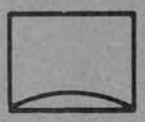
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Washington, DC, 4 March 1986

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iii, iv	iii, iv
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Chief of Staff

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3736	Offensive Air Support Opertions (ATP-27)
3805	Airspace Control in the Combat Zone (ATP-40)
3880	Counter Air Operations (ATP-42)

Unless otherwise stated, whenever the masculine gender is used, both men and women are included.

Field Manual
No. 44-15

FM 44-15

Headquarters
Department of the Army
Washington, DC, 4 April 1984

PATRIOT
BATTALION OPERATIONS

Preface

US Army AirLand Battle Doctrine balances firepower with maneuver, stresses combined arms warfare, and requires cooperation with sister services and allies. It emphasizes tactical flexibility, speed, mission orders, the initiative of subordinates, and the spirit of the offense. The doctrine uses air mobility and air power to extend the battlefield to unprecedented depths. Air defense forces on the air-land battlefield must limit the effectiveness of enemy offensive air efforts to a level permitting freedom of action to the ground commander.

With so much reliance on air defense, air defenders must obtain the maximum combat effectiveness of all air defense systems. To achieve this effectiveness, sound operational art and tactics must be applied to each tactical situation. The difference between winning and losing could very well depend upon the choice of tactics.

The purpose of this manual is to provide doctrinal guidance on how to use the Patriot system in support of the air-land battle. All Patriot officers must have a thorough, in-depth knowledge of the technical capabilities of the Patriot system. Knowledge of AirLand Battle Doctrine is also a prerequisite to understanding the role of the Patriot system. That role is to provide effective very low-to very high-altitude air defense coverage. This manual is oriented toward operations in NATO although it is adaptable to any other theater of operations. A number of deployments for both area and point defenses are described. The actual choice of deployment is made by the Patriot battalion commander depending on the tactical situation. The manual is primarily for commanders, staff officers, tactical directors, and tactical control officers.

Since this manual is unclassified, threat information and system capabilities are discussed in general terms. Where detailed, precise threat information is required, authoritative threat documents should be consulted. Classified capabilities and planning data on the Patriot system, which form the basis for the employment concept, can be found in (SNF) FM 44-1A.

Users of this manual are encouraged to recommend changes and submit comments for its improvement. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded to:

Commandant
US Army Air Defense Artillery School
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Fort Bliss, Texas 79916

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When used in this publication, "he," "him," "his," and "men" represent both the masculine and feminine genders unless otherwise stated.

CHAPTER 1

Patriot and the Air Defense Artillery Mission

As part of the air defense family of weapons, the Patriot missile system contributes to the winning of the air-land battle and the accomplishment of the Air Defense Artillery mission by providing very low-to very high-altitude fires against enemy aircraft. This chapter defines the mission of Air Defense Artillery, discusses the objective of air defense, points out how the family of complementary air defense weapons counters the enemy air threat, and states the mission of the Patriot battalion and the role of the Patriot system in the air-land battle.

MISSION

The mission of US Army Air Defense Artillery is defined in the illustration below.

US ARMY AIR DEFENSE ARTILLERY MISSION

To nullify or reduce the effectiveness of attack or surveillance by hostile aircraft or missiles after they are airborne, thereby supporting the primary army function of conducting prompt and sustained land warfare operations (FM 44-1).

OBJECTIVE OF AIR DEFENSE

★ Joint Chiefs of Staff Publication 1 defines air defense as "all defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack".

★ Joint Chiefs of Staff Publication 8 states that the objective of air defense is "to limit the effectiveness of enemy offensive air efforts to a level permitting freedom of action to friendly forces of all types."

To accomplish this objective, air defense performs these four basic functions:

1. Detection of potential air threats.
2. Identification of unknown airborne objects.
3. Interception of enemy air forces.
4. Destruction or nullification of hostile air weapons.

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Air defense forces are equipped, trained, and employed to carry out these functions by—

- Attacking the enemy air threat as soon as possible, and as far from the defended area as operationally feasible.

- Subjecting the enemy air threat to fires of increasing intensity and diversity as he approaches the defended area.

- Keeping the enemy under attack so long as he remains a threat.

All US services and allied forces have an air defense capability. However, no single element has enough air defense weapons to insure complete air defense protection against a threat having a large, modern air force. For this reason, the capabilities of all air defense weapons within a force must be integrated into an overall air defense operating under the direction of a single air defense commander. An integrated air defense insures that air defense weapons are employed to achieve optimum effectiveness against enemy aircraft without degrading friendly air operations.

DISTINCTION BETWEEN AD AND ADA

The distinction between air defense and air defense artillery must be emphasized. The terms "air defense" and "AD" refer to the whole realm of air defense; "air defense artillery" and "ADA" refer to specialized ground-based, surface-to-air weapon systems or the specific army branch.

THE AIR-LAND BATTLE

★ The Army's AirLand Battle Doctrine describes the ways that campaigns and battles are conducted. Doctrine supporting the air-land battle is based on securing and retaining the initiative to defeat the enemy force. Operations conducted on the air-land battlefield are designed to throw the enemy off balance with a powerful initial blow from an unexpected direction followed by rapid exploitation to prevent his recovery.

TENETS OF AIRLAND BATTLE DOCTRINE

Flexibility, combined arms cooperation, and integration of efforts are essential to battlefield success. ADA units support operations designed to preserve and exploit the initiative, attack the enemy in depth with firepower and maneuver, maintain the agility that is necessary to rapidly shift forces and fires to enemy weaknesses, and synchronize combat operations to attain the commander's goal. Success in the air-land battle depends on our ability to achieve these four elements—initiative, depth, agility, and synchronization—in our combat operations.

Initiative

★ ADA is a combat arm which fights the air battle just as armor and infantry fight the land battle. ADA operations will cause the enemy air threat to react to what the ADA does, and lead to ineffective, uncoordinated, and piecemeal enemy responses and eventually to his defeat. ADA commanders at all echelons will develop a plan of action to mass combat power at the critical time and place to achieve their objective of permitting freedom of action to friendly forces. Destruction of the enemy will occur as far forward as possible to retain the independence of action necessary for the maneuver forces. To preserve this initiative, ADA commanders will assign

appropriate tactical missions that allow as much flexibility as possible to their subordinates. Subordinate commanders will move their units as far forward as possible and position them where the air threat does not expect to encounter ground-based air defense.

Depth

★ ADA supports AirLand Battle Doctrine in all areas of operations (close-in battle, deep battle, and rear battle), during all hours of day or night, and during periods of reduced visibility. Corps ADA and echelon above corps ADA provide the depth of resources to provide flexibility and extension of influence throughout the battle area.

Agility

★ ADA commanders flexibly tailor their organizations to support the entire spectrum of missions and allow for rapid shifting of ADA forces to anticipate and counter any air threat. This agility is facilitated by the command, control, communications, and early warning networks available to the ADA units.

Synchronization

★ The ADA battle plan will flow from the force commander's concept of the operation. This will be true from theater commander to division commander. Their supporting ADA commander will ensure that a unified effort on the part of all of his subordinates is accomplished. Each individual mission assigned to a subordinate ADA unit will be a part of and contribute to the successful implementation of the force commander's concept of the operation. Provisions for exploitation of tactical success will be planned in order to insure sustained ADA support.

PLANNING CONSIDERATIONS

★ The air-land battle must be perceived in terms of collapsing the enemy's ability to fight. This concept is not new. Current and future capabilities require commanders to consider new methods for bringing that goal within reach.

The air-land battle is one battle which simultaneously encompasses—

- The deep battle.
- The close-in battle.
- The rear battle.

Successful operations require the unified employment of a wide range of systems and organizations on a battlefield that is much deeper for corps and divisions than portrayed in previous doctrine. The primary considerations within the concept of the air-land battle are deep attack, limited assets, modern and enhanced weapon systems, and a single unifying idea.

Deep Attack

Deep attack is an absolute necessity to winning the conflict. This results from the threat's numerical superiority, which allows him to keep a substantial amount of his force out of the initial battle. These additional enemy forces can then be committed at will to overpower or bypass our forces. Their existence poses a substantial threat and gives the enemy a strong hold on the initiative that can only be broken by the conduct of a deep attack.

Limited Assets

Deep attack is conducted with limited resources for both acquiring and striking the enemy. This necessitates a high degree of coordination between the decisive close-in battle and the deep battle so that maximum combat power can be brought to bear on the enemy at the right time and place. The coordinated conduct of these two battles prevents second and succeeding echelons from joining the close-in battle.

Modern and Enhanced Weapon Systems

Modern and enhanced weapon systems of enormous lethality and range, supported by automated command and control systems and sensors of substantial capability, are employed in the air-land battle. These systems provide a means of generating levels of combat power not possible in previous conflicts.

Single Unifying Idea

AirLand Battle Doctrine is the single unifying idea which provides the basis for current operational planning. FM 44-1 provides a more detailed discussion of ADA in the air-land battle.

COMBAT IMPERATIVES

★ Success in battle—achieving superior combat power—also depends on using tactics appropriate to mission, enemy, terrain, troops, and time available (METT-T). The effectiveness of maneuver, firepower, and protection depends on how the commander combines operational procedures, battle drills, or other measures to solve a particular problem. Doctrine establishes common techniques of fighting. The successful tactician depends on proven techniques and on troops who are well-versed in employing them. As he plans and fights the battle, the tactician must understand the seven imperatives of combat, which are—

Insure Unity of Effort

★ The role of ADA is to support the force commander's concept of the operation. All subsequent actions are directed towards that goal. Mission orders will be simple and allow subordinates the greatest possible freedom. Where possible, ADA units will be employed as battalions in support of the force mission. The command and control system available to Patriot will facilitate battalion level control yet still allow higher level commanders to follow up and insure that their concept is driving the operation to completion.

Direct Friendly Strengths Against Enemy Weaknesses

★ The enemy air threat is most vulnerable while it is enroute to or at its ordnance launch position. To capitalize on this, the mobility of all ADA units must be exercised to rapidly position them to deny the enemy the use of very low-to low-altitude approaches and stand-off firing positions. Appropriate mix of ADA weapons with complementary capabilities will preclude evasive or suppressive air tactics designed to exploit individual ADA system weaknesses.

Designate and Sustain the Main Effort

★ ADA units will be massed to support the force commander's concept of the operation. This may necessitate executing economy of force measures in other areas. Certain relatively static assets may have to rely more on their own passive and active self-air defense measures.

Sustain the Fight

★ Positioning of maintenance support throughout the battlefield with emphasis on fixing forward provides the requisite depth of logistics resources for conducting continuous and flexible operations. Patriot units can fight 24 hours a day; however, maintenance, personnel, and movement requirements will normally limit the use of this capability.

Move Fast, Strike Hard, and Finish Rapidly

★ The mobility of Patriot units, the accuracy and lethality of their weapons, the ability to mass at the proper place and time, and the organizational flexibility to tailor to exploit tactical successes all contribute to the accomplishment of the ADA mission.

Use Terrain and Weather

★ Patriot units will make maximum use of natural terrain features. Covered and concealed routes will be used to the maximum degree possible. Patriot units will occupy positions that offer long range observation and fields of fire that reach deep along the enemy air attack avenues.

Protect the Force

★ The force commander will take all steps necessary to preserve the fighting strength of his unit. He must not be surprised by air attack. Early warning against air attack is provided by Patriot units to other ADA units who in turn alert the force. Patriot will be positioned to counter the air threat directed

against those assets crucial to the force commander's concept of the operation.

THE ROLE AND MISSION OF PATRIOT

The role of ADA weapon systems is to accomplish the ADA mission within the capabilities of these systems. The role of each system is tailored to the tactical situation and to the system's optimum, rather than maximum capabilities. For example, the role of the Hawk system is to accomplish the ADA mission within the very low- to medium-altitude boundaries of the battlefield, even though the Hawk system has some high-altitude capability. Because of the Patriot system's firepower, range, and altitude capabilities, the normal role of the Patriot system is to accomplish the ADA mission within the very low- to very high-altitude boundaries. This role may be tailored when airborne interceptors provide medium- to very high-altitude coverage. The mission of Patriot battalions is to provide very low- to very high-altitude air defense of high value assets and ground combat forces. The five standard altitude bands which are used in all air defense operations are shown here. These altitudes *do not necessarily* correspond directly to engagement capabilities of ADA systems or to altitude limits of weapon engagement zones.

STANDARD ALTITUDE BANDS

ALTITUDE BAND	ALTITUDE IN METERS	APPROXIMATE ALTITUDE IN FEET
1. VERY LOW	0-150	0-500
2. LOW	150-600	500-2,000
3. MEDIUM	600-7,500	2,000-25,000
4. HIGH	7,500-15,000	25,000-50,000
5. VERY HIGH	15,000 +	50,000 +

PATRIOT IN THE DEEP BATTLE

The deep battle begins before the enemy closes with our maneuver forces, continues throughout the covering force and main battle area operations. It will likely continue after initial direct contact between the forces ends. The deep battle is designed to prevent or delay the closure of follow-on echelons, and creating windows of opportunity for decisive attack of leading enemy echelons.

To fight the deep battle, the corps commander relies primarily on the following combat capabilities:

- Interdiction by air, artillery, and special operating forces.
- Offensive electronic warfare.
- Deception.
- Maneuver.

Of these assets, battlefield air interdiction is currently the principal means of conducting deep attack. In both the defense and the offense, the deep battle plans of the corps and its divisions must be carefully coordinated to insure unity of effort and to prevent duplication.

As previously stated, deep attack is vital to the success of our fighting force. ADA protection is integral and vital to this mission. The requirement to conduct deep attacks forces commanders at all levels to consider protection of deep attack assets in the development of air defense priorities. Because of the direct relationship between success in the deep attack and ultimate success in the air-land battle, commanders must give a high

priority for air defense protection to assets required to conduct the deep attack. Protecting these assets from air attack preserves combat power for interdiction of the enemy second echelon forces. These deep attack assets will include, but are not limited to, long-range delivery systems (to include aircraft, artillery, and missile systems), maneuver units, and command and control facilities at various levels.

★ At theater level, a mix of Air Force and Army ADA resources is usually allocated for air defense protection of the theater commander's priority assets. The theater commander must conduct a careful analysis to identify those assets most critical to the conduct of the air-land battle. He then provides air defense protection in priority commensurate with that criticality. Patriot battalions normally provide point defense of deep attack assets in the communications zone. This coverage provides coverage of assets such as air bases and missile systems. Patriot battalions also provide area defense overwatch protection (medium-to very high-altitude coverage) of the combat zone. Hawk and short-range air defense (SHORAD) units are normally allocated to provide point defense of deep attack assets.

★ At the corps level, the corps ADA brigade supports the corps commander's concept of the operation. Since the corps commander normally has only one assigned high-to medium-altitude air defense (HIMAD) battalion, he must identify additional corps requirements for air defense to the theater commander. The theater commander normally allocates Patriot battalions to provide all-altitude protection of deep attack assets. Priority of coverage normally goes to the tactical operations area. The corps commander can locate deep attack assets, such as Lance, under the coverage provided by theater Patriot battalions in the tactical operations area. Patriot units would move further forward to support deep attack maneuvers. Patriot units also can engage stand-off jammers. Destruction of these jammers contributes to improved ADA system performance. Additionally, communications jamming may be reduced in the tactical operations area.

PATRIOT IN THE CLOSE-IN BATTLE

★ The maneuver brigades which fight the close-in battle must be protected against threat attack helicopters and ground support fighters. This protection should include integrated SHORAD and HIMAD defenses. The air defense protection provided by the Patriot battalion inflicts attrition on the enemy's deep attack aircraft. While at the same time, it forces enemy aircraft into the lower altitude engagement zones of SHORAD systems by denying medium- to very high-altitude attack options to the enemy. Coverage provided by Patriot battalions also normally extends over that portion of the corps rear area which is adjacent to the division area. This overlapping of coverage also provides the corps commander a degree of rear area protection. The Patriot and divisional SHORAD battalion commanders must exchange operational information to optimize the integrated ADA protection rather than optimizing an individual weapon system's contribution. The same is true for the Patriot and corps ADA brigade commanders. Close coordination enhances air defense of critical assets for both the close-in battle and the deep battle.

PATRIOT IN THE REAR BATTLE

★ In rear areas, enemy forces will attempt to disrupt and demoralize forces by interrupting support activites, interdicting lines of communications, and diverting main battle area combat forces. The threat to this area includes air attack, special purpose forces, saboteurs, terrorists, airborne forces, airmobile forces, and amphibious forces. The size of these forces can range from single individuals to division-size elements and single to multiple attack aircraft.

ADA support for rear battle operations includes air defense of likely enemy targets to include the following:

- Nuclear sites

- Command and control headquarters.
- Airfields.
- Ports.
- Logistics installations.
- Intelligence facilities.
- Key civilian industrial and utility installations.

Attacks against these type assets are an important component of the enemy's concept of battle. ADA protection of these assets, many of which are deep attack and sustaining base assets, is an important element in the preservation of our combat power and our ability to conduct and sustain air-land battle operations.

★ At theater level, these vital assets will generally be defended by ADA resources, including Patriot battalions, of the Army air defense command. The corps ADA brigade provides rear area protection of the corps in consonance with the corps commander's concept of the operation. In the corps areas, assets will be defended by the Air Force and theater level ADA if designated as priorities by the theater commander. In the division area, planned ADA protection is normally provided from theater Patriot and corps Hawk resources. Planned Patriot coverage also may extend into portions of the corps rear area. Patriot battalions normally are under the command of ADA brigades assigned to the Army air defense command. Control is exercised by the controlling Air Force control and reporting center.

The significant threat posed by airborne and air assault forces capable of penetrating division, corps, and theater rear areas through very low-altitude avenues of approach must be carefully evaluated. Extensive terrain analyses to determine very low-altitude avenues of approach and reductions in coverage caused by terrain masking are essential in ADA planning. Coverage should be weighted against these avenues of approach while at the same time providing contiguous lateral coverage in the assigned sector.

Effective air defense protection in the conduct of the air-land battle is critical. One of the most important contributions that Patriot battalions make to the main effort is the protection of deep attack assets. Patriot battalions also increase the survivability and sustainability of our fighting forces by providing coverage over combat, combat support, and combat service support units operating in the division area.

CHAPTER 2

The Threat

Soviet tactical aviation has been the focus of comprehensive modernization and reorganization programs emphasizing offensive capabilities. Changes over the last 5 years in the areas of equipment, training, tactics, and organization have not occurred spontaneously. They are the results of careful, long-range planning to increase tactical aviation capabilities against NATO. Since 1978, the Soviets have introduced two new fighters and three new versions of reconnaissance/ground attack aircraft. These aircraft have increased ranges, improved avionics, and better altitude and all-weather capabilities than previous Soviet models.

There also have been significant changes in tactics and training that are less visible than equipment improvements, but have a potentially far greater effect on tactical aviation effectiveness. Soviet doctrine places great emphasis on achieving air superiority from the outset. To implement this doctrine, the Soviets have recently made significant changes in their combat air tactics and training programs. Pilot independence and initiative are now stressed, a significant departure from previous procedures requiring positive ground control of air operations. Continued technological upgrading of equipment and increasing proficiency in combat employment of that equipment have greatly increased Soviet aviation capabilities to strike the NATO rear area.

