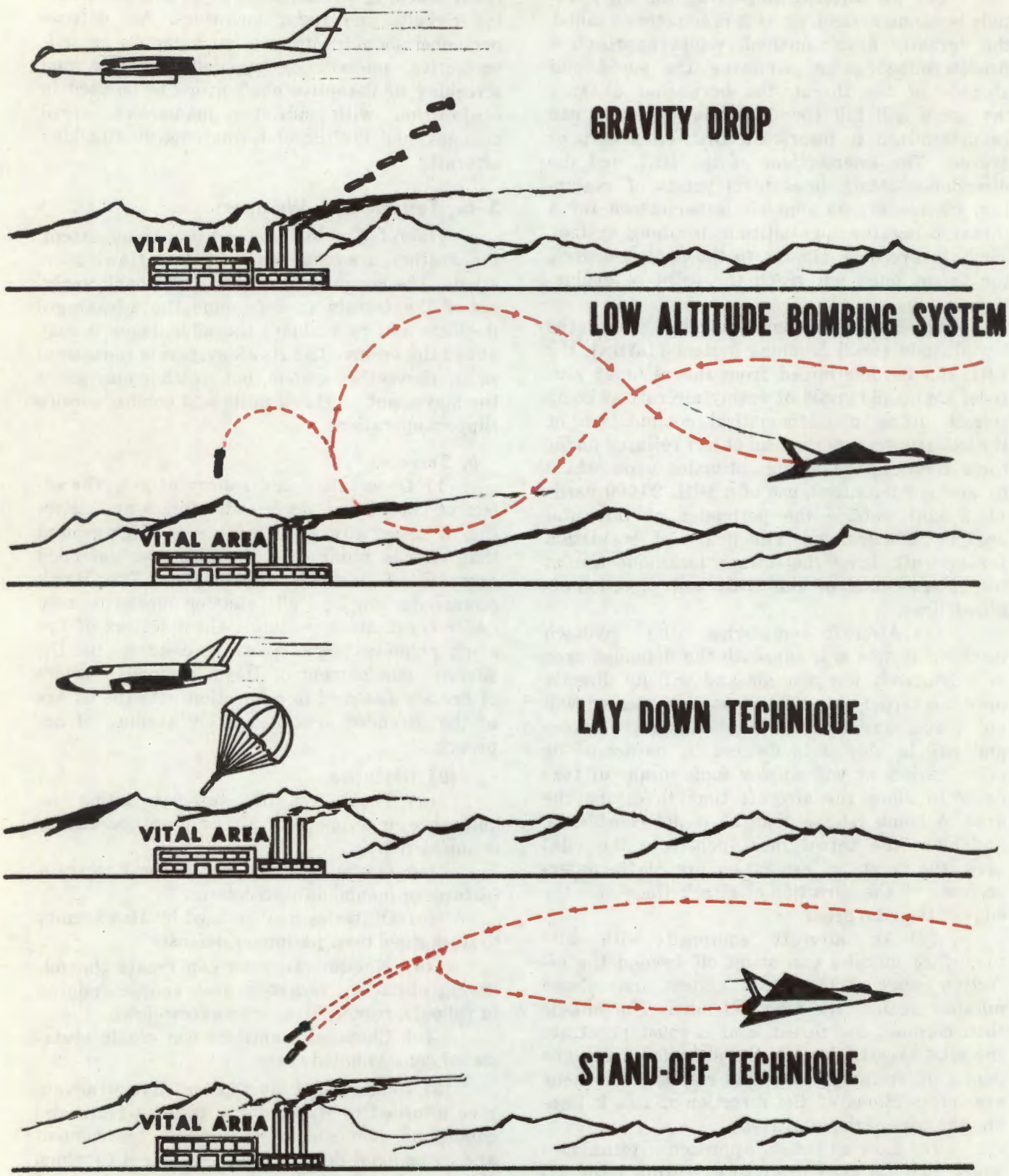
(*b*) Obstacles may be natural terrain features or manmade obstructions.

(*c*) Obstacles may be used by Hawk units to strengthen their perimeter defenses.

(*d*) Nuclear weapons can create the following obstacles: radiation area (either induced or fallout), rubble, fires, or tree blow-down.

(*e*) Chemical munitions can create obstacles of contaminated areas.

(3) *Concealment and cover.* Every advantage afforded to Hawk units by the terrain and conditions of visibility to provide concealment and cover must be exploited. The extent to which Hawk units may take advantage of cover and concealment is limited by the nature of system operation. The Hawk unit must have line of sight into the primary sector of fire. Care should be taken, however, to insure that only the mini-



★*Figure 3–3. Low-altitude approach techniques.*

mum essential amount of Hawk equipment is exposed.

(4) *Avenues of approach.* Possible low-altitude avenues of approach are analyzed, and tentative positions selected based on the availability of radar coverage, sectors of fire, space for emplacement and maneuver, and trafficability.

c. Weather. Weather conditions have a bearing on any decision and must be a consideration in operational planning. Because the Hawk system has an all-weather firing capability, the primary effects are on mobility. The basic meteorological elements affecting operations are temperature, humidity, precipitation, and atmospheric stability. The forecast, which includes such items as sunrise, sunset, moonrise, and moonset, should be considered. Weather conditions may prohibit or limit some phases of an operation. In developing air defense maneuver plans, adverse weather conditions should be considered. Often the success gained during unfavorable weather offsets the limitations and difficulties imposed by soil trafficability and slow rate of movement. Weather factors are of special importance in developing maneuver plans to support offensive or defensive operations that include nuclear and chemical weapons employment (FM 31–3).

3–7. Hawk System Capabilities and Limitations

a. Range. Although enemy electronic intelligence (ELINT) and artillery capabilities influence positioning of Hawk units in relation to the FEBA, the range of the Hawk system must also be considered in this regard (FM 32–5 and TB 380–6–1). The Hawk system range will also determine positioning for mutual support.

b. Rate of Fire and Kill Probability. The rate of fire and kill probability of the Hawk system will determine the density of units required to counteract the threat.

c. Radar Limitations. The pulse acquisition radar (PAR) is not fully effective against very low-altitude targets. This will dictate complementation of the PAR coverage by the CWAR. Because terrain will present masking problems to either type of radar, further coverage by shorter range visually-directed ADA systems will ordinarily be required.

d. Resupply. Basic load and resupply times should be assessed to insure that a fire unit does not become inoperational during periods of prolonged activity for lack of missiles.

e. Communications. The necessity of maintaining continuous communications between Hawk fire units and control echelons must be considered in determining the employment of Hawk units. These links are provided by organic communication equipment, area communication systems, and by special communication support requested from the field army commander. Circuit requirements are determined by the situation, the number of fire units employed, the distance and type of terrain between units, and the future deployments envisioned. These will place heavy demands on available radio relay repeater stations and terminal equipment.

f. Mobility. The mobility of the Hawk unit must match that of the defended unit. The mobility of SP Hawk should be exploited to provide air defense to the forward elements and to mobile task forces. Mobility can also enhance the survivability of ADA units by permitting movement to prevent detection and attack, and to occupy protected areas that are accessible only to self-propelled type vehicles.

g. Vulnerability. Vulnerability of Hawk units can be reduced by positioning them as far behind the FEBA as mission requirements and weapon range capabilities permit, and by stringent application of active and passive defense measures. Radiation from each of the communications and noncommunications emitters in a HAWK battery is vulnerable to enemy intercept, location, and analysis. Factors which make the HAWK battery emitters easy to detect include: strength of the radiated signal; positioning of the emitter; and radiation of the signal into enemy territory. For further information on electronic intelligence (ELINT) vulnerability, see TB 380–6–1.

h. System Reliability. The Hawk battery equipment is considered to be stable in operation. The battery may be expected to maintain a 5-minute state of alert or "Battle Stations" unless a major breakdown would force the unit to a lower state of alert. The length of time a unit would be in an advanced state of alert is dependent upon the air threat. Scheduling of a unit in an advanced state of alert for periodic checks will normally be accomplished at battalion level after coordination with group or brigade AADCP. These checks, necessary to insure an operational system, are initiated at a specific frequency, such as 24- and 6-hour checks listed in FM 44–99 or unit SOP.

i. Electronic Warfare. Hawk operations involve heavy reliance on radio for communications and radar for target detection, tracking, ranging, illumination, and missile tracking. The advent of sophisticated electronic countermeasures

(ECM) techniques, and antiradiation missiles which home on radar energy, further complicates the problems of Hawk survivability and effectiveness. To operate successfully in a sophisticated electronic warfare environment, air defense artillery commanders at all echelons must vigorously apply electronic security (ELSEC) measures such as site selection and equipment checkout, communications security (COMSEC) measures, and electronic countercountermeasures (ECCM). A careful analysis of the threat and defense capabilities to reduce electronic vulnerability without degrading defense effectiveness must be made. Signal security measures are discussed in FM 32–5. Details of ECCM are contained in FM 24–18 and TM 9–1400–500–12/3 for radio and the HAWK system respectively. FM 32–20 and FM 101–5 should be reviewed for supporting data and reference to trained advisors and special staff officers to assist in all aspects of EW; i.e., Prefix E EW Officers and EW/Cryptologic Staff Officers.

j. Displacement and Maneuver.

(1) *General.* Displacement and maneuver of Hawk units fall into two categories.

(*a*) Movement required to support the tactical plan, to meet changes in threat, priorities, and/or mission.

(*b*) Movement designed to enhance survivability.

(2) *Movement to support the maneuver plan.* Hawk commanders select positions to best accomplish the mission and report the locations of their units through command channels. Initial selection of positions may be based on map, aerial, or ground reconnaissance. The following general considerations govern movement to support the maneuver plan—

(*a*) A frequently desirable technique for Hawk unit displacement is by echelon, wherein batteries of a battalion are moved one or two at a time. This technique minimizes vehicle and road space requirements and maintains maximum ADA support during the move.

(*b*) A special consideration for the displacement of battalion headquarters and headquarters batteries is the requirement to maintain communications with higher ADA echelons. This requirement may be met by setting up communications at the new location before all communications at the old location are shut down.

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

1. Required levels of defense in the old and new areas.

2. Limitations of the low-altitude capabilities of enemy aviation due to darkness and weather.

3. The ability of a Hawk battery to provide limited air defense with one element while moving the other. The degradation to system capabilities caused by splitting the battery must not be overlooked.

(*d*) The Hawk unit accomplishes route and position reconnaissance, position selection, and occupation of position as described in chapter 7.

(3) *Movement to enhance survivability.* The survivability of Hawk units is usually enhanced by random movement because this minimizes the probability of enemy detection of the fire unit and subsequent suppression attack. The extent to which this tactic should be practiced is directly related to the enemy's intelligence capability and ability to act thereupon, balanced against Hawk unit mobility, vulnerability to ground and air attack during the move, and air defense mission requirements. The probable priority for destruction of the Hawk unit, as seen from the enemy viewpoint, should also be considered. An examination of each situation to determine the requirement for, and the practicability of, random deployment to alternate sites should be a primary item of consideration in air defense planning. Where the situation permits, each Hawk battery should occupy two to four selected battery locations on a random schedule. Use of a limited number of sites will permit more extensive hardening and preparation, improve the speed and efficiency of movement, and allow radar operators to become acquainted with special problems associated with each site.

(4) *Considerations for movement to enhance survivability.* Hawk may be deployed at considerable distance from enemy detection means, but also frequently may be found in forward areas where it is more vulnerable. Because it must defend against low-altitude targets against which little early warning will be available, a number of Hawk fire units must be radiating, thus increasing exposure time to ELINT (for additonal guidance on measures to decrease vulnerability of the Hawk system to enemy ELINT exploitation, see TB 380–6–1). These considerations magnify the importance and frequency of Hawk displacement. However, if reduced Hawk fire power can be afforded, a limited number of SP Hawk units may be moved to

defiladed assembly areas or preselected survival areas to avoid targeting. Alternate sites should ordinarily be within a 10-km radius so as not to prejudice defense deployment.

CHAPTER 4

COMMAND AND CONTROL

Section I. COMMAND AND CONTROL MEASURES

4-1. Command

Command includes the authority and responsibility for effectively using available resources for the accomplishment of assigned missions in accordance with established policies. Command also includes authority and responsibility for logistics and administration, unit training, and health, welfare, morale, and discipline matters.

4-2. Operational Control

Operational control provides authority and responsibility for designation of air defense priorities, mission assignment, organization for combat, unit positioning and repositioning, control of fires, and delegation of authority, all in accordance with established theater policies and procedures.

4-3. Standard Tactical Missions

Hawk battalions may be assigned one of four standard tactical missions. Listed in descending order of the amount of centralized control retained by the air defense commander assigning the tactical mission, they are *general support, general support-reinforcing, reinforcing,* and *direct support.*

a. General Support.

(1) A Hawk battalion assigned the tactical mission of *general support* provides air defense of a force as a whole. Units with this mission will remain under the command or operational control of the commander assigning the mission. General support is the normal tactical mission of field army and corps Hawk units. It is to be understood that the operation order assigning a tactical mission to a Hawk battalion may designate certain of its subordinate elements for accomplishment of other tactical missions.

(2) Liaison and communications are established as directed with Air Force control installations. Liaison and communications are also established, as directed, with other general support units to insure coordination of ADA fires across force boundaries.

b. General Support-Reinforcing.

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

(2) Liaison and communications requirements are the same as for general support and, in addition, are established with the reinforced unit.

c. Reinforcing.

(1) A Hawk unit assigned a tactical mission of *reinforcing,* augments the defenses of another ADA unit. The reinforcing unit remains under the command, or operational control of the commander assigning the reinforcing mission, but its defenses are planned and controlled by the reinforced unit as necessary for accomplishment of the reinforced unit's mission. This tactical mission may be given to a corps self-propelled Hawk unit to reinforce a divisional Chaparral/Vulcan battalion for a specific operation.

(2) Liaison and communications are established between the reinforcing and reinforced unit as directed. This includes interconnection of electronic control and coordination systems as applicable.

d. Direct Support.

(1) A Hawk battalion assigned the tactical mission of *direct support* provides close and continuous air defense for a designated force element and must coordinate its operations with

this element. The direct support Hawk commander deploys his units as necessary to defend the supported element. A battalion with this type tactical mission remains under the command or operational control of the headquarters assigning the mission. The self-propelled battalion is the most logical type Hawk unit to receive the direct support mission. This type unit can readily be employed for movement to contact, or air defense of a division-size penetration.

(2) Liaison and communications requirements are the same as those for general support and, in addition, both are established with the supported unit.

4–4. Mission Assignment and Maneuver Control

a. General. Hawk unit attachment carries with it a mission to provide air defense of the force, unless specified otherwise. A force receiving a Hawk unit allocation further assigns missions, subject only to limitations which will be included in the attachment order. Because the air defense means made available generally are limited, the force commander should prescribe priorities for air defense of his units or installations.

b. Type Mission Assignment.

(1) The basic Hawk mission is to provide air defense for assigned installations or areas against hostile aircraft flying at low and medium altitudes.

(2) Hawk units are assigned standard tactical missions by the commander exercising operational control. A Hawk fire unit is assigned only one tactical mission at a time. The differing deployment, employment, and control concepts of each tactical mission preclude assignment of two or more tactical missions simultaneously.

c. Maneuver Control. Control of the maneuver (i.e., initial position and subsequent repositioning) of Hawk units normally is a function of the commander exercising operational control. SP Hawk units in the defense of forward units complement other field army air defense systems, such as Nike Hercules, by providing early destruction along low-altitude routes of approach and by contributing to defense in depth.

4–5. Control of Hawk Fires

a. Concepts.

(1) The right of self-defense against hostile air and ground attack is never denied. Commanders at all echelons have the responsibility to take whatever action is required to protect their forces and equipment against enemy air attack. Normally, such action will be governed by rules and procedures established by the air defense commander. Emergency action taken contrary to established rules should be reported to the appropriate commander at the earliest practicable time.

(2) Hawk unit tactical control officers make air defense engagement decisions based on the rule that aircraft identified as hostile will be engaged. This rule may be changed by higher air defense echelons to allow relatively unrestricted engagement, or to impose increased fire restrictions. This concept for control of fires is dependent upon provision of clear and detailed air defense rules covering the items discussed in *b* through *h* below, and communications to allow higher air defense echelons to modify the air defense rules if the situation demands.

b. Conditions of Readiness and Air Defense Warning.

(1) *Conditions of readiness.* Conditions of readiness are the means used by specified authorities to maintain the theater air defenses at a state of preparedness compatible with the real or apparent imminence of attack. The terms, *defense readiness condition* (DEFCON) and *defense readiness posture* (DEFREP), are frequently used in relation to conditions of readiness. In response to each condition of readiness, the Army air defense commander prescribes a required *state of alert* for each ADA unit under his command.

(2) *Air defense warning.* Air defense warnings normally are 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. Typical warnings include: 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 for engagement and procedures are established in operation orders or SOP.

c. Rules of Engagement.

(1) Rules of engagement are promulgated by the area air defense commander to define, as a minimum, the responsibilities, procedures, and criteria for aircraft identification and engagement in agreement with the theater air defense policies.

(2) The following are rules of engagement considered typical for Hawk operations during peacetime and wartime—

(*a*) *Conditions short of war.* Engagements are conducted only in self-defense or as ordered by designated AD commanders.

(*b*) *Wartime.* Engagements are conducted in accord with the prevailing ADA weapon control status (*d* below) and the hostile criteria (*f* below).

(3) Implementation of the rules by Hawk units requires that determination be made of the friendly or hostile character of each aircraft; therefore, the rules are based on use of reliable identification criteria.

d. ADA Weapon Control Status. Each ADA weapon control status indicates the degree of air defense fire restriction imposed on Hawk units.

(1) *Weapons free.* Fire at any aircraft not identified as friendly. Under this status, "unknowns" may be engaged. An "unknown" is an aircraft whose identity has not been established.

(2) *Weapons tight.* Fire only at aircraft positively identified as hostile. 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. Weapons hold may be used for a particular weapon system, altitude layer, aircraft heading, geographical sector, or any combination of these factors; e.g., "Weapons hold, Hawk and Nike Hercules, GEOREF grids, GF, GE, and GD." TCO actions are the same as for special control instruction "hold fire" given in paragraph 4–5*e*(1).

e. Special Control Instructions. Special control instructions pertaining to *specific* engagements or actions may be utilized by air defense commanders in controlling the Hawk system. Typical instructions are—

(1) *Hold fire.* Hold fire is used to protect friendly aircraft. This special instruction normally is transmitted as follows: "Fire unit 68 ———hold fire———track 97." When received by a TCO, it means:

If you have not fired—	*If you have fired—*
• Do not fire • Cease tracking	• Destroy missile immediately • Cease tracking.

(2) *Cease fire.* Cease fire is used to preclude simultaneous engagement of a target with both interceptors and SAM. When received by a TCO, it means—

If you have not fired—	*If you have fired—*
• Do not fire. • Continue tracking.	• Permit missile to continue to intercept.

(3) *Cease engagement.* This instruction is used to divert a unit already engaging a target to a target of higher priority. When received by the TCO, it means—

If you have not fired—	*If you have fired—*
• Cease tracking. • Prepare for new target.	• Permit missile to engage the target, then transfer to new target.

f. Hostile Criteria. The theater rules of engagement will define criteria by which an aircraft *may* be designated hostile. For example, SOP may classify as hostile any aircraft which meet any, or a combination, of the following actions—

(1) Attacking friendly elements.

(2) Responding improperly to electronic identification, friend or foe (IFF), interrogation.

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

(4) Dropping flares at night 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) Improperly entering an area designated as restricted, prohibited, or as an ADA "battle zone."

(8) Dropping electronic countermeasure (ECM) devices; e.g., chaff or reflectors over friendly territory without prior coordination.

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

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

(11) Improperly departing from a zone, route, or corridor designated as "safe."

(12) Maneuvering in a manner clearly indicating imminent attack.

g. Methods of Control.

(1) *General.* Theater rules or unit SOP may specify or imply the required Hawk method of control.

(2) *Centralized.* Under this method of control, an air defense commander may require that engagements be conducted only after receipt of permission from a designated higher air defense

echelon. The higher echelon may also designate tentative targets, by voice command, when operating in this method of control. The right of unit self-defense is not denied. This method is not appropriate for Hawk fire units during wartime.

(3) *Decentralized.* Under this method of control, engagement decisions are made at Hawk battalion or lower level, based on the rules of engagement and subject to any temporary engagement restrictions imposed by higher echelons. This is the normal wartime method of control for Hawk fire units.

(4) *Autonomous.* When communications with higher headquarters have been lost, Hawk batteries may continue to engage targets, based on the rules for autonomous operations prescribed by higher air defense echelons.

h. Control and Coordination. The control and coordination procedures in a Hawk defense are achieved through proper fire-unit-to-target pairing, and proper deployment and use of PTL/ sectors of fire. Targets appearing in the primary sector receive priority over those in secondary sectors. As a general rule, in the case of several targets, the target in the primary sector that is most threatening to the defended area is engaged first.

Section II. FIRING TECHNIQUES

4–6. General

With high-speed aircraft attacking at low altitudes, the time available for engagement with the Hawk system frequently will be quite short. It is, therefore, imperative that simple, prearranged firing technique guidance be established in the tactical SOP and provided to the tactical control officer. This guidance should specify, as a minimum, the number of missiles to be fired under various tactical conditions and the method of fire to be employed.

4–7. Variable Factors

Specific firing techniques are based on several variable factors. Regardless of the firing technique to be employed for any given situation, the tactical control officer should be aware of the effect of these variable factors upon the tactical capability of his battery.

a. Time Available. The time available for a given engagement is primarily influenced by the speed of the threat and the range at which the threat is acquired or detected.

b. Engagement Effectiveness (Kill Assurance) Desired. Engagement effectiveness varies with the number of missiles fired at a target. Desired engagement effectiveness should be specified in the tactical SOP or operations orders. It is specified as a percent of kill assurance; for example, when the firing battery is the target, an engagement effectiveness of 99 percnt is ntirely justified because missile economy is of little consequence if the attack is successful. (For a more detailed discussion of engagement effectiveness and air defense probability applications, see FM 44–1A, and FM 44–1–1.)

c. Raid Size. The number of targets in the raid, along with the required engagement effectiveness discussed in *b* above, must be considered in the application of appropriate firing techniques.

d. Evasive Maneuvers. When engaging hostile aircraft performing evasive maneuvers, the type of maneuver must be considered in the application of appropriate firing techniques.

e. Methods of Fire. Three methods of fire may be employed with the Hawk system. These methods are subject to frequent change as dictated by the tactical situation.

(1) *Shoot-look-shoot method of fire.* Missiles are fired one at a time with damage being assessed after each firing. This method affords maximum missile economy and is effective against individual targets engaged at maximum range.

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

(3) *Salvo fire.* This method involves firing missiles simultaneously in pairs, one from each fire unit under BCC control, at a predetermined interval between launchings. This method permits the application of maximum firepower in a minimum period of time and is especially useful against close-in, high-speed targets when the urgency of the situation warrants the high expenditure of missiles. This method does not apply to SP Hawk platoons operating as independent fire units.

4–8. Graphical and Tabular Devices

Graphical and tabular devices may be used to assist the TCO in implementing the firing guidance established in the tactical SOP. These devices provide a rapid and simple means of providing firing guidance in both training and combat environments. A sample firing chart and firing template are depicted in figures 4–1 and 4–2, respectively.

a. Construction. Both devices were constructed according to the time available for engagement after illuminator lock is achieved with an assumed three missiles being required to achieve a desired engagement effcetiveness of

TYPE 600 KNOT FIRING CHART
(NOT TO SCALE)

TARGET RANGE AT ILLUMINATOR LOCK	FIRING METHOD
	SHOOT–LOOK–SHOOT
26KM	
	RIPPLE THREE
16KM	
	SALVO FOUR
8KM	
	NO LAUNCH

Figure 4–1. Hawk firing chart.