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Improved tactics and training are aimed at maximizing performance of a new generation of Soviet aircraft that will have better penetration capabilities. Also, recent major reorganizations of the command and control structure for Soviet air and air defense forces have greatly improved Soviet air fighting capabilities. Their new structure now provides the Soviets with a peacetime organization that closely approximates their anticipated wartime structure for the employment of air power. This will allow a more rapid transition to a wartime posture and will enhance operational flexibility and coordination through centralized control of air assets at front and theater levels.

The Soviets and Warsaw Pact nations will continue to have an aircraft quantity advantage over NATO and are rapidly closing the qualitative capabilities gap. They have and must be expected to use these capabilities to attack our maneuver forces and their supporting elements, as well as striking corps and theater targets to destroy NATO deep strike assets.

Since Patriot will initially be deployed in NATO, the focus of section I of this chapter is on the most lethal part of that threat— the very-low- to medium-altitude attack by fighter-bombers and bombers. The section also describes the roles and capabilities of threat aircraft and the tactics which they will employ. Section II discusses the threat to Patriot units by enemy suppressive measures. Patriot units are certain to be a high priority for early destruction or neutralization. To accomplish their air defense mission, Patriot units must counter and survive enemy suppressive means.

All enemy order of battle data and doctrine presented are unclassified. It is accurate enough to be used for general planning by Patriot units. Additional unclassified threat information important to Patriot units is contained in the FM 100-2 series of manuals. Patriot S2s coordinate specific threat data bases for all tactical plans and operations. FM 44-1A also contains extensive, classified threat data.

Section I — THE AIR THREAT

MISSION TYPES

Soviet forces recognize that part of their air effort is initially required to obtain local air superiority. Fighter units of the air army have the dual mission of providing air defense and close air support for their ground forces. Attack and bomber units are used to engage targets beyond the range of artillery and to reinforce artillery fires on selected targets

and targets of opportunity. A combined bombardment by bombers and ground attack aircraft is coordinated with artillery preparatory fires. After the ground attack has begun, tactical air will provide close air support (CAS) for ground elements in contact. Priority tasks for enemy tactical air are the destruction/neutralization of hostile nuclear delivery means and other targets beyond artillery range.

GROUND ATTACK

Soviet forces consider air strikes an extension of field artillery. They place great emphasis on tactical air support of ground operations. Attacks are made against preplanned targets to neutralize support and reserves within the tactical-operational area. Soviet air forces usually do not use high-performance aircraft to provide close air support along the line of contact where artillery can be employed. Armed helicopters are the primary air threat along the forward line of troops.

BOMBING MISSIONS

The primary responsibility of Soviet bombers is to maintain a strategic force capable of conducting strikes against military and industrial targets. Although ballistic missiles have been given an increased role in destruction of deep targets, the Soviets will retain a sizeable bomber force for many years to come. Bombers have certain advantages over ballistic missiles. Bombers can be used for nonnuclear as well as nuclear warfare, and can seek out and strike small and mobile targets. Additionally, they can be recalled or retargeted after launch. They can also conduct post-strike reconnaissance and have a restrike capability.

AERIAL RECONNAISSANCE

Tactical aerial reconnaissance is a method of gathering intelligence concerning the enemy. It employs airborne collection devices ranging from air-crew eyes to the most advanced sensory devices. The Soviets will use reconnaissance aircraft equipped with sensors capable of monitoring US operations in daylight, darkness, and inclement weather. Reconnaissance aircraft can operate singly or in pairs.

ELECTRONIC COUNTERMEASURES

Soviet aviation has several organic support squadrons with aircraft equipped to conduct electronic countermeasures (ECM) missions. These units can conduct ECM against enemy radar and electronic guidance and communications systems. The most common air ECM operations are spot or barrage jamming and dispensing chaff. This ECM is directed against enemy air defense early warning and fire control radars. Soviet bombing operations will be protected or camouflaged by aircraft using ECM in either a standoff or escort role. Jamming equipment, with an effective range of up to 200 kilometers and covering frequencies of NATO air defense radars, is installed in these ECM aircraft. They may also eject chaff to achieve deception and camouflage. Other individual aircraft may carry self-screening jammers and chaff dispensers.

TACTICAL AIRLIFT

The Soviets consider tactical airlift operations critical both in the conventional and nuclear area. Tactical airlift operations include logistics operations, airborne drops, and assault landings.

AIR SUPERIORITY

Fighter aircraft are normally given the mission of destroying enemy aircraft on approaches, flanks, and beyond the maximum range of the ground-based air defense systems within a zone. For example, the integration of fighter and surface-to-air missile (SAM) systems within a zone is by geographical area, altitude layering, time separation, or by specific target allocation within a particular area. It should be understood that while aircraft may be hostile, not all aircraft are priority threats to air defense. A fighter/interceptor poses little or no threat to a defended asset when compared to a close air support aircraft.

HELIBORNE ASSAULTS

Soviet forces have placed increasing emphasis on air assault operations in recent years. The mobility of helicopters allows Soviet commanders to—

- Assist attacking forces by rapidly surmounting obstacles and large areas of NBC contamination.
- Prevent enemy forces from closing gaps created by nuclear strikes.
- Seize and hold important objectives in the rear operations area until the arrival of advancing troops.
- Conduct raids to destroy control points, radar posts, and signal centers.
- Assist maneuver units by providing a highly mobile antitank capability.

Soviet doctrine stresses maintaining the momentum of the attack. Heavy use of air assault missions is one way to do this. Their leadership believes that air assault missions are especially useful after a nuclear strike. Using this type of assault as soon as possible after a nuclear strike maximizes the gains made with the strike and minimizes the risk to air assault forces. Tactical air support, to include assault helicopters, is often used to create a fly-through zone in enemy lines. Tactical air support generally continues until the air assault forces have landed and deployed.

In the past, Soviet forces have used helicopters to transport small numbers of specially trained airborne troops on air assault missions. Recently, however, emphasis has been placed on using motorized rifle battalions for these missions. Soviet leadership believes that these forces can be used effectively with a minimum of training. The threat presented by a motorized rifle battalion being airlifted behind our lines should not be underestimated.

AIRBORNE ASSAULTS

Airborne assaults are conducted with aircraft from military air transport forces. The mission of airborne forces can be strategic, operational, or tactical.

Strategic missions are usually conducted in division strength. The purpose of this type of mission is to establish a new battle front within a theater of operations. Operational missions are conducted in support of armies or fronts. Units conducting these operations are usually of regimental size or smaller and are dropped from 200 to 1,000 kilometers in the rear. Tactical missions are conducted up to 200 kilometers in the rear. Normal objectives are seizing bridgeheads and critical road or rail junctions, destroying airfields, and disrupting rear areas. In a nuclear environment, tactical missions are most often used to exploit a nuclear strike.

Although airborne operations can be conducted at almost any time, Soviet forces generally conduct them at night. Airborne drops are generally preceded by an increase in reconnaissance of the drop area. Reconnaissance can be conducted by air, clandestine agents, long-range patrols, or air-dropped reconnaissance teams.

Recently, Soviet emphasis on tactical airborne missions has decreased. Helicopter assaults are taking their place; however, airborne forces will still be used for operational and strategic missions.

SOVIET AIRCRAFT AND CAPABILITIES

Soviet forces have been particularly effective in integrating older aircraft and newer, more modern aircraft into a formidable fighting force. These aircraft can be classified by the role of the aircraft or by the type of aircraft. All data presented is representative of the operational use of these aircraft rather than maximum design capabilities. Additional information on Soviet aircraft can be found in appendix D of FM 44-1 and FM 44-30.

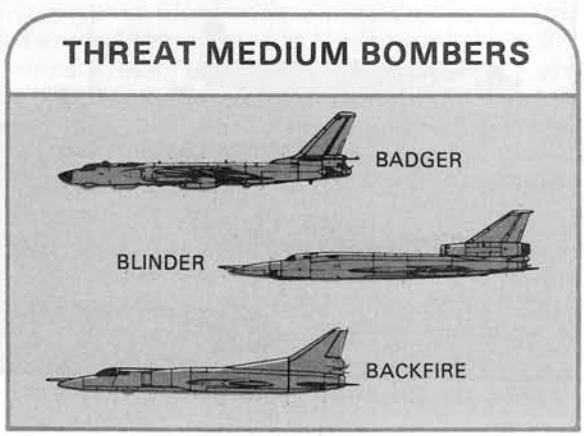
FIXED-WING AIRCRAFT

The primary air threat facing our forces and which the Patriot system was designed to counter is the fixed-wing threat. These

aircraft will operate in all areas over the battlefield and will make up the vast majority of Soviet air forces.

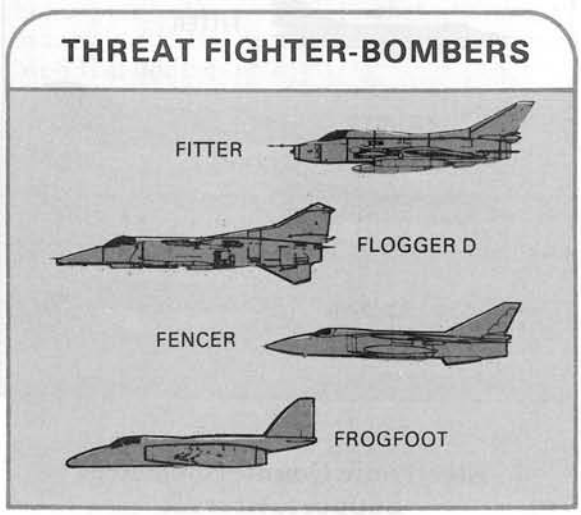
Bombers

Medium bombers will be used during the first phase of the air battle to strike targets critical to the theater in conducting and sustaining war efforts. These targets include air bases, nuclear storage sites, and military-industrial complexes. Medium bombers likely to be encountered are the Tu-16 Badger, Tu-22 Blinder, and the Tu-22M Backfire. These aircraft pose a unique threat to NATO units. Because of their extended range, they can be used in "end-around" tactics, to attack NATO rear areas from the flanks and rear.



Fighter-bombers

The early MiG-series aircraft (MiG-15, 17, 19, and 21) were all designed primarily as interceptors for use in the counter-air role. Early MiGs could only carry two bombs or rocket pods on wing pylons normally used to carry external fuel pods. Because of this limited ordnance carrying capability, their ability to attack ground targets was limited. Newer models of these aircraft have been significantly improved in their ability to attack ground targets. The Su-17 Fitter C and D and the export variant Su-20 Fitter are typical of these improved, older generation aircraft. Two newer aircraft, in particular, have greatly increased the ground attack capability of Soviet forces. The MiG-27 Flogger D is designed specifically for ground attack. It is able to carry most new ordnance currently under development. To supplement this ground attack capability, the Su-24 Fencer has been fielded. The Fencer is a deep penetration strike aircraft believed equivalent to our FB-111. Using an improved terrain avoidance radar, it may be able to underfly friendly radar defenses while conducting deep penetrations. Additionally, a new ground support fighter, the Su-25 Frogfoot, is designed to fly high-performance missions and is capable of carrying a wide variety of munitions.



Fighters

Despite the fact that fighters are defensive in nature, Patriot units will encounter fighters escorting strike aircraft penetrating friendly air defenses. The Soviets are also modernizing their force of fighters. The early MiG- and Su-series aircraft have been improved in their air-to-air role. The second generation fighter currently in service is the MiG-23 Flogger B, which also has a secondary ground attack capability greater than Fishbed or Fitter.

Reconnaissance Aircraft

Tactical aerial reconnaissance is one

method of gathering intelligence concerning the enemy. The Soviets use reconnaissance aircraft equipped with photographic and electronic sensors. This equipment is capable of detecting, locating, and monitoring US operations in daylight, darkness, and inclement weather. Reconnaissance aircraft can operate singly, but probably will operate jointly with ground attack aircraft. Soviet aircraft used most often for reconnaissance today are the Fitter, Fishbed, Flogger, and Foxbat.



Electronic Countermeasures Support Aircraft

Generally, there are two roles for ECM support aircraft involved in support of offensive air operations. These two roles are standoff jammers (SOJ) and escort jammers (ESJ). These aircraft serve as airborne platforms for electronic jamming equipment primarily directed against radar but may also be directed against communications.

The Soviets have modified transports, fighters, bombers, and helicopters to provide both standoff and escort jamming of enemy radars and communications equipment using chaff and electronic jammers. Cub, Coot, and Badger aircraft have been extensively modified to give these aircraft primary roles of stand-off jamming while remaining outside the range of our HIMAD and defensive fighter aircraft. As other Badger, Backfire, Blinder, and Brewer bombers and Fishbed, Foxbat, and Flogger B and D fighters have had ECM equipment installed. This provides self-defense escort jamming on missions across the forward edge of the battle area (FEBA). The Brewer and Mi-4 Hound helicopters have been modified to provide jamming of enemy communications in the forward area in support of ground operations.



Drone Aircraft

Drones are remotely piloted aircraft which receive guidance from accompanying manned aircraft, ground control stations, or on-board, programable navigation systems.

Drones are classified as either refitted, retired aircraft (RRA) or true drones. RRA are obsolescent, retired fighter or reconnaissance aircraft withdrawn from front-line duty, such as the Yak-25 Mandrake and the MiG-19 Farmer. The Soviets have been using both of these aircraft as surface-to-air missile target drones for years. True drones are those designed and built as pilotless aircraft, such as the LA-17.

RRA may be used in the initial stages of air operations against NATO and may continue to be used until stocks are depleted. Both RRA and true drones can deliver a wide variety of ordnance. Additionally, drones can be used effectively as reconnaissance platforms.

The most significant advantage of drones is the elimination of pilot loss. An especially effective use of this advantage is to reconnoiter NBC contaminated areas. On the other hand, the lack of on-board human control limits the drone's maneuver capabilities. Other uses of drones are to reconnoiter fire unit positions and force HIMAD missile expenditure.

ROTARY-WING AIRCRAFT

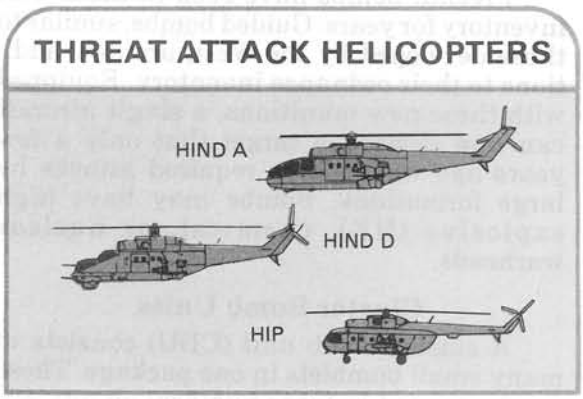
Helicopters have some distinct advantages over fixed-wing aircraft which enable them to be employed in large numbers in forward areas. They do not require large airfields or costly runways from which to operate. They are suitable for conducting reconnaissance of the enemy's forward forces. They are highly mobile and can fly in weather that grounds fixed-wing aircraft. Helicopters can carry a wide variety of weapons; to include cannons, machine guns, antitank guided missiles (ATGM), free-flight rockets, and grenade launchers. They can also be used as electronic warfare platforms and to transport small, light units for air assault operations.

Attack Helicopters

The Soviets have the most heavily armed helicopters in the world today. They will employ them in the covering force area (CFA), in the main battle area (MBA), and in air assaults against rear area targets. The attack helicopter achieves maximum utility in a war of movement when employed in ambush or assault actions. Using speed, mobility, surprise, and an impressive array of weapons, it can harass, delay, and destroy advancing columns and armor thrusts.

The Mi-24 Hind is the first Soviet helicopter specifically designed for attack missions. However, it is also capable of landing a squad behind enemy lines. There are currently four operational versions of the Hind. The first two, Hind A and C, differ basically in the ordnance they carry. The third version, the Hind D, features a completely redesigned front fuselage. The Hind D's armament capabilities exceed those of the Hind A. The Hind D has a four-barrel Gatling gun instead of the single-barrel machine gun of the Hind A. The Hind E version is basically the same as the Hind D except it is equipped with Spiral ATGMs carried on launch racks under each of its wings.

A new version of the Mi-8 Hip, called Hip E, has been introduced as being equipped with "the heaviest firepower seen on any helicopter in the world." Rocket and missile launching racks are now included on most Mi-8 Hip helicopter.



ECM Helicopters

These aircraft operate to reduce the effectiveness of our communications. Specifically, the Mi-4 Hound C is designed as an ECM emitter of noise and chaff.

Utility Helicopters

The Mi-8 Hip is the main utility helicopter for Soviet forces and is replacing the Mi-4 Hound as the standard troop carrier for air assault operations.

Other helicopters which may be targets for ADA systems are the Mi-2 Hoplite which will act as a spotting aircraft for attack

helicopters and the Mi-6 Hook. Helicopters may be targets for the Patriot system when deep airmobile assaults are conducted or when helicopters conduct deep reconnaissance missions.

SOVIET MUNITIONS AND ATTACK TECHNIQUES

The Soviets have a full spectrum of munitions capable of being air dropped which are nearly as effective as those of our own Air Force. A new series of advanced munitions is in development and can be expected to be deployed during Patriot fielding in NATO.

THREAT MUNITIONS

Bombs

Freefall bombs have been in the Soviet inventory for years. Guided bombs, similar to those developed by the West, are new additions to their ordnance inventory. Equipped with these new munitions, a single aircraft can now destroy a target that only a few years ago would have required attacks by large formations. Bombs may have high explosive (HE), chemical, or nuclear warheads.

Cluster Bomb Units

A cluster bomb unit (CBU) consists of many small bomblets in one package. These can be carried in large numbers on any aircraft. CBUs are dropped at high speeds and low altitudes to cover a wide area, such as a Hawk or Patriot unit position.

Rockets

Rockets are loaded into pods or clusters which allow for a high rate of fire. These rockets are ballistic and are normally used against soft targets.

Napalm

Napalm is a jellied fuel mixture which may be used against virtually all types of targets. The fuel mixture ignites on impact, burns the target, and forces personnel out of vehicles and shelters.

Cannons

In addition to employing specialized munitions, Soviet aircraft are equipped with cannons for use in strafing targets. Normally, these cannons are 23-mm or 30-mm guns. Fighters also carry cannons for self-defense.

Air-to-Surface Missiles

To improve capabilities against point targets, such as bridges and radar sites, the Soviets have developed new air-to-surface missiles (ASM) with improved guidance systems. These ASMs are either command-guided, passive-homing, or active-homing missiles. Command guided ASMs are flown into the target by the pilot or electronic warfare officer in the launching aircraft. The controller must see the target, or have a remote TV pickup in the missile. Active homing is characterized by having an electromagnetic transmitter in the missile which illuminates the target. The missile then homes on the reflected energy. In passive homing, the missile homes on the target's own emissions, or on reflected energy when the target is illuminated from a source other than the missile.

Some of the earlier version ASMs are nearly the size of small aircraft and can be launched only from medium and heavy bombers. Tactical ASMs are delivered by fighter-bomber aircraft and represent the greatest threat in the tactical operations area. To radars, an especially dangerous type of ASM is the antiradiation missile (ARM) which passively homes in on the targeted radar's emissions. These ARMs may be carried by bombers or fighter-bombers and some can be launched outside the lethal kill envelope of Patriot, reducing the danger to the launching aircraft. ASMs may carry HE, nuclear, or chemical warheads.

ATTACK TECHNIQUES

High-performance, fixed-wing aircraft rely on speed and ECM for surprise and survival. Fixed-wing aircraft can attack ground targets in a variety of ways. The actual attack technique depends on the type of target, aircraft, ordnance available, terrain, and weather. These tactics/profiles include—

- Gravity drop-bombing.
- Dive-bombing.
- Toss-bombing.
- Standoff.
- Pop-up.
- Lay-down.

The attack variations illustration shows examples of attack profiles, ordnance, and targets.

ATTACK VARIATIONS

ATTACK TECHNIQUE	ORDNANCE	WEAPON RELEASE HEIGHT (Meters)	AIRCRAFT SPEED (Meters per Second)	ORDNANCE RELEASE DISTANCE (Meters)	TARGET
POP-UP	BOMBS	810	230	1,110	ARMOR CONCENTRATIONS
GRAVITY DROP-BOMBING	BOMBS	2,000	300	3,000	LOGISTICS COMPLEXES
LAY-DOWN	CBU	500	230	1,200	VEHICLES, PERSONNEL IN OPEN
LAY-DOWN	NAPALM	60	260	900	ALL EXCEPT HEAVY STRUCTURES
TOSS-BOMBING	BOMBS	1,500	240	3,200	LOGISTICS COMPLEXES, HEADQUARTERS
DIVE-BOMBING	ROCKETS/ BOMBS	475	230	800	HEADQUARTERS, VEHICLES
STANDOFF	ASM	100	250	10,000	PATRIOT BATTERY
STANDOFF	ASM	5,000	200	70,000	HEADQUARTERS COMPLEXES
POP-UP	CANNONS	475	130	800	VEHICLES, PERSONNEL IN OPEN

Gravity Drop-Bombing

Aircraft using gravity drop-bombing approach a predetermined drop-point. The ordnance is then delivered by free fall gravity drop. The ordnance will fall forward toward the target due to the inertia of the aircraft. This distance can be determined for planning purposes based on the speed and altitude of the aircraft. Normally gravity drop-bombing is used by bombers at medium and high altitudes but it may also be used by fighter-bombers at lower altitudes. This technique can be used to deliver nuclear as well as conventional ordnance.

Dive-Bombing

Aircraft using this attack technique start the attack run at medium altitude and dive directly at the target. Ordnance release will occur at low to medium altitudes. After delivering the ordnance, the aircraft will execute

an evasive maneuver. As in gravity drop-bombing, the ordnance falls forward, usually less than 1 kilometer.

Toss-Bombing

Aircraft using this attack technique usually ingress at low to medium altitude. At a predetermined point, the aircraft goes into a steep climb. The aircraft then releases its ordnance and reverses its direction. The ordnance can be thrown forward as far as 18.3 kilometers, but the accuracy of ordnance delivery is poor.

Standoff

Aircraft equipped with ASMs and precision guided munitions can, with a few types of specialized ordnance, stand off beyond the effective range of ADA systems and release ordnance against the defended asset. The ordnance itself then becomes the threat. ASMs have ranges up to 500 kilometers. There is no fixed altitude required for ASM release.

Pop-up

Aircraft using the pop-up technique begin a low-level run-in about 10 to 20 kilometers from the target. When reaching a pull-up point about 3 to 8 kilometers offset from the target, the aircraft will climb to its attack height. This height will vary from 300 to 2,000 meters, depending on the terrain and type of ordnance used. Air speed will also vary, but will generally be between 200 and 250 meters per second. The pilot begins to look for the target as soon as possible after pull-up. He has only a few seconds to find the target if minimum exposure time is to be achieved. The aircraft will then dive at the target and release its ordnance 500 to 1,500 meters from the target. It then escapes the target area at high speed and low altitude.

Lay-down

Aircraft using the lay-down technique fly at altitudes below 200 meters and at speeds from 150 to 250 meters per second. High speed and low altitude increase aircraft survival and mission success. The speed of ordnance fall is reduced by ordnance retardation devices, such as drogue chutes or retarding fins. This allows the aircraft to escape the target area before the ordnance detonates. Runway cratering bombs are frequently delivered by this method.

SOVIET TACTICS

The study of recent conflicts and current threat analysis provide clear insights into the nature of the future air battle. The next air battle will be a large numbers game, played by both sides in terms of aircraft and ADA systems. The Soviets will bring together air attacks from multiple, dispersed air bases in an attempt to gain air superiority. At the same time, they will be playing the air defense game to protect their own forces.

Friendly forces can expect that enemy air will initially outnumber friendly air. In any event, it must not be assumed that US forces will have air superiority; except, perhaps, in limited areas for short periods of time. This leads to the concept of two distinct phases to the air battle.

FIRST PHASE OF THE AIR BATTLE

The first phase of the air battle will consist of high risk operations designed to gain air superiority and to neutralize theater nuclear forces. Soviet forces will dedicate all available assets to this effort including strategic aviation, naval aviation, tactical aviation, and the strategic rocket forces. Their air forces will attempt to punch holes or lanes through our defended airspace by suppressing forward HIMAD units. Successive waves of aircraft will use these lanes to attack our air bases, command and control facilities, key logistics installations, and theater nuclear forces. If this initial air operation is successful, our retaliatory capability will be greatly reduced and the ability to sustain ground forces will be greatly degraded.

In the first phase air battle, Soviet aircraft will be loaded with munitions optimized to knock out our ADA units and to kill aircraft on air bases and in the air. While the air superiority phase will continue as long as conflict exists, it is the first attack which will be vital. As with other combat arms, *ADA*

must win the first battle. Our success will determine—

- The size of initial and subsequent attacks on our ground forces.
- The amount of close air support available to our ground forces.
- Our freedom of maneuver despite enemy air actions.
- The survivability of our logistics support systems.

The first phase of the air battle is illustrated below.

FIRST PHASE AIR BATTLE

FIGHTER-BOMBERS

ATTACKING AT LOW ALTITUDES (150-600 METERS)

USING TERRAIN FOLLOWING AND AVOIDANCE TECHNIQUES

USING ECM PODS

DELIVERING MIXED ORDNANCE
—CBUs
—ASMs (ARMs)
—CHEMICALS
—CANNONS
—ROCKETS

BOMBERS

ATTACKING AT MEDIUM ALTITUDES (600-7,500 METERS)

USING SELF-SCREENING JAMMER PODS

DELIVERING HEAVY ORDNANCE
—RUNWAY CRATERING BOMBS
—ASMs
—NUCLEAR, CHEMICAL, AND HE

FIGHTERS

ESCORTING FIGHTER-BOMBERS AND BOMBERS

CONFIGURED ONLY FOR AIR-TO-AIR COMBAT

RECONNAISSANCE

PRECEDING AND FOLLOWING ATTACK

HIGH ALTITUDE

LOCATING HIMAD UNITS

ASSESSING COMBAT DAMAGE

ECM SUPPORT

PRECEDE HIMAD ATTACK BY MINUTES

DIRECTED AGAINST HIMAD ACQUISITION RADARS

STANDING OFF OUTSIDE ENGAGEMENT RANGE

MOST EFFECTIVE FOR LOW-ALTITUDE AIRCRAFT

ESCORTING BOMBER FORMATIONS

SECOND PHASE OF THE AIR BATTLE

After the initial waves of air superiority attacks, the Soviets will shift their emphasis to close air support of maneuver forces. The second phase of the air battle will be the attack of maneuver forces and their support elements. If they fail to achieve air superiority, the second phase may be delayed and continued attacks could be directed against our ADA forces.

In the second phase, Soviet aircraft will attack forward maneuver elements, as well as command and control, fire support, and logistic assets in brigade and division areas.

Enemy flights will approach the forward edge of the main battle area at low altitudes to avoid HIMAD weapons. Most attacks on ground targets will be at altitudes below 1,000 meters and at speeds less than 250 meters per second. Flights will probably be composed of 2-4 aircraft. As they near their targets, these flights may divide into two separate elements. The aircraft may execute a pop-up maneuver when approaching the target area. The first element will attack, deliver its ordnance, and then escape the target area. The second element will follow almost immediately. Elements may make a second attack on the target if they have unexpended ordnance. The second phase of the air battle is illustrated below.

SECOND PHASE AIR BATTLE

FIGHTER-BOMBERS

ATTACKING AT LOW ALTITUDES (150-600 METERS)

DELIVERING MIXED ORDNANCE
—CBUs
—NAPALM
—ROCKETS
—CHEMICALS
—CANNON

ATTACK HELICOPTERS

FLYING NAP-OF-THE-EARTH (NOE)

TARGETING ARMOR AND MECHANIZED UNITS

DELIVERING MIXED ORDNANCE
—ATGM
—ROCKETS
—CANNON
—BOMBS, CHEMICAL, AND HE

RECONNAISSANCE

FLYING MEDIUM ALTITUDE

DIRECTING ARTILLERY FIRE

REPORTING TROOP CONCENTRATIONS AND MOVEMENT

ECM SUPPORT

COMMUNICATIONS JAMMING EMPHASIZED

JAMS HIMAD

Section II — THE SUPPRESSION THREAT

DETECTION OF PATRIOT UNITS

Before an enemy can attempt to suppress Patriot, he must first detect its presence, identify the weapon system, and determine its position. He has many assets to do this including the following:

- Human intelligence.
- Signal intelligence.
- Imagery intelligence.
- Electronic warfare support measures.

HUMAN INTELLIGENCE

Human intelligence (HUMINT) is the use of people to gather information. These people can be members of the local population, or enemy ground and air observers. They can also be enemy intelligence agents disguised as friendly troops or civilians. Loose talk, information posted on maps and vehicle windshields, and improperly safeguarded operations plans and orders are examples of types of information that could be easily collected through HUMINT and pieced together to form essential intelligence.

SIGNAL INTELLIGENCE

Signal intelligence (SIGINT) is the intelligence derived from the intercept and interpretation of communications-electronics (C-E) systems. This includes the interception of both radio and radar systems. VHF, UHF, and the Patriot radar can all be detected, intercepted, and located. A direct line of sight must exist between the emitter and the electronic sensor. This normally precludes intercept by ground-based sensors because of terrain masking. However, all Patriot C-E systems may be intercepted by airborne sensors.

IMAGERY INTELLIGENCE

Imagery intelligence (IMINT) is intelligence derived from the location, recognition, identification, and description of objects, activities, and terrain represented on imagery. IMINT is the most widely used detection method. It provides a permanent record of the exact details of an area. It also permits long-term comparisons to find changes in detail. IMINT is the most accurate means of pinpointing target locations. Patriot units not properly camouflaged to reduce visual and infrared signatures will be easily detected and located through IMINT measures.

ELECTRONIC WARFARE SUPPORT MEASURES

Electronic warfare support measures (ESM) is that division of EW that involves actions taken to search for, locate, and identify radiated electromagnetic energy for the purposes of immediate threat recognition and tactical employment of forces.

ESM is often confused with SIGINT, which is largely concerned with intercepting, locating, and monitoring C-E emitters for intelligence information. ESM, however, is concerned with identifying, discriminating, and locating the emitters. ESM includes use of both ground and airborne radio direction finding (RDF) equipment.

RDF sensors can intercept signals at several times the operational range of Patriot radios and radar, if a direct line of sight exists. This allows an enemy to find the approximate azimuth to his target—your position. If the enemy can obtain three RDF bearings to your position, he can determine its location. The enemy can locate positions with sufficient accuracy for directing indirect fires in less than 3 minutes. After determining azimuth and range, he needs only a short time to coordinate a fire command. From the time of detection to "steel-on-target" is less than 30 minutes. This response time is expected to be significantly reduced by technological innovations being developed. The Patriot radar is the C-E emitter that is most susceptible to intercept, identification, and location by ESM. Operations security measures to counter ESM are contained in chapter 8.

SUPPRESSIVE MEANS

After the Soviets have identified and located a Patriot unit, they will attempt to destroy or neutralize the unit. They will try to do this through suppressive attacks and/or electronic warfare. Patriot units can be suppressed in four ways.

INDIRECT FIRE

The Soviets have a wide variety of indirect fire weapon systems, including cannon artillery, mortars, multiple rocket launchers (MRL), and tactical ballistic missiles (TBM). Mortar ranges are typically less than 6 kilometers, cannon artillery ranges are less than 30 kilometers, and MRL ranges are less than

20 kilometers. Normally, Patriot units are deployed out of range of those systems, but will be deployed within range of nearly all TBMs. The range of the Frog-7 is 70 kilometers, the SS-21 is 120 kilometers, the Scud-B is 280 kilometers, the SS-23 is approximately 50 kilometers, and the range of the Scaleboard is 800 kilometers. Replacement of the Frog-7 by the SS-21 with its improved accuracy and range will increase the likelihood of Patriot units being targeted. The threat posed by this array of TBMs is by far the most severe to Patriot units. Given the priority placed on destroying Patriot units early in the next battle, the Soviets will probably devote TBMs to destroy key Patriot units.

AIR ATTACK

Air attack will be used to suppress Patriot units. Section I clearly pointed out that fighter-bombers will be devoted to the mission of suppressing Patriot units. These fighter-bombers will attack at extremely low altitudes and at high speed. High-performance aircraft will attack in flights of 2-4 aircraft, attempting to saturate and overrun the Patriot unit. Aircraft will attempt to suppress Patriot units by employing ARMs and may also deliver CBUs, if they can penetrate to the Patriot unit position. Chemical munitions may also be used.

GROUND ATTACK

This is the third method of direct physical suppression. This method includes the use of conventional forces as well as unconventional forces, such as guerrillas, saboteurs, and commandos. Even a small force has the capability to neutralize a Patriot unit through the use of man-portable weapons, such as the RPG-7.

ELECTRONIC WARFARE

Modern warfare views the electromagnetic environment as an extension of the battlefield where a unique type of combat occurs. This invisible but very real component of the air-land battle is known as EW, and is a viable form of air defense suppression. The Soviets will use ECM extensively to screen aircraft, to deceive identification, friend or foe (IFF), systems, to degrade missile guidance, and to jam command and control communications systems. They may use ECM to intrude into radio nets, using imitative and deceptive voice techniques or otherwise interfering with or interrupting radio communications between control and firing elements. Soviet use of ECM against radar and missile guidance systems may degrade detection ranges and missile accuracy and increase response time, thereby improving an aircraft's ability to penetrate the defense.

CHAPTER 3

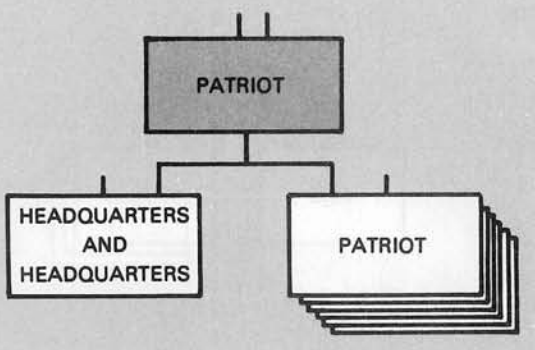
Patriot Battalion

★ This chapter describes Patriot battalion organization and equipment. Emphasis is on key fundamental features of the system and organizational functions required for the understanding of tactical employment of Patriot units. The Patriot tables of organization and equipment provide more detailed information on unit personnel and equipment authorizations. Patriot tables of organization and equipment are listed in the references. Detailed data on system characteristics are contained in Patriot technical manuals. Classified performance and planning data are in (SNF) FM 44-1A.

BATTALION

★ The Patriot battalion is organized with a headquarters and headquarters battery and six firing batteries as shown in the Patriot battalion illustration. Initially, Patriot battalions will be fielded with headquarters and headquarters battery and three firing batteries. The battalions will be backfilled with the remaining batteries until they reach full strength. The Patriot firing battery is an ADA fire unit. The Army Dictionary, AR 310-25, defines a fire unit as "a unit whose fire in battle is under the immediate and effective control of one leader." This definition has been modified in Air Defense Artillery to state "the smallest tactical unit that can successfully accomplish an engagement sequence against a hostile airborne target." An engagement sequence includes detection, identification, engagement, and destruction of a target.