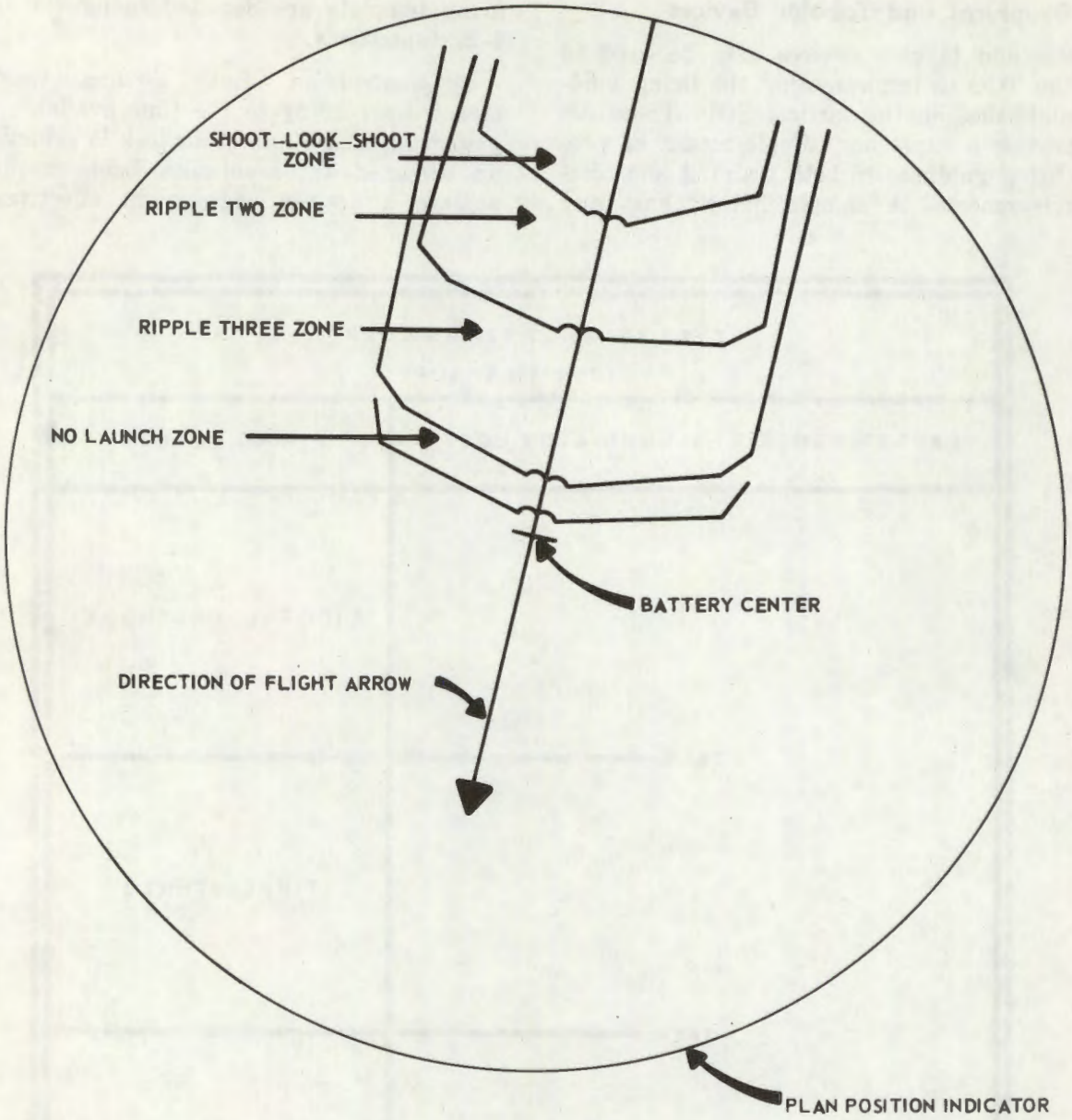


Figure 4–2. Type 600-knot Hawk firing template.

0.90. For construction aids, see FM 44–1A and FM 44–1–1.

b. Use of Firing Charts and Templates.

(1) Firing charts may be used by the tactical control officer to determine quickly the appropriate firing technique to employ under various tactical circumstances.

(2) Firing templates, providing in graphical form the same information as the firing chart, are superimposed on the PPI display with the direction-of-flight arrow parallel to the target course. Oriented in this manner, these devices enable the tactical control officer to determine immediately the number of missiles to be fired according to the target location when illuminator lock is achieved.

c. Other Firing Guidance. Firing guidance may also be provided for the tactical control officer by referencing the target location to the range rings on the PPI display. This method may be preferred to the firing template when numerous other data are marked on the scope.

Section III. COORDINATION

4–9 General

Hawk operations must be coordinated with the defended force and the area air defense system. Coordination is accomplished through use of liaison personnel and communications. Coordination is enhanced through collocation of command posts whenever feasible.

4–10. Liaison

Liaison requirements will vary. As a general rule, Hawk battalions and batteries should establish liaison when the force commander's operation center and the AADCP are not collocated. Hawk battalion personnel usually operate in tactical operation centers and insure that the force commander and his staff are advised of the air situation and that the Hawk commander is kept abreast of changes in the ground tactical situation. In addition, Hawk battalions should be prepared to receive and support Chaparral/Vulcan liaison officers.

4–11. Communication

Communications are required for rapid receipt of changes to the air defense rules for control of fires. These communications follow ADA channels and eventually terminate in a designated tactical air control center.

CHAPTER 5

COMMUNICATIONS

5–1. General

Effective Army air defense operations are directly related to a rapid, reliable, secure, and continuous communication system. Hawk units will use assigned signal teams and equipment to satisfy communication requirements for flexible and alternate routing among widely dispersed units. The assigned signal teams have the necessary communication equipment to satisfy the digital and voice requirements. Backup communications are established with TOE equipment for manual operation. TOE tactical radio and communication equipment will meet requirements for tactical and administrative voice and teletype nets.

5–2. Principles

The principles of communication that fix the responsibility for the establishment and maintenance of Hawk communication systems are given in *a* through *d* below.

a. Senior to Subordinate. The higher or senior unit is responsible for the establishment and maintenance of communications with the lower or subordinate unit. (When a Hawk unit is attached to another unit, it comes under the classification of a subordinate unit.)

b. Supporting to Supported. A Hawk unit supporting another unit (any type) is responsible for the establishment and maintenance of communications with the supported unit.

c. Lateral Communication. Responsibility for the establishment and maintenance of lateral communications between adjacent units is as directed by the next higher common commander. In the absence of specific instructions or SOP, the commander on the left is responsible for the establishment and maintenance of communications with the unit on his right (facing the FEBA).

d. Maintenance. Maintenance of communications requires coordination and joint participation. Although the commander of one unit is specifically charged with the responsibility for the establishment and maintenance of communications with another unit, it is only through joint effort of both units that continuous communication is insured. If communication is disrupted, its immediate reestablishment is the joint responsibility of all units affected.

5–3. Command, Control, and Coordination Systems and Communications

When operating in the field army, Hawk units use an air defense command, control, and coordination system (ADCCCS) with the data converter (AN/GSA–77). Control with the ADCCCS) is exercised by exchange of digital data; therefore, the communication system must provide high-quality, reliable circuitry for this purpose.

5–4. Multichannel Radio System

The multichannel radio system is the primary communication system used by Hawk air defense artillery units.

a. This system is established, using assigned signal teams supplying multichannel radio equipment. The multichannel radio provides the communications from the ADA command to battery level. The communication requirements between the battalion and the battery are the same as those between battalion and group. Additional circuits within the multichannel radio system, such as secure teletype between battalion and group, may be established after the dedicated circuits are operational. The communications between the battalion and the group include—

(1) An automatic data link (ADL) for digital data transmission.

(2) A voice channel for air defense control.

(3) A second voice channel for air defense intelligence and radar reporting.

(4) A third voice channel for maintenance.

b. In a static situation, operational control of multichannel radio equipment normally would be exercised by the senior Army air defense echelon (command, brigade, or group). In a fluid situation, the operational control of battalion to battery communication equipment may

be delegated to battalion to insure that changes in requirements will be met in a timely manner.

5–5. Radio Nets

a. Radio. If the electronic ADCCCS is nonoperational or if the multichannel communication equipment that supplies the ADL capability should fail, the Hawk unit would use the manual method of AADCP operation, utilizing organic tactical radios. Type battalion radio nets are shown in figures 5–1 and 5–2.

b. Battalion External Radio Nets. To meet its external communication requirement, the battalion may operate in four external nets. Type battalion external radio nets are discussed in (1) through (4) below.

(1) *Air defense control net (SSB–VOICE).* This net provides two-way communications between the battalion AADCP and the group AADCP. It is used for the transmission of tactical information to include conditions of readiness, method of control, engagement instructions, states of alert, weapon control status, engagement results, acknowledgment of receipt of commands, missile count, launcher status, weapon system locations, and other tactical information pertaining to the air battle.

(2) *Intelligence and radar reporting net (SSB–VOICE).* This net provides two-way communication from group to battalion, and through a battalion internal net to battery. It is used for the transmission of intelligence from higher to lower echelons and for the transmission of radar plots from fire units and defense acquisition radars to the battalion AADCP and the group AADCP. Information transmitted includes track position data, track identity, raid size, and air defense warning.

(3) *Command and administrative net (SSB–VOICE).* This net is a two-way voice net between the group headquarters and the Hawk battalion which is used for exchanging command, administrative, and logistical information that does not pertain directly to the air battle.

(4) *Supported unit net (FM–VOICE).* This net provides the battalion with the capability to communicate with the supported unit, to coordinate unit movements, and necessary intelligence.

c. Battalion Internal Radio Nets. The number and type of internal radio nets operated by the battalion and its batteries are tailored to fit the organization (towed or self-propelled) and mission requirement. The type nets discussed below are basic nets that may be used for command, administration, operations, and logistical support.

(1) *Battalion command and administrative net (FM–VOICE).* This net provides two-way communications between operations and logistical staff officers, battery commanders, and the battalion commander.

(2) *Battalion air defense control net (SSB–VOICE).* This net provides two-way communications between the battery control central (BCC) and the battalion operations central (Bn OC).

(3) *Battalion intelligence and radar reporting net (SSB–VOICE).* See paragraph *b*(2).

(4) *Support platoon command net (FM–VOICE).* This net provides two-way communications between the battalion support platoon headquarters, support platoon elements, and the firing batteries.

(5) *Battery command net (FM–VOICE).* This net provides two-way communications between the battery commander, battery executive officer, platoon leaders, communication section, service platoon, and motor maintenance section.

(6) *Battery air defense control net (FM–VOICE).* This net provides two-way communications between the platoons and the BCC.

(7) *Self-propelled platoon command net (FM–VOICE).* This net provides two-way communications between the platoon leader, other platoon elements, the BCC, and the service platoon.

5–6. Battalion Wire Nets

The wire nets of the Hawk battalion consist of circuits to higher, adjacent, and subordinate units, and the required local circuits. The communications section in the headquarters battery will install the local circuits in the CP area and the circuits necessary to connect the battalion headquarters to the nearest army or division area signal center. Type wire nets for the towed and SP Hawk battalions are shown in figures 5–3 and 5–4, respectively.

5–7. Battery Wire Nets

The wire nets of the Hawk battery consist of circuits to the battalion headquarters and the required locals. A single switchboard is used for local administration and security lines. Type wire nets for towed and SP Hawk batteries are shown in figures 5–5 and 5–6, respectively. Although a

NET / STATION	GP COMD/ ADMIN SSB–VOICE	GP ADC SSB–VOICE	GP IRR SSB–VOICE	BN COMD/ ADMIN FM–VOICE	BN ADC SSB–VOICE	BN IRR SSB–VOICE	BN SPT PLT COMD FM–VOICE	BTRY COMD FM–VOICE	SUPPORTED UNIT FM–VOICE
BN CO				X					
BN XO				M					M
HQ BTRY CO				M					
1/ OP & INTEL SEC		X	R	M	N	N			M
BN COMM SEC	X			N	M				
BN MAINT SEC				M					
BN SUPPLY SEC				M					
BN RADAR SEC			X			X			
1/ ADCCCS (FDS)		X	R						
BN SPT PLT HQ				M			N		
GND GUID EQUIP SPT SEC							M		
ADCCCS (FDS) SPT SEC							M		
FIRING BTRY CO				M				X	
FIRING BTRY XO								M	
2/ BCC			R		X	X			
FIRING PLT								X	
SERVICE PLT								X	
BTRY COMM SEC				X			M	N	

NOTE: 1/ THESE SECTIONS ARE COLLOCATED TO FORM THE BATTALION AADCP.

2/ COMMUNICATIONS FOR AN AFU ARE PROVIDED BY THE BCC IF AFU IS DEPLOYED.

LEGEND: N=NET CONTROL STATION M=MONITOR, ENTER AS REQUIRED

X=ACTIVE STATION R=RECEIVE ONLY

Figure 5–1. Type battalion radio nets (towed Hawk).

STATION \ NET	GP COMD/ ADMIN SSB – VOICE	GP ADC SSB – VOICE	GP IRR SSB – VOICE	BN COMD/ ADMIN FM – VOICE	BN ADC SSB – VOICE	BN IRR SSB – VOICE	BN SPT PLT COMD FM – VOICE	BTRY COMD FM – VOICE	BTRY ADC FM – VOICE	SP PLT COMD FM – VOICE	SUPPORTED UNIT NET FM – VOICE
BN CO				X							
BN XO				M							M
HQ BTRY CO				M							
1/ OP & INTEL SEC		X	R	M	N	N					M
BN COMM SEC	M			N	M						
MTR MAINT SEC				M							
BN SUPPLY SEC				M							
BN RADAR SEC			X			X					
1/ ADCCCS (FDS)		X	R								
LIAISON SEC				M							X
BN SPT PLT HQ				M			N				
FIRING BTRY CO				M				X			
FIRING BTRY XO								M			
BCC			R		X	X			N	M	
SERVICE PLT								X		M	
MTR MAINT								M			
FIRING PLT (TOWED)								X			
FIRING PLT (SP)					(X) 2/			X	X	N	
FIRING SEC (SP)										X	
				X			M	N		M	

NOTE: 1/ THESE SECTIONS ARE COLLOCATED TO FORM THE BATTALION AADCP.

2/ FOR INDEPENDENT OPERATIONS.

LEGEND: N=NET CONTROL STATION M=MONITOR, ENTER AS REQUIRED

X=ACTIVE STATION R=RECEIVE ONLY

Figure 5–2. Type battalion radio nets (SP Hawk).

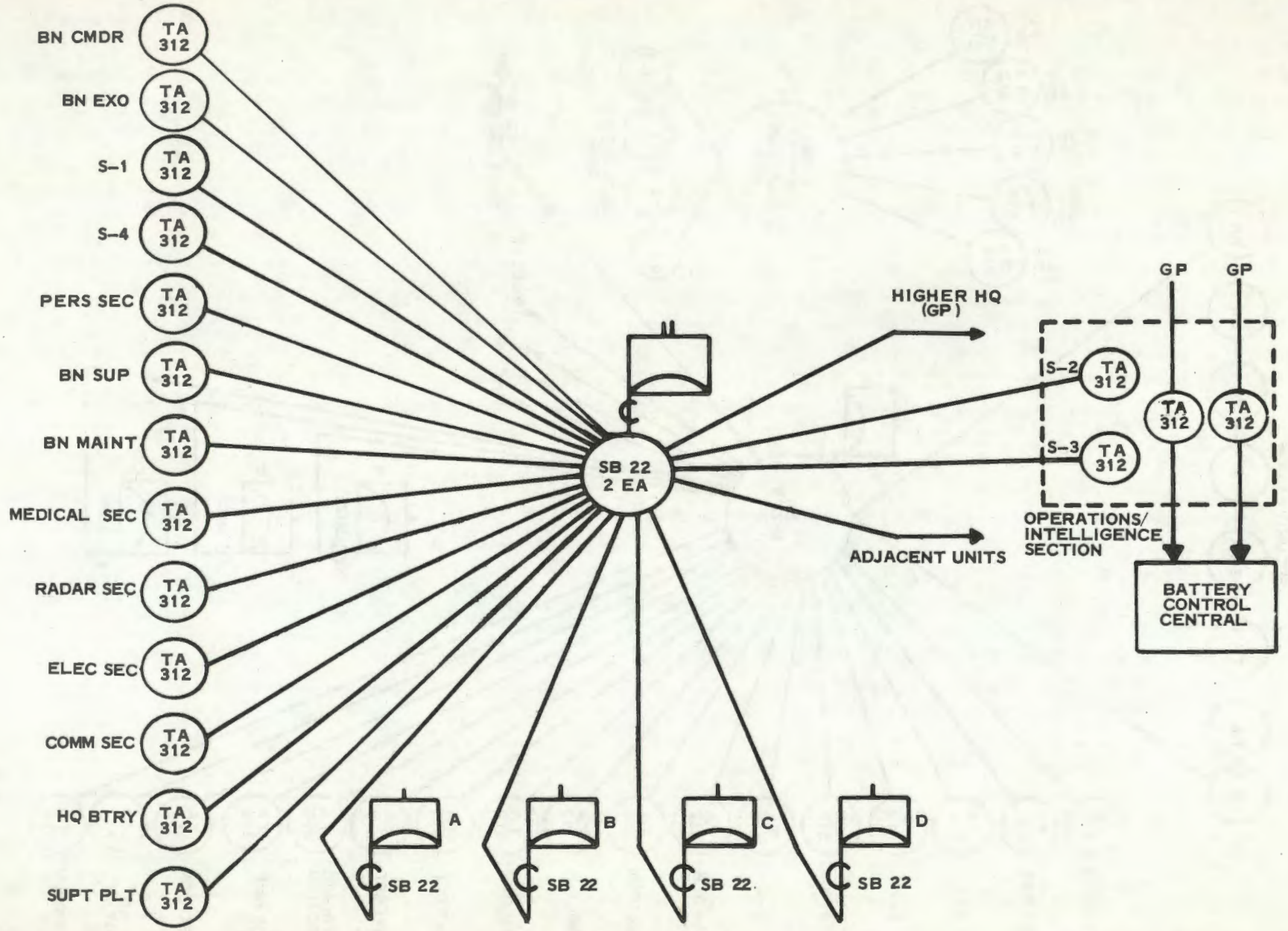


Figure 5–3. Type battalion wire nets (towed Hawk).

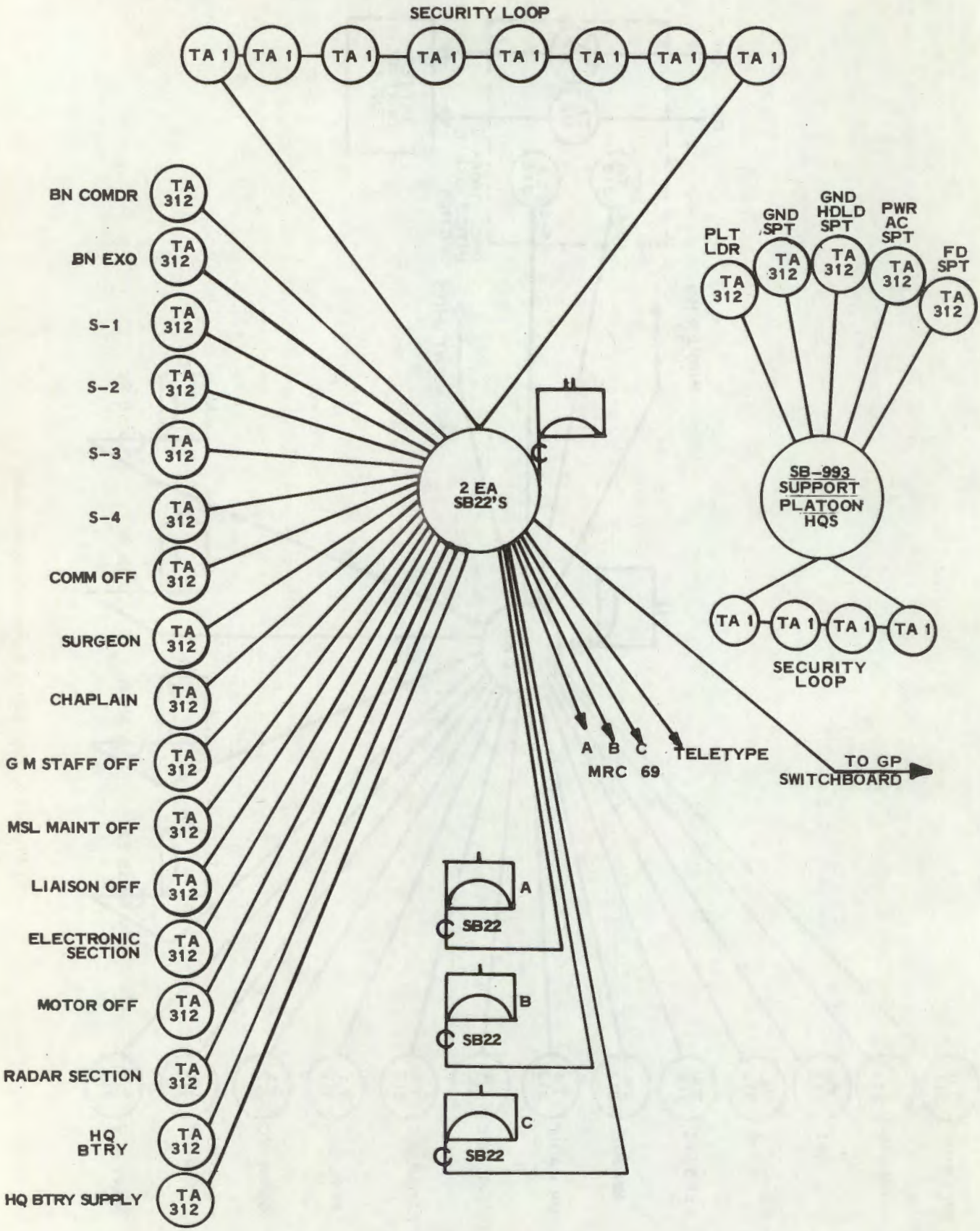


Figure 5-4. Type battalion wire nets (SP Hawk).

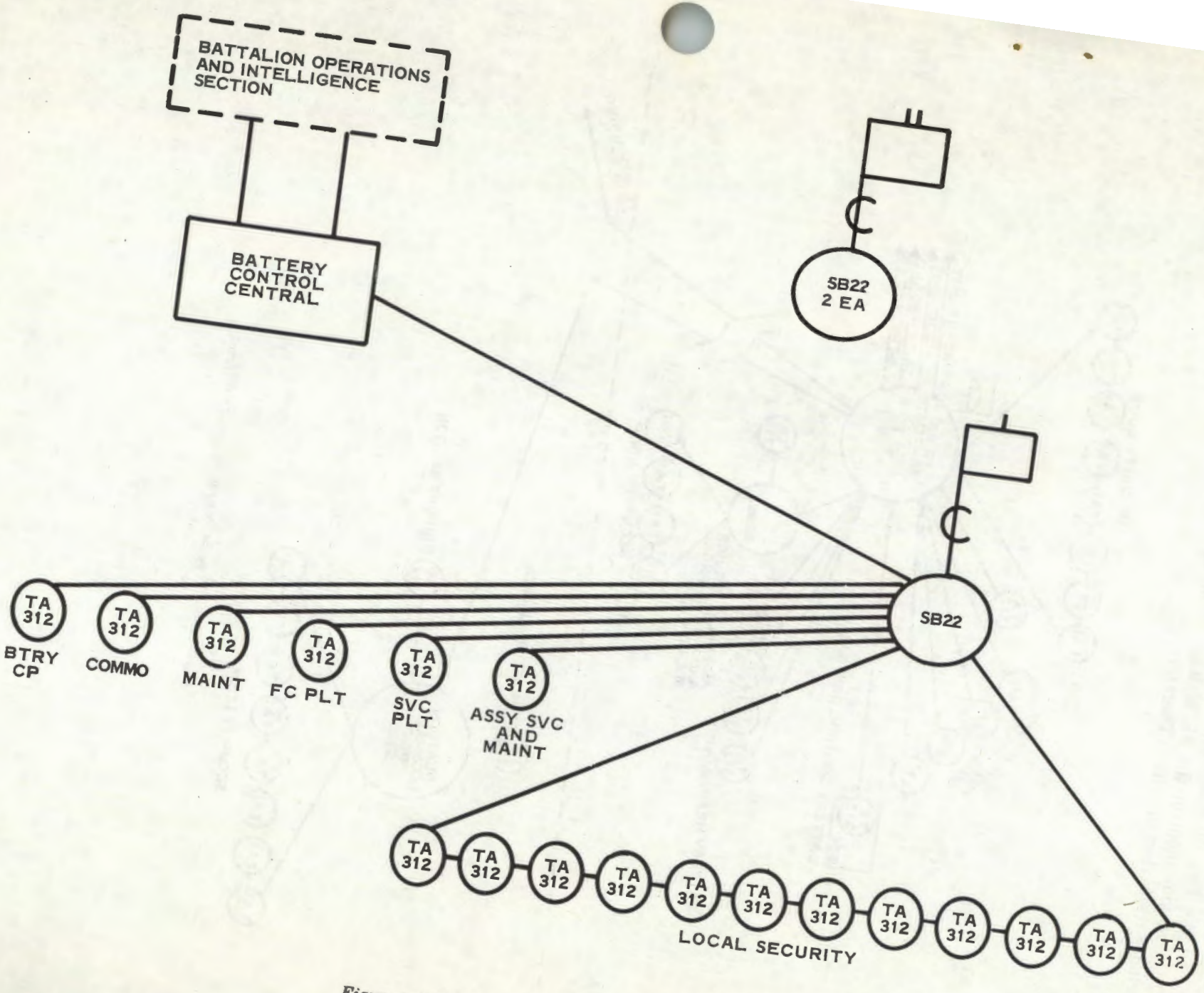


Figure 5–5. Type battery wire nets (towed Hawk).

capability exists to establish wire lines between the battery and the two SP platoons, the distance and frequent movement of the SP platoon usually precludes the laying of wire. (Therefore, in the case of self-propelled Hawk, the battery command net (FM) will be used as the primary means to exchange command-type information.)

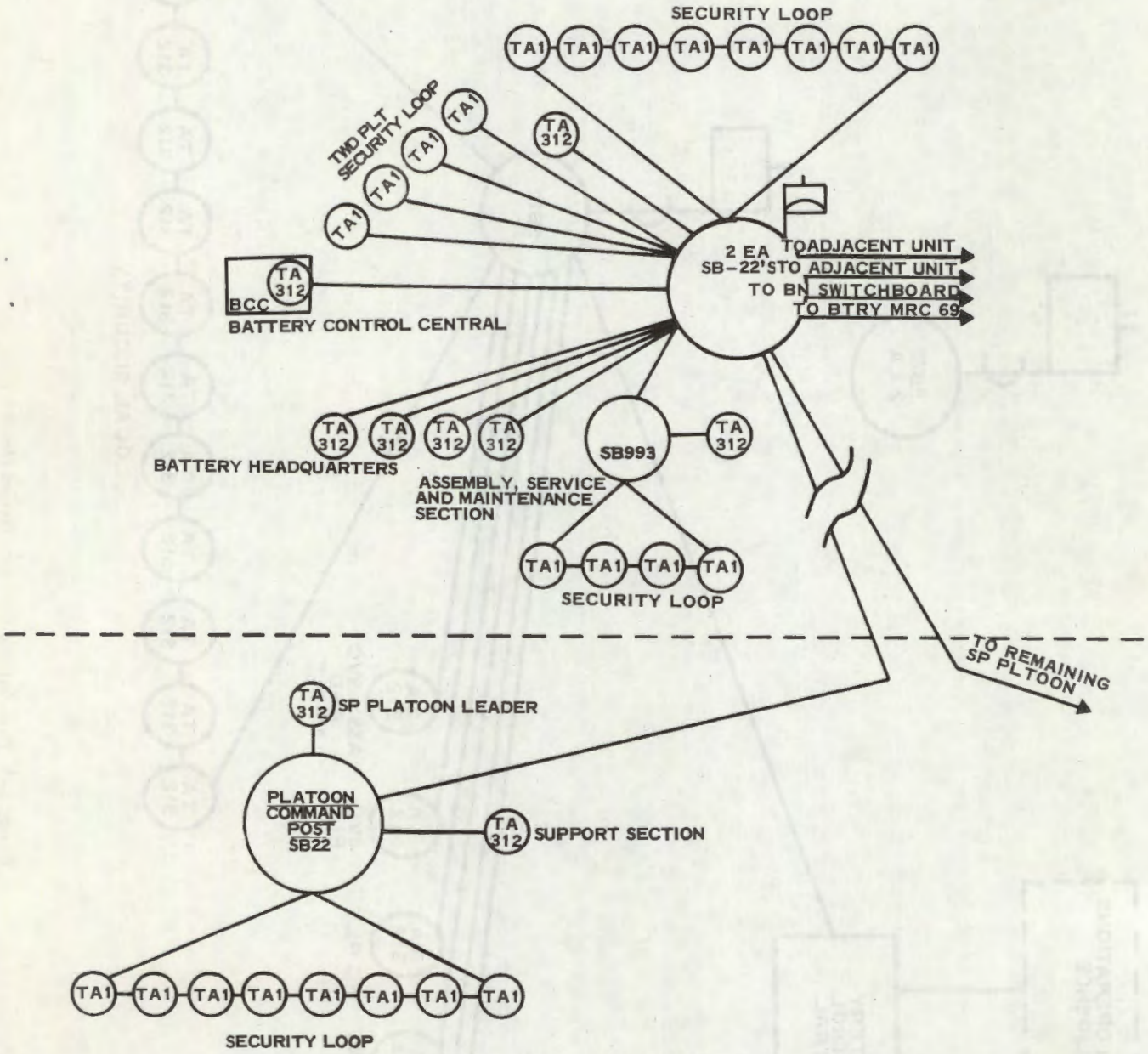


Figure 5–6. Type battery wire nets (SP Hawk).

CHAPTER 6

SPECIFIC EMPLOYMENT CONCEPTS

Section I. FIELD ARMY EMPLOYMENT

6–1. General

Air defense forces contribute to a military posture which deters attack. Should deterrence fail, air defense forces have as their primary objective the air defense of the defended force by limiting the effectiveness of enemy offensive air efforts to a level permitting freedom of action to friendly forces. This chapter discusses how the Hawk fundamentals of employment are applied to a variety of missions and operations. Additional information regarding the employment of Hawk in combat zone operations is contained in FM 44–1.

6–2. Concept of Employment

a. In the field army, the fundamentals of employment are applicable to offensive, defensive, retrograde, and relief operations. The primary differences are changed in priorities as a result of the assigned mission, the location of the Hawk unit, the changing importance of various elements of the defended unit, and in the phasing of air defense forces into special combat operations. The air defense artillery means available to the commander will often be insufficient to defend all high value field army assets; therefore, the force air defense officer must recommend air defense priorities based on the force commander's concept of the operation and the values placed on the assets. The force commander then establishes the air defense priorities. Detailed information concerning asset values and air defense priorities is contained in paragraph 10–3 and FM 44–1. When air defense priorities for a combat operation have been established, the senior Army air defense artillery commander prepares his air defense plan and provides it to the force commander for approval.

b. All Hawk batteries (fig. 6–1) normally will be deployed to the rear of the line of contact out of range of most light and medium conventional artillery. Self-propelled Hawk units normally are deployed far enough forward in the division area to deny enemy overflight of friendly air defense forward area weapons (Chaparral/Vulcan and Redeye). Towed Hawk battalions normally are deployed in the corps rear area and field army service area. For discussion purposes, it is assumed that both self-propelled and towed Hawk battalions are available to the field army. If only towed Hawk battalions are available, employments must be modified to allow for decreased mobility of towed Hawk, particularly for Hawk units contemplated for division area deployment.

6–3. Control and Coordination

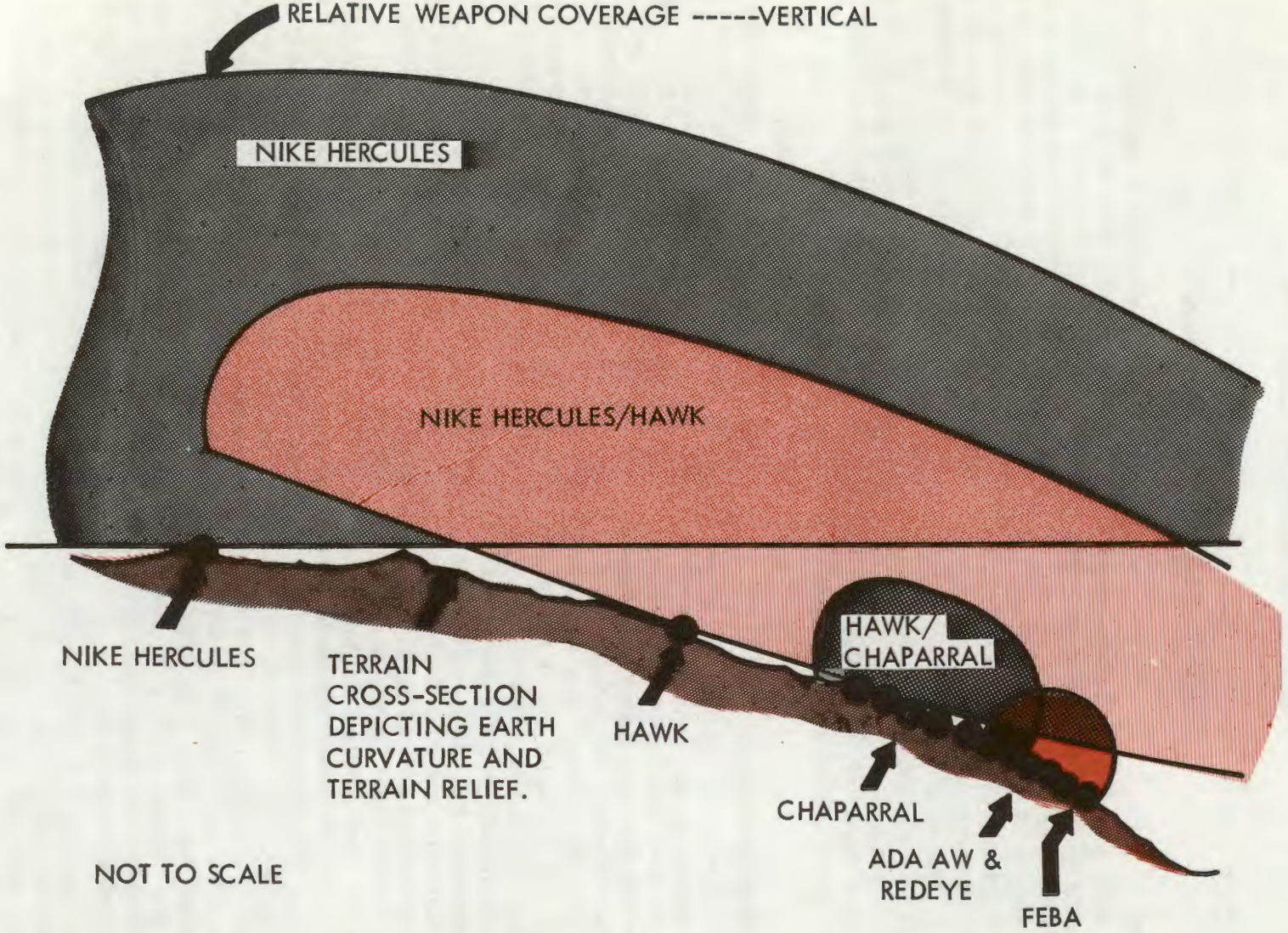
Hawk batteries incorporate organically the means for detecting, identifying, intercepting, and destroying hostile targets. Control and coordination of defensive fire among Hawk batteries should be accomplished at the lowest practicable level. Hawk operations will be coordinated with other army operations at field army, corps, and division by the airspace control element (ACE) in respective tactical operations centers (TOC).

6–4. Self-Propelled Hawk

a. Mission. To provide all-weather air defense against low- and medium-altitude aircraft and cruise-type missiles.

b. Assignment and Allocation. The most appropriate status for self-propelled Hawk battalions is that of assignment or attachment to the corps air defense artillery (ADA) group. The self-propelled Hawk battalions may be allocated on the basis of one self-propelled Hawk battalion per division on line. Self-propelled Hawk may be attached for short periods to a division under certain tactical situations to fulfill special air defense requirements; however, ADA group-level attachment is normal. Attaching self-propelled Hawk battalions to the air defense artillery group that supports corps operations accomplishes the following—

(1) Gives the ADA group commander flex-



★*Figure 6–1. Type field army air defense artillery deployments.*

ibility in weighting all-weather air defense of the corps.

(2) Provides a better capability to integrate air defenses across division boundaries.

(3) Provides a better control echelon to balance Hawk capabilities to provide all-weather defense of the corps and its ability to assist in defense of rear area installations.

(4) Permits forward deployment to exploit Hawk range capabilities fully while allowing rearward deployment to provide increased survivability. Economy is also inherent in this organizational arrangement because a better integrated defense probably can be provided with fewer fire units.

c. Air Defense Concepts. The priority for self-propelled Hawk defenses will change according to the tactical situation. Deployment concepts to support these changing priorities may also change. Three likely concepts of deployment are discussed below.

(1) *Provide air defense to support the ground maneuver plan.* SP Hawk has the required flexibility and mobility to provide air defense in support of division ground maneuvers. The semi-independent capability and dispersed deployment of self-propelled platoons render the battery less vulnerable to attack.

(2) *Defend rear area installations.* When the priorities of air defense shift to rear area installations, a larger proportion of SP Hawk may be deployed in the corps area.

(3) *Support the field army area air defense plan.* This concept provides that SP Hawk operates as part of a coordinated and integrated area air defense system.

d. Planning. The plans and operations of the divisional Chaparral/Vulcan battalion and the SP Hawk battalion operating in the division area should be coordinated. Additionally, a liaison team organic to the Chaparral/Vulcan battalion may be located with the self-propelled Hawk battalion to assist in coordinating Chaparral/Vulcan deployments with overall air defense plans and to serve as an information exchange relay. All air defense plans are submitted through the appropriate channels to the force commander.

e. Deployment.

(1) *General.* Self-propelled Hawk, with its rapid emplacement and march order capability, is well suited for division area deployment and defense of fast-moving echelons. During fair weather, the SP Hawk should be deployed on high ground out of range of enemy artillery fire. During periods of low visibility and at night, SP Hawk may be moved further forward, but in any event, movement should be frequent to avoid detection of firing positions by the enemy.

(2) *Effect of enemy capabilities.*

(*a*) *Threat.* When the primary air threat is low, fast aircraft, the SP Hawk battalion should be dispersed as in Concept III (fig. 6–2), weighted toward the probable low-altitude avenue of approach. If, however, the forward area ADA weapons (Chaparral/Vulcan or Redeye) can be expected to force the threat to a higher altitude, Concept I (fig. 6–2) may be selected. This concept will provide a positive fire distribution arrangement which is necessary for fire control when the threat is at a higher altitude.

(*b*) *SP Hawk vulnerability to detection.* SP Hawk platoons operating in the division area will be vulnerable to enemy detection (ground and air observers, and RF energy detection equipment). SIGSEC measures to be taken to prevent enemy detection include: adherence to prescribed SOP and restriction of knowledge of radio frequencies, operating schedules and missions, and association of communications with noncommunications electromagnetic facilities to those who have a need to know. For further information, see TB 380–6–1. In this environment, frequent movement is desirable. Concepts I and II normally are selected for daylight operations to reduce vulnerability to visual detection of firing positions. Movement to alternate sites is controlled by the Hawk battalion and coordinated with the division air defense officer.

(3) *Position requirements.* Position requirements are those considerations which affect the actual location of the various pieces of equipment on the ground. These include access routes, suitable terrain to eliminate or reduce radar masking, communication requirements, enemy observation, mutual support, and complementary coverage. Illustrations of typical position areas are included in chapter 7.

(*a*) *Positioning of the battery control central.* The BCC must be located to minimize its clutter-producing effect on the CWAR. It should be placed in defilade or dug in. Cable lengths must be considered in selecting a suitable location.

(*b*) *Positioning of radars.*

1. Towed platoon (SP Hawk battery). The CWAR should be given positioning priority, followed by the PAR and the HIPIR.

2. Self-propelled platoon. The SP Hawk platoon CWAR should be given positioning priority. The HIPIR should be given second priority.

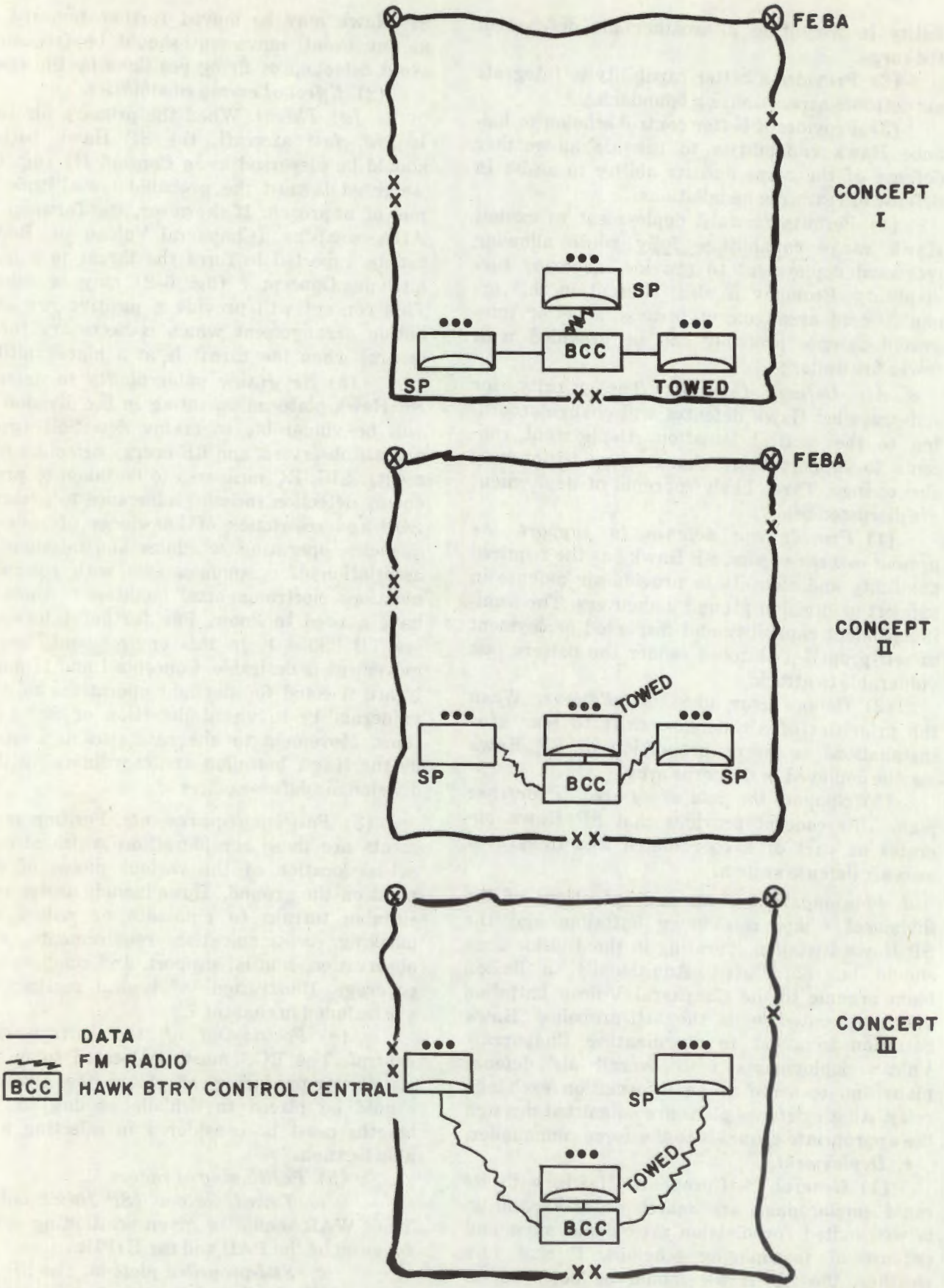


Figure 6-2. Self-propelled Hawk deployment concepts.

In the forward area, 360° coverage may be sacrificed to reduce vulnerability to detection. With the introduction of the Chaparral/Vulcan battalion into the division defense structure, aircraft may be forced to fly higher and 360° coverage in forward areas may become more attainable.

(*c*) *Positioning launchers.* There are three possible configurations for the emplacement of the launchers (fig. 6–3). Case I affords maximum concealment, but there is a possibility of undesirable over-the-radar engagement. Case II reduces the possibility of over-the-radar engagement, but presents maximum vulnerability to detection. Case III combines the best features of the first two cases.

(4) *Organization of the platoon position.* Ideal terrain for Hawk positions will seldom be available. To perform the mission, the self-propelled Hawk tactical equipment should be deployed on high ground but below the crests of hills. A higher probability exists that an adequate number of small platoon positions will be avail-

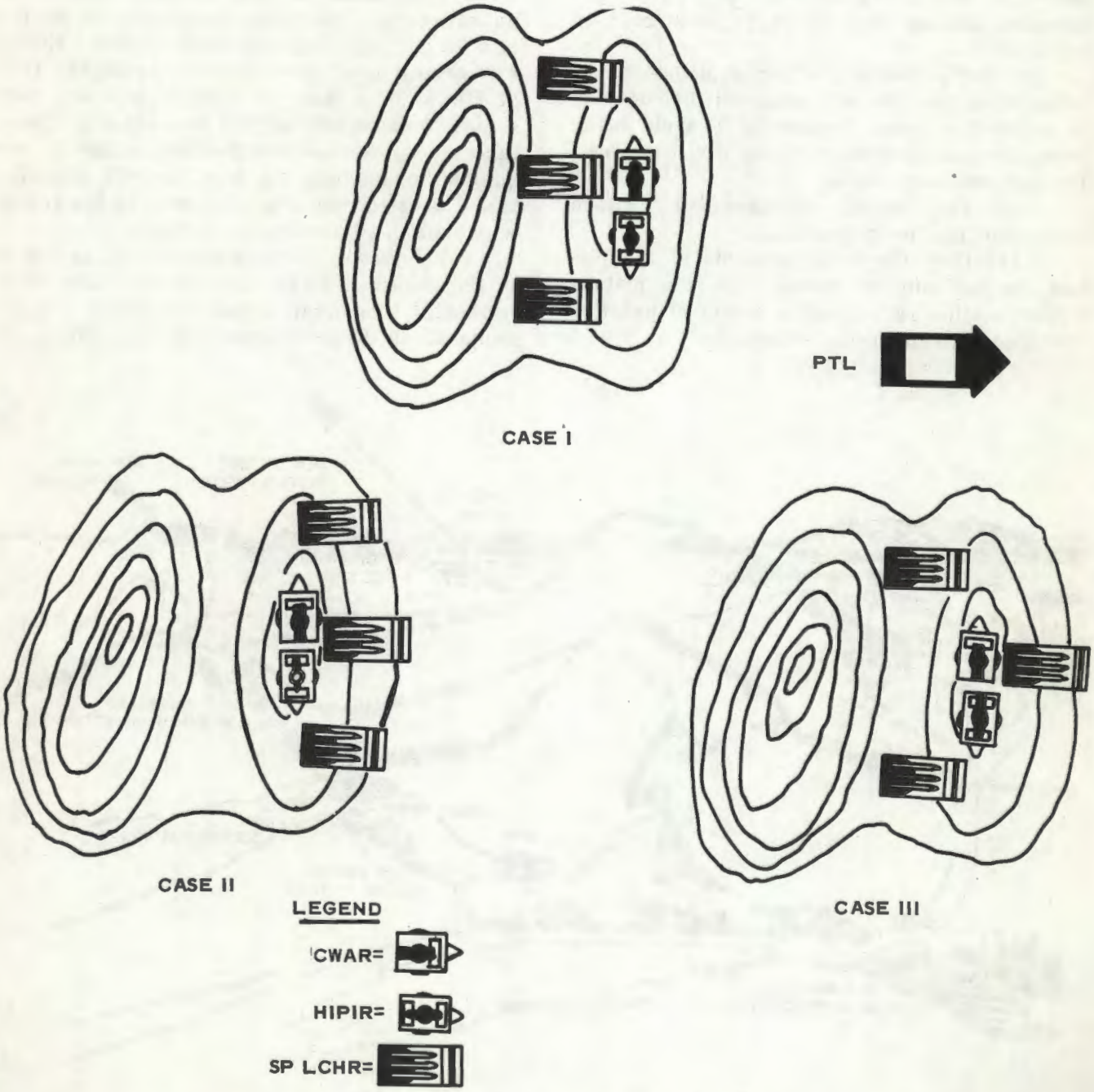


Figure 6–3. Self–propelled launcher positioning options.

able rather than one large battery position. Trafficability may dictate that self-propelled platoon wheeled vehicles be routed to a platoon area separately. The separation of the self-propelled platoon into two distinct sections, firing and support, is accepted to reduce sitting problems and to expedite redeployment of the self-propelled platoons (fig. 6–4). Placing the support section in defilade further reduces the probability of enemy detection. The support section should be located as close as possible to the firing section to facilitate missile reload and other support and security functions. A typical self-propelled platoon deployment is illustrated in figure 6–5.

(5) *Self-propelled platoon deployment.* As indicated earlier, the self-propelled platoon may be required to move frequently to avoid being targeted while operating in the division areas. Two options are available.

(*a*) The entire self-propelled platoon moves from position to position.

(*b*) Only the firing elements of the platoon conduct random moves, with the platoon support section remaining in a central location. This concept is illustrated in figure 6–6.

(6) *Effects of poor visibility conditions.* The self-propelled Hawk mission of countering aircraft that overfly or fly through the coverage of divisional weapons implies that deployment must be shifted as visibility conditions change. During fair weather, Chaparral becomes a predominant factor in forward area air defense. As visibility decreases, SP Hawk platoon deployments may be shifted to compensate for the decrease in Chaparral effectiveness. Concept III (fig. 6–2) is based on this consideration.

(7) *Position security requirements.* Air defense units establish local security defenses to guard against infiltrators, saboteurs, or ground attack. The self-propelled Hawk platoons should man several observation/listening posts. The TOE of Hawk units does not provide sufficient personnel for adequate tactical site security. Assistance of appropriate commanders should be requested to augment the local security capabilities. The battery security plan must be integrated with plans of adjacent units (chap 9).