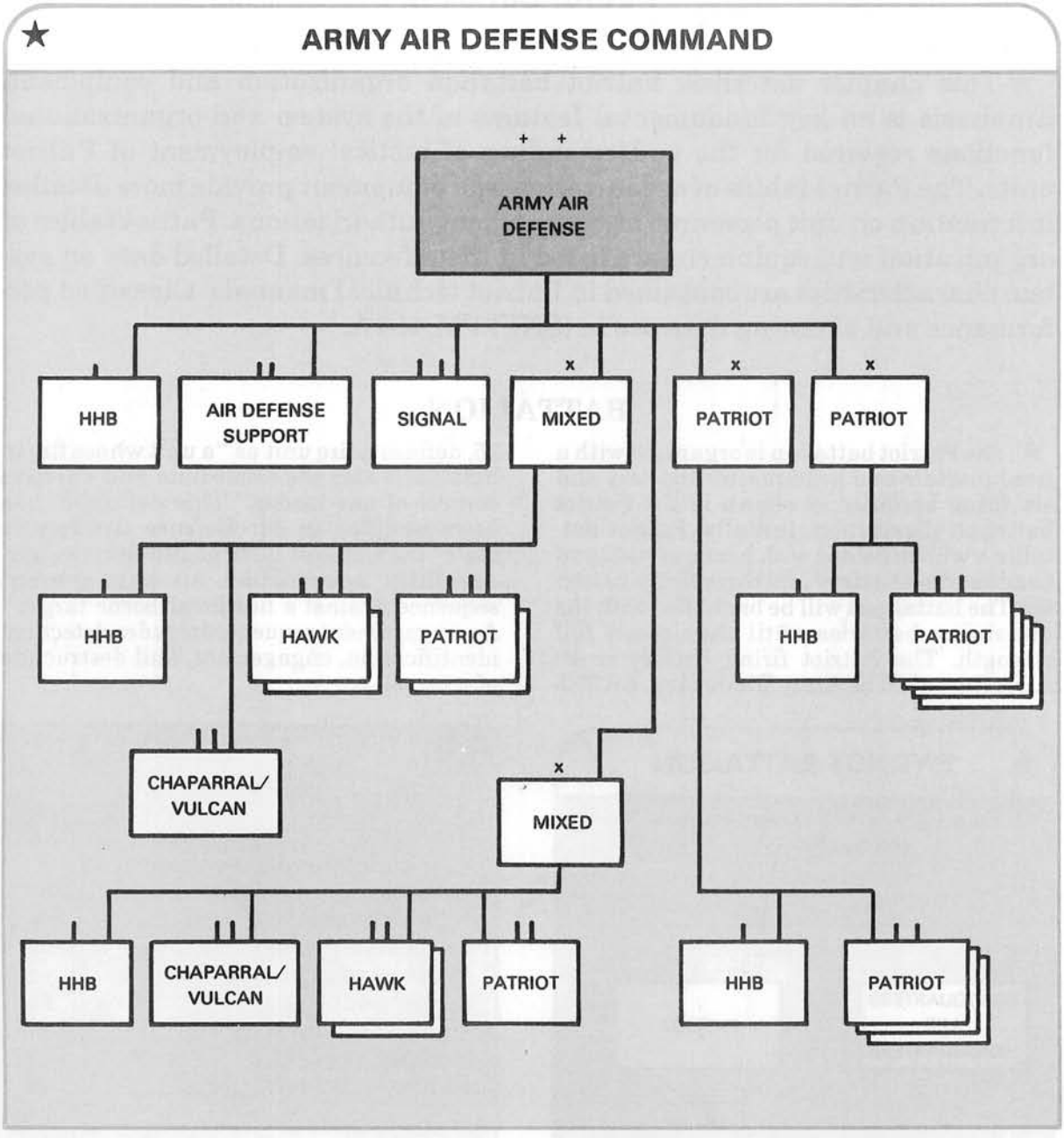
★ PATRIOT BATTALION



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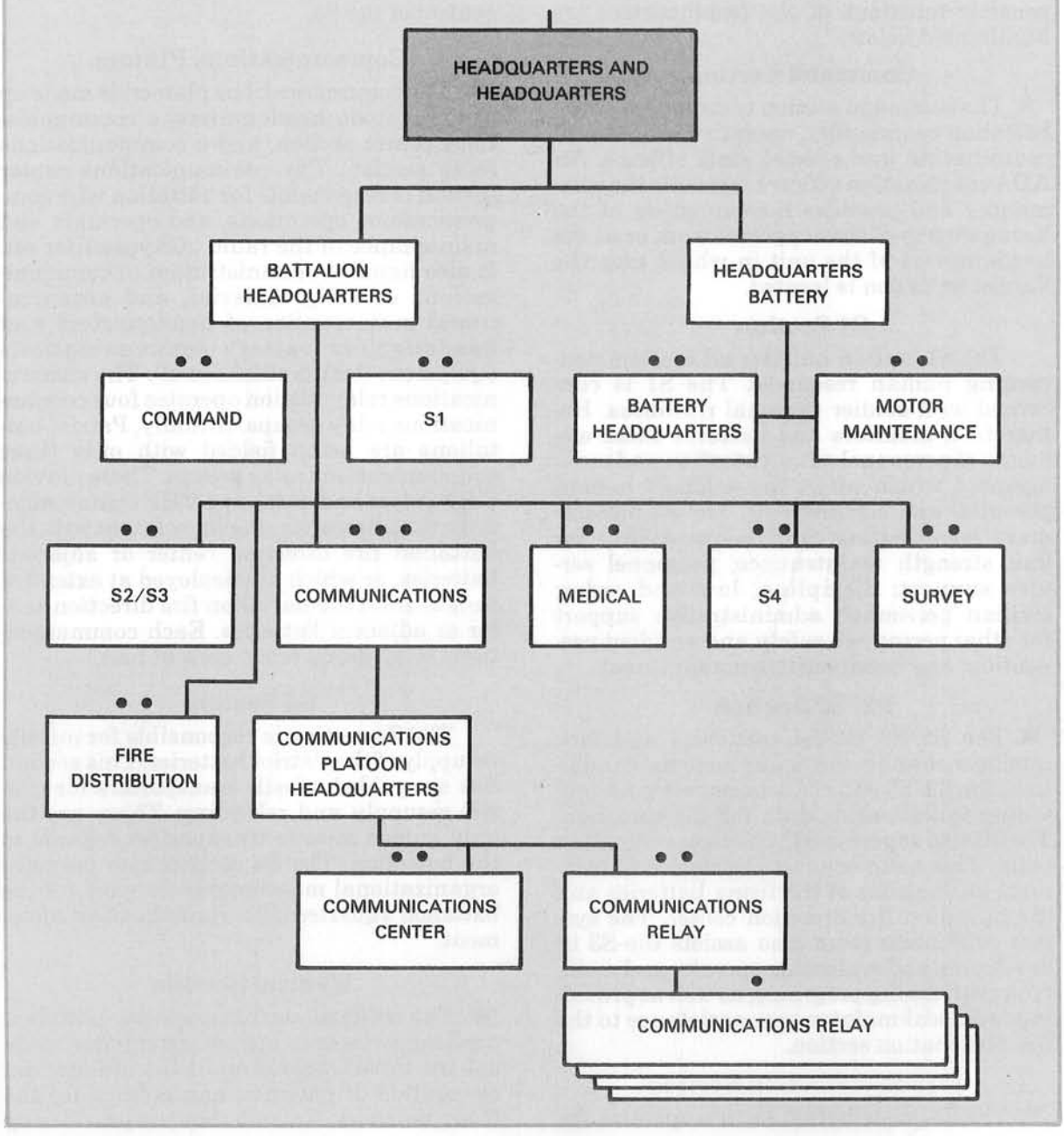
★ The battalion is normally assigned to a theater army ADA brigade. A theater army ADA brigade may consist purely of Patriot battalions, or may be a mix of Patriot, Hawk, and Chaparral/Vulcan battalions. Theater army ADA brigades are organized and assigned to an army air defense command as shown in the army air defense command illustration.



HEADQUARTERS AND HEADQUARTERS BATTERY

★ The headquarters and headquarters battery of the Patriot battalion is organized as shown in the headquarters and headquarters battery illustration.

★ HEADQUARTERS AND HEADQUARTERS BATTERY



BATTALION HEADQUARTERS

★ The headquarters provides command, operational control, and administrative and logistic support for the battalion. While most functions performed in the Patriot battalion headquarters are similar to those performed in other types of organizations, the Patriot-peculiar functions of the headquarters are highlighted below.

Command Section

★ The command section is composed of the battalion commander, executive officer, and coordinating and special staff officers. An ADA coordination officer represents the commander and provides liaison, either at the headquarters of the supported unit, or at the headquarters of the unit in whose area the Patriot battalion is located.

S1 Section

The S1 section handles all matters concerning human resources. The S1 is concerned with soldier personal readiness. He, therefore, monitors and assesses those elements of personnel administration and management which affect the soldier's human potential and commitment. The S1 has primary coordinating staff responsibility for unit strength maintenance; personnel service support; discipline, law and order; civilian personnel; administrative support for other personnel; safety and accident prevention; and headquarters management.

S2/S3 Section

★ The S2/S3 section performs standard intelligence and operations functions. In addition, the S2/S3 section is responsible for providing initialization data for the battalion. The S3 also supervises the system evaluation team. This team conducts tactical and technical evaluations of the firing batteries and the battalion fire direction center. The system evaluation team also assists the S3 in developing and evaluating operator and maintenance training programs, as well as providing technical maintenance assistance to the fire distribution section.

Fire Distribution Section

★ The fire distribution section operates the battalion fire direction center which exercises direct control and supervision of the firing batteries. The battalion fire direction center also interfaces with the brigade and adjacent battalion fire direction centers. The fire distribution section is under the operational control of the S3.

Communications Platoon

★ The communications platoon is made up of the platoon headquarters, a communications center section, and a communications relay section. The communications center section is responsible for battalion wire communications operations, and operation and maintenance of the radio teletypewriter set. It also handles administration of communications security material, and organizational maintenance of headquarters and headquarters battery communications equipment (less multichannel). The communications relay section operates four communications relay groups. Initially, Patriot battalions are being fielded with only three communications relay groups. These provide UHF (voice and data) and VHF communications to units not having line of sight with the battalion fire direction center or adjacent batteries, or which are deployed at extended ranges from the battalion fire direction center or adjacent batteries. Each communications relay group has a crew of four.

S4 Section

The S4 section is responsible for missile resupply of the Patriot batteries. This section has six guided missile transporters for missile resupply and reloading. These are the only guided missile transporters organic to the battalion. The S4 section also provides organizational maintenance support for the battalion's quartermaster and chemical equipment.

Medical Section

★ The medical section provides battalion medical services to include emergency medical treatment, operation of the aid station, evacuation of patients, and aidmen for the firing batteries. An ambulance is provided by

the section for evacuation of casualties directly to the nearest medical facility or to the battalion aid station.

Survey Section

The survey section is responsible for providing survey data to the firing batteries for siting and orienting radar sets and launching stations. A survey information center and two survey teams comprise the survey section. Each team has a position and azimuth determining system and a theodolite as a backup. The survey section operates under the operational control of the S3.

HEADQUARTERS BATTERY

Headquarters battery provides food service, unit supply, refueling, and organizational maintenance support for vehicles, power generators, and engineer missile equipment. Headquarters battery is organized with a battery headquarters and a motor maintenance section.

Battery Headquarters

★ The battery headquarters is composed of the command element, the unit supply element, and the unit food service element. All weapons and nuclear, biological, and chemical protective masks are consolidated in the battery headquarters. The headquarters also has equipment for one Stinger team to provide self-defense of the fire direction center. The team is manned by battery personnel as an additional duty. Patriot (16T) crew members are designated as Stinger team members on an additional duty basis. These crew members normally receive familiarization training on the Stinger system prior to deployment of the Patriot battalion. In the case of HHB, the commander should consider training additional personnel, as the designated 16Ts will not be available to man the Stinger equipment during missile resupply operations.

Motor Maintenance Section

★ The motor maintenance section provides organizational maintenance for all battery vehicles, power generation equipment, and air conditioners. The section has refueling equipment and provides vehicle recovery for the battery.

FIRING BATTERY

★ The Patriot firing battery is organized with a battery headquarters, a maintenance platoon, a fire control platoon, and a launcher platoon as shown in the Patriot firing battery illustration. The battery is normally integrated with the rest of the battalion defense through the battalion fire direction center; however, it is capable of autonomous operations.

BATTERY HEADQUARTERS

The Patriot firing battery headquarters has a command element, supply element, and food service element. The battery command post is a mobile, 2-1/2-ton shop van.

MAINTENANCE PLATOON

★ The maintenance platoon is organized with a platoon headquarters, communications section, motor maintenance section, and system maintenance section. The platoon headquarters ensures responsive, coordinated organizational maintenance support. The platoon leader serves as a tactical control officer on a rotational basis with the other platoon leaders. The communications section is responsible for supporting battery wire communications and performing organizational maintenance on field communications equipment. The battery motor maintenance section performs organizational maintenance on all vehicles and generators (less turbines). It also recovers vehicles, refuels all battery generators and vehicles, and maintains the battery repair parts prescribed load list (less Patriot system). The system maintenance section accomplishes all Patriot system maintenance below the intermediate maintenance level on the major items of battery

equipment as well as platoon maintenance and test equipment. The section also maintains the Patriot system prescribed load list.

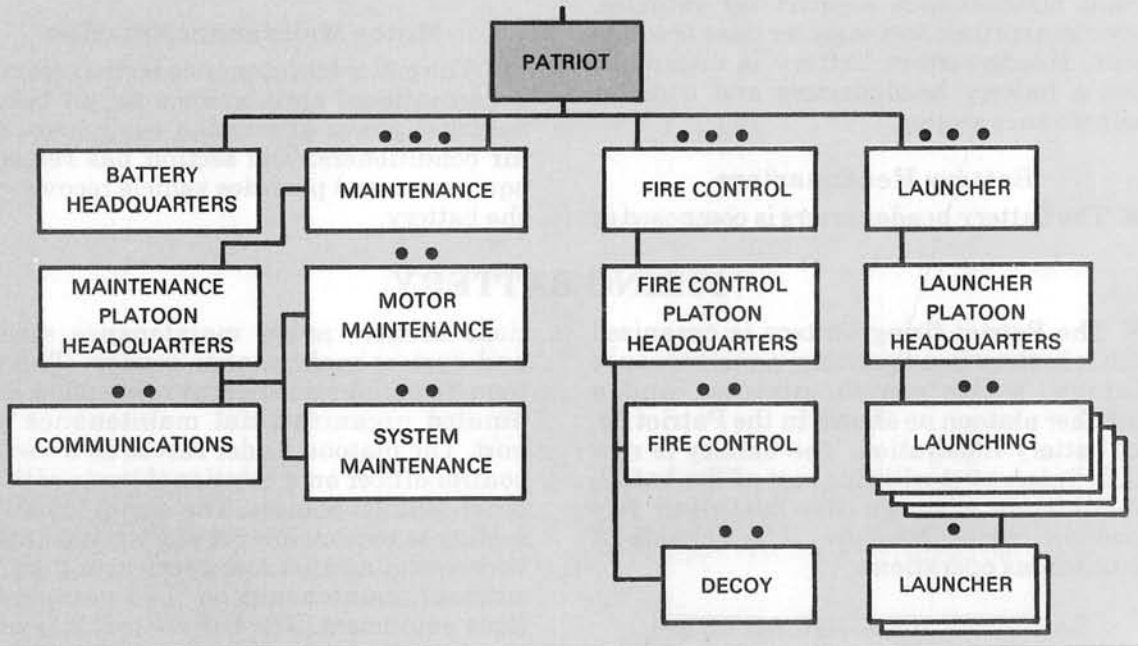
LAUNCHER PLATOON

★ The launcher platoon contains four launcher sections. Each section has two launching stations. Each launching station is manned by three crew members. The launcher platoon mans a Stinger team for self-defense of the battery.

FIRE CONTROL PLATOON

★ In the fire control platoon there is a platoon headquarters, fire control section, and decoy section. The platoon is capable of sustained operations and is fully mobile. The fire control platoon also provides a Stinger team for self-defense of the battery. The equipment in the fire control section includes the engagement control station, radar set, electric power plant, and an antenna mast group. The UHF multichannel communications are installed and operated by a three-man team. The decoy section consists of a four-man team which deploys the four electronic decoys that enhance the survivability of the radar set. The Patriot firing batteries have been initially fielded without the decoys, but will be backfilled in the near future. The platoon has personnel to operate the electric power plant and perform turbine maintenance.

★ **PATRIOT FIRING BATTERY**



KEY SYSTEM FEATURES

Patriot is a mobile air defense guided missile system designed to counter the tactical air threat of the 1980s and 1990s. Patriot is effective against aircraft at all tactical altitudes and has replaced US Nike Hercules and will replace most Hawk systems. The key features of the Patriot system are a multifunction, phased-array radar; track-via-missile guidance; and automated operations with capability for human override. The single, multifunction, phased-array radar performs the tactical functions that presently require

nine separate radars within currently operational ADA systems. The track-via-missile guidance increases the single shot engagement kill probability. This automated operation provides firepower at levels many times greater than currently fielded systems.

The major items of Patriot equipment discussed below are only described to the extent necessary to understand the tactical function of the equipment. Detailed information is contained in the appropriate technical manuals listed in the references.

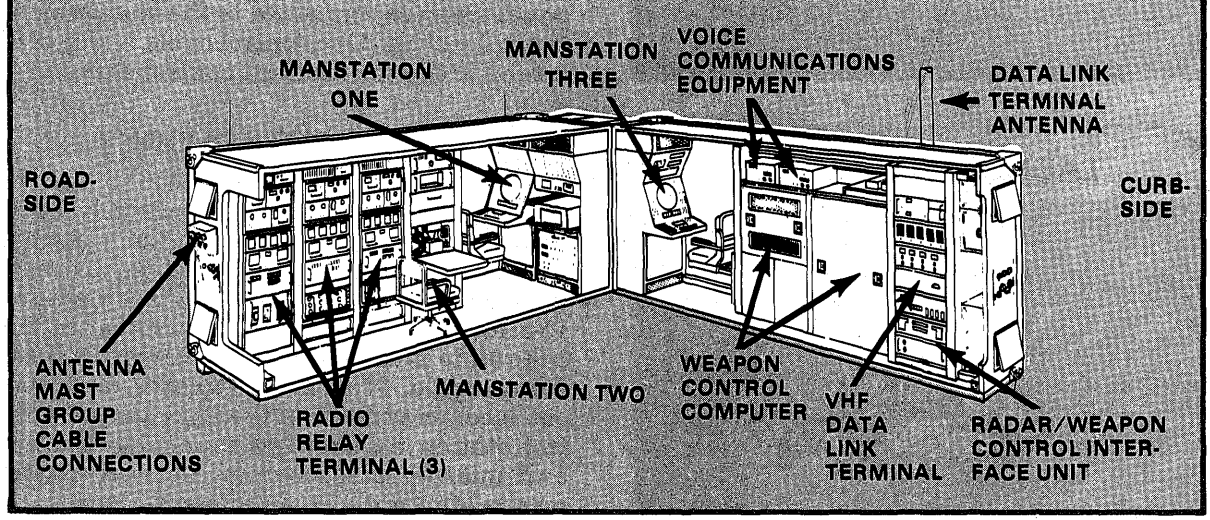
FIRING BATTERY EQUIPMENT

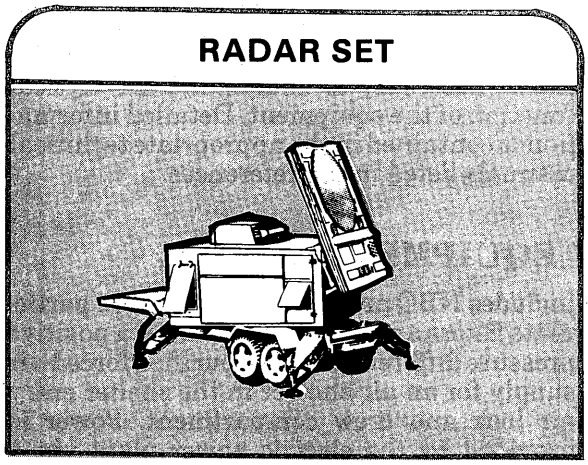
Major equipment items found in the Patriot firing battery include the engagement control station, radar set, electric power plant, launching stations, Patriot guided missiles, and antenna mast group.