(8) *Influence of Chaparral/Vulcan battalion on self-propelled Hawk deployments.* Hawk and divisional Chaparral/Vulcan battalion deployments should be coordinated. The deployment of

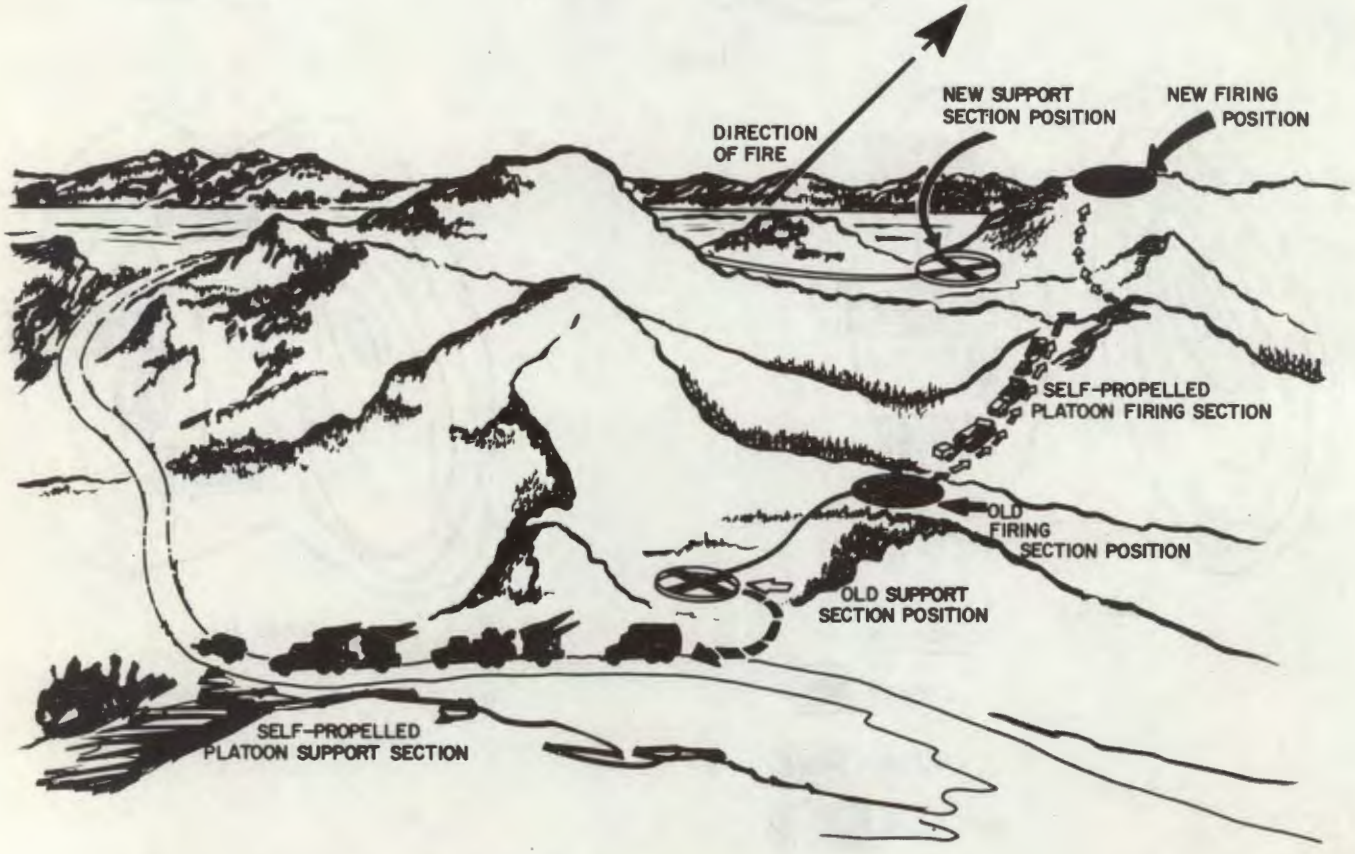


Figure 6–4. Redeployment of self-propelled platoon.

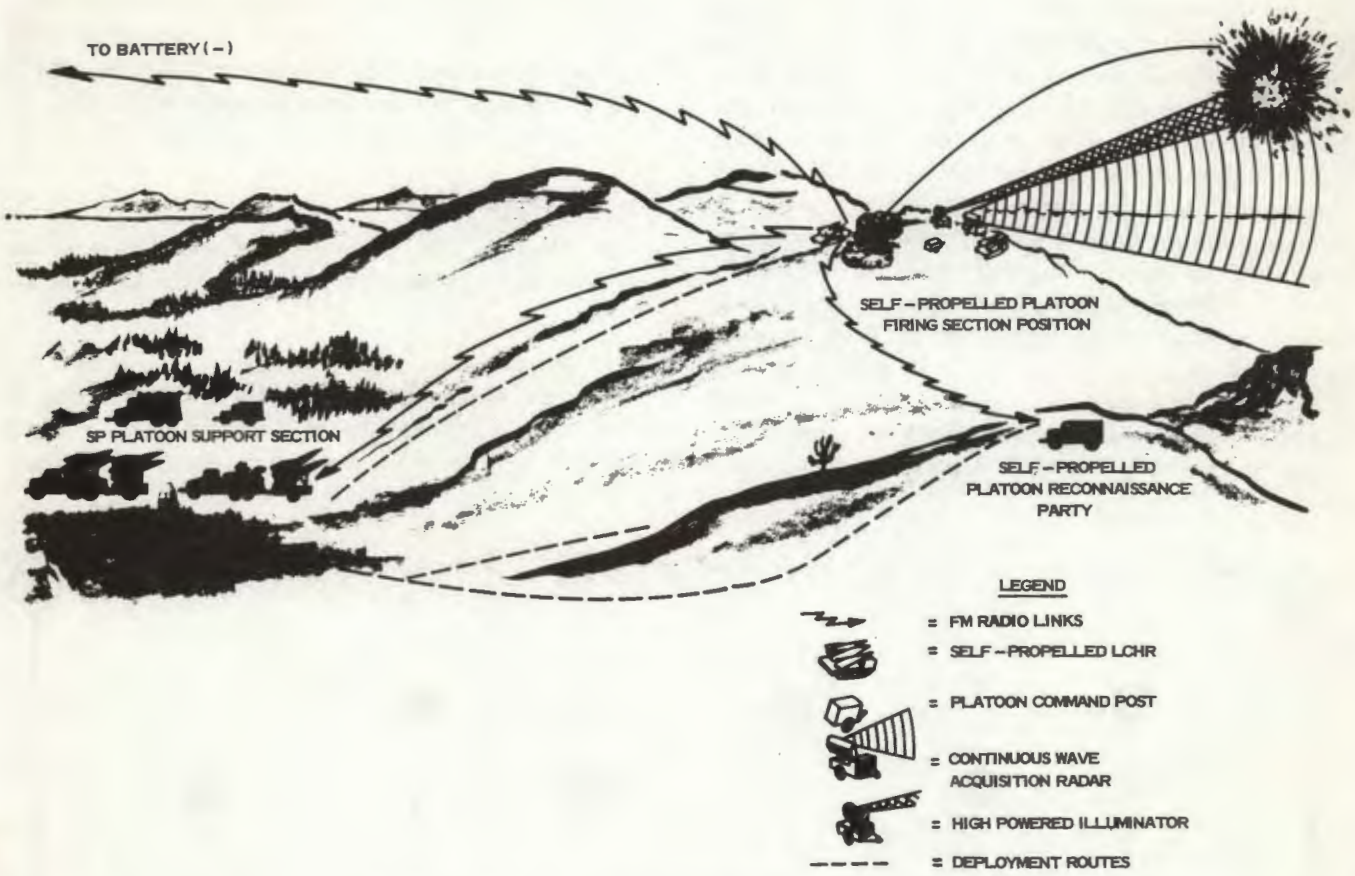


Figure 6-5. Type self-propeleld platoon deployment.

Figure 6-6. Random deployment concept.

Chaparral in the forward area affects the SP Hawk deployment primarily during fair weather (good visibility) when the SP Hawk platoons normally should be deployed behind the brigade rear boundaries. If reduced Hawk firepower can be afforded, it may be desirable during certain fair-weather operations to have some SP Hawk fire units move to defiladed assembly areas or preselected survival areas instead of displacing rearward to avoid being targeted. SP Hawk deployment during fair weather should provide sufficient overlap with Chaparral so that no open corridors exist and that aircraft cannot overfly Chaparral and underfly Hawk. The SP Hawk platoon radars may remain silent in some situations in fair weather and depend upon warning from the battery minus (−) (SP Hawk battery less SP platoons) or the Chaparral/Vuclan battalion air defense liaison net. To maximize the air defense effectiveness, coordination is established between all air defense elements in the division area to exchange pertinent data (fig. 6–7).

6–5. Towed Hawk

a. Mission. The primary mission is to provide air defense against low- and medium-altitude attacks.

b. Assignment and Allocation. The most appropriate status for a towed Hawk battalion is that of assignment to the air defense artillery groups in the field army air defense artillery

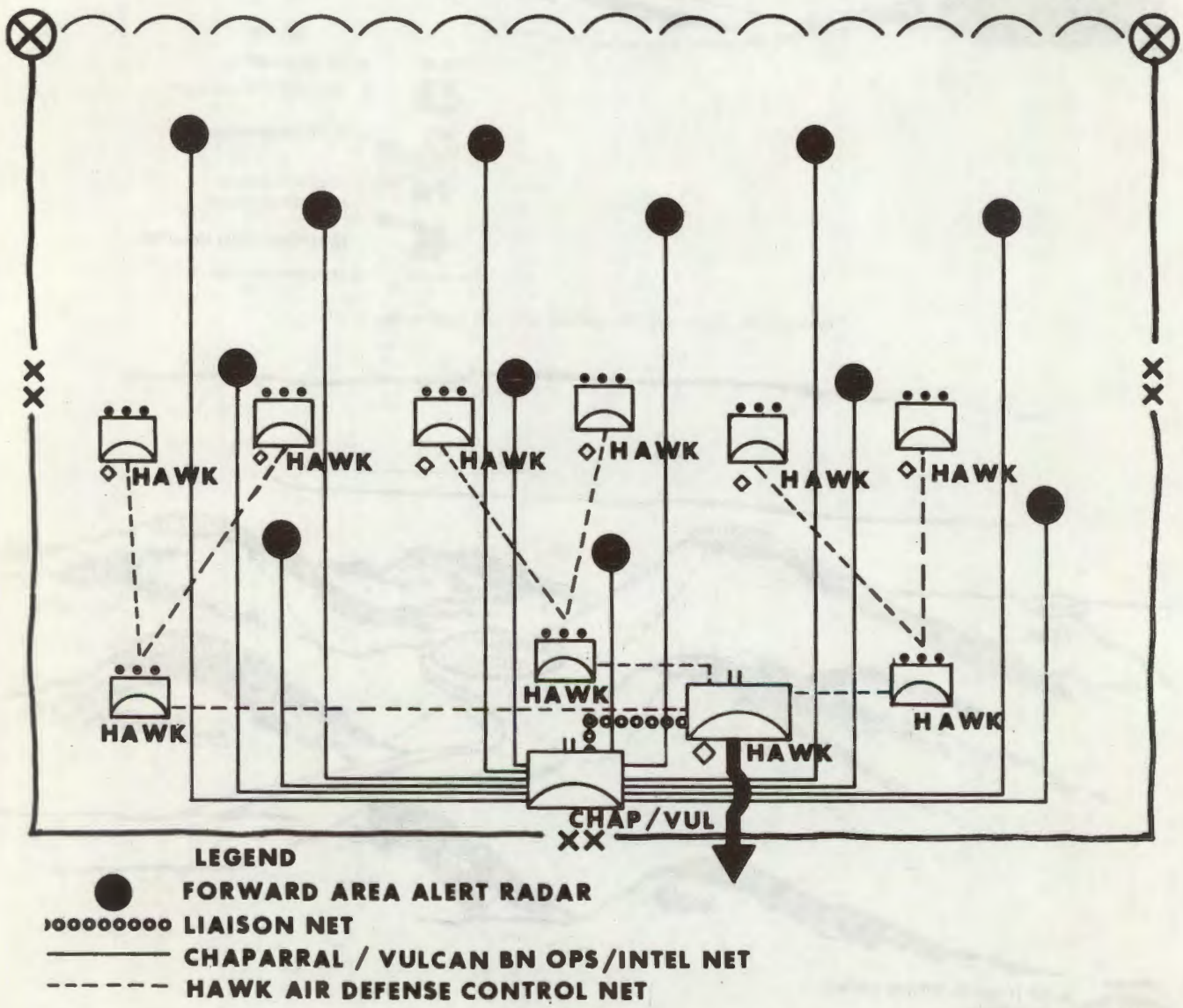


Figure 6–7. Coordination between self-propelled Hawk and Chaparral/Vulcan battalions.

brigade, the communications zone, or in corps support. Towed Hawk battalions may be allocated on the basis of one per corps air defense artillery group, three per field army service area (two-corps field army), and eight per type communications zone (COMMZ) supporting a two-corps field army. These allocations are for planning guidance only. Allocations are based on the number, size, and priorities of the assets located in the vital areas to be defended, the number of units available, and the aerial threat against these vital areas.

c. Air Defense Concepts. Priorities for towed Hawk defenses will change according to the tactical situation. Three likely concepts of deployment are—

(1) *Support of field army area air defense plan.* In this role, towed Hawk battalions are deployed in an integrated defense to defend a large landmass. This is the normal priority for towed Hawk units.

(2) *Defense of rear vital areas.* A corollary to the field army area air defense role is the defense of specific vital areas as opposed to overall area defense. If high priority assets are situated within a given area and an adequate air defense of the entire area is not feasible, this role may be designated.

(3) *Support of ground maneuver plan.* If SP Hawk units are not available, towed Hawk units will be assigned the mission of defending the maneuvers of the forward-deployed ground elements.

d. Planning. Normally, the detailed plan for air defense by towed Hawk battalions deployed in a corps rear area or field army service area will be prepared by the ADA group to which the battalion is assigned. The air defense artillery group insures that the plans developed for assigned towed Hawk battalions are in consonance with the instructions received from the headquarters that is responsible for the overall air defense design (normally the field army air defense artillery brigade) and are integrated with those of the field army air defense structure. The plans are forwarded by the air defense artillery groups to the air defense artillery brigade for coordination with ground force and other service plans.

e. Deployment.

(1) *General.* The fundamentals of deployment should be used as guides in the deployment of towed Hawk battalions.

(2) *Enemy capabilities.* When the primary threat is low-flying fast aircraft, the deployment of Hawk units must give maximum emphasis to defending (covering) low-altitude routes of approach. Towed Hawk units operating in the corps rear area and field army service area will be vulnerable to enemy detection (air observers and RF energy detection equipment). In this low-altitude threat environment, random movements or an augmentation of ADA weapons may be required to enhance survivability.

(3) *Position requirements.* Position requirements are those considerations which affect the actual location of the various items of equipment on the ground. These include access routes, suitable terrain to eliminate radar masking, communication requirements, enemy observation, mutual support, and complementary coverage.

(*a*) *Positioning of radars.* Radar sites are selected first. The CWAR and HIPIR require positions on dominant terrain to exploit their low-altitude detection and tracking capabilities.

(*b*) *Positioning of launchers.* Launchers should be emplaced at a minimum of 60 meters (200 feet) from each other, or with suitable barricade protection between them to permit safe reloading of one launcher while an adjacent launcher is firing missiles.

(4) *Redeployment.* When Hawk displacements are necessary, the Hawk battalion normally is redeployed by echelon in accordance with the procedures outlined in chapter 5. The towed Hawk battery has the capability of forming an assault fire unit. However, when SP Hawk is deployed in the forward portions of the field army area, the requirement for the rearward deployed towed Hawk batteries to employ assault fire units is reduced.

Section II. COMMUNICATIONS ZONE EMPLOYMENT

6-6. General

A communications zone air defense is not separate and distinct from the field army air defense. Rather, the two are complementary and mutually reinforcing elements of a coordinated theater air defense system. Execution authority is decentralized as necessary for accomplishment of the assigned air defense missions. In a large theater, a theater army air defense command (TAADC) may be established. In smaller theaters, the func-

tions of this theater Army air defense command may be performed by elements of the Army component commander's staff or by the headquarters of the senior theater Army air defense artillery unit. The TAADC provides the Army component commander with a means of exercising command (less operational control exercised by other designated commanders) of theater Army air defense forces not assigned or attached to field armies/army groups. The TAADC also provides the staff capability for the Army component commander to carry out his responsibility for integration of the Army ADA capability into overall Army and theater planning.

6–7. ADA Organization in the COMMZ

The organization of the air defense artillery forces will depend upon the size of the COMMZ and the number of high priority assets to be defended. The distance between most critical targets in the COMMZ will cause these assets to be defended as isolated vital areas by Army air defense artillery. Adjacent vital area defenses may be integrated. Specified high priority assets can include port facilities, airbases, industrial and metropolitan centers, and key military installations.

6–8. Control and Coordination

As in the field army, coordination of air defense artillery and aviation operations is conducted at all levels. In the COMMZ, ADA operations in each defense are coordinated with the responsible U.S. Army, U.S. Air Force, or U.S. Navy air defense/air traffic regulation facilities. Facilities for coordination of operations are designated by the regional air defense commander. Frequently, joint facilities are established for sector level control and coordination. Many control facilities are semistatic and more sophisticated than those employed in the field army and may themselves require air defense.

6–9. Movement

Because the areas being defended are fairly static, ADA unit redeployments usually are required only when theater priorities change or shift position, or if deployment is made to alternate sites as a passive air defense measure.

6–10. Planning and Employment Concepts

Normally, towed Hawk units will be employed in the COMMZ. The same tactical, technical, and electronic security requirements must be met as in the combat zone with a few exceptions. Units will be far to the rear of the FEBA and, therefore, will not be vulnerable to ground observation and will be screened to some extent from enemy signal intelligence devices attempting to detect radar electromagnetic emissions. However, care must still be exercised against indiscriminate use of radars to eliminate this source of information to the enemy. Requirements still exist for a balanced defense and mutual support between fire units. Techniques for design of a vital area defense are discussed in FM 44–1–1. For signal security considerations, see FM 32–5 and TB 380–6–1.

6–11. Communications

a. The commander of the unified command, through his communications-electronics officer (J6) plans, directs, and coordinates the provision of communications to the air defense forces in the theater. Communications required by air defense units of any of the services may be provided through facilities operated by the service or by another service, depending on such factors as unit locations, availability of facilities, and requirements of other users.

b. Army-operated communication facilities available for the support of air defense forces are provided by the theater army communication system. This system is installed, operated, and maintained by the U.S. Army Strategic Communication Command (Theater) (FM 11–23). The system extends from the theater rear boundary into the field army areas where it interconnects with the field army area communication system. Communications security (COMSEC) procedures must be emphasized when this communication facility is used, since it is a lucrative source of information for enemy intelligence. See FM 32–5 for detailed discussion of COMSEC.

c. The headquarters of the TAADC, or the COMMZ ADA unit serving in a similar capacity, will require internal communications among staff sections and external communications to theater army headquarters, the area AD commander, subordinate units, and air defense agencies of other services. The internal communications are provided by the signal operations company, medium headquarters. External communications are provided as outlined above.

Section III. JOINT TASK FORCE AIR DEFENSE RESPONSIBILITIES

6-12. Command Responsibilities for Air Defense

a. Joint Task Force (JTF) Commander.

(1) Establishes responsibilities and broad guidance for air defense and airspace control within the combat area.

(2) Designates a JTF air defense commander (normally the Air Force component commander).

(3) Allocates air defense resources.

(4) Establishes priorities to achieve the objective of air defense of the combat area.

(5) Establishes the military requirement for the emergency control of air traffic and air navigational aids.

b. JTF Air Defense Commander.

(1) Exercises operational control over all air defense means made available for JTF defense except as operational control authority is delegated to Army commanders for organic, assigned, or attached ADA.

(2) Prepares the plan for the overall air defense of an area in coordination with the other services involved for approval by the JTF commander.

(3) Promulgates rules for engagement and other weapon control and coordination measures binding on all joint task force air defense forces.

(4) Implements the JTF commander's guidance on airspace control and air defense.

(5) In coordination with the Army forces commander, establishes the procedures for air traffic regulation and identification within the combat area for approval by the JTF commander.

(6) In coordination with the Army forces commander, may designate specific areas and/or corridors in which Army aircraft can fly with minimum restriction.

(7) Establishes a tactical air control system (TACS) required for overall area and internal Air Force air traffic regulation, identification, and air defense operations.

(8) Insures coordination of operations and exchange of information between Air Force and Army facilities assigned air traffic regulation, identification, and air defense functions.

c. Army Component Commander.

(1) Establishes and employs an Army air defense system and an Army air traffic regulation system, exercising control delegated by the air defense commander/airspace control authority.

(2) Furnishes communications necessary to link Army air traffic regulation and air defense facilities to Air Force traffic control and air defense facilities.

(3) Designates an Army air defense officer for the JTF (normally the senior ADA officer).

d. Army Air Defense Officer.

(1) Employs the Army air defense weapon systems in defense of the combat area in accordance with the joint air defense plan.

(2) Provides ADA personnel for duty with tactical operations centers.

(3) Provides liaison personnel to the tactical air control center (TACC), control and reporting center (CRC), and control and reporting post (CRP), as required.

(4) Recommends deployment of Army air defense weapon systems and assists in preparation of the air defense plan.

(5) Participates in planning and coordinating the use of airspace with aviation and other staff members as appropriate. The plan will be coordinated with the TACC and/or CRC to minimize mutual interference of Army/Air Force activities.

6-13. Joint Air Defense Plan

The joint air defense plan specifies the air defense mission, enumerates available forces by types and numbers, outlines logistical support, and describes the scheme of operations. It will also include the specific command, control, and organization arrangements within which the air defense function is accomplished. The plan must provide for—

a. Centralized direction and maximum decentralized authority to engage hostile aircraft and other air vehicles commensurate with identification capability.

b. Compatible Army, Navy/Marine, and Air Force electronic coordination and control means, operationally connected, whenever air defense forces of these services are operating within a region.

c. Coordination of effort and unity of action, to include close coordination with sea-based and adjacent air defense commanders.

d. Rapid reaction.

e. Warning to friendly military forces and civil authority as appropriate.

f. Minimum mutual interference among operating forces and with all services primary functions.

g. Safeguards to preclude inadvertent engagement of aircraft.

h. Continued effective air defense if command, control, and communication systems should be degraded.

Section IV. INDEPENDENT CORPS EMPLOYMENT

6–14. General

The fundamentals of employment discussed in sections I and III are applicable to independent corps operations. In addition to the basic fundamentals of employment, those Hawk operational concepts peculiar to independent corps operations are included in this section.

6–15. Concept of Employment

It is anticipated that an independent corps normally will function as the Army component of a joint or unified command. The geographical region in which this corps will operate and the composition and strength of the enemy forces will influence the corps structure. Assuming the independent corps is composed of three infantry divisions with two divisions committed and one division in reserve, three SP Hawk battalions may be assigned to this independent corps. Each division would have an organic Chaparral/Vulcan battalion for low-altitude air defense. In addition, Redeye teams organic to infantry, tank, and field artillery battalions and cavalry squadrons would supplement the low-altitude air defense by providing these forward units with a self-defense capability. For planning purposes, an additional Hawk battalion normally would be attached to the corps for each additional division. The concept of employment of the Hawk missile units is essentially the same for an independent corps as for a corps in a field army with the exception that, if towed Hawk battalions are employed, they normally will be positioned less than 30km from the FEBA. Figure 6–8 illustrates a possible deployment plan. The ADA group command post is collocated with the Air Force control and reporting center (CRC). Two Hawk battalion command posts are located near the division rear boundaries. Each controls two Hawk batteries in its division area and two Hawk batteries deployed in the corps area to assist in defense of corps vital area installations. The third Hawk battalion command post is located in the corps service area from which it controls the four firing batteries in the corps rear area. Two batteries are providing air defense of the two ports, one battery is defending an airbase, and the remaining battery is providing air defense of the other priority military installations.

6–16. Command and Control

One air defense artillery group headquarters is allocated to the corps to provide centralized planning and direction of assigned or attached air defense units. The group coordinates the activities of the subordinate air defense artillery battalions and also functions as the operational link between higher air defense headquarters and the other Army air defense units of the independent corps. The AN/MSG–4 (Missile Monitor) command, control, and coordination system provides a two-way automatic data link from the Army air defense group to the Hawk battalions and

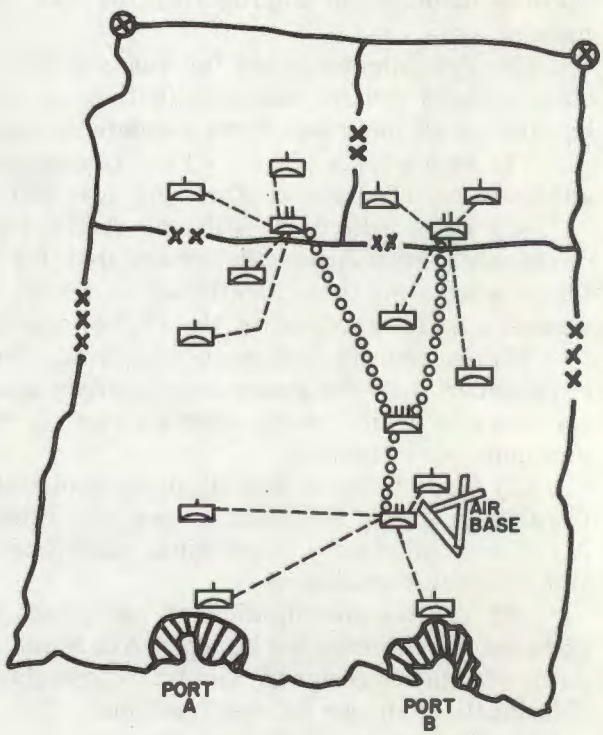


Figure 6–8. Hawk deployed with independent corps.

their firing batteries. All Hawk units linked to the command, control, and coordination system can be furnished air defense and target information. Data inputs can be fed into the system from all participating elements. As in the field army combat zone, the group and battalion Army air defense CP personnel maintain coordination with the supported Army force, Army aviation facility, and tactical Air Force facility at the corresponding level of command. Chaparral/Vulcan (C/V) battalions maintain liaison with the closest Hawk battalion AADCP in the same manner as prescribed for combat zone operation located at the Hawk battalion AADCP will relay early warning, conditions of readiness, and other tactical information to the C/V battalion AADCP.

6–17. Combat Service Support

Requirements for combat service support are fulfilled by the Corps support command (COSCOM). This is a tailored organization which can be expanded or reduced as required. A corps support brigade assigned to the COSCOM, with the added units of the theater army support command, normally performs the combat service support functions for a corps. In addition to normal supply, specific missile unit requirements are provided. Guided missile general support maintenance units assigned to the general support ammunition battalions provide maintenance support to missile firing units in the corps area.

Section V. INDEPENDENT DIVISION OPERATIONS

6–18. General

An independent division may be employed as the Army element of a joint force. The geographical region in which the division will be employed will influence the type force to be organized. Also the type operation, such as amphibious, shore-to-shore, airborne, or airmobile, will determine the composition of the force which would be most effective. Independent divisions may be infantry, airborne, airmobile, armored, or mechanized infantry divisions. A Chaparral/Vulcan battalion will be organic to each independent division to provide low-altitude air defense. Depending upon the air threat, Hawk units may be attached to the independent division. If attached, the allocation of Hawk units normally will be one SP Hawk battalion per independent division. When the airmobile division is operating as an independent division or when Hawk is required for Phase I airborne operation, the towed Hawk battalion should be allocated.

6–19. Command and Control

When a Hawk battalion is authorized, it may be attached to the division. Subordinate elements of the Hawk battalion may be attached to or placed in support of the maneuver elements of the division. The task force air defense commander prepares rules of engagement and other weapon control and coordination measures for approval by the task force commander. The Hawk battalion may be equipped with the AN/TSQ–38, battalion operations central, to provide control and coordination for its missile batteries. When a Chaparral/Vulcan battalion and a Hawk battalion are assigned to an independent division, a battalion group will be formed. Due to the inherent capabilities of the Hawk command, control, and coordination system, the Hawk battalion AADCP should be employed as the battalion group AADCP; however, the commander of the organic battalion normally will be designated the battalion group commander. The AADCP communications will be used to relay early warning, identification, conditions of readiness, and similar tactical information to the Chaparral/Vulcan battalion command post and its batteries. One way this can be accomplished is by using the AM radio receiver-transmitter authorized the liaison section of the Chaparral/Vulcan battalion to transmit such information over an operations-intelligence radio net. Control and coordination to the Hawk missile batteries will be exercised through the normal ADL from the battalion operations central to the data converter (AN/GSA–77) at each battery.

6–20. Independent Division in Amphibious Operations

a. Responsibilities for Air Defense Planning.

(1) *Amphibious task force commander.* The amphibious task force (ATF) commander (usually a naval officer) is initially responsible for air defense planning. He will—

(*a*) Establish responsibilities and broad guidance for air defense and airspace control within the combat area.

(*b*) Coordinate plans for early warning, surveillance, and emergency control of air traffic and air navigational aids.

(*c*) Determine the general policy for priorities for air defense.

(*d*) Allocate air defense resources.

(*e*) Establish air defense sectors. The area generally conforming to the final division landing force beachhead area normally will be established as an air defense sector to facilitate employment of landing force air defense weapon systems and ultimate passage of control of air defense ashore.

(*f*) Establish air defense restricted areas as required (an area in which special rules for the operation of aircraft pertain).

(*g*) Designate an amphibious task force air defense commander (normally a naval officer). (If the Air Force furnishes the preponderance of air support, an Air Force officer will be designated.)

(2) *Amphibious task force air defense commander—*

(*a*) Implements the ATF commander's broad guidance on air defense and airspace control.

(*b*) Prepares the air defense plan for the overall air defense of the area in coordination with the other services involved for approval by the ATF commander.

(*c*) In coordination with force commanders from the other services, prepares air defense procedures and rules of engagement for approval by the ATF commander.

(*d*) In coordination with the landing force commander, establishes the procedures for air traffic regulation and identification within the combat area for approval by the ATF commander.

(*e*) Establishes a TACS required for overall area and internal Navy/Air Force air traffic regulation, identification, and air defense functions.

(*f*) In conjunction with the landing force commander, he may designate specific areas and/or corridors in which landing force organic aircraft can fly with minimum restriction.

(3) *The Army landing force commander—*

(*a*) Designates an Army air defense officer.

(*b*) Determines Army landing force requirements for air defense.

(*c*) Submits requirements for support of the Army landing force air defense effort to the amphibious task force commander along with a statement of Army landing force air defense capabilities.

(*d*) Insures that Army air defense means are available and allocated in the proper numbers and types to permit establishment of an effective land-based air defense system.

(*e*) Insures early establishment of land-based early warning radars ashore.

(*f*) Establishes necessary Army air defense by landing force ADA units.

(4) *Landing force Army air defense commander—*

(*a*) Recommends deployment of Army air defense artillery weapon systems and assists in preparation of the air defense plan.

(*b*) Participates in planning and coordinating the use of airspace with aviation and other staff members as appropriate.

(*c*) Initially collocates his CP aboard ship with the amphibious force supporting arms coordination center (SACC).

(*d*) Provides ADA personnel for duty with the AEC in the DTOC.

(*e*) Provides liaison personnel to the Air Force or Navy control facilities as they become operational ashore.

(*f*) Employs the Army air defense artillery weapon systems in defense of the combat area in accordance with the JTF air defense plan.

(5) *Air defense artillery unit commanders—*

(*a*) Conduct rehearsals of embarkation and landing of their units if shipping is available. If not, these operations will be simulated.

(*b*) Prepare plans for embarkation and landing.

(*c*) Select approximate locations for their units based on the landing force commander's air defense plan.

(*d*) Train all personnel on their duties while embarking, en route, and during land operations.

b. Location of AADCP Prior to Landing. The senior Army ADA officer normally will be designated the landing force Army air defense commander. His command post must be established aboard the command ship which contains the SACC so that he is kept abreast of the situation on the ground as well as in the air. This is done so that he can insure the air defense artillery unit landings are made in a timely and tactically logical manner. It is desirable that he remain afloat until his control and coordination system is operational ashore; otherwise, he will be in no position to coordinate the employment of his air defense artillery units. ADA operations personnel should be assigned to the SACC. It may be

necessary to augment the command ship's radios by utilizing landing force radios on board. During the planning effort, the amount of augmentation materiel must be determined, and effective amphibious task force/landing force air defense coordination procedures must be established.

c. Priority for Landing of Hawk Battalion.

(1) Hawk batteries should be landed behind their associated maneuver brigades as soon as air defense positions have been made available. Consideration should be given to the vulnerability of these positions to enemy artillery fire. The landing of the Hawk firing batteries normally will be a phased movement with Hawk AFU landing on call. If the situation permits, it is preferable to land complete Hawk batteries with their greater firepower and coordination capabilities. If this is not possible because of the tactical situation, the remainder of the firing batteries should follow the AFU's as soon as possible. The landing should take place at beaches which will expedite movement to preplanned air defense sites which provide coverage of the supported division. It may be necessary that the AFU's be emplaced initially in the beach area until such time as personal reconnaissance of the preplanned air defense sites insures that these positions are reasonably secure from hostile artillery fire. If little or no opposition is expected and an SP Hawk battalion is attached to the division, the SP platoons could be phased into landing in scheduled waves with the brigades they are supporting. SP platoons can be landed earlier than towed Hawk units because of their greater mobility. The SP Hawk platoons could emplace initially in the beach area until such time as preplanned sites have been reconnoitered and local security is provided at these sites. If the enemy situation is doubtful, all Hawk elements should be landed on call after reconnaissance of proposed air defense sites indicates they can be occupied.

(2) In the second phase of the operation, the battalion AADCP will be established ashore. After it has established communication with its firing batteries and has become operational, it will continue to control the fires of the Hawk batteries through the organic command, control, and coordination system. The battalion AADCP will maintain the necessary coordination with the ground-based tactical air direction center (TADC) utilizing nets similar to those initially established. Figure 6–9 illustrates how a Hawk battalion might be deployed in support of an independent division in an amphibious operation. First priority for occupying positions would be the Hawk battery providing air defense for the airbase.

d. Coordination of Air Defense Fires. The amphibious task force commander will provide air defense of the force afloat and also air defense of the landing force throughout the conduct of amphibious operations, employing organic means and such special air defense augmentation forces as may have been requested and attached for the operation. As the Hawk missile batteries become operational ashore, initial coordination of the fire of the Hawk units will be accomplished by the SACC aboard ship. This will be done by voice radio net. In the buildup of air defense control facilities ashore, lightweight ground radars will be brought in initially for establishment of Air Force forward air control posts (FACP) or equivalent Navy control facilities. Coverage can be augmented by aircraft with airborne radars to provide early warning. When airlift capability permits, long range radars will be brought in and the CRC or equivalent Navy facility established. Once this has been accomplished, the Air Force or Navy can install its TACC ashore. After establishment of the TACC ashore and by mutual agreement of the ATF and landing force commanders, all control of the air defense effort in the amphibious objective area will be transferred to the TACC ashore. In this final phase, and until such time as the amphibious task force ships depart, the landing force TACC will exercise operational control of all assigned air defense means in the area including the air defense afloat. The Hawk battalion AADCP, if at all

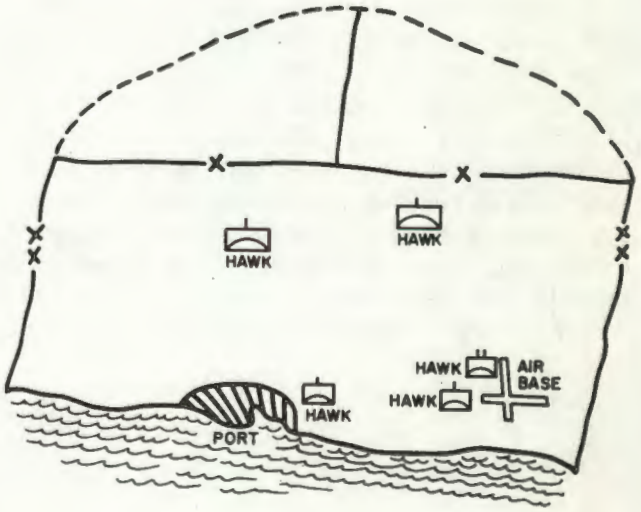


Figure 6–9. Hawk in support of an amphibious operation.

possible, should be collocated with its corresponding level of landing force air defense control. If collocation is not possible, a liaison detachment must be maintained by the Hawk battalion at the controlling facility, and communications must be maintained between the two facilities. Figure 6–10 illustrates the communications and control channels which might be employed.

e. Rules of Engagement. As indicated previously, the ATF commander gives final approval of the rules of engagement to be followed during the amphibious operation. After the landing force has been established ashore, the Army air defense commander has assumed operational control of the Army air defense means, and the amphibious force has departed, it may become necessary to modify the rules of engagement.

6–21. Combat Service Support

The requirements for combat service support for the independent division normally are fulfilled by tailoring a corps support brigade. The brigade exercises command, control, and supervision of a medical battalion, a transportation group, support battalions, military police (MP) battalion, and necessary detachments. In addition to the normal supply and administrative functions, it provides for specific missile unit requirements. One special ammunition supply point (SASP) can be established for missiles. The GM maintenance company contains a missile maintenance platoon for the Hawk missile system.

6–22. Independent Divisions in Irregular Deployment

a. Figure 6–11 illustrates two divisions which have been deployed at considerable distances from each other. In addition, a brigade from one division has established itself far inland to protect or clear critical routes of communications. As illustrated, the three areas are separated to such an extent that the Hawk missile batteries cannot furnish mutual support or overlapping fires. Therefore, these three areas must be considered as three separate vital areas which require individual air defense.

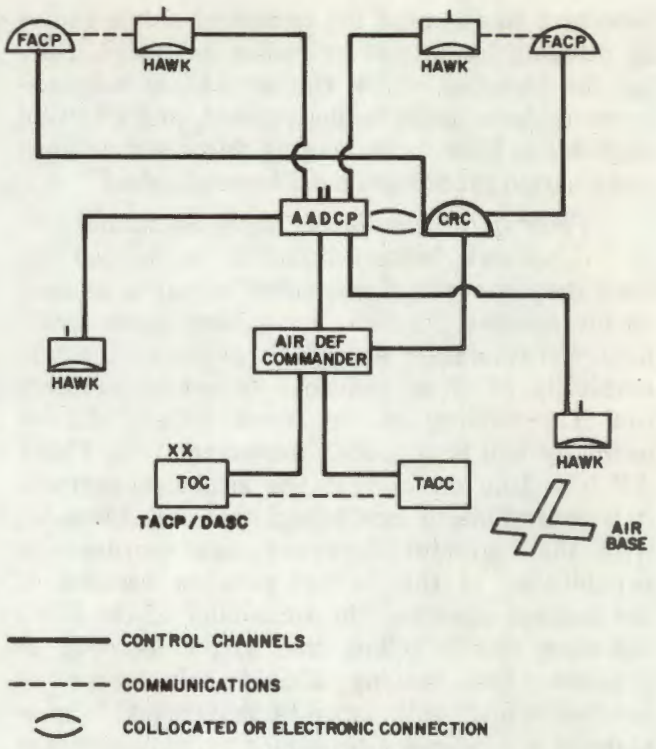


Figure 6–10. Communications and control channels (independent division in an amphibious operation).

b. It can be assumed that the Air Force has established its TACS and that a TACC and a CRC have been installed at the airfield complex near the port city. Accordingly, the Air Force will exercise operational control over all air defense means providing air defense for the port city and the airfield complex. Airborne early warning and control (AEWC) aircraft can be used on low-altitude orbiting stations to provide radar surveillance for the brigade deployed forward. A forward air control post (FACP) should have been established by the Air Force in the forward brigade area to maintain radio contact with friendly Air Force aircraft. This FACP should be collocated with the Hawk missile battery or maintain contact with it. The Hawk missile battery also will maintain communication with the flight coordination center (FCC) and airspace control element (ACE) so that the battery commander may be kept aware of airborne friendly Army aircraft within his sector of AD responsibility.

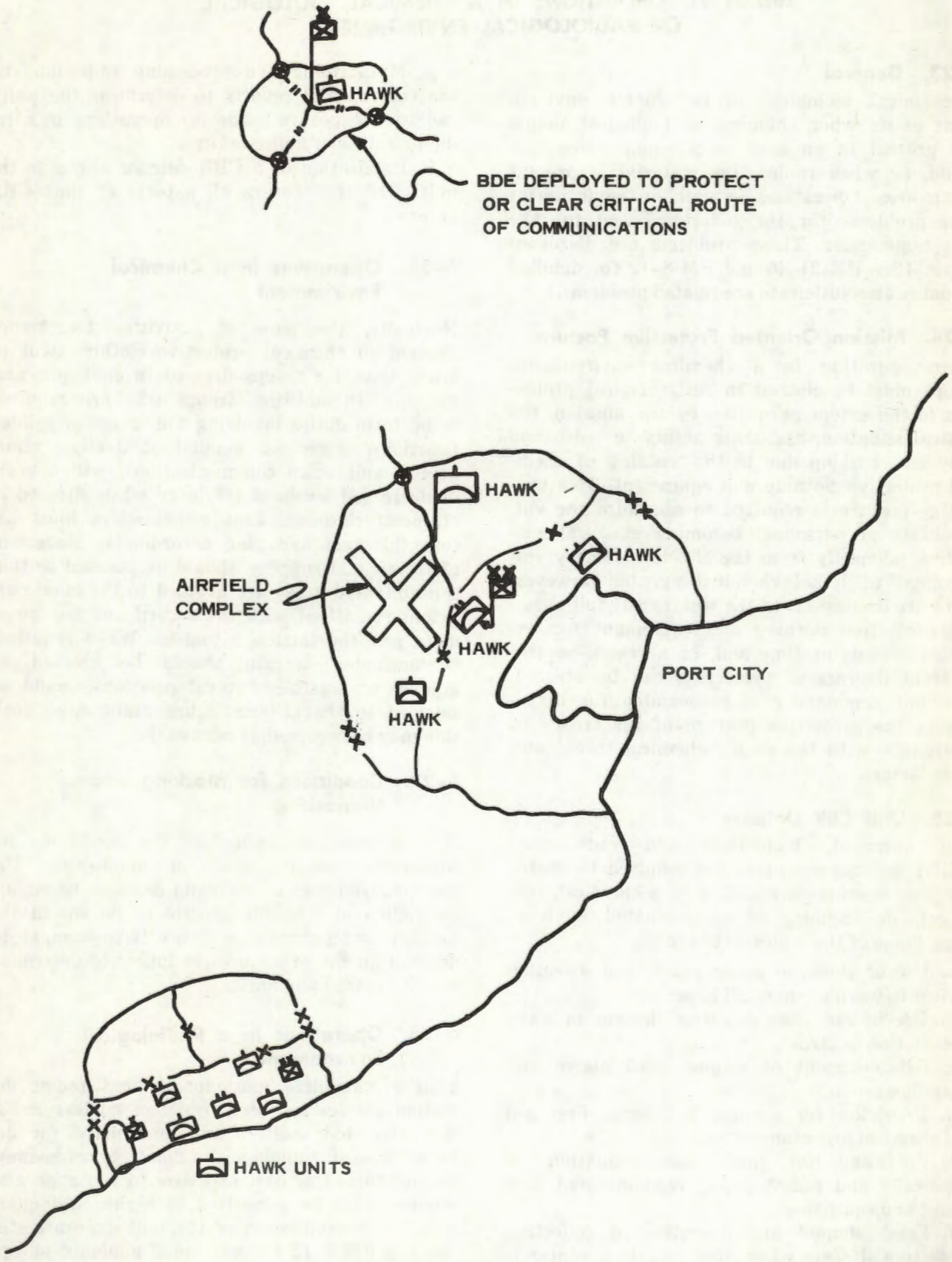


Figure 6-11. Hawk in irregular deployment.

Section VI. OPERATIONS IN A CHEMICAL, BIOLOGICAL, OR RADIOLOGICAL ENVIRONMENT

6–23. General

A chemical, biological, or radiological environment exists when chemical or biological agents are present in an area as a vapor aerosol or liquid, or when radioactive material is present in an area. Operations in such an environment pose problems for the individual and for the unit commander. These problems are discussed below. (See FM 21–40 and FM 3–12 for detailed guidance on solutions to the related problems.)

6–24. Mission Oriented Protective Posture

When operating in a chemical environment, troops must be clothed in full chemical protection to the extent permitted by the mission, the tactical situation, and their ability to withstand body-heat buildup due to the wearing of chemical protective clothing and equipment. This protective posture is required to minimize the vulnerability of personnel becoming chemical casualties, primarily from the effects of enemy employment of lethal chemical agents. However, there are limitations to the wearing of full chemical protective clothing and equipment for extended periods of time and, as a result, several different degrees of protection can be utilized. The unit commander is responsible for determining the protective posture of his troops in accordance with the enemy chemical threat and other factors.

6–25. Unit CBR Defense

Unit chemical, biological, and radiological (CBR) defense measures are required to enable troops to operate successfully in a chemical, biological, or radiological contaminated environment. Some of these measures are:

a. Use of chemical agent alarm and detection devices to warn of chemical hazards.

b. Use of radiation detection devices to warn of radiation hazards.

c. Establishment of a unit CBR alarm and warning system.

d. Provision for prompt individual first aid and chemical decontamination.

e. Providing for unit decontamination of chemically and radiologically contaminated personnel and equipment.

f. Establishment and operation of collective protective shelters when operating in a contaminated environment. See TM 3–221 for details.

g. Maintaining and processing radiation status records and reports to determine the unit's radiation exposure guide for operations in a radiologically contaminated area.

h. Publication of a CBR defense annex to the unit SOP that covers all aspects of unit CBR defense.

6–26. Operations in a Chemical Environment

Normally, the pace of activities for troops dressed in chemical protective clothing will be lower than for troops dressed in environmental clothing. In addition, troops who are required to perform duties involving the senses or related functions, such as manual dexterity, visual acuity, and voice communications, will operate at decreased levels of efficiency while dressed in chemical clothing. Unit commanders must accept this fact and plan accordingly. Movement of troops and supplies should be planned so that contaminated areas are avoided to the maximum extent consistent with the security of the movement and the tactical situation. When required, contaminated terrain should be crossed as quickly as possible. Several positions should be selected so that alternate uncontaminated position may be occupied, if necessary.

6–27. Conditions for Masking and Unmasking

Troops must be trained in the conditions for automatic masking and for unmasking. Unmasking requires a command decision based upon judgment when it is safe to do so. In the absence of command guidance, troops must be advised on the procedures to follow to determine that it is safe to unmask.

6–28. Operations in a Radiological Environment

Unit commanders must insure that radiac detection devices are used to detect nuclear radiation and that shelters are constructed for defense against radiological fallout. Records must be maintained of unit exposure to radiation and reports must be submitted to higher headquarters for determination of the unit exposure status. See FM 3–12 for additional guidance on operations in a radiological environment.

CHAPTER 7

RECONNAISSANCE, SELECTION, AND OCCUPATION OF POSITION (STANAG 2112, SEASTAG 2112)

Section I. GENERAL

7-1. Purpose

The purpose of reconnaissance, selection, and occupation of position (RSOP) is to move a Hawk unit from a position, bivouac area, rendezvous, or march column into a position from which the unit is able to deliver effective fire to accomplish its mission. Movements are accomplished as required to support the maneuver plan, or as a survivability measure.

7-2. Definition of Terms

a. Position Reconnaissance. Position reconnaissance is the examination of terrain to select a position from which weapons and troops can best accomplish the mission. Some of the factors for consideration are location and boundaries of installation or unit to be defended; fields of fire; battalion radar sites; access routes to, from, and within the position area, and routes of communication; communications capability; location of friendly and enemy troops; probable enemy observer positions; communication and electronic security; cover and concealment; dispersion; drainage; and local security. Reconnaissance should be carefully planned and the reconnaissance party should be limited to the personnel and vehicles actually required. The reconnaissance for, and the selection of, the positions are normally accomplished by the major unit commander together with the subordinate unit commanders.

b. Selection of Position. Factors affecting the selection of position area are the mission, size of the defended area, terrain and weather conditions, weapon characteristics, chemical, biological and radiation hazard, and the tactical situation. Position areas which provide for communication and electronic equipment security, concealment, defilade for nonfiring elements, sufficient space and dispersed equipment locations, and terrain suitable for ground defense of the unit are desirable, but the essential requirement of the position is that it permits the unit to accomplish its mission. Thus, for Hawk, low-altitude sectors of fire are a governing consideration.

c. Classification of Position Areas. Hawk positions are classified tactically as primary, alternate, dummy, and decoy.

(1) A primary position is one from which the unit intends to accomplish its tactical mission. Each position should be improved for permanent occupation as time permits, even though the tactical situation may dictate displacement of the unit at any time.

(2) An alternate position is one to which the Hawk unit moves when the primary position becomes untenable or unsuitable for carrying out its task. Therefore, the alternate position should meet all of the requirements of the primary position. It should be close enough to the primary position to permit rapid displacement to it, 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.

(3) A dummy position is one designed to resemble a real air defense position. It is designed to mislead the enemy as to the location and number of air defense units. Dummy positions are 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. Hawk dummy positions should be tactically integrated with the actual Hawk positions.

(4) A decoy position is very similar to the dummy position. The difference is in purpose and degree of authenticity. A decoy position is intended to cause the enemy to commit action which would 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 systems in consonance with the force commander's plans for counterintelligence interception. Hawk decoy positions should be tactically integrated with the actual Hawk positions. To achieve the desired degree of authenticity, consideration should be given to the generation of radiation patterns for decoy or dummy positions that resemble the electronic signatures of an actual Hawk unit. The planning and conduct of deception operations is discussed in FM 31–40.

d. Occupation. The actual occupation of the position areas should be orderly, rapid, and quiet. So far as possible, it should conform to unit SOP. Speed in execution is obtained by planning and organization, a high degree of training, good reconnaissance, careful selection of position areas, and briefing of the occupation plan to at least one member of each section. Actual occupation of position is directed and supervised by the local commander or executive officer. Fire control equipment and launchers are emplaced first; then positions are improved progressively as time permits. When possible, position signature, such as altered vegetation and track marks, should be prevented or eliminated. When permitted by the tactical situation, occupation of position should be conducted under cover of darkness.