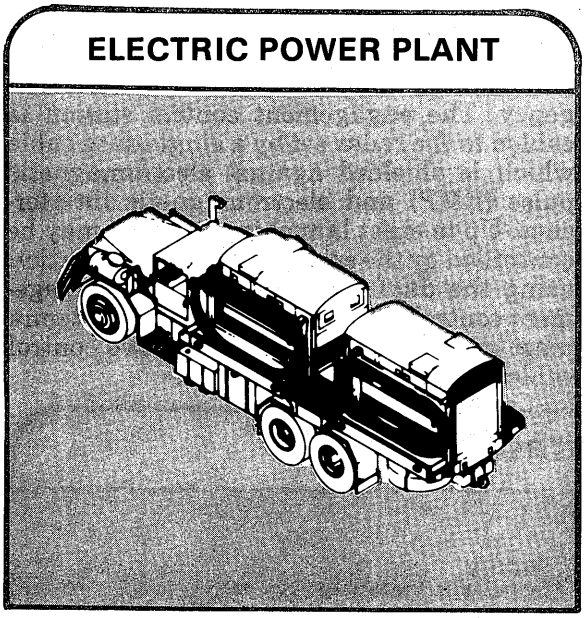
ENGAGEMENT CONTROL STATION

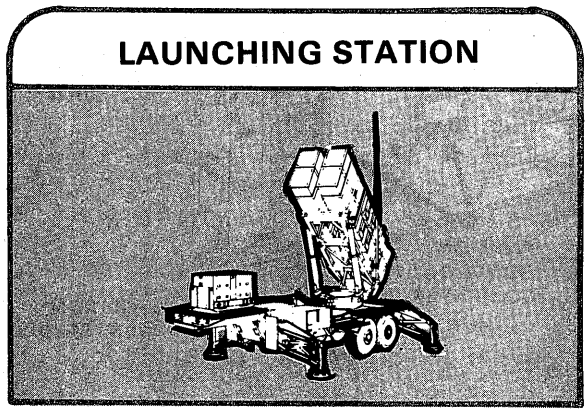
The engagement control station is the fire direction center of the Patriot firing battery and is the only piece of equipment manned during the air battle (see the engagement control station illustration). It contains the weapons control computer, display and control group, three UHF radio terminals, a VHF data link terminal, and two VHF voice radios. The shelter is a radio frequency shielded and weather-tight enclosure. The walls and inlets include electromagnetic shielding. The shelter is air conditioned and includes NBC protection devices. Gas particulate filters and blowers maintain a positive pressure differential and a purified forced-air supply for an air-shower in the shelter entry air lock and crew compartment. Power is provided by the electric power plant via a single power cable. A control cable from the electric power plant provides the capability for the operator to monitor the electric power plant status and shut it down in an emergency. The engagement control station is cabled to the radar set by a single data cable which is shielded against electromagnetic pulse (EMP) and electromagnetic interference. Up to eight launching stations may be controlled by the engagement control station using the data link terminal. The engagement control station is cabled to the antenna mast group by one power cable, two control cables, and eight signal cables.

ENGAGEMENT CONTROL STATION









RADAR SET

The radar set (see the radar set illustration) consists of a multifunction, phased-array radar mounted on a semitrailer. The radar set is monitored and controlled by the engagement control station, and is unmanned during operations. The radar set is capable of performing surveillance, target tracking, missile tracking, identification, electronic counter-countermeasures (ECCM), and missile guidance. The antenna can be positioned in azimuth using a motor-driven pedestal assembly which supports and rotates the entire radar shelter. The antenna is erected to a fixed elevation angle of 67.5° for tactical operations. The beam is positioned electronically. Power for the radar set is provided from the electric power plant by three power cables.

ELECTRIC POWER PLANT

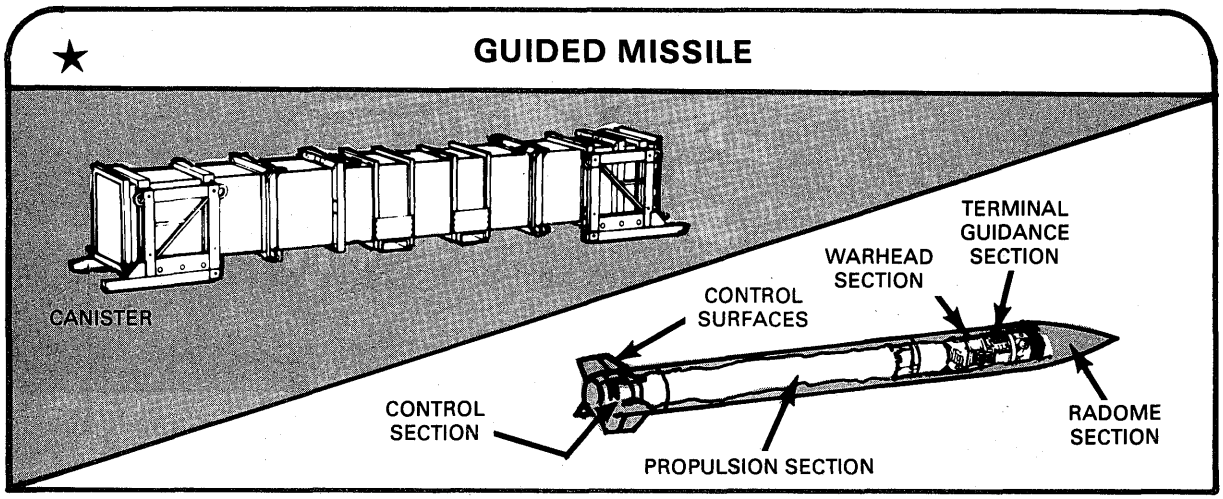
The electric power plant (see the electric power plant illustration) provides power for the engagement control station and radar set. The electric power plant has two EMP-hardened, 150-kilowatt turbine engine generator sets mounted on an M811 truck. Each electric power plant contains two 75-gallon fuel tanks. Normal operation requires only one generator on line while the other generator serves as a backup. The electric power plant can be monitored and shut down from the engagement control station. Three power cables are connected to the radar set and one power cable is connected to the engagement control station. One control cable is also connected to the engagement control station.

LAUNCHING STATIONS

The launching stations (see the launching station illustration) are remotely operated, fully self-contained units. Each launching station can carry up to four guided missiles. Power is provided by an onboard 15-kilowatt generator. The launching station can rotate in azimuth and elevates to a fixed firing angle. It receives, decodes, and executes commands from the engagement control station and reports launching station and missile status reports as well as the results of recently commanded actions.

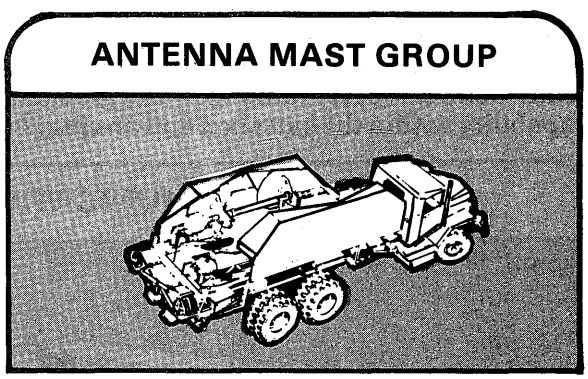
GUIDED MISSILE

The guided missile (see the guided missile illustration) consists of a Patriot missile, intercept aerial, MIM-104, mounted within a canister that functions both as a shipping and storage container and as a launch tube. Four missiles are transported on a launching station at one time. A single cable and grounding strap connects each canister with the launching station and provides the means for status monitoring, preheating, and launching. The Patriot missile has four clipped-delta, all-movable tail control surfaces and is propelled by a single-stage, all-boost, solid propellant rocket motor. The main sections of the missile are the radome section, terminal guidance section, warhead section, propulsion section, and control section.



ANTENNA MAST GROUP

The antenna mast group (see the antenna mast group illustration) has four high-power amplifiers and four antennas for UHF communications. The antenna mast group is cabled to the engagement control station to provide radio frequency (RF) signal circuits and to permit control of the antenna azimuth. The antennas can be rapidly erected to obtain communications line of sight. (The antenna mast group is also used with the information and coordination central and communications relay groups at battalion).



BATTALION EQUIPMENT

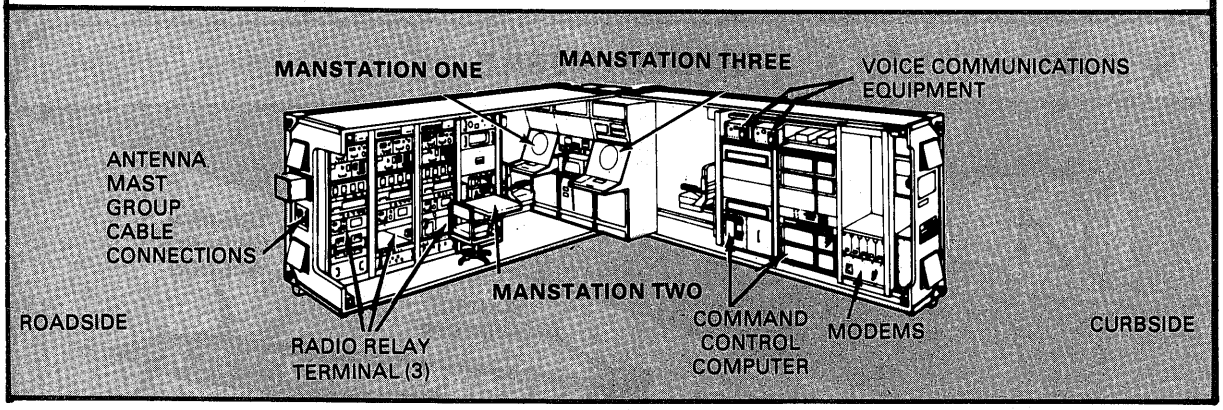
Major items of Patriot equipment at the battalion level include the information and coordination central, communications relay group, electric power unit, and antenna mast group which was explained previously.

INFORMATION AND COORDINATION CENTRAL

The fire direction center for air defense operations in the Patriot battalion is the information and coordination central (see the information and coordination central illustration). The FDC controls up to six

firing batteries and coordinates their operations with those of adjacent battalions and higher headquarters. The information and coordination central interfaces with the AN/TSQ-73 through use of an army tactical data link-1 modulator/demodulator (MODEM). Physically, the information and coordination central is similiar to the engagement control station. Each uses the same type of shelter, antenna mast group, VHF (voice) and UHF radios, and NBC protection.

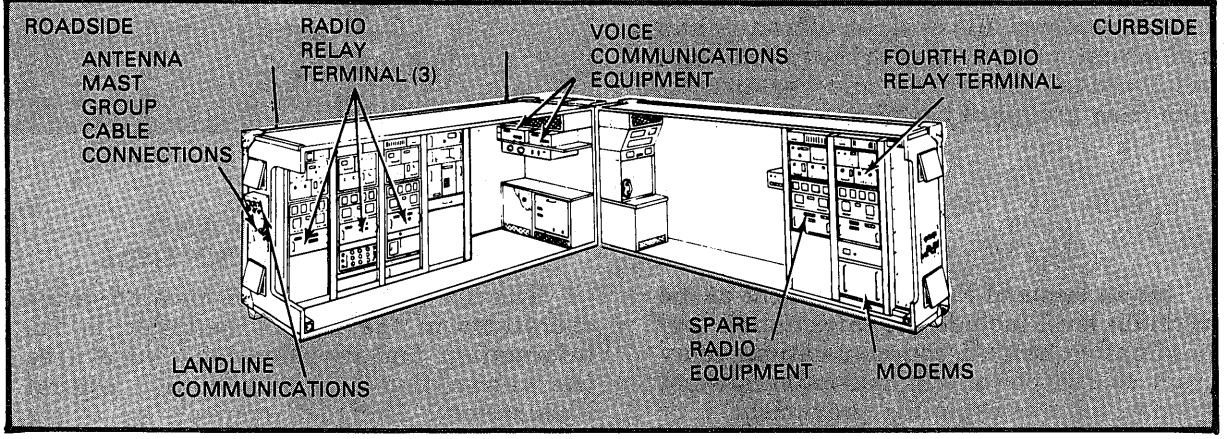
INFORMATION AND COORDINATION CENTRAL



COMMUNICATIONS RELAY GROUP

★ The communications relay group (see the communications relay group illustration) enables non-line-of-sight deployment between the information and coordination central and engagement control station. It provides both an UHF radio-wire integration capability within the battalion and an entry/exit point for interbattalion communications as well as an UHF and VHF radio relay capability. The CRG uses an antenna mast group and includes a shelter, four active UHF terminals and one inactive UHF terminal, MODEMs, and VHF radio relay equipment.

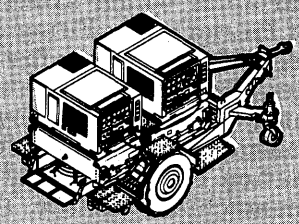
COMMUNICATIONS RELAY GROUP



ELECTRIC POWER UNIT

The electric power unit (see electric power unit illustration) is the prime power source for the information and coordination central and the communications relay groups. The electric power unit consists of two 60-kilowatt, 400-hertz turbine engine generator sets mounted on a trailer which also mounts a palletized dual-chamber fuel tank. Only one generator is required for all power needs of the information and coordination central or communication relay group.

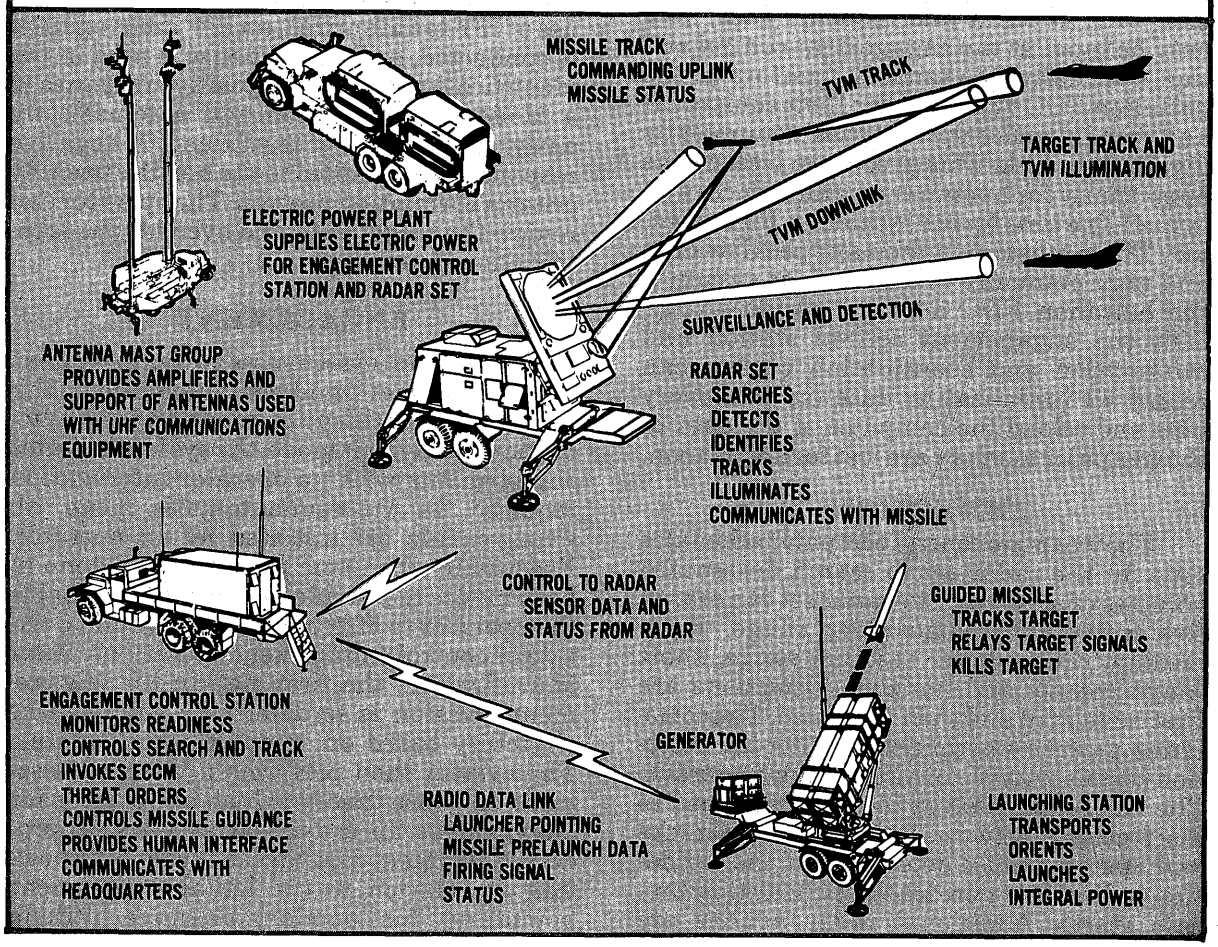
ELECTRIC POWER UNIT



SYSTEM OPERATION

The illustration below shows the scheme of operation of a Patriot fire unit and provides the principal functions of each major item of equipment.

PATRIOT FIRE UNIT OPERATIONS



INITIALIZATION

★ Initialization is the process of loading the software into a computer's memory and inputting variables which affect tactical operations of Patriot units. Firing decisions based on target identification, fire distribution, and rules of engagement are automatically computed and controlled by the engagement control station and information and coordination central computers with minimal man-machine interface. Therefore, it is essential that the computers be programmed correctly. Some examples of initialization variables are defended assets, identification parameters, launch decision parameters, and radar frequencies. A complete set of operator inputs may be found in TM 9-1430-600-10-1 and TM 9-1430-602-10-1. Recommended values for initialization are contained in (SNF) FM 44-1A. Some variables, such as radar and launcher sites, may only be input at the engagement control station. Normally, the tactical directors at the battalion FDC will initialize their equipment and then initialize the batteries' computer by digital data link. This procedure lessens the opportunity for human error and reduces system off-line time for initialization. Firing battery TCOs must input their site peculiar data and may manually initialize their system if the battalion FDC does not. Additionally, both the engagement control station and information and coordination central can record all initialization data on a recovery tape and reload the computer, if the data in the computer memory are lost for any reason.

DETECTION

The weapons control computer schedules time for the radar set to search designated volumes of airspace. The radar set can search five sectors of airspace (long range, upper medium range, lower medium range, short range pop-up, and horizon). Detections are first correlated and then validated. The correlation process determines whether the detection correlates with an already existing track. The validation process is then performed to discriminate between legitimate new tracks and spurious noise detections. If the validation indicates a new track, the tracking process starts. Additional radar actions are scheduled to get additional data on the target. Once the necessary data are obtained, the track on the target is maintained.

IDENTIFICATION

The Patriot system has two identification modes—automatic and manual. The tracking function gives accurate position, altitude, speed, heading, and ECM emission data on the target. Target data are compared with the current set of hostile/friendly criteria when in the automatic identification mode and assigned one of the following identifiers: friend, true friend, assumed friend, unknown, or hostile. Tabs also display correlation between target track data and hostile/friendly criteria so the operator can assign an identity in the manual identification mode. If the initial identity assigned is unknown, and the use of IFF is authorized, an IFF interrogation is conducted, and the response is used in the identification process. A positive response to a Mode 4 interrogation will automatically assign an identity of true friend. A negative response will be added to the hostile/friendly criteria correlation process. The operator can review the target data and override the identification if necessary.