7–3. Types of Reconnaissance

a. There are two general classes of reconnaissance, position reconnaissance and route reconnaissance. Usually reconnaissance for position and routes is performed simultaneously; however, either may be performed separately.

(1) The reconnaissance for position is made for the purpose of selecting the actual positions on the ground for the location of the major items of equipment and functional areas in the battery: radars, control equipment, launchers, the assembly and service area, and the necessary administrative areas.

(2) Reconnaissance for routes is made for the purpose of selecting routes suitable for moving to and from a selected position in a minimum amount of time, with minimum disruption of tactical activities, while maintaining unit security.

b. Of the two classes of reconnaissance (position and route), there are four types of each—map, photographic, aerial, and ground.

(1) A map reconnaissance precedes a ground or aerial reconnaissance and is used as the basis for planning the reconnaissance. Map reconnaissance generally is the type accomplished by group and higher headquarters and gives the lower headquarters the maximum amount of time in which to accomplish the more detailed ground reconnaissance. Advantages of this type are its ease of use, safety (because it may be made in a sheltered location with the equipment in the present command post), reconnaissance of a large area in a short period of time, and the uniformity of information obtained by many individuals at the same time. Disadvantages are the inaccuracies inherent in maps, lack of detailed information available on maps, and the many instances where maps are out of date.

(2) Photographic reconnaissance is similar in purpose and scope to a map reconnaissance except that information contained on the photograph usually will be more detailed and more accurate than that contained on maps. A photograph presents the terrain and man-made objects as they actually appear, which is more useful than map symbols, and the scale of the photographs normally will be larger than the available map coverage. All types of photography can be used for reconnaissance; however, vertical and oblique photography used together will provide the best pictorial presentation of the area. The disadvantages of map reconnaissance discussed in (1) above are either eliminated or considerably improved upon by the use of photographic reconnaissance to supplement or replace the map reconnaissance.

(3) The third type of reconnaissance is aerial reconnaissance which is often used preceding a ground reconnaissance. Advantages of aerial reconnaissance are that it is often possible, though difficult, to reconnoiter terrain held by the enemy; a large area can be reconnoitered in a short time; and with trained observers, it reflects more accurate and current information. Some of the disadvantages are the limited number of aircraft available to air defense artillery units for this purpose, the inability to obtain detailed information about the terrain without repeated flights over the area, and the lack of detailed information on soil conditions. Photography should be used after an aerial reconnaissance to confirm visual sightings. The problem of lack of detailed information on the terrain

and soil conditions can be lessened by accurate analysis of these subjects from photography.

(4) The verifying ground reconnaissance is the most important of the four types. Whenever possible, it should be made by the personnel of the units that will occupy the area or utilize the routes. Ground reconnaissance entails actual inspection of the terrain for the purpose of verifying its suitability for positions or routes. It offers accurate, up-to-the-minute information and, at this point, should answer most of the commander's questions as to the suitability of the terrain. Some of the disadvantages are that only a limited amount of terrain can be reconnoitered and it is time consuming. These, and other tactical considerations, may preclude general reconnaissance in some cases.

c. In executing a reconnaissance, there are certain principles which must be employed. Plan with definite objectives in view. These objectives should include the determination of—

(1) Routes to the new position unless there is a prescribed route.

(2) Positions for the major items of equipment.

(3) Location of the battery command post, bivouac area, and other administrative areas.

(4) Communication security requirements.

(5) Procedures and routes for position occupation.

d. The reconnaissance must be active and timely to allow physical coverage of the area and to permit appropriate planning time. When time is limited, it may be necessary to conduct a decentralized reconnaissance to increase the amount of terrain that can be covered in the time allotted.

Section II. RSOP CONSIDERATIONS

7–4. Planning the 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 the batteries may be designated and overlays given to the battery commanders, along with the orders to displace. Then battery commanders are called to the battalion command post or instructed to meet at a designated location to receive the warning order. The order may be prepared in normal operational order form or may be issued as a fragmentary order. It should contain, but not be limited to, the tactical situation; position areas for batteries; time of movement; local security instructions; order of march; administrative arrangements; and communication instructions. Road priorities and the tactical situation may dictate that the battalion commander limit the number of vehicles in battery reconnaissance parties, but normally the composition of the reconnaissance party is a matter of SOP. The reconnaissance party may include the following personnel:

a. Headquarters Staff.

(1) Battalion commander.
(2) S3.
(3) S2.
(4) Communications officer.
(5) Headquarters battery commander.
(6) Communication personnel.
(7) Representatives from all major staff sections.
(8) Selected personnel for ground security and guides.

b. Hawk Firing Battery (Towed and Self-propelled).

(1) Battery commander.
(2) Communication personnel, including wiremen.
(3) First sergeant.

c. Hawk AFU or SP Platoon.

(1) Platoon leader or assistant platoon leader.
(2) Platoon sergeant.
(3) Communication personnel.

Note. This reconnaissance party is established for a battalion-controlled RSOP and applies equally well to battery and platoon independent operations by deleting the headquarters elements.

7–5. Planning the Reconnaissance

a. The commander's task in getting his unit into position includes reconnaissance for, and selection of, locations for Hawk tactical equipment and command and logistic installations; formulation of the occupation plan; 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 the 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 com-

mander must appoint members of his party to perform portions of the reconnaissance. A position for an installation may be selected initially by any designated member of the party, but the position finally occupied must be approved by the responsible commander.

b. In planning his reconnaissance, the commander considers the following:

(1) Current mission requirements.
(2) New mission requirements.
(3) Distance and route to the new area.
(4) Personnel available and additional personnel required.
(5) Vehicles and equipment required for the reconnaissance and for early preparation of the position (i.e., communication and pioneer equipment).
(6) Siting requirements for radar and communication equipment.
(7) Size, location, and characteristics of the defended unit or installation.
(8) Location for each item of tactical equipment; observers; motor park; ammunition; mess; and petroleum, oil, and lubricants (POL) facilities.
(9) Time available.
(10) Tactical situation.
(11) Ground security requirements.
(12) Chemical or radiological contamination of route and position area.

7–6. Planning the Occupation

a. It is desirable to have a guide lead each vehicle to its place, especially during darkness. If personnel are not available, signs may be used. The guides expedite the movement of vehicles from the column to their selected positions in the battery area without delaying the column or prompt clearance of the road.

b. Separate entrance and exit routes are desirable. When available, established roads and trails should be used. The entrance to the bivouac area of the headquarters battery should be located so that vehicles do not pass through the command post area.

7–7. Procedure

Upon receipt of orders from the battalion commander, the battery commander takes the following steps:

a. Before he leaves the battery to report to the battalion commander for movement orders, the battery commander issues instructions covering operations during his absence. He tells his executive officer (in the case of headquarters battery, the first sergeant) where he is going, when he expects to return, and what he knows of the situation.

b. When the battery commander and his party approach the place where the battalion commander's orders are to be received, the battery commander halts the party, directs dispersion and concealment of the vehicles, and reports to the battalion commander.

c. After receiving the order, the battery commander assembles his party, explains the situation, shows the new 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. If the Hawk unit is to defend a unit during the march, firing positions and/or road guide positions along the route are required; these positions are selected.

d. On arrival at the new area, the battery commander makes a general survey of the area and assigns various duties of the reconnaissance mission to members of his party. Before leaving the area or issuing his orders, the battery commander receives recommendations for the locations of battery equipment and considers them for use in his plan.

e. Radiological survey of the route to the new position, and the position itself, plus alternate routes and positions, are accomplished by a survey party. A party normally consists of a driver and monitor and may be part of, or separate from, the reconnaissance party. The team 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, 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.

f. Areas found to be contaminated with chemical agents should be avoided if possible. When in such areas, personnel should don protective masks and other available protective clothing. Areas should be marked as to type of contamination. Vehicles and equipment should be decontaminated as soon as possible without interrupting the mission. Area marking procedures and proper decontamination techniques are given in FM 21–40.

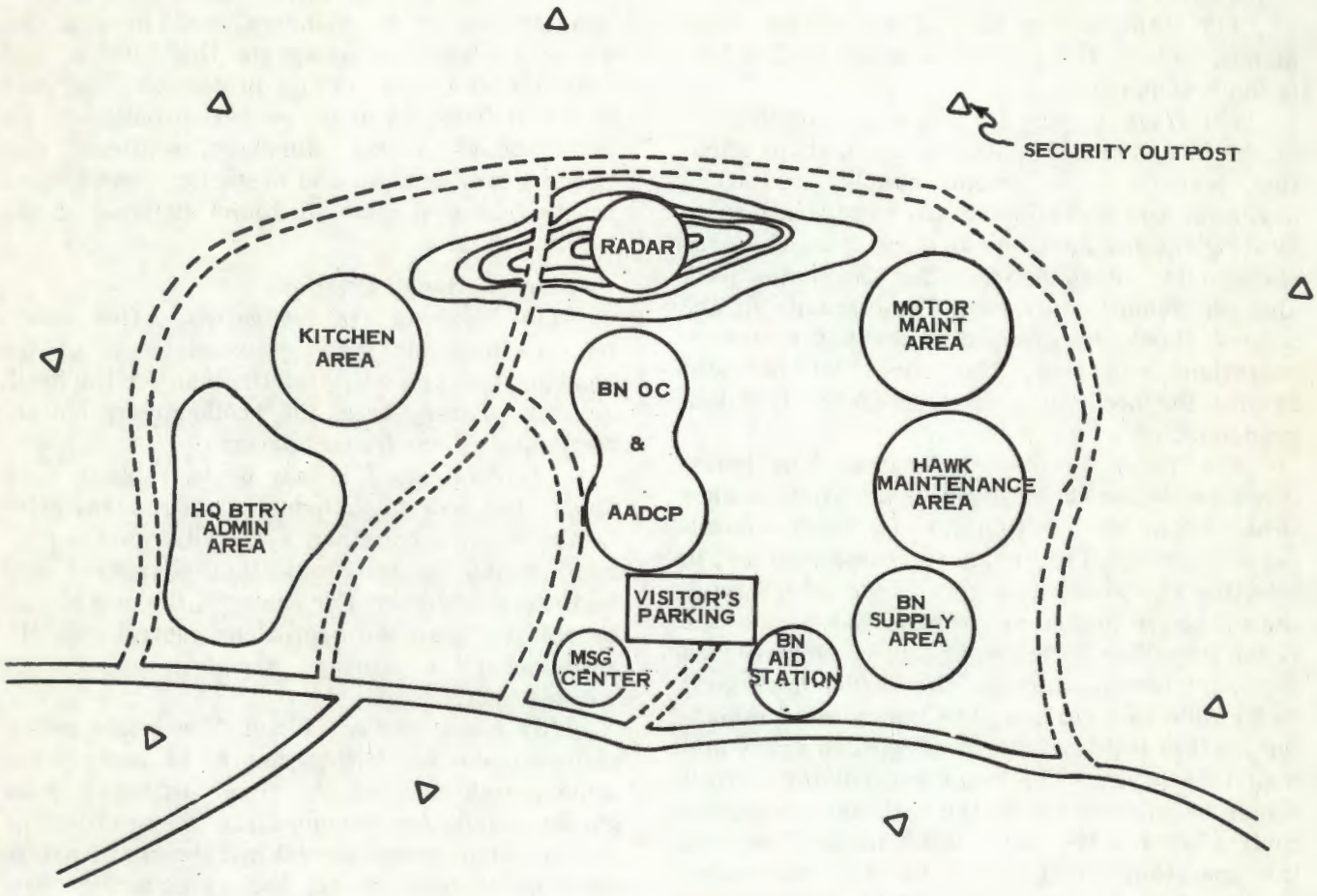


Figure 7–1. Headquarters and headquarters battery position area organization.

7–8. Headquarters and Headquarters Battery Selection and Occupation of Position

a. General. Procedures for positioning the elements of the command post and organizing the position for the towed Hawk and self-propelled Hawk battalion headquarters and headquarters batteries generally are the same (fig. 7–1). The initial reconnaissance may be made by the battalion commander or his designated representative, normally the S3, who would select tentative locations for various installations. Normally, the battalion commander will direct the headquarters battery commander or the S1 to organize the headquarters area. The S1 and the headquarters battery commander must know the desires of the commander and the type of location required by each staff section. To insure efficient operation, they must understand the relationship among the various elements of the headquarters. After an SOP has been developed, the same general layout of the headquarters should be used in each position to attain greater efficiency of operations.

b. Characteristics of Position Areas. In planning the organization of the position area, the commander considers the space available; cover and concealment; security; communications with superior, subordinate, and supported units; and requirements of headquarters battery in regard to mess, maintenance, and bivouac areas. In evaluating the space available, the headquarters battery commander should, in coordination with the appropriate staff officer, consider the locations for the following elements:

(1) Radar surveillance central.

(2) Battalion operations central and AADCP.

(3) Communications center.

(4) Administrative and supply areas.

(5) Headquarters battery installations and bivouac area.

(6) Dismount point.

(7) Local security.

c. Receipt of Orders. If the entire battalion is to displace, all battery commanders and the staff receive their orders at the same time.

d. Selection of Positions.

(1) *Headquarters area.* The battalion commander selects the general location of the battalion headquarters.

(2) *Headquarters battery area.* The location of the battalion headquarters, the tactical situation, security, concealment, supply, sanitation, drainage, and accessibility are considerations in locating the headquarters battery area. The area should offer adequate space for the motor park and maintenance facilities. The elements of the battery should be grouped logically for ease of operations; however, this must be balanced against the need for protection of the battalion headquarters.

(3) *Radar surveillance central.* The battalion commander should conduct a reconnaissance to determine the location for the radar surveillance central. The primary consideration in selecting the location of this radar is achieving the necessary degree of coverage. As a rule, the radar surveillance central should be emplaced on dominant terrain, and the site should have good radar reflecting surface. The best ground reflecting surface is flat and free of wooded areas and manmade objects. The radar surveillance central should be collocated with the battalion operations central because the radar is an integral part of this operation. On the other hand, a good radar location is not always compatible with the requirement for cover and concealment of other headquarters elements. In this case, the radar may be displaced from the primary headquarters area. The displacement of the radar surveillance central should not be excessive because the normal communications link with AADCP is wire. Local security and messing requirements for the radar section are also complicated by excessive distance from the headquarters area.

(4) *Cover and concealment.* The headquarters area should have sufficient defilade to minimize visual or radar observation by the enemy. In heavily wooded areas concealment is available, but it is difficult to find good locations for radar, radios, panel stations, and helicopter pads. In areas of sparse or scattered vegetation, it is necessary to include plans for camouflage. In open terrain, such as desert, elements should be dispersed to make identification of the type of installation more difficult.

(5) *Local security.* The position selected should facilitate organization of local security with the weapons and personnel available. The headquarters and headquarters battery should, if possible, be located to derive some protection from the Hawk firing battery defenses. The headquarters battery commanders should develop local security plans and integrate the defense with adjacent units for mutual protection. The perimeter defense includes prepared positions for machineguns, rocket launchers, sentinels, outposts, alarm devices, and obstacles, located so as to provide a flexible all-round defense of the position area.

e. Occupation of Position.

(1) *Planning the occupation.* 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.

(2) *Equipment.* It may be desirable to move and install a certain amount of equipment prior to the main occupation. Generally, such equipment would be communication equipment and facilities for shelter. For example, the unit should be able to move the operations central into the area, occupy a position, and begin operations without delay.

(3) *Road guides.* When the headquarters and headquarters battery moves as part of the same march unit as the firing batteries, road guides usually are provided for in the orders of the battalion commander. When the headquarters elements displace alone, the headquarters battery commander is responsible for providing road guides.

(4) *Coordination.* Because all headquarters staff elements are affected by displacement of the headquarters battery, the headquarters battry commander should coordinate general plans for movement to, and occupation of, the new area with the battalion executive officer.

(5) *Supervision of movement to, and occupation of, position.* The headquarters battery commander may return from the reconnaissance, assemble certain personnel from the staff sections and headquarters battery, and proceed to the new area in advance of the main column. This party should carry road signs and sufficient personnel to act as guides and to prepare the new area for occupation. In the absence of the headquarters battery commander or the battalion executive officer, a staff officer may be appointed to lead the headquarters battery main column, or the battery commander may assign this duty to the first sergeant.

(6) *Displacement.*

(*a*) The headquarters battery commander must know the capabilities of his battery to move. If, for any reason, he is unable to move in

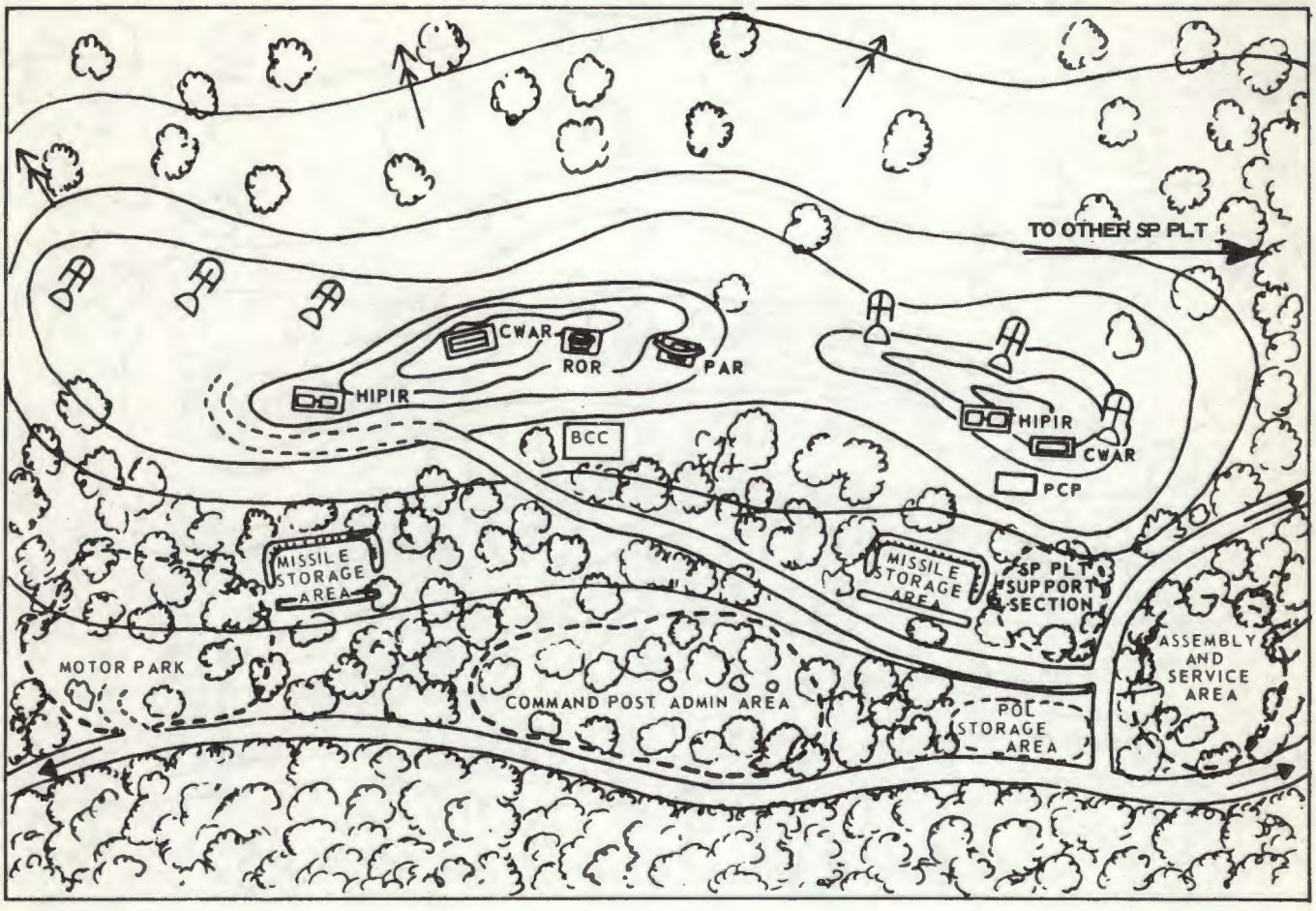


Figure 7–2. Organization of position (SP Hawk battery).

one echelon, he should inform the battalion executive officer and recommend 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. Detailed loading plans in the SOP expedite planning and displacement.

(*b*) When the headquarters displaces by echelon, each staff officer is responsible for the section under his control. He informs the headquarters battery commander as to the number of personnel, the amount of equipment, and the persons in charge of the subdivisions in each echelon.

(*c*) The headquarters battery SOP (loading plans) should provide for movement of the battery by separate 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.

7–9. Hawk Firing Battery (Towed and Self Propelled Hawk)

a. General. The first point to consider is that, prior to moving into position, the occupation should be planned in detail. Second, the occupation of a position should be progressive; the equipment most vital to the accomplishment of the unit's mission is emplaced first. Third, every detail of the reconnaissance, selection, and occupation of position areas must be supervised. This supervision is not limited solely to that of the battery commander. The area is quite large in comparison to that of other type units, and the commander may very well delegate the responsibility for this supervision. The priorities for occupation of positions are: first, to prepare to fire; and second, to improve positions, which includes the construction of fortifications and the establishment of administrative areas. Future moves must be anticipated. All echelons involved in air defense must carry out a continuing process of planning and designing future defenses. This principle involves air defense artillery personnel

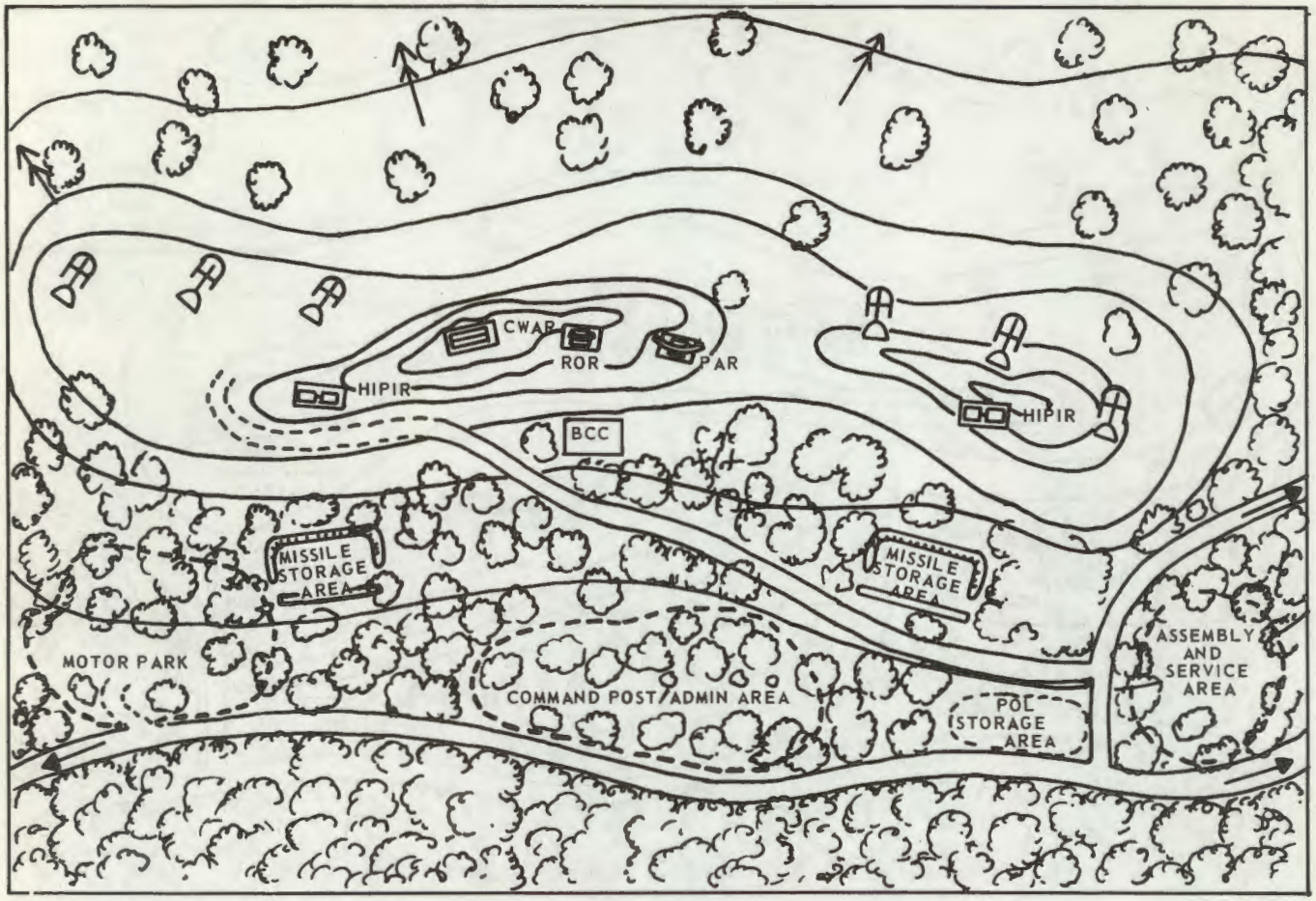


Figure 7–3. Organization of position (Towed Hawk battery).

from the battery level, where the training of personnel for movement is being conducted, up to the highest level of air defense, where the future positions and defenses are being selected. Thus, anticipatory planning is of primary importance at all echelons involved in site selection and occupation.

b. Characteristics of Firing Battery Positions. The position areas for Hawk firing batteries are determined by the terrain available, location of the defended unit or installation, and the weapon characteristics. The Hawk battery positions (figs. 7–2 and 7–3) include the Hawk firing positions, battery control central, missile storage areas, assembly and service area, SP platoon support section (SP battery only), motor park, POL storage area, and command post administrative area. A perimeter defense is established to provide all-round defense of the unit.

c. Receipt of Orders. If the Hawk battery is to displace on order of the battalion commander, the order is received as outlined in 7–4.

d. Selection and Reconnaissance of the Battery Position Area.