ENGAGEMENT

★ The Patriot system uses two engagement modes—automatic and semiautomatic. In the automatic identification mode and the automatic engagement mode, the system initiates engagements with no operator intervention required. In the semiautomatic mode, all engagements are initiated by an operator. Essentially the same processing is done in both modes to provide information to enable the operator to effectively monitor and override or control engagement operations. After identification, the first step in the engagement decision is to determine engagement eligibility based on weapon control status. The system then performs a threat assessment on those targets which are eligible for engagement. In the threat assessment process, the system first checks the target's position in relation to the lethal engagement boundary. This boundary is a range/altitude

boundary which is established during the initialization process. This range may be adjusted during tactical operations. However, such range adjustments may affect the system's probability of kill. Refer to (SNF) FM 44-1A for a discussion and recommendation on the use of engagement range bias. Only targets within, or approaching the lethal engagement boundary, are further evaluated based on the target's time of flight from the defended assets. A limited number of targets will be listed in the TO BE ENGAGED QUEUE from "most threatening to high priority assets to least threatening to low priority assets." The system displays the time when missile launch should occur.

DESTRUCTION

Once a missile is launched, either automatically by the system or by the operator, it is acquired by the radar set and guided to target intercept. There are no actions necessary by the operator during missile flight. The system automatically counters ECM and evasive maneuvers of the target. The Patriot system achieves a very high probability of kill through the use of track-via-missile terminal guidance. In the terminal phase of engagement, the radar set illuminates the target with an RF beam. The missile seeker receives RF reflected from the target and reports that information to the radar set. The computer then gets two perspectives of the target—one from the radar set and one from the missile. The computer nulls out any pointing errors, sends steering commands to the missile, and sends fuse commands. Depending on the type and effectiveness of any ECM employed, the missile also has several other modes of operation.

SYSTEM CAPABILITES

The Patriot air defense missile system is designed to counter the air threat of the 1980s and beyond. Patriot units are 100 percent mobile. The Patriot system has fewer major items of equipment and requires fewer operating personnel than other HIMAD systems. As an example, the Patriot phased-array radar performs all the functions currently performed by four different Hawk radars.

The Patriot air defense missile system can—

- Engage and destroy threat aircraft operating at all tactical speeds and altitudes. The system is effective from near ground level up to altitudes in excess of 20 kilometers and ranges in excess of 80 kilometers.
- Deliver sufficient firepower to counter threat saturation attacks.
- Operate at night and under all conditions of weather and reduced visibility.
- Function effectively in an intense ECM environment.
- Move about the battlefield using organic wheeled vehicles. The system can be transported by rail and ship, and can be airlifted by C-141 aircraft with some disassembly and by C-5 aircraft without alteration.

SYSTEM CHARACTERISTICS

The Patriot system has inherent technical and tactical characteristics which can affect its employment. Understanding these characteristics and how they affect the system can reduce their impact on operations.

TECHNICAL

Technical characteristics that must be considered are line of sight, sectored engagement zone, and Patriot signatures.

Line of Sight

Communications line of sight is required to support the UHF system. Use of multichannel radio relay techniques eliminates the need for line of sight between the firing batteries and the battalion FDC. Visual line of sight is also desirable between the radar set and the launching stations, but is not required.

Sectored Engagement Zone

The Patriot system can search, track, and engage within an azimuth-specified sector. See (SNF) FM 44-1A for search and track sectors.

Patriot Signatures

As with other ADA systems, the Patriot system has distinctive visual, communications, and radar signatures. As explained in chapter 2, these signatures can be detected at several times their operational ranges and are used to locate and identify Patriot units.

TACTICAL

Tactical characteristics that must be considered include terrain and launching station reloading.

Terrain

Terrain slope and surface firmness must be considered when selecting positions. The launching station and radar set can be leveled to compensate for slopes up to 10°. Most pieces of Patriot equipment, the launching station and radar set in particular, are outsized and heavy. Routes into and from the position must be able to support this equipment.

Launching Station Reloading

Launching station reloading is a time consuming process. See (SNF) FM 44-1A for reloading time. Therefore, reloading must be carefully planned to provide a continuous firing capability.

CHAPTER 4

Command and Control

★ Patriot battalions need effective command and control to perform their combat mission on the air-land battlefield. Air defense artillery fires must be directed and controlled to support the overall force objectives. This chapter discusses typical command and control procedures required to integrate Patriot battalions into both the force commander's concept of the operation and the battle for air superiority.

The information contained in this chapter is applicable to any theater of operations. It must be recognized, however, that air defense organization, control structure, policies, and procedures can vary widely from theater to theater, depending on a number of factors which include the following:

- Nature of the air threat.
- Size of the total force structure.
- Mission of the force.
- Nature of the transition from peace to war.
- The command relationships established among the services and with allied forces.

CONCEPTS

★ Command and control is the process of directing the activities of military forces to attain an objective. This process involves two basic concepts: *command* and *control.* Command is the authority and responsibility to use available resources to accomplish missions in accordance with established procedures. Control is the authority, which may be less than full command, exercised by a commander over part of the activities of subordinate or other organizations. Command and control functions are performed through the integration of personnel, communications, facilities, equipment, and procedures which allow the commander to plan, direct, and coordinate his forces in the accomplishment of the mission.

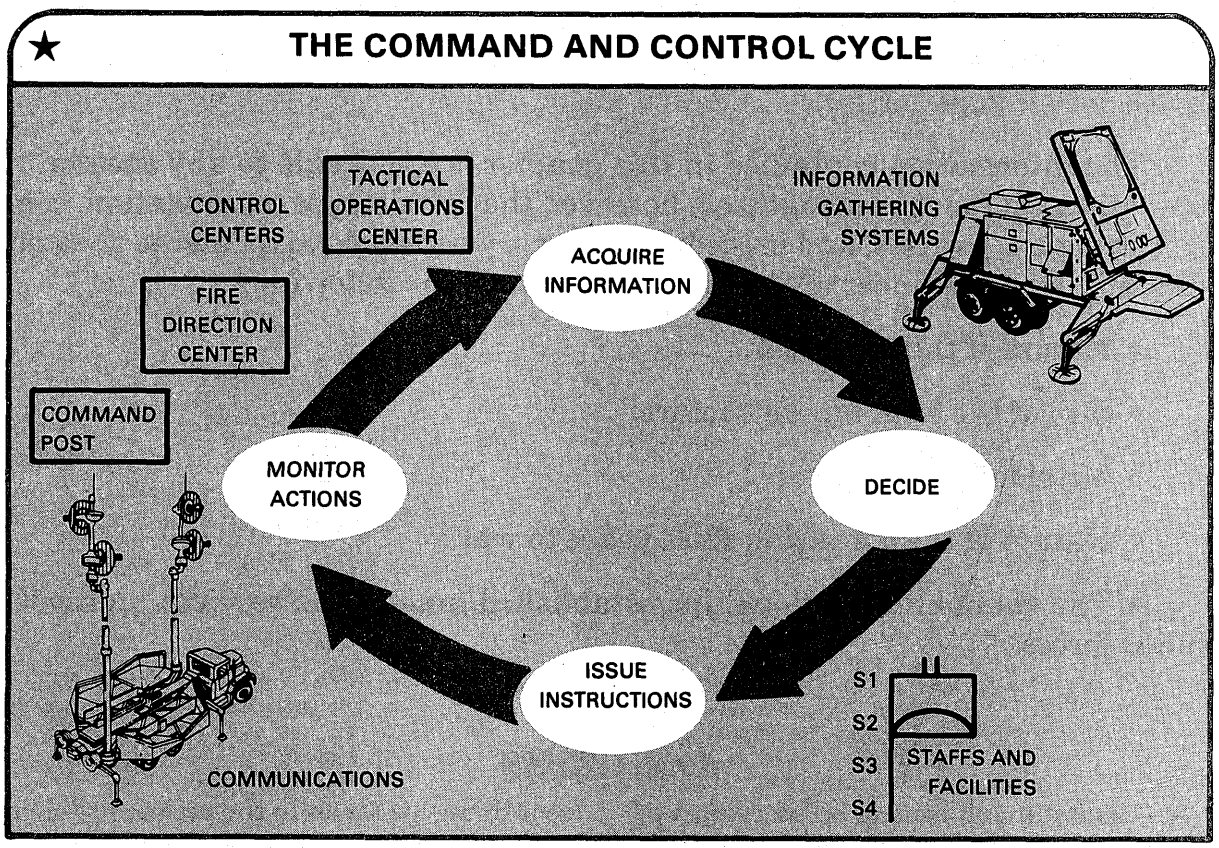
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CYCLE

★ The heart of command and control is the cycle of acquiring information, making appropriate decisions, issuing instructions, and monitoring subordinates for compliance. The critical element which underlies all these tasks is time. The command and control cycle (see the command and control cycle illustration) must be so well organized and efficient that it is faster than the enemy's command and control cycle. Through the fusing and filtering of information comes the ability to think and act faster so that we can actually turn inside the decision cycle of the enemy. Speed is vital to operational effectiveness, and effectiveness in command and control is a prerequisite to successful air defense.

★ THE COMMAND AND CONTROL CYCLE



COMMAND AND CONTROL FUNCTIONAL AREAS

★ Air defense command and control must satisfy two functional areas—control of the air battle and defense planning. Both are continuous processes but have basically different information and processing time requirements.

Control of the Air Battle

★ Control of the air battle must be executed on a real-time basis. Real-time control is supported by automatic data processing at the battery, battalion, and brigade fire direction centers. There are dedicated data and voice communications circuits between fire direction centers. Air battle command and control procedures are explained further starting on page 4-11.

Defense Planning

Defense planning is the process of prioritization of assets requiring ADA protection, allocation of forces, assignment of tactical

missions, and design of the defense. This process at the battalion level typically takes from 6 to 24 hours to complete one cycle. Defense planning is explained in detail in chapter 6.

MANAGEMENT

★ Three fundamental tasks form the basis for ADA command and control. These tasks relate the management of the Patriot battalion to the conduct of the overall air battle. They are:

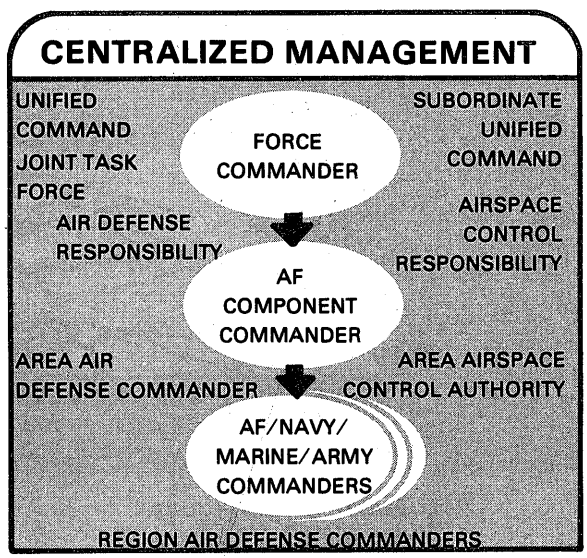
- Centralized management with maximum decentralized authority to engage.
- Air battle management.
- Management by exception.

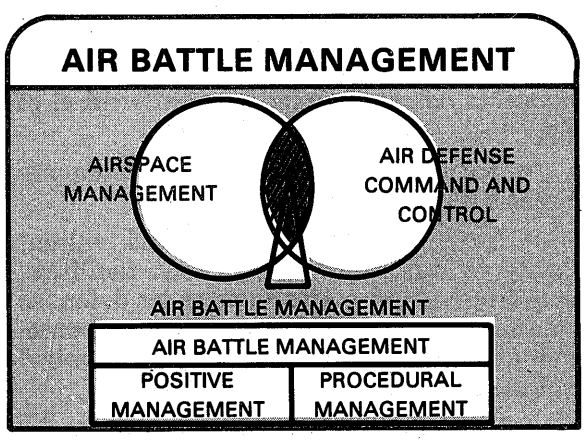
CENTRALIZED MANAGEMENT WITH MAXIMUM DECENTRALIZED AUTHORITY TO ENGAGE

★ Organizations established for air defense operations are an integral part of the overall force structure. Of necessity, air defense organizations are structured at different command levels with different areas of responsibility. Centralized management must, therefore, be exercised to ensure the coordination, integration, and maximum operational effectiveness and economy of the entire air defense organization. However, the number of air defense units prevents a single commander from directing the many actions required in defending a large number of assets and achieving air superiority. To ensure rapid and flexible response to the threat, decentralized execution of air defense tasks is essential. This is accomplished by delegating authority for mission execution, as shown in the centralized management illustration.

AIR BATTLE MANAGEMENT

★ Air battle management encompasses the principles for the control and coordination of both tactical air and ground-based Air Defense Artillery resources. This includes airspace management (to include Army airspace command and control), as well as air defense command and control (see the air battle management illustration). Close coordination among the diverse elements of an air defense is important because of the short reaction times available to engage the air threat, and the need to integrate air defense operations with all other air and ground operations. This coordination becomes even more critical in the integration of air defense operations with offensive air operations. Exacting centralized coordination must be effected to prevent mutual interference between ADA weapons and offensive air forces. The two basic methods of exercising air battle management are positive management and procedural management.





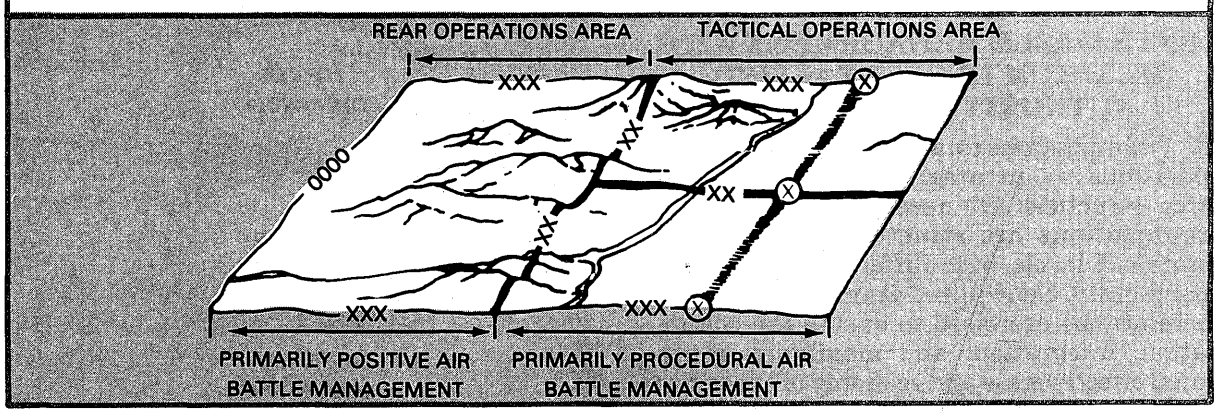
Positive Management

★ Positive management requires real-time data from radar; identification, friend or foe; computer; and communications equipment. This equipment is used for both air defense and airspace management purposes. Such positive management facilities are vulnerable as they are subject to air and ground attack, as well as to sabotage. Also, they can be degraded by the necessity for line of sight, electronic interference, and limited communications. The Patriot battalion relies heavily on positive management procedures.

Procedural Management

★ Procedural management includes such techniques as the segmenting of airspace by volume and time and the use of weapons control statuses. This method is usually more restrictive than positive management, but is less vulnerable to interference by electronic and physical attack. It does, however, ensure continuity of operations under adverse environmental conditions. Procedural management must always be available to provide an immediate backup system should positive management be degraded, and to provide a permanent management technique for those air defense systems lacking a real-time data transmission capability. The Patriot system automates many of the procedural management techniques.

REAR AND TACTICAL OPERATIONS AREAS



Air Battle Management Methods and Areas

★ Usually, a combination of the two methods of air battle management is employed. The degree to which each method is used is determined from consideration of the—

- Nature and magnitude of the enemy threat and operations.
- Availability, capability, and vulnerability of friendly management facilities, including airborne and surface air defenses command and control as well as by peacetime air traffic control and terminal control facilities.
- Number, deployment, and characteristics of friendly airborne weapon systems.
- Type of terrain and likely weather conditions in the combat area.

Patriot battalions will almost always use both positive and procedural management techniques. The mix of techniques will be greatly influenced by the location of the Patriot battalion.

In addition, the combat area can be divided into two areas — *the rear operations area and the tactical operations area* — based on general patterns of air traffic flow and the types of ongoing combat operations (see the

rear and tactical operations areas illustration at left). The boundary between the tactical and rear operations area will normally be the division's rear boundary. Air battle management takes into account the differences in traffic flow and characteristics and complexities of air operations in each area.

In the rear operations area, air traffic will be mostly along an axis perpendicular to the forward line of own troops, in transit between forward and rear areas. Since this area is more easily defined in terms of air traffic movements and electronic control, aircraft will be controlled by radar to the maximum extent possible. *Patriot battalions within this area will be managed primarily through positive management means.*

In the tactical operations area, air traffic will be both parallel and perpendicular to the forward line of own troops. Air operations in this area are characterized by the need for rapid and flexible response to both air and ground commanders' requirements. Freedom of movement throughout the area is paramount. The required flexibility for tactical operations and the potential density of air traffic make control of individual ADA units much more difficult. Therefore, *Patriot battalions within this area will be primarily managed through procedural management techniques.*

MANAGEMENT BY EXCEPTION

★ This task of Air Defense Artillery command and control is based on the idea that no single commander can direct the overall air battle on a real-time basis. The area/region air defense commander must supplement positive management with procedural techniques to ensure coordination and provide unified direction when positive management capability is degraded. However, due to the unpredictable nature of combat, tactical situations may arise which have not been addressed in procedural or positive rules and directives. In such instances, positive management exceptions will be made on a case-by-case basis to countermand or modify previous guidance (either positive or procedural). Strict procedural management should be used only when a combination of positive and procedural techniques is not possible (for example, during a communications outage, or for units without real-time data transmission capability).

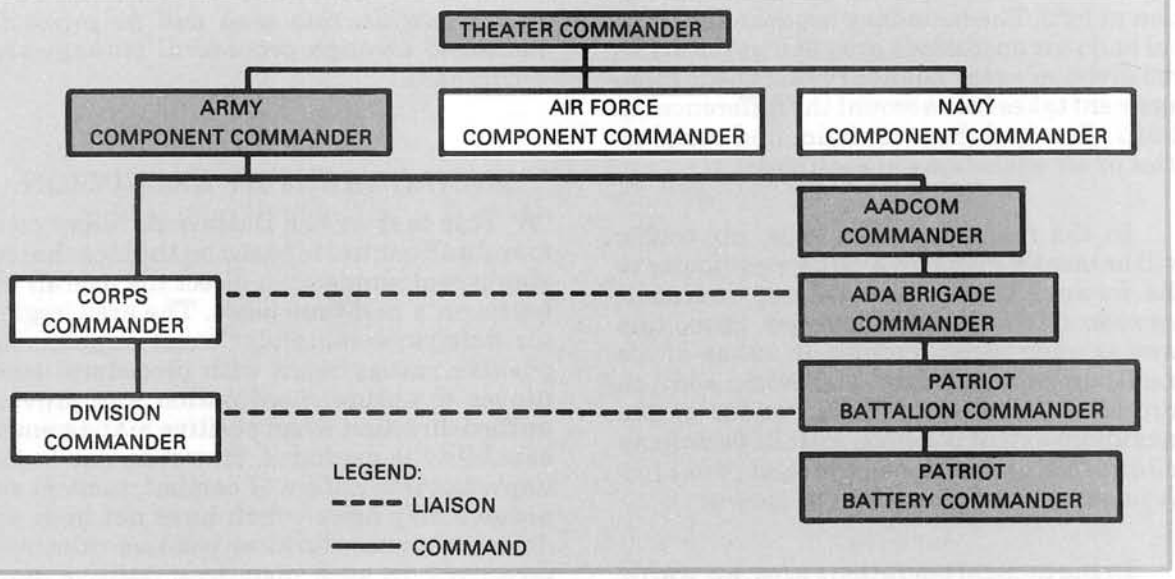
STRUCTURES AND PROCEDURES

ADA is unique in that it relies upon separate chains for command functions and control functions.

COMMAND CHAIN

★ The ADA command chain for a Patriot battalion links the theater commander to the Army component commander, the army air defense command commander, the ADA brigade commander, the Patriot battalion commander, and the Patriot battery commander in a successive chain. The ADA brigade commander exercises full command of assigned Patriot battalions. See the Patriot command chain illustration for a typical command structure. ADA liaison is also provided to the ground force commander by the ADA brigade and Patriot battalion in the tactical operations area. The ADA brigade conducts liaison with the corps. In NATO, the ADA brigade liaison team provided to the corps is termed the air defense operations liaison team and acts as a point of coordination between the integrated air defense system and the corps. The Patriot battalion conducts liaison with the division. In the rear operations area, liaison is also provided to defended asset commanders, such as wing commanders.

★ **PATRIOT COMMAND CHAIN**



SPECIAL COMMAND STATUSES

★ Special command statuses can be formed by attaching the Patriot battalion to another unit or by placing the Patriot battalion under engagement control or operational control of another unit. These statuses create special operational, training, administrative, and logistic relationships among the Patriot battalion, its parent organization, and the receiving unit.

Attachment

★ Attachment is the temporary placement of a unit under the command authority of another organization. Subject to the limitations imposed by the attachment order and by the rules and procedures established by the area air defense commander, the commander of the organization receiving an attached Patriot unit will exercise the same degree of command and control over attached units as he does over units organic to his command. This includes administrative and logistical support. The parent ADA unit commander retains the responsibility for the transfer and promotion of personnel. Generally, Patriot batteries are attached only to Patriot battalions. Likewise, Patriot battalions usually are attached only to ADA brigades.

Engagement Control

★ Engagement control is the degree of control exercised over the operational functions of a Patriot unit that are related to detection, identification, engagement, and destruction of hostile targets. Although the Air Force exercises engagement control of the ADA brigade, the ADA brigade exercises engagement control of the Patriot battalion. When a Patriot unit is under the engagement control of another unit, the parent ADA unit commander retains training, administrative, and logistical responsibilities.

Operational Control

In this special command status, the commander receiving the Patriot unit has authority for —

- Composing subordinate forces.
- Assigning missions and/or tasks.
- Designating objectives.

The parent ADA unit commander is responsible for —

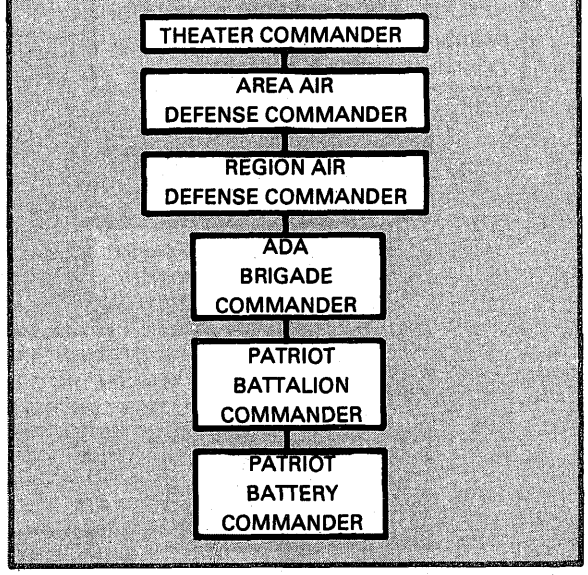
- Administration.
- Discipline.
- Internal organization.
- Logistics.
- Training.

CONTROL CHAIN

★ The control chain is a more complex structure than the command chain (see Patriot control chain illustration at right). The theater commander assigns responsibility for overall air defense and airspace control to a single commander. This is normally the Air Force component commander who is both the area air defense commander and the area airspace control authority. The area air defense commander manages the coordination and integration of the entire air defense effort within the command from his command post at the tactical air control center. He may create air defense regions and appoint a commander for each. The region air defense commander may be selected from any service component, but is normally an Air Force commander. He is fully responsible for, and has full authority for, the air defense of his region. The region air defense commander is normally located at the control and reporting center. The control and reporting center supervises the surveillance and control activities of subordinate radar elements, provides means for air traffic identification, and directs region air defense operations. In the Army chain, the control and reporting center exercises engagement control of theater ADA brigade fire direction centers. ADA brigades exercise engagement control of Patriot battalions. Under contingency conditions, a Hawk battalion performing the role of master battalion could exercise engagement control of Patriot battalions. Patriot battalions exercise engagement control of Patriot batteries.

★ When Army air defense units are assigned, attached, or organic to Army maneuver elements, they remain subject to area/region air battle management directives to ensure a coordinated and integrated air defense effort. The region air defense commander will normally relinquish operational control, less the engagement control previously described, of these assigned, attached, or organic Army air defense units to the respective maneuver commander. Priorities for these air defense resources will be developed by the maneuver commander.

★ PATRIOT CONTROL CHAIN



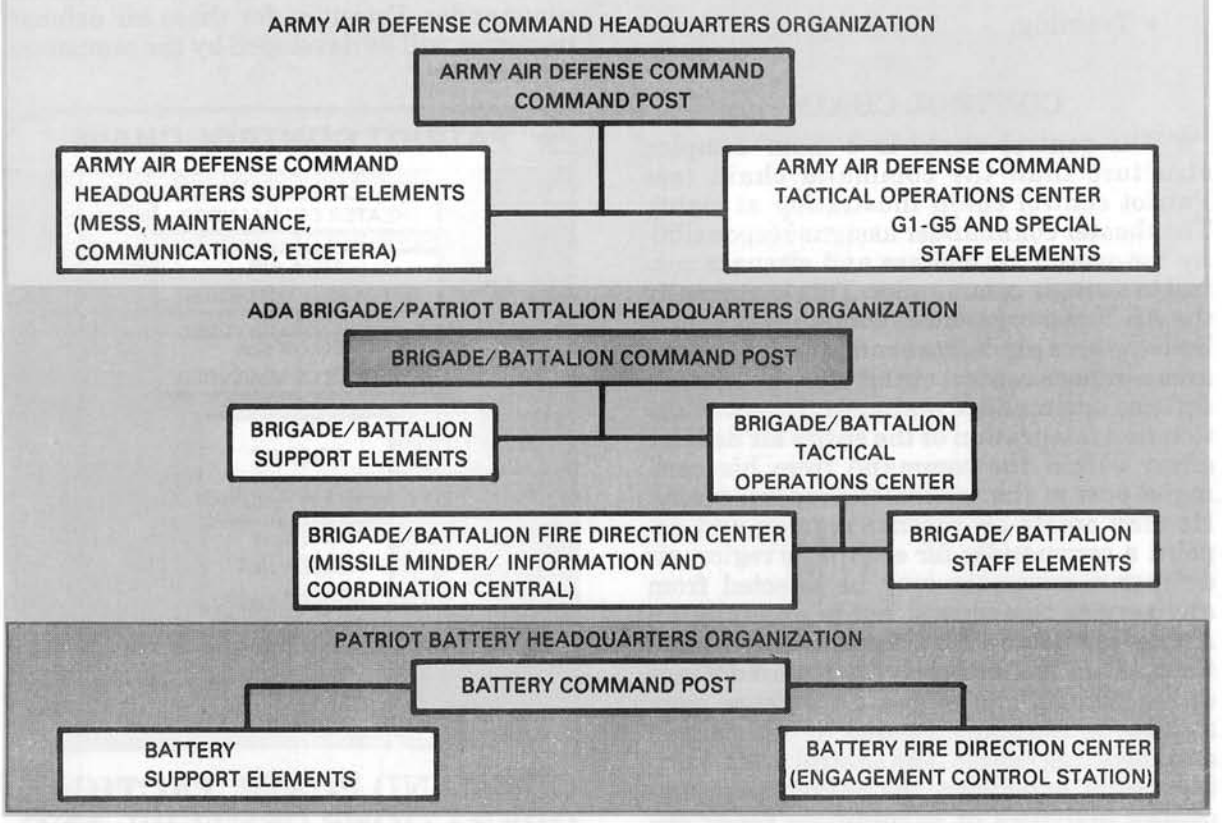
COMMAND POSTS, TACTICAL OPERATIONS CENTERS, AND FIRE DIRECTION CENTERS

★ ADA headquarters and headquarters elements were formerly known as army air defense command posts, group operations centers, and battalion operations centers. These nonstandard terms for Army air defense artillery command and control facilities have been eliminated. The standard terms for these facilities are command posts, tactical operations centers, and fire direction centers.

COMMAND POSTS

★ A command post is a unit, or subunit, headquarters where the commander and staff perform their activities. In combat, the headquarters is often subdivided. The element in which the commander is located or operates is called a command post. It is his principal facility for commanding and controlling combat operations. Any ADA echelon from army air defense command to platoon may have a command post. (See the air defense artillery command organizations illustration.) Patriot battalions may establish a jump command post during moves of the main command post.

★ AIR DEFENSE ARTILLERY COMMAND ORGANIZATIONS



TACTICAL OPERATIONS CENTERS

★ A tactical operations center is a subelement of a command post for headquarters with staff elements (army air defense command, brigade, or battalion). It consists of a physical grouping of the staff elements concerned with current tactical operations and tactical support (see illustration).

★ The Patriot battalion commander exercises command and control of his fire units through the battalion tactical operations center at his command post. The tactical operations center is made up of a fire direction center, an operations and intelligence element (includes an NBC subelement), a personnel and logistics element, and other elements as required and directed by the commander.

★ The operations and intelligence element plans, coordinates, and supervises activities other than those involved in the minute-to-

minute conduct of the air battle. These activities include the following:

- Processing and evaluating intelligence on both the air and ground situations.
- Planning defenses.
- Providing battalion input for the initialization function of Patriot.
- Planning, directing, and coordinating unit movements.
- Receiving and disseminating NBC information.
- Coordinating with supported units.
- Reconstituting forces.

The personnel and logistics element plans tactical support of battalion operation. The fire direction center is discussed below.

FIRE DIRECTION CENTERS

★ A fire direction center is that subelement of brigade and battalion tactical operations centers and battery command posts where the commander exercises fire direction and/or fire control. The fire direction center receives target intelligence and fire control orders and translates them into appropriate fire directions. Army air defense commands do not have fire direction centers except when augmented with fire direction equipment (see the air defense artillery command organizations illustration). Two different fire direction systems are used at HIMAD brigade and battalion fire direction centers. The Missile Minder system performs fire direction functions for Hawk battalions and theater army ADA brigades. The information and coordination central performs these functions in Patriot battalions.

★ The Missile Minder system is an automated electronic air defense command and control system which is capable of operating at battalion and brigade levels. It furnishes information for the command and control of individual fire units (to include control of radar emissions), coordinates the actions of subordinate command and control systems, and provides an interface with other services. The Missile Minder contains situation display consoles, radar interface equipment, automatic data processing equipment, and communications equipment. It is capable of providing automatically processed digital information and advanced voice communications.

★ The brigade-level Missile Minder acts as the overall ADA operational activity director by coordinating the operations of subordinate battalions and providing command and control interface with other services. The brigade-level system can coordinate 8 battalions with a total of 48 individual fire units. In the absence of a brigade level system, a battalion Missile Minder is capable of assuming the brigade-level command and control functions. Through the Missile Minder, the ADA brigade commander exercises engagement control of Patriot battalions.

★ Air battle command and control of Patriot firing batteries is accomplished by the information and coordination central, which is the battalion's fire direction center. The information and coordination central is the nerve center for the Patriot battalion's air defense operations. It controls the firing batteries and coordinates their activities with those of adjacent battalions and higher headquarters. The information and coordination central is capable of controlling up to six firing batteries and interfacing with the brigade-level Missile Minder.

★ Through the information and coordination central, the battalion commander exercises engagement control, provides fire direction, and coordinates battery operations. In addition, the information and coordination central connects the battalion to the other elements of the air defense force. The information and coordination central can interface —

- External Army command and control facilities (for example, an ADA brigade fire direction center for the purpose of

engagement control and receiving and forwarding data). This normally requires external signal support.

- Adjacent Patriot battalions for firing coordination. Each information and coordination central can interface with up to three other battalions.

- Other air defense systems for the purpose of integrating fire direction. For example, the information and coordination central can interface with Hawk battalions through the brigade Missile Minder or, in its absence, a Hawk battalion Missile Minder configured as a master battalion system. Currently, only a manual interface can be established with SHORAD units.

- Other services' command and control facilities (for example, a control and reporting center when the ADA brigade is not available).

★ The information and coordination central provides control for its firing batteries in two basic areas: target evaluation and engagement control. Target evaluation includes identification and threat assessment. Engagement control consists of determining what targets to engage, determining the priority for engaging targets, selecting firing batteries to engage each target, and monitoring engagements.

★ A manual fire direction center may be established, with existing resources, as a back-up means to *monitor* the air battle when the information and coordination central becomes nonoperational, the automatic data link channel stops functioning, or the information and coordination central redeploys.

★ In the past, manual fire direction centers were elaborate facilities designed to use several large plotting boards and a dedicated vehicle. This fire direction center could maintain centralized control of fire units during training exercises if only a few aircraft were involved. However, on today's air-land battlefield, saturation tactics will be the norm. It will be impossible for a manual fire direction center to control the operations of six firing batteries. The degree of coordination which is necessary between the battalion and the firing batteries can be provided by the manual fire direction center when the information and coordination central is nonavailable or nonoperational. Because the manual fire direction center cannot effectively exercise centralized control against saturation attacks, control should be decentralized to the firing battery level. If voice communications between the battalion and batteries are still operational, the batteries would be conducting independent operations, which is a subset of decentralized control. The primary function of the manual fire direction center is to pass changes in the air battle command and control procedures to the firing batteries. In a low density threat environment, the manual fire direction center has a limited capability to prevent simultaneous engagements. One of the tactical directors monitors communications, and plots, on a simple lap board, tracks which are reported by tactical control assistants of the firing batteries approximately 5 seconds prior to engagement. The tactical director determines whether a simultaneous engagement is taking place and, if necessary, issues the appropriate fire control order.

★ During redeployment of the information and coordination central the reconnaissance party can operate a manual fire direction center at the new site. This may compromise the new site by exposing it to the enemy's radio direction finding efforts. However, the amount of risk is low due to the relatively short time the manual fire direction center would be in operation and the even shorter time the manual fire direction center would be transmitting.

★ The manual fire direction center could also be established at the old fire direction center site while the information and coordination central redeploys. This method reduces the reconnaissance party's workload and size. However, this method has the disadvantage of splitting the fire distribution section into three parts:

1. The reconnaissance party.

2. The information and coordination central convoy.

3. Manual fire direction center.

★ Whenever possible, the information and coordination central should be moved during periods of low air activity, such as adverse weather or at night, as the manual fire direction center is easily saturated. The most important point to remember is that the battalion's effectiveness is directly related to the survival of the information and coordination central. Commanders should not hesitate to redeploy the information and coordination central if it is targeted, even if a manual fire direction center cannot assume decentralized control and the firing batteries must operate autonomously for short periods of time.

AIR BATTLE COMMAND AND CONTROL PROCEDURES

The area air defense commander manages the integrated air defense through the command and control structure and the use of air battle procedures. The three categories of air battle command and control procedures are —

1. Warning procedures and alert statuses.

2. Rules of engagement.

3. Supplemental fire control measures.

WARNING PROCEDURES AND ALERT STATUSES

★ These measures are used to alert, prepare, or build up units for combat. All of the warning procedures and alert statuses are implemented in the Patriot system as display information only. The operator must take action to implement any changes in the warning procedures or alert statuses, as required by the tactical standing operating procedures.

Defense Readiness Conditions

★ Defense readiness conditions are a uniform system of progressive alert postures for use between the Joint Chiefs of Staff and commanders of unified and specified commands. Defense readiness conditions are graduated to match situations of varying military severity. In NATO, a similar formal military alert system of stages of alerts is used. Also in NATO, a countersurprise system of states of alert is used. The Patriot display for defense readiness conditions can be used for states and stages of alert as well.

Air Defense Warnings

★ Air defense warnings reflect the commander's evaluation of the probability of air attack within his respective area of operation. Air defense warnings are routinely issued by the air defense division or sector commander. (Air defense divisions and sectors are geographical subdivisions of air defense regions.) They can also be issued by any commander for his command. The issuance of an air defense warning is not tied to any other warning procedure or alert status; that is, a commander can issue an air defense warning for his command irrespective of a low defense readiness condition or weapons alert designator. In NATO, the term air raid warning is used.

★ The three air defense warnings are as follows:

1. *Air defense warning red.* Attack by hostile aircraft or missiles is imminent or in progress.

2. *Air defense warning yellow.* Attack by hostile aircraft or missiles is *probable.*

3. *Air defense warning white.* Attack by hostile aircraft or missiles is *improbable.*

Air Defense Emergency

★ Air defense emergency is an emergency condition declared when attack upon the Continental United States, Alaska, Canada, or US installations in Greenland by hostile aircraft or missiles is considered probable, is imminent, or is taking place. The initial declaration of air defense emergency automatically establishes an air defense warning other than air defense warning white to enable secure control of air traffic.

Weapons Alert Designators

★ Weapons alert designators are a progressive system of alert postures. Weapons alert designators are based on the defense readiness condition. They are used by the area/region air defense commander to specify minimum percentages of ADA fire units required to be at given states of readiness or states of emission control (see the brigade weapons alert designators illustration below). Weapons alert designators are disseminated down to battalion level. Each battalion must determine the state of readiness or state of emission control of each battery in order to meet the weapons alert designator. In NATO, defense readiness postures are the equivalent of weapons alert designators.

★ BRIGADE WEAPONS ALERT DESIGNATOR

Here is how an ADA composite brigade's state of readiness requirements might vary based on the weapons alert designator—

ADA BRIGADE ALERT REQUIREMENTS (Percent of fire units at each state of readiness)						
CODE	BATTLE STATIONS	5 MIN	20 MIN	1 HR	3 HR	12 HR
A				34%	33%	33%
B			34%	33%	33%	
C		34%	33%	33%		
D		50%	50%			
E	100%					

★ BATTALION STATE OF READINESS

From the requirements shown in the example above a subordinate Patriot battalion commander would designate the number of fire units within his battalion to be at these states of readiness—

PATRIOT BATTALION ALERT REQUIREMENT TOTAL NUMBER OF FIRE UNITS: 6 (Number of fire units at each state of readiness)						
CODE	BATTLE STATIONS	5 MIN	20 MIN	1 HR	3 HR	12 HR
A				2	2	2
B			2	2	2	
C		2	2	2		
D		3	3			
E	6					

States of Readiness

★ States of readiness represent the degree of readiness of ADA fire units from time of alert notification to time of engagement (see the battalion state of readiness illustration at left). States of readiness can also be used to specify personnel/manning requirements. The actual time for each state of readiness is based on the threat. States of readiness are primarily used during peacetime, deterrent operations.