(1) *Selection.* The basic principles of selection must be considered; the most important being the tactical mission. Hawk units should be located on terrain suitable to the type of battery being employed. The terrain generally must be level and firm, with adequate drainage, and must be of a type that will remain suitable under all possible weather conditions. The site selected should facilitate control and support of the unit. The protection of personnel and equipment must be considered when selecting the positions; they should be those that offer the best possible conditions for the protection of personnel and equipment so long as such protection does not adversely affect the accomplishment of the mission. Reconnaissance is made for the purpose of selecting routes suitable for moving to and from a selected position in a minimum amount of time. Factors affecting site selection for the Hawk missile system, are—

(*a*) Commanding terrain is required for CW radars to exploit low-altitude target detection and tracking.

(*b*) Line of sight is required between the HIPIR and launchers of each section.

(*c*) Radars are separated from each other a sufficient distance to prevent mutual masking.

(*d*) Launchers are separated from all other items of equipment a distance sufficient to insure safe operation.

(*e*) Equipment with high-velocity moving parts; i.e., generators, engines, etc., should be revetted or located away from the CW radars to minimize CW clutter.

(*f*) Cables that connect major items of equipment are limited in length (figs. 1–5 and 1–10).

(2) *Reconnaissance.* When the battery commander arrives at the new battery position area with his party, he first determines location and boundaries of the unit or installation he is to defend. He inspects the surrounding terrain to determine avenues of approach and possible tactical equipment locations. He then begins his ground reconnaissance to select the location of main tactical equipment and 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 and section chiefs select individual launcher locations based on guidance from, and general areas assigned by, the battery commander. Continuous practice of SOP will greatly simplify and hasten the reconnaissance of position. Whenever possible, the battery commander should personally select the location of the battery radars, and these positions normally are selected before any other part of the reconnaissance is performed. During the ground reconnaissance, the battery commander, time permitting, should also determine—

(*a*) The map coordinates of each radar position and the center of the battery so the defense analysis can begin immediately and necessary adjustments in radar locations can be accomplished quickly. (If positions are selected by platoon leaders, they immediately report radar map locations and sectors of fire so defense analysis can be made and adjustments directed, if required.)

(*b*) The positions of local security weapons.

(*c*) The entrance and exit routes to the battery headquarters area.

(*d*) The established primary and secondary sectors of fire.

(*e*) The location of the command post, motor park, and missile storage areas.

e. Position area.

(1) After the position has been selected, the battery commander, assisted by his party, locates and stakes positions for each major item of equipment or activity and designated routes to the position.

(*a*) The radar sites are selected first, with first priority being given to the CW acquisition radar and then the illuminator radars, as their positions require dominating terrain to exploit their low-altitude detection and tracking capabilities. The pulse acquisition and range-only radars perform best in flat sites that are free of wooded areas and irregular terrain. Location of ideal sites for all radars, located within cable length limitations, may not be possible, and compromise will be necessary.

(*b*) Launchers must be emplaced at a minimum of 61 meters (200 feet) from each other; this distance may be lessened with suitable barricade protection between them, to permit safe reloading of one launcher while an adjacent launcher is firing. Launchers must be located a safe distance from other equipment, areas used by personnel during operation, and complete bunds. Launchers must be within one cable length of their associated LSCB and generator.

(*c*) The BCC should be located in a defiladed or concealed position and must be within cable length of both acquisition radars, the range-only radar, the fire control generator, and both illuminators.

(*d*) The maximum slope leveling capability is 10°.

(*e*) Line of sight is necessary from the PAR to the CWAR and HIPIR and between the HIPIR and the ROR. Line of sight is desirable between each HIPIR and its associated launcher.

(*f*) To minimize CW radar clutter, equipment with blower fans should be situated with fans pointing away from the radars and be barricaded or placed in defilade.

(2) The message center should be located as close to the entrance of the CP as possible to reduce vehicle traffic throughout the CP area.

(3) The service platoon leader, with guidance from the battery commander and assisted by the missile assembly sergeant, lays out the

missile assembly and service area and missile storage area.

(4) The firing platoon leaders assist the battery commander in selecting positions for tactical equipment.

(5) The executive officer and first sergeant recommend a local defense plan to include the location of machineguns and grenade launchers.

(6) The motor sergeant, with guidance from the battery commander, lays out the motor park area with separate entrance and exit routes, if possible.

(7) The battery commander and first sergeant determine the location of the administrative and bivouac areas.

(8) The reconnaissance party checks for mines and clears and marks paths required for rapid occupation. This party also checks for CBR contamination.

(9) Communications personnel will install wire lines in such manner as to prevent traffic from disrupting circuits during occupation.

(10) The firing platoon leader sets up and orients the aiming circle at the pulse acquisition radar site. Consideration must be given to night orientation.

(11) Time permitting, preparation of fortifications is begun.

f. Displacing the Battery.

(1) 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 the release point. The battery executive officer usually commands the battery march unit. Security measures to be taken on the march and upon arrival at the position should be prescribed in the battery SOP.

(2) At times the battery commander may control the displacement; when he does, the essential elements for column control, described above, either must be a matter of SOP or must be announced.

(3) The formation of the battery column should remain the same regardless of the headquarters controlling the movement. The convoy should be organized so that the 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.

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

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

(*b*) The road is crowded and road clearances cannot be obtained for the entire battery.

(*c*) The road is under artillery attack.

(5) When moving by echelon, the first echelon might typically consist of the CWAR, the AFCC, one illuminator, the scoop loader, three launchers, generators, pallet and loader, and other supporting equipment. The second echelon would have the remainder of the battery's equipment. Unit SOP should provide for these two echelons in the march column with a short time separation in movement. Each echelon would consist of a complete fire unit (BCC or AFCC with associated equipment) to prevent complete destruction of the battery's capabilities should one echelon be attacked while moving.

g. Occupation of Position.

(1) *General.*

(*a*) The actual occupation of position must be thoroughly planned to prevent confusion and to save time. The battery and defended installation are extremely vulnerable during the occupation.

(*b*) When the battery arrives at the position, all vehicles should be moved off the road into the position area without halting or closing the interval between vehicles. Guides should lead each vehicle to its proper location. As soon as vehicles are unloaded, they should be guided to the motor park or other designated point. Equipment should be unloaded quietly, quickly, and orderly. Noise should be held to a minimum so that commands and other necessary instructions may be heard. Previous training will insure that a minimum of orders and instructions are necessary.

(2) *Night occupation.*

(*a*) Practice in night occupation of position is necessary to insure smooth operation. When time and the situation permit, daylight reconnaissance should be made by all key personnel, including drivers. This may be accomplished by 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 position in the area. In making a reconnaissance prior to a night occupation, marking stakes are used to identify tactical equipment positions. An identifying tag or tape with lettering that can

be read under blackout conditions is attached to each position stake. Night occupation also may be facilitated by accomplishing certain other tasks during daylight when time allows. Some of these tasks are—

1. Leveling tactical equipment sites.
2. Laying wire.
3. Constructing equipment parapets and digging foxholes.
4. Preparing the CP.
5. Installing light reflecting devices on equipment position stakes.
6. Marking with white tape the routes within the position.

(*b*) 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. No attempt should be made to hasten the operation until all personnel are capable of performing their duties in darkness. Particular care is necessary in guiding vehicles during blackout. Immediate corrrective action must be taken to overcome violations of light and sound discipline.

Section III. MOVEMENT PLANNING CONSIDERATIONS

7–10. General

In planning a move, several factors must be considered. The mission is of primary importance, and it must be the overriding consideration. If the mission cannot be accomplished, the movement is a failure; therefore, the mission becomes the basis for all movement planning. The overall situation also must be considered, including such elements as the terrain and weather. The type of terrain over which the unit will move and weather conditions that may be encountered during the movement will affect the move. These requirements necessitate a reconnaissance of the route, or as a minimum, a map or photographic reconnaissance. An aerial reconnaissance may be used; however, the best method is an actual ground reconnaissance of the route to be used. The enemy situation with particular emphasis on the enemy air situation, guerrilla activities, and enemy nuclear capabilities are also of prime interest. Detailed information on movement planning is contained in FM 55–15.

a. Available Routes. Available routes are another consideration. The routes available and restrictions imposed on the move must be considered. Route clearance should be requested from the battalion S3 and normally will be given along with the order for the movement. If route clearance has not been given and if a specific route has not been designated, Hawk battery commanders will have to select the route and obtain route clearance from the headquarters prior to using that route. The battery commander must select and designate the route that he desires to use and the time that he intends to use it. Once a route has been designated and route clearance has been obtained, it becomes mandatory that the battery use that route only during the specified times. Normally, a movement table will be given to the battery as part of the movement order. It is extremely important that the battery meet the times designated in the movement table to keep the roads free for other elements that have clearance to use them.

b. Security and Control. Security and control measures will play an important part in the organization of the march. It is desirable to establish temporary organizations for the purpose of regulating and controlling marches and convoys. The unit should be organized so that the individual units are sufficiently flexible to meet the various conditions arising in connection with the move.

7–11. Ambush Vulnerability

The ambush vulnerability of Hawk units must be considered as a part of movement planning. It must be assumed that these units will be prime targets for guerrilla forces. Hawk units, in particular, are not organized or equipped to defend themselves adequately during movement unless augmented by security forces. In general, movement by open column is preferable because it affords less vulnerability to ambush by small enemy groups and better control than infiltration. At the same time it alleviates some of the disadvantages of the closed column by concentrating less of the unit in the preselected "killing zone" of a large enemy ambush and by presenting a less lucrative target to aircraft and artillery. Some of the measures that can be taken to reduce the ambush vulnerability of Hawk units include—

a. Attachment of security forces.

b. Careful map reconnaissance to locate probable ambush spots along the route.

c. Use of observation aircraft ahead of the column.

d. Intensive and continuous unit training in antiambush techniques.

e. When COMSEC equipment is not available to secure communications, strict adherence to COMSEC practices and procedures (e.g., authorized low level codes, authentication systems, etc.) is essential.

7-12. Control Measures

Control measures that can be implemented to facilitate unit movement include—

a. Designation of checkpoints along the route.

b. Road guides.

c. Prescribed vehicle speed and column density.

d. Strip maps.

e. Road markers.

CHAPTER 8
ACTIVE AND PASSIVE DEFENSE OF A HAWK UNIT (STANAG 2047)

Section I. INTRODUCTION

8–1. General

The ability of a Hawk unit to accomplish its primary mission of providing air defense for the combat arms may be directly affected by its ability to defend itself against direct enemy action. The forms of enemy action against Hawk units are counterbattery fire, air attach, ground attack, or any combination thereof. The unit commander must make plans for the defense of his unit against these threats. The goal of the unit should be to remain undetected by the target acquisition agencies of the enemy by using passive defense measures. Dispersion and field fortifications are effective in limiting the damage caused by air or counterbattery attacks. Effective protective measures against ground attack include early warning, field fortifications, and a well-planned perimeter defense.

8–2. Defense Against Guerrillas

Operating in a guerrilla warfare environment creates added problems for the Hawk commander. The guerrilla relies upon surprise, a good knowledge of the terrain, the ability to hit and run, and a superior intelligence system which allows him to strike weak forces or the weak point of a strong force. More important, the guerrilla can choose his own time and place for action. However, in spite of the guerrilla's advantages, he can be soundly defeated by an informed and prepared force. The same principles that apply to a conventional defense also apply to the defense against guerrillas.

Section II. SECURITY MEASURES

8–3. General

Because the Hawk unit must concentrate on its primary mission of providing air defense, it must rely upon early warning, a well-planned perimeter defense, field fortifications, and a security force to protect its weapons and personnel. Defensive measures taken by a Hawk unit are not designed to destroy, channelize, disrupt, or disorganize the enemy. Defensive measures are designed, by using all available means, to prevent enemy entrance into the position area. Typical perimeter defense layouts for the various type Hawk units are shown in figures 7–1 to 7–3.

8–4. Passive Security Measures

The passive security measures utilized include cover, concealment, dispersion, field fortifications, camouflage, and communications security. Other passive measures not as noticeable, but just as important, are noise and light discipline and adequate training in security matters. These measures will be implemented in the battery training program and the battery SOP. On the nuclear battlefield, passive security measures will pay ever-increasing dividends because survival will depend to a large extent upon remaining undetected by the enemy.

8–5. Camouflage

a. Field fortifications and battery installations should be positioned to permit effective camouflage. Initial consideration of this important factor will save labor in achieving good camouflage. The members of the battery must be well-grounded in the principles of camouflage and must be closely supervised to prevent breaches of camouflage discipline.

b. The three basic methods in concealing a position area are hiding, blending, and deceiving.

c. In planning the camouflage of the position area, the commander unit consider the eight factors of recognition (position, shape, shadow, texture, color, movement, shine, and tone) and decide in what manner he will apply these to the selection of position, camouflage discipline, and construction of camouflage. The seven camouflage discipline rules that must be followed are:

(1) Avoid changing the appearance of the area.

(2) Cover spoil and debris or place it where it will blend with the surroundings.

(3) Follow existing roads and tracks. Avoid making new tracks.

(4) Extend tracks to where they might logically end. Do not end exposed tracks at position areas.

(5) Control and disperse smoke.

(6) Prevent shine.

(7) Maintain light and noise discipline.

d. One careless act can reveal a carefully camouflaged position area to the enemy. Where existing natural concealment is not adequate, camouflage is added to help blend equipment and personnel with the surroundings by using natural or artificial materials which closely resemble the natural background. Changes in seasons will require gradual changes in color and types of artificial materials used in camouflage construction.

8–6. Field Fortifications

a. Stages of Development. The first priority is to emplace the tactical equipment. Hawk system tactical emplacements are constructed to allow for continuous improvement so that additional protection and comfort can be provided in the event of prolonged occupation. Field fortifications are developed in stages as described in (1) through (4) below.

(1) *Stage 1.* In the initial stage, open foxholes provide protection for personnel, and open emplacements provide protection for crew served weapons used to defend the positions.

(2) *Stage 2.* In this stage, provision is made for covered emplacements for personnel, ground defense weapons, and ammunition.

(3) *Stage 3.* In this stage, work is begun on covered shelters for personnel.

(4) *Stage 4.* In this stage, the tactical positions are revetted.

b. Use of Overhead Cover. It is difficult to provide overhead cover for Hawk system components. The width and height involved made such construction impractical under most conditions, and overhead cover may interfere with radar coverage. Construction of a high all-round parapet up to the base of radar antennas is advisable.

8–7. Active Security Measures

Active security measures available to the Hawk unit must be employed in all situations. Each element of active security will later receive separate consideration; however, the aggressive utilization of active measures, in conjunction with the previously discussed passive security measures, provide the best possible defense. This must be the aim of the unit commander in every situation. Before a good defense can be developed for any unit or installation, the personnel and equipment available for defense and the capabilities of each must be known. Personnel should be used as conservatively as possible on the perimeter consistent with the provision of perimeter defense. Individuals should be designated as members of crews for the rocket launchers and the machineguns. They must be briefed on their responsibilities in the positioning of these weapons and the areas they must protect. They should be required to prepare range cards (FM 23–65). Other personnel must be designated as members of a security force. A source of men for this duty is the system operators and maintenance personnel because the Hawk sections can function effectively for short periods of time with two or three fewer men per section. The SOP of the unit should provide for the formation of this force and specify signals for its assembly.

8–8. Defense of a Position Area

a. General. The defense plan includes an early warning system consisting of outposts and warning devices, a perimeter defense, and an organized reserve security force. Considerations which affect the implementation of a defense plan are as follows:

(1) Available individual and crew served weapons should be positioned so as to take maximum advantage of terrain to provide interlocking fields of grazing fire, and mutual support. All crew-served weapons should have primary, alternate, and supplementary positions. Positions should be selected and prepared for each crew-served weapon of the unit so that the enemy can be engaged as early as possible at the maximum range of the weapon. The enemy is then brought under an increasingly heavy volume of fire as he approaches the battery position.

(2) Flexibility can be added to the defense plan by selecting and preparing more than one position for each machinegun and rocket launcher. This, of course, requires a thorough orientation as to the locations, routes of occupation, and sectors of responsibility of all the machinegun and rocket launcher teams.

(3) Communication is of primary concern to a battery commander since only by adequate control of his unit is it possible to successfully

defend a position. Communication is not only a necessity for early warning, but is required for the control of the battery perimeter and security focre.

b. Warning. A Hawk unit is primarily concerned with its air defense role and because the number of personnel available will not permit the continuous manning of the perimeter in force, warning is essential to the defense of the unit. Warning may be in the form of sentinels, patrols, trip flares, noisemaking devices, and pyrotechnics. Listening posts or outposts may be established. Their primary mission is to provide warning of ground attack; however, if the terrain permits, the listening posts may be incorporated into defensive positions and be manned by machinegun or rocket launcher teams. To facilitate the withdrawal of the listening posts, concealed routes are desirable. Communication between the outposts, patrols, and the battery must be carefully planned and installed. Wire communication is normally used between outposts and the battery.

c. Warning Signals. Unit SOP must prescribe specific warning signals for ground, air, and NBC attacks. Periodic rehearsals and drills must be conducted to insure that the signals used are understood and that the methods of dissemination are adequate to provide unit personnel sufficient warning time to take action. STANAG 2047 (second edition) prescribes use of the following warning signals:

Hazard	*Sound signals*	*Visual signals*
Nuclear, Biological, Chemical (NBC)	A raipd 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 warning 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	Continous 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	Series of long blasts on a vehicle horn, whistle, bugle, or other wind instrument.	Per SOP.
Friendly Nuclear Strike	Per SOP.	Per SOP.
All Clear	Orally or continuous sustained blast on a vehicle horn, whistle, bugle, or other wind instrument.	Per SOP.

Note 1. If an air or 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.
Note 2. The spoken word (vocal alarm) remains the most effective means of informing the troops in an emergency.

d. Perimeter Defense. The perimeter defense is based upon the location of the tactical equipment. Because of the primary mission and the limited number of available personnel assigned to the battery, the defensive positions normally are not manned until a warning is received. Should the enemy penetrate the outer perimeter of the battery, a secondary perimeter must be established around the firing position to protect the tactical equipment. Enemy troops which penetrate the perimeter must be driven out by the security force, employing small arms, automatic weapons, and grenades.

e. Security Force. Each battery must form a reserve force as an integral part of the battery defense system. The primary purpose of the security force is to counterattach any enemy who penetrates the perimeter, to eject him, and to restore the perimeter. This force should be organized as an infantry rifle squad in size and composition. The security force officer, designated by the battery commander, commands the battery security force and insures that all its members receive complete instructions, including the signal for, and place of, assembly. Rallying points, designation of squad leaders, fire and maneuver teams, and counterattack plans should be specified in the security force plans.

8–9. Defense of a Battery Convoy

a. General. Whenever a unit is confronted with a serious guerrilla threat in its area, it must make special preparations for any movement that it makes. The ambush is one of the guerrilla's favorite tactics because it takes maximum advantage of his capabilities while minimizing his disadvantages. He can choose the time, place, and size of the unit to hit which almost assures him of success. The guerrilla can strike, then disengage and withdraw with very little loss. The duration of an ambush normally is from 3 to 5 minutes. With this in mind, the necessity for immediate reaction is obvious. By the application of good organization and communication and by immediate action, these advantages can be neutralized and the ambush can be defeated.

b. Organization of the Column. To facilitate rapid entry into action from the march, Hawk units organize their columns in the order of tactical equipment and support. However, this organization, which places all of the tactical equipment at the front of the march unit, should not be used in an area where an ambush is possible. In such an area, the force must be balanced in manpower and firepower so that there is no weakness or weak point at any place in the convoy. To accomplish this, the column is rearranged by the convoy commander. All vehicles should be prepared for action with all canvas down and the loads in the back arranged so that personnel can dismount rapidly from the rear without climbing over cargo. The tailgate should be lowered parallel to the ground so that personnel can come straight out of the rear of the vehicle. All automatic weapons should be mounted and manned at all times. Personnel in the vehicles should sit with weapons in hand, ready for action (faced toward the flank of the road on the side of the vehicle in which they are riding). Fifty percent alert is maintained at all times except when passing through suspect areas where 100 percent alert is maintained. Radio communications should be placed at the head and rear of a march unit. Radio communications should also be maintained between the march unit and the reconnaissance element of the convoy. A convoy should not stop to fight as long as it can move forward. Personnel should not dismount unless the convoy is forced to stop. Immediate action drills should be conducted prior to starting the motor march to insure familiarity with the SOP.

8–10. Employment of Nonair-Defense Weapons Against Aircraft

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 nonair-defense weapons can place against this threat.

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

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

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-speed and high-speed. Low-speed aircraft include helicopters and liaison, reconnaissance, and observation fixed-wing propeller aircraft. High-speed aircraft include 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 rule 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.

(2) *Engagement of high-speed aircraft.* In accordance with the rule 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 ammunition.* 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 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 nonair-defense weapons.

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

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

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

(4) *Authority to engage.* (Authority to engage attacking aircraft is delegated to individual weapon operators and authority to engage all other hostile aircraft is received 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.)

(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.* (Principles of tracer observation. Massed fire. Maximum rate of fire. Lead and superelevation. Maximum use of tracer ammunition.)

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

CHAPTER 9

USSTRICOM AIR DEFENSE ARTILLERY BATTALION (PROVISIONAL)

9–1. General

This chapter briefly describes employment concepts for the USSTRICOM air defense artillery battalion (provisional).

9–2. Mission

The mission of this battalion is to destroy, nullify, or reduce the effectiveness of aerial attacks against designated airbases or other strategic installations.

9–3. Organization

This type battalion is CONUS-based and allocated to U.S. Strike Command (USSTRICOM) for employment on a contingency basis throughout the world to defend designated airbases and other vital installations. The basic battalion, organized for independent operations, is composed of two Hawk batteries and one composite Chaparral/Vulcan battery (fig. 9–1). Organizational tailoring will often be required to fit the defense needs of specific airbases or installations.

9–4. Deployment

a. General. The fundamentals of employment discussed in chapter 4 are applicable (fig. 9–2).

b. Hawk. Hawk fire units are positioned to insure early engagement of low-altitude attackers. 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 will frequently force an off-base deployment.

c. Chaparral. The Chaparral weapons and forward area alert radars (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 unbal-

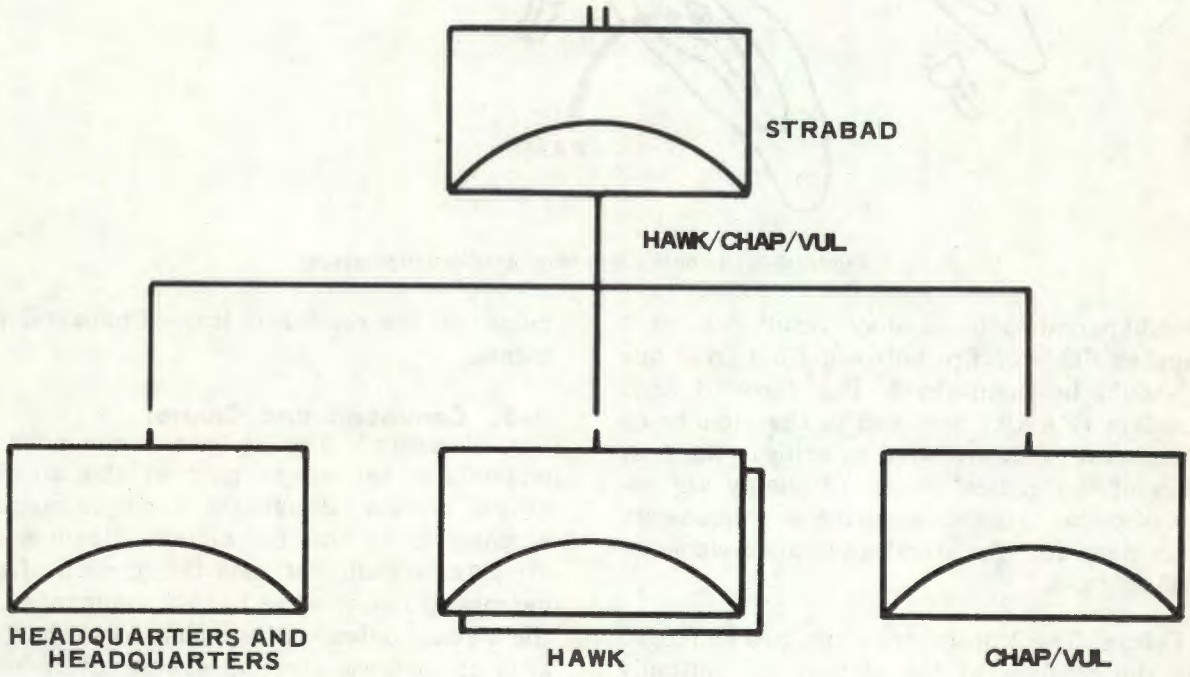


Figure 9–1. USSTRICOM air defense artillery battalion (provisional).

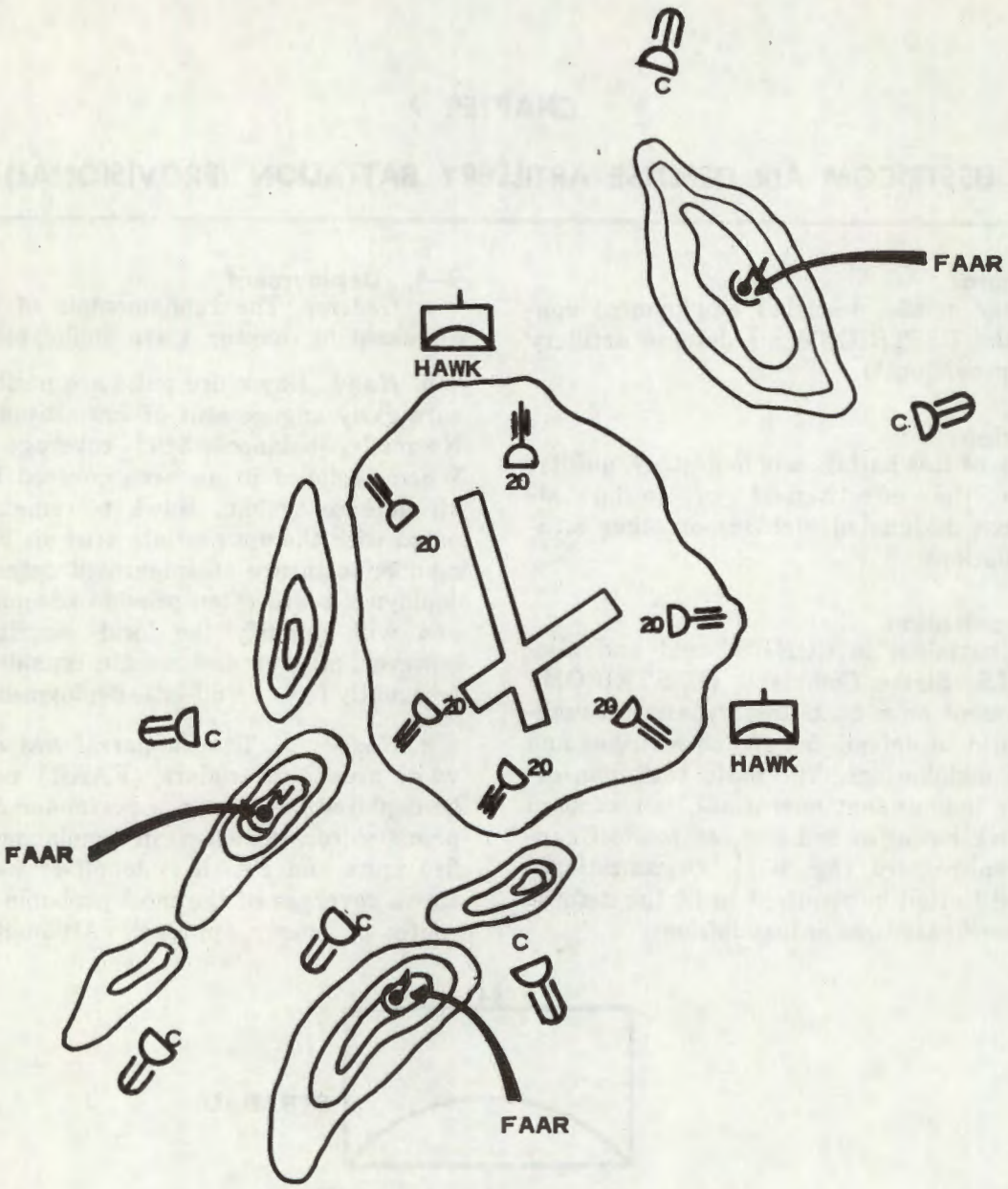


Figure 9–2. Airbase air defense artillery deployment.

anced Chaparral defense may result, at least overlapping fields of fire between Chaparral fire units should be maintained. The forward area alert radars (FAAR) 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.

d. Vulcan. The Vulcan fire units are employed within the confines of the airbase. A mutually supporting defense of the airbase complex is essential. The defense is weighted to cover weaknesses in the combined Hawk-Chaparral deployments.

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 commander responsible to him for airbase air defense. All air defense units assigned the mission of airbase 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.

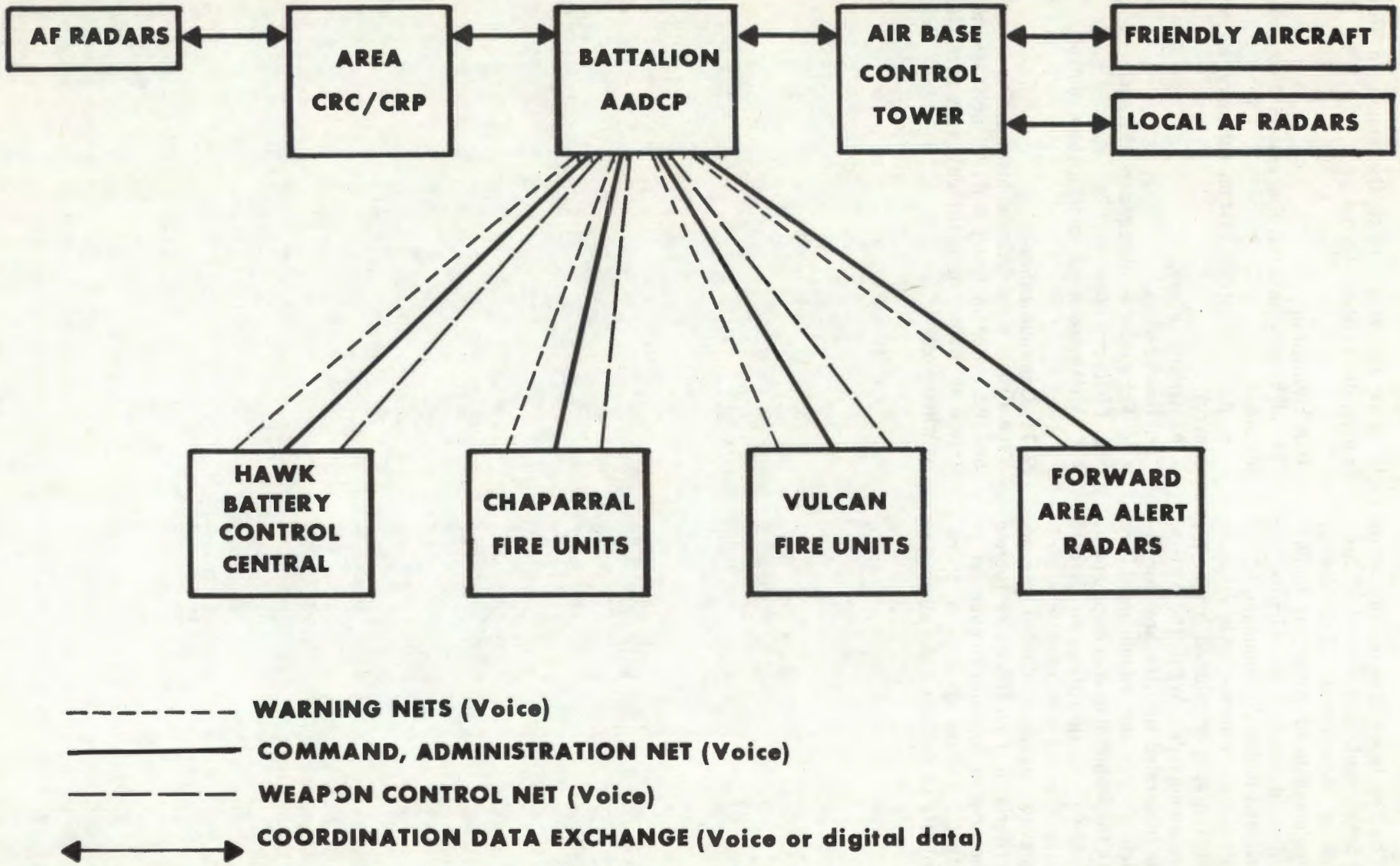


Figure 9–3. Strategic air base air defense communication concepts.

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 air base 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 engagement, hostile criteria, and modifications thereto approved by the area air defense commander or higher authority for airbase air defense operations. The possibility of declaring the airbase as a *restricted area* out to the maximum Hawk range, should be considered.

9–6. Warning

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 alert radars (FAAR).

e. Chaparral observers.

f. Airborne aircraft under airbase control.

9–7. Communications

Type airbase air defense communication concepts are illustrated in figure 9–3. All nets are radio (voice or digital, as indicated) with wire backup where possible.

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 given in this appendix.

A–2. Army Regulations (AR)

310–25	Dictionary of United States Army Terms.
310–50	Authorized abbreviations and brevity codes.
380-series	Military security.

A–3. Field Manuals (FM)

3–12	Operational aspects of radiological defense.
11–23	U.S. Army Strategic Communications Command (Theater).
21–40	Chemical, biological, radiological, and nuclear defense.
23–65	Browning Machinegun, caliber .50 HB, M2.
24–1	Tactical communications doctrine.
24–18	Field radio techniques.
31–3	Weather support for Field Army tactical operations.
31–23	Stability Operations, U.S. Army Doctrine.
(C) 31–40	Tactical cover and deception (U).
(C) 32–5	Signal security (U).
(C) 32–20	Electronic warfare (Ground based) (U).
44–1	U.S. Army Air Defense Artillery employment.
(S) 44–1A	U.S. Army Air Defense Artillery employment (U).
44–1–1	U.S. Army air defense artillery operations.
44–99	Procedures and drills for HAWK missile battery.
55–15	Transportation reference data.
101–5	Staff Officers' Field Manual: Staff organization and procedure.

A–4. Technical Manual (TM)

9–1300–206	Care, handling, preservation, and destruction of ammunition.
(S) 9–1400–500–12/3	Electronic countermeasures and countercountermeasures (HAWK air defense guided missile system) (U).

A–5. Tables of Organization and Equipment (TOE)

44–235G	Air Defense Artillery battalion, HAWK.
44–236G	Headquarters and headquarters battery, Air Defense Artillery battalion, HAWK.
44–237G	Air Defense Artillery battery, HAWK.

44–255T	Air Defense Artillery Battalion, HAWK, self-propelled.
44–256T	Headquarters and Headquarters Battery, Air Defense Artillery Battalion, HAWK, self-propelled.
44–257T	Air Defense Artillery Battery, HAWK, self-propelled.

A–6. Technical Bulletin (TB)

(C) 380–6–1	Improved electronic security for the HAWK air defense guided missile system (U).

APPENDIX B

ESTABLISHING A MISSILE DEFENSE

B–1. Basic Principle

a. The basic principle of employment of Hawk units is to provide air defense to the supported force.

b. The level of protection provided to various positions within a defended area should be proportional to their overall strategic or tactical value.

c. The information required to plan a defense includes the threat that the defense must counter and the area to be defended. Detailed procedures for establishing a missile defense are contained in FM 44–1–1 and FM 44–1A.

B–2. Defense Prerequisites

The establishment of Hawk defenses require that the following information be furnished:

a. Area or vital area to be defended.

b. The estimated enemy capabilities in terms of specific threats for each area to be defended, including—

(1) Estimated number and type of aircraft and missiles.

(2) Type of attack: Mass or multiple.

(3) Type of weapons: Nonnuclear and nuclear (including deliverable yield).

(4) Altitude and speed of attack.

(5) Technique of attack and range of bomb release line for that technique.

c. The maximum acceptable degree and extent of damage that may be sustained by the defended area.

d. The desired kill assurance.

e. Location of adjacent units.

B–3. Employment Doctrine

The basic employment doctrine to be considered in performing the Hawk air defense mission is as follows:

a. The greatest effectiveness against low-altitude, high-performance targets is achieved when engagement control is decentralized to fire unit level and identification is accomplished between the fire unit and the target.

b. Units are deployed along likely low-altitude routes of approach.

c. Units are deployed normally out of range of enemy artillery but well forward to permit the early destruction of airborne objects.

d. Units are sited to provide defense in depth and mutual support.

e. Positions are selected to maximize the system capabilities.

B–4. Defense Design

The design phase consists of selecting basic employment considerations applicable to the Hawk system. These selected employment considerations are then used in conjunction with the defense planning considerations to design the defense. The basic employment considerations, and the procedure for designing a defense, are discussed in FM 44–1–1.

B–5. Defense Evaluation

a. Defense evaluation and defense design are conducted concurrently. Defense evaluation determines the capability of a defense to destroy an enemy threat before that particular threat reaches the position from which it can deliver an attack.

b. Evaluation of the Hawk defense of the entire field army is made at the intersection of the low-altitude route of approach and the field army boundary or the forward edge of the battle area.

c. Evaluation of the defense of a specific installation or unit within the field army area is made at the intersection of the low-altitude route of approach and the bomb release line. This bomb release line is based upon the specific attack technique the enemy may employ. In the case of air-to-surface missiles, no bomb release line is considered, and the point of evaluation is where the low-altitude route of approach crosses the edge of the vital area.

d. Analyzing devices, including their construction and use, are discussed in detail in FM 44–1–1 and FM 44–1A.

APPENDIX C

SUMMARIES OF CHAPTERS

C–1. General

The purpose of this appendix is to present, in summarized form, the major points of each chapter. It serves as a ready reference when detailed information is not required.

C–2. Chapter 1, Organization and Tactical Missions

a. There are two types of Hawk battalions:

(1) Towed.

(2) Self-propelled.

b. The towed battalion consists of a headquarters and headquarters battery, and four firing batteries. This battalion may be mobile, fixed or semimobile; the fire power is the same regardless of mobility, because there are two fire units per battery.

c. The self-propelled battalion consists of a headquarters and headquarters battery and three firing batteries. Each firing battery has three fire units.

d. Each battalion has the necessary electronic command, control, and coordination system for air defense operations.

e. The mission of the towed and self-propelled Hawk battalion is to provide air defense of assigned installations or areas against hostile aircraft flying at low and medium altitudes. The SP battalion is further assigned the mission of providing all-weather air defense of vital areas or units in the forward areas of the combat zone.

C–3. Chapter 2, Capabilities and Limitations

a. The Hawk system is mobile, rugged, and compact, and designed to operate with combat elements.

b. For special operations, part of the Hawk battery can be detached and used as an assault fire unit (AFU).

c. The Hawk battery is capable of:

(1) Engaging two (towed battery) or three (SP battery) targets simultaneously.

(2) Delivering fire under all conditions of visibility, weather, and terrain.

(3) Rapid displacement.

d. The Hawk battery is somewhat limited in that:

(1) Its air defense effectiveness is reduced when the unit must defend itself against ground attack.

(2) Effectiveness is reduced and vulnerability is increased during displacement.

(3) The AFU or AAFU do not have the ability to identify aircraft, and are dependent upon the battery minus for IFF and AADCP data. The SP platoons have identification capability but are dependent upon the towed platoon for AADCP data. However, carefully designed rules of engagement and complementary air traffic control procedures permit independent operation.

C–4. Chapter 3, Fundamentals of Employment

a. There are three basic employment guidelines:

(1) *Early destruction along low-altitude routes of approach.* Hawk is deployed to provide air defense along the most critical low-altitude routes, see figure 3–1.

(2) *Defense in depth.* This is achieved by positioning Hawk units at distances from each other which will permit mutual support or overlapping fires, thereby providing continuous fire and flexibility against mass or multiple attacks.

(3) *Position requirements.* The tactical and technical considerations which affect the location of a Hawk battery; i.e., access routes, suitable terrain, communication requirements, enemy observation, and mutual support.

b. Factors affecting employment are: mission, enemy threat characteristics, terrain and weather, and system capabilities and limitations.

(1) *Mission.* A mission, as assigned by higher headquarters, is a statement of a task and its purpose which indicates the action to be taken and the reason therefor. The Hawk commander must analyze the mission in relation to

other factors affecting employment to decide requirements and tasks which are not stated specifically but which must be done to accomplish the mission.

(2) *Enemy threat characteristics.* The air defense commander makes a study of enemy threat characteristics; i.e., capabilities and attack techniques as a prelude to Hawk defense design and employment. By careful analysis of available intelligence, the commander can estimate the number of enemy aircraft or missiles available in a given area, their operational characteristics, size, and probable employment tactics or attack techniques. Hawk deployment is then designed to counter this threat.

(3) *Terrain and weather.* The terrain, and to a lesser extent, the weather, are important factors in Hawk employment. The commander makes a thorough analysis of the terrain to determine the advantages it offers to the Hawk unit for radar clearance and good sectors of fire along primary target lines. He must also evaluate the advantages this same terrain may afford the enemy. Weather will affect the mobility of the Hawk unit; extreme weather conditions place a heavy maintenance burden on the unit and affect both operation and employment.

(4) *Capabilities and limitations.* The capabilities and limitations of Hawk affect employment as follows:

(*a*) System range determines positions for mutual support.

(*b*) Rate of fire and kill probability dictates the number of units required to counter a given threat.

(*c*) Basic load and reliability of resupply determines combat operational time.

(*d*) The availability of communications equipment, both organic and area communications systems, to meet tactical requirements will directly affect the employment of Hawk units.

C–5. Chapter 4, Command and Control

a. A Hawk battalion may be assigned one of four standard tactical missions.

(1) *General support.* This is the normal tactical mission of field army and corps Hawk battalions. Provides air defense of a force as a whole. Units remain under the command or operational control of the commander assigning the mission.

(2) *General support-reinforcing.* A Hawk battalion with this mission will furnish air defense for the force as a whole and, in addition, reinforce the defenses of another ADA unit. This reinforcement is accomplished through designation of sector of fire priorities. This mission is normally given to a self-propelled Hawk unit to augment the fires of a divisional Chaparral/Vulcan battalion. Command or operational control is the same as that in general support.

(3) *Reinforcing.* Augments the defenses of another ADA unit. While the reinforcing unit remains under the command or operational control of the commander assigning the mission, its defenses are planned and controlled by the reinforced unit as necessary for accomplishment of the reinforced unit's mission. This mission may be given to a corps self-propelled Hawk to reinforce a divisional Chaparral/Vulcan battalion for a specific operation.

(4) *Direct support.* This battalion provides close and continuous air defense for a designated force element and coordinates its operations with this element. The self-propelled battalion is the most logical type unit for this mission. This unit can be employed for movement to contact, or air defense of a division-size penetration.

b. Control of the maneuver (i.e., initial position and subsequent repositioning) of Hawk units is a function of the commander exercising operational control.

c. Hawk units make air defense engagement decisions based on the rule that aircraft identified as hostile will be engaged. This basic rule may be changed by higher air defense echelons as the situation demands.

d. Conditions of readiness and air defense warnings serve as a basis for implementation of the air defense rules and procedures of the regional air defense commanders.

e. Rules of engagement are promulgated by the area air defense commander to define, as a minimum, the responsibilities, procedures, and criteria for aircraft identification and engagement in agreement with the theater air defense policies.

f. Each ADA weapon control status indicates the degree of fire restriction placed on the fire unit as follows:

(1) Weapons free. Fire at any aircraft not identified as friendly.

(2) Weapons tight. Fire only at aircraft positively identified as hostile.

(3) Weapons hold. Do not fire. Self-defense permitted.

g. Special control instructions pertaining to specific engagements or actions may be utilized

by air defense commanders in controlling the Hawk system.

h. Hostile criteria are defined in the rules of engagement.

i. Firing technique guidance is established in the tactical SOP. This guidance should specify the number of missiles to be fired under various tactical conditions and the method of fire to be employed.

C–6. Chapter 5, Communications

a. The multichannel radio system is the primary communication system for Hawk units. This system provides an automatic data link (ADL) for transmission of digital data between the ADCCCS and the data converters of the batteries. It also provides voice channels for air defense control, intelligence and radar reporting, and maintenance nets.

b. If the ADCCCS or the multichannel radio system is nonoperational, the Hawk units must resort to the manual method of operation using organic tactical radios.

c. The number and type of internal radio nets operated by the battalion and its batteries are tailored to fit the organization (towed or self-propelled) and mission requirements.

d. Wire nets consist of circuits to higher, adjacent, and subordinate units, and required local circuits.

C–7. Chapter 6, Specific Employment Concepts

a. Field Army Employment.

(1) In the field army, the fundamentals of employment are applicable to offensive, defensive, retrograde, and relief operations.

(2) Self-propelled Hawk units are deployed to provide all-weather air defense for division areas. Towed Hawk units are deployed in the corps rear area and field army service area.

(3) Hawk operations are coordinated with other operations at field army, corps, and division level by the airspace control element (ACE) in their respective tactical operations centers (TOC).

b. Communications Zone Employment.

(1) Normally towed Hawk units are employed in the COMMZ.

(2) Movement is required only when theater priorities change or shift position, or if redeployment is necessary as a passive air defense measure.

(3) In the COMMZ, ADA operations in each defense are coordinated with the responsible U.S. Army, U.S. Air Force, or U.S. Navy air defense/air traffic regulation facilities.

c. Independent Corps Employment.

(1) The corps normally functions as the Army component of a joint or unified command.

(2) For planning purposes, the number of battalions assigned to the corps is one per division.

(3) One ADA group headquarters is allocated to the corps to provide centralized planning and direction of assigned or attached ADA units. It also functions as the operational link between higher ADA headquarters and the ADA units of the corps.

(4) Hawk deployed with independent corps, see figure 6–8.

d. Independent Division Employment.

(1) Depending upon the air threat, Hawk units may be attached to the independent division.

(2) The allocation of Hawk units normally will be one SP Hawk battalion per independent division.

(3) For Phase I airborne operation, the towed Hawk battalion is allocated.

e. Operating in a CBR Environment.

(1) Hawk units have a limited capability in a CBR environment because crewmen operate at decreased levels of efficiency while dressed in protective clothing.

(2) Decontamination is a major problem due to the complexity of the equipment.

(3) Several positions must be selected so that an alternate uncontaminated position may be occupied, if necessary.

C–8. Chapter 7, Reconnaissance, Selection, and Occupation of Position

a. The purpose of reconnaissance, selection, and occupation of position is to move a Hawk unit into a position from which it will be able to deliver effective fire to accomplish its mission.

b. The reconnaissance and selection of position for the battalion headquarters and headquarters battery of the towed and self-propelled are generally the same. An area to accommodate the ADCCCS, command post, and radar is of primary importance, with additional space available for staff functions and support facilities.

c. The firing battery (towed or self-propelled) reconnaissance and selection of position considerations are location and size of the installation

or unit to be defended; fields of fire; access routes to, from and within the position area; routes of communication; probable enemy observer positions; communication and electronic security; cover and concealment; dispersion of firing and administrative facilities; and local security.

C-9. Chapter 8, Active and Passive Defense of a Hawk Unit

a. Active defense measures taken by a Hawk unit are designed to destroy, disrupt, or disorganize the enemy air or ground attacks. This is accomplished through the employment of the Hawk missile system against the primary air threat, the use of nonair-defense weapons against low-altitude aircraft attacking the Hawk position, or the use of individual and crew-served weapons in defending the site against ground attack.

b. Passive defense measures include cover, concealment, dispersion, field fortifications, communications and electronic security, camouflage, and noise and light discipline.

c. Because a Hawk unit is primarily concerned with its air defense role and because the number of personnel available will not permit continuous mannning of the perimeter in force, a warning system is essential to the local defense of the unit. An SOP must be developed to prescribe specific warning signals for NBC, air, and ground attacks.

C-10. Chapter 9, USSTRICOM Air Defense Artillery Battalion (Provisional)

a. The USSTRICOM ADA battalion (provisional) is CONUS-based and allocated to USSTRICOM for employment on a contingency basis throughout the world to defend designated airbases and other vital installations.

b. The basic battalion is organized for independent operations and is composed of two Hawk batteries and one composite Chaparral/Vulcan battery. Organizational tailoring will often be required to meet specific defense needs.

c. The composite Chaparral/Vulcan battery consists of six Chaparral and six Vulcan fire units.

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