States of Emission Control

★ States of emission control represent the degree of emission control by radar-directed ADA units such as a Patriot firing battery. The states of emission control identify the equipment which can be emitting and the time from alert notification to time of engagement. The states of emission control range from all equipment off to all equipment on. For illustrative purposes, six Patriot states of emission control are shown in the illustration below.

★ At state one, the battery is at battle stations and all equipment is on. At state two, the battery has only internal and external data and voice communications equipment emitting. At state three, the battery has only internal data and voice communications equipment emitting. At state four, the battery has only external data and voice communications equipment emitting. At state five, no equipment is emitting, but all equipment is emplaced. At state six, no equipment is emitting and all equipment is in a hidden position. See chapter eight for more discussion on emission control.

★ **BATTALION STATE OF EMISSION CONTROL**

From the requirements shown in the brigade weapons alert designator, a subordinate Patriot battalion commander would designate the numbers of fire units within his battalion to be at these states of emission control—

PATRIOT BATTALION EMISSION CONTROL ALERT REQUIREMENTS TOTAL NUMBER OF FIRE UNITS: 6 (Number of fire units at each state of emission control)						
CODE	STATE ONE	STATE TWO	STATE THREE	STATE FOUR	STATE FIVE	STATE SIX
A				2	2	2
B			2	2	2	
C		2	2	2		
D		3	3			
E	6					

RULES OF ENGAGEMENT

★ Rules of engagement are both positive and procedural management directives issued by appropriate military authority which specify the circumstances and limitations under which forces will initiate or continue combat engagements with other forces.

★ Rules of engagement are established by the area air defense commander and allow him to do two things. First, they enable him to delegate the authority to engage aircraft or missiles. Second, they allow him to retain control of the air battle by prescribing the exact conditions under which engagements can be conducted. Rules of engagement have

seven common components which are as follows:

1. Right of self-defense.
2. Hostile criteria.
3. Levels of control.
4. Modes of control.
5. Autonomous operations.
6. Weapons control status.
7. Fire control orders.

The Right of Self-Defense

★ Commanders at all echelons have the responsibility to take whatever action is required to protect their forces and equipment against air attack. Normally, such action will be governed by established rules and procedures. However, the right of self-defense is never denied. Self-defense engagements may be initiated when a battery or an adjacent battery is under attack. To implement self-defense measures, the battalion fire direction center and each firing battery should be initialized as defended assets. The priority should be the same as the highest priority critical asset, usually an asset threat category one or two. This doctrine applies to both area and point defenses.

Hostile Criteria

★ Hostile criteria are basic rules promulgated by the commanders of unified or specified commands which are used by echelons having identification authority to determine if detected targets are friendly or hostile. Identification authority may be retained at the air defense sector level. Identification authority can also be delegated to lower echelons. Delegation of identification authority can be made separately from delegation of engagement authority. However, identification and engagement authority should reside at the same level. This normally results in identification authority being held at Patriot battalion level.

★ The Patriot system has two identification modes, *automatic* and *manual.* In the automatic mode, the system assigns an identity to each track. In the manual mode, the operator must assign an identity to each track. *The automatic mode is the preferred identification mode.* Even when higher echelons have retained identification authority, Patriot should be used in the automatic identification mode. Hostile criteria processed by the Patriot system are: negative identification, friend or foe; selective identification feature, modes 1 and 3; hostile origin volume correlation; prohibited volume correlation; restricted volume correlation; emission of electronic countermeasures; and violation of pop-up criteria. Friendly criteria in the Patriot system are: positive identification, friend or foe; selective identification feature, modes 1 and 3; positive corridor correlation; friendly origin correlation; and minimum safe velocity. Additional criteria, such as speed, altitude, heading, and raid size, currently must be manually evaluated by the operator. Positive mode 3 responses may require the tactical director or tactical control officer to manually identify the target as friend. The use of Patriot identification criteria is greatly affected by the location of the Patriot battalion and the air situation. In a mixed ADA brigade, Patriot should be the primary source of identification data.

★ In the tactical operations area, the following guidance is provided for battalion-level operations:

- The battalion should establish a restricted volume from the rear firing batteries to the fire support coordination line. To save points, the restricted volume need not follow the fire support coordination line exactly. It should have the same altitude as the missile engagement zone.

- The battalion should establish a prohibited volume from the rear firing batteries to the forward line of own troops. To save points, the prohibited volume need not follow the forward line of own troops exactly. Care must be taken to ensure that hostile identification range does not reduce maximum automatic engagement range. It should have the same altitude as the missile engagement zone.

• The battalion may establish a hostile origin volume over all enemy airspace beyond the fire support coordination line or around selected, known enemy air bases. The battalion should inactivate the first type of hostile origin volume when friendly aircraft are operating beyond the fire support coordination line. The battalion should deactivate the hostile origin volumes around enemy air bases when friendly aircraft are attacking these air bases.

• The battalion may establish a friendly origin volume around division and corps airfields, Air Force forward operating bases, and at the intersection of rearmost battery search sectors and safe passage corridors. The size of the last type of volume should allow for speed of the aircraft and frame time of the radar set.

• The battalion should establish safe passage corridors for every minimum risk route/low level transit route in the battalion area. Preplanned but inactive routes would also be initialized but not activated. Any buffers to allow for aircraft navigation or radar set inaccuracies should be built into the width of the corridor.

• The battalion should use modes 1, 3, and 4 in accordance with the area air defense commander's directives. The interrogation line normally coincides with the fire support coordination line.

• The battalion may authorize the use of minimum safe velocity criteria. However, the battalion should deactivate it when enemy close air support aircraft and helicopters are the dominant low and slow airspace user.

• The battalion may authorize the use of pop-up criteria. However, the battalion should deactivate it when friendly, high-performance aircraft are operating in the area.

• The battalion may authorize the use of electronic countermeasures criteria. However, the battalion should deactivate it when special jamming missions are operating forward of Patriot units.

★ In the rear operations area, the following guidance is provided for battalion-level operations:

• The battalion should establish a prohibited volume throughout the entire sector of coverage. The size of the volume should support identification prior to maximum engagement range. The altitude of the volume should correlate to the altitude of the missile engagement zone.

• The battalion should establish a restricted volume throughout the entire sector of coverage. It should have the same dimensions as the prohibited volume.

• The battalion does not generally use hostile origin volumes.

• The battalion should establish a friendly origin volume around main operating bases, collocated operating bases, and corps airfields if they are in the sector.

• The battalion should establish safe passage corridors for all air routes and corridors in the battalion sector of the rear operations area.

• The battalion should use modes 1, 3, and 4 in accordance with the area air defense commander's directives. An interrogation line is not established in the rear operations area.

• The battalion should authorize the use of minimum safe velocity criteria all the time.

• The battalion should authorize the use of pop-up criteria.

• The battalion should authorize the use of electronic countermeasures criteria.

Units may need to tailor the above guidance for specific theaters and for specific operations. See FM 44-1A for a more thorough discussion of the Patriot system identification process and doctrine.

Levels of Control

★ The level of control specifies which air defense echelon within the overall air defense command and control chain is conducting

positive management of the air battle. This can be any of the following:

- Tactical air control center.
- Control and reporting center.
- Control and reporting post.
- ADA brigade.
- Patriot battalion.
- Patriot firing battery.

The normal wartime level of control for Patriot is the battalion. This level of control maximizes air defense protection capabilities of the Patriot system. The echelon designated as the level of control exercises engagement and identification authority.

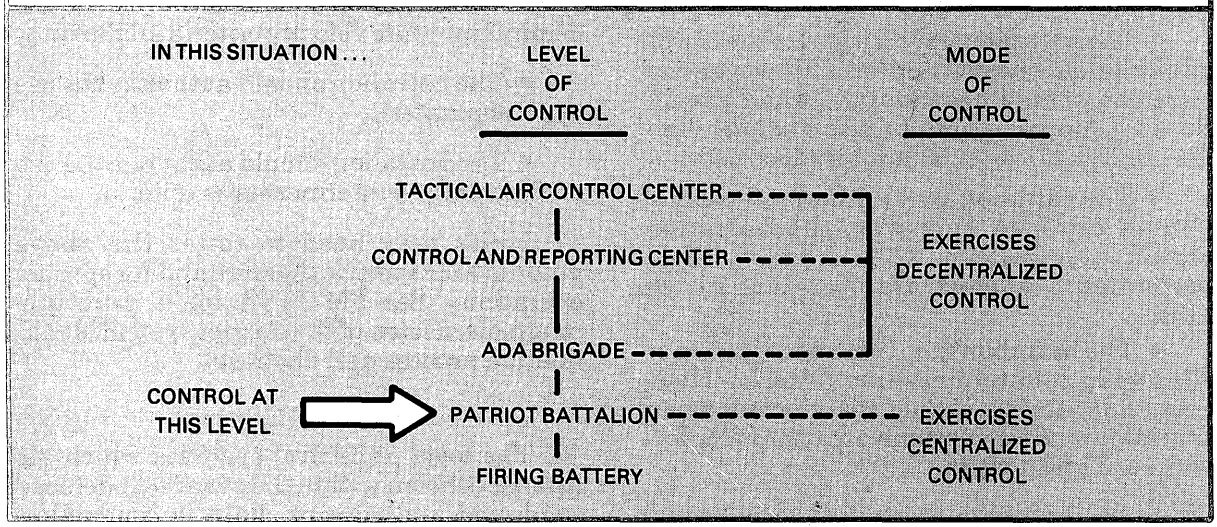
Modes of Control

★ The two modes of control are centralized and decentralized control. In the centralized mode of control, a higher air defense echelon initiates engagements. In the decentralized mode of control, a higher air defense echelon monitors subordinate unit actions, making target assignments only when necessary to ensure proper fire distribution or to prevent engagement of friendly aircraft. Independent operations are essentially a subset of decentralized control and are conducted when a Patriot battery only has voice communications with its parent battalion. In this case there is no operational data link between the two echelons.

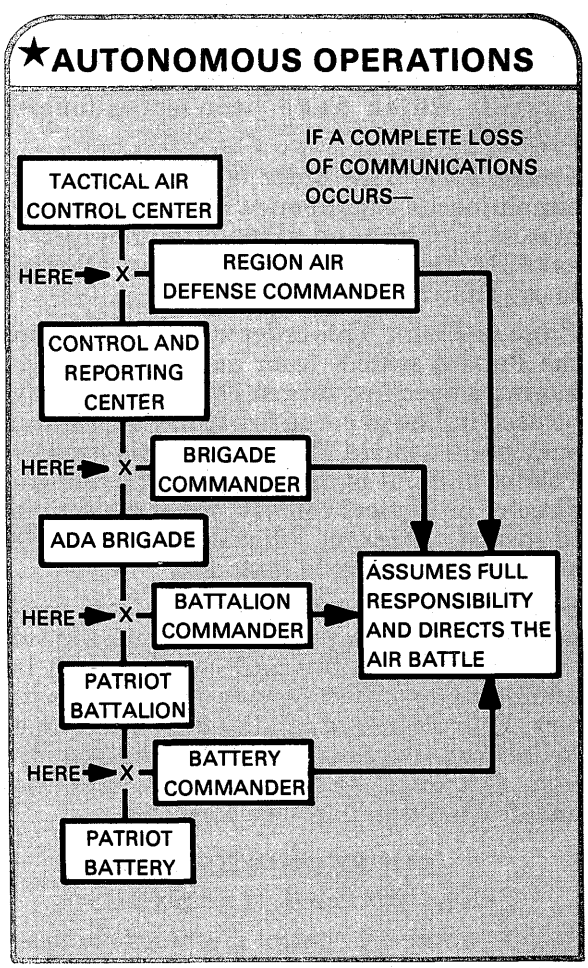
★ The processes of raising and lowering the echelon at which the air battle is being managed are termed centralizing control and decentralizing control, respectively. Air battle management is centralized when it is conducted at battalion level or higher, as long as that echelon has the capability to initiate engagements, and higher echelons have the capability to monitor firing battery actions.

★ Consider a situation in which air battle management has been decentralized to the Patriot battalion fire direction center. Here, the Patriot battalion commander exercises centralized control of subordinate batteries. At the same time, however, the ADA brigade is continuously monitoring the actions of the battalion. Therefore, the ADA brigade is exercising decentralized control, while the Patriot battalion commander is exercising centralized control. In other words, centralized control and decentralized control can be conducted simultaneously, although at different echelons (see the level and mode of control illustration).

★ **LEVEL AND MODE OF CONTROL**



★ The capabilities of the Patriot system are maximized when operating under the centralized control of the battalion. Control should be maintained at the battalion level unless the information and coordination central can no longer control the firing batteries due to saturation. In the early stages of the air battle, control normally will be centralized at the highest possible level. However, the tempo of the air battle will dictate that control be decentralized to the air defense echelon most capable of directing ADA weapons—usually the Patriot battalion. *The normal wartime mode of control for the Patriot battalion is decentralized. The normal wartime mode of control for the Patriot firing batteries is centralized.*



Autonomous Operations

★ Autonomous operations are conducted when a unit loses *all* communications with higher echelons (see autonomous operations illustration). The rules of engagement will define specific actions and procedures to follow for autonomous operations. Normally, the hostile criteria in effect at the time of communications loss remain in effect until communications are regained. Weapons control statuses may become more restrictive. Prearranged tactical standing operating procedures are followed for all other aspects of air battle management.

Weapons Control Statuses

★ Weapons control statuses describe the degree of fire control imposed upon Army ADA units. This degree or extent of control will vary, depending on the relative priorities of the need to provide for the protection of friendly aircraft and the need to maintain a high level of air defense for a specific tactical situation.

★ The weapons control status normally is imposed by the area/region air defense commander. However, other commanders (corps, division, brigade, and battalion) have the authority to impose a more restrictive weapons control status within their respective area of operations for assigned and attached ADA weapons, as well as the authority to request a less restrictive weapons control status. The Patriot system will automatically consider weapons control status in the engagement eligibility process. Patriot units must be prepared to use weapons control status effectively. The three weapons control statuses are—

1. *Weapons free.* Fire at any aircraft not positively identified as friendly. This is the least restrictive weapons control status.

2. *Weapons tight.* Fire only at aircraft positively identified as hostile according to the prevailing hostile criteria.

3. *Weapons hold.* Do not fire except in self-defense or in response to a formal order. This is the most restrictive weapons control status.

★ In peacetime, Patriot battalions will normally be at weapons hold. However, the normal weapons control status for wartime air defense operations is weapons tight.

Fire Control Orders

★ Fire control orders are commands which are used on a case-by-case basis, regardless of the prevailing weapons control status. Fire control orders can be transmitted electronically or verbally. Engagement modes and methods of fire are used in conjunction with fire control orders. Patriot fire control orders are engage, hold fire, cease fire, engage hold, and stop fire.

★ ***Engage.*** This order is used to direct a unit to fire on a specific target. This order cancels any previous fire control which may have been issued on that target. *Because of the anticipated intensity of future conflicts, the preferred engagement mode for Patriot is the automatic engagement mode.* Engagements directed by higher headquarters, which are time sensitive and cannot be held until optimum engagement range, must be given as a verbal "engage now" fire control order. Engagements may be conducted using one of three firing methods. The methods of fire described below are for a single target or multiple targets presenting a single track. Based on the tactical situation, a method of fire other than the one selected by the computer may be manually selected by the operator.

★ Ripple fire is the firing of a series of two missiles from one or more launchers with a predetermined time between launches (see FM 44-1A). Ripple fire is selected when the commander desires to engage multiple targets at short range. Ripple fire is preferred over other methods during an engagement of multiple targets because of the high probability that if the first missile destroys the first target, the second missile will be guided toward a second target in the same formation.

★ Salvo fire is the firing of two missiles from two separate launchers with a minimum time interval between launches. Salvo fire may be selected when the commander desires an extremely high kill assurance against a single target. Since the Patriot system already has an inherently high probability of kill, it is recommended that the use of salvo fire be discouraged. This is the least desirable method of fire when engaging multiple targets due to the high probability of destroying only one aircraft.

Shoot-look-shoot is the firing of missiles against a single target, one at a time, with kill assessment being automatically performed by the computer after each firing and prior to the launch of a second missile at the target. This is the only method used by the computer for automatic engagements as it provides the most effective use of missiles considering the high probability of kill by a single missile. Shoot-look-shoot is normally the preferred method of firing.

★ ***Hold Fire.*** This is an emergency fire control order used to stop firing and includes the command destruction of any missiles already in flight. This order is used to protect friendly aircraft which have been erroneously engaged.

★ ***Cease Fire.*** This order is used to prevent simultaneous engagement of air threats by manned fighters and ADA units, or by different ADA units. Missiles in flight are allowed to continue to intercept.

★ ***Engage Hold.*** This order is used to restrain the Patriot system from automatically engaging a specified target. Engage hold may be used in lieu of cease fire in the automatic engagement mode. This order is only used by Patriot units. It is used to allow the tactical director or tactical control officer more time to identify a target. Missiles in flight are allowed to continue to intercept.

Stop Fire. This command is used to temporarily halt the engagement sequence due to internally unsafe fire unit conditions. It is seldom transmitted outside the firing battery. This command can be given by anyone in the fire unit who observes an unsafe condition. The engagement continues after the unsafe condition has been corrected.

SUPPLEMENTAL FIRE CONTROL MEASURES

★ Supplemental fire control measures are procedural management measures issued by

appropriate military authority which delineate or modify hostile criteria, delegate identification authority, or which serve strictly as aids in fire distribution or airspace control. The five supplemental fire control measures are—

1. Air defense operations area.
2. Weapons engagement zone.
3. High density airspace control zone.
4. Temporary airspace restrictions.
5. Sectors of fire and primary target lines.

Air Defense Operations Area

★ An air defense operations area is an area and the airspace above it within which procedures are established to minimize mutual interference between air defense and other operations. These designations can include air defense action area, air defense area, and air defense identification zone. Currently, only the air defense identification zone is used. This is airspace of defined dimensions within which the ready identification, location, and control of airborne vehicles are required. This type of air defense operations area is normally used only for airspace control. Areas within an air defense identification zone will normally be characterized by extremely stringent hostile criteria and weapons control statuses. In wartime, the air defense identification zone is usually bounded by the fire support coordination line and the forward line of own troops. Friendly aircraft begin minimum risk procedures at the fire support coordination line when returning to friendly airspace. Establishment of safe passage corridors; restricted and prohibited volumes; and identification, friend or foe, on/off lines are tied to the air defense identification zone. In peacetime, the limits of the air defense identification zone are related to political boundaries.

Weapons Engagement Zone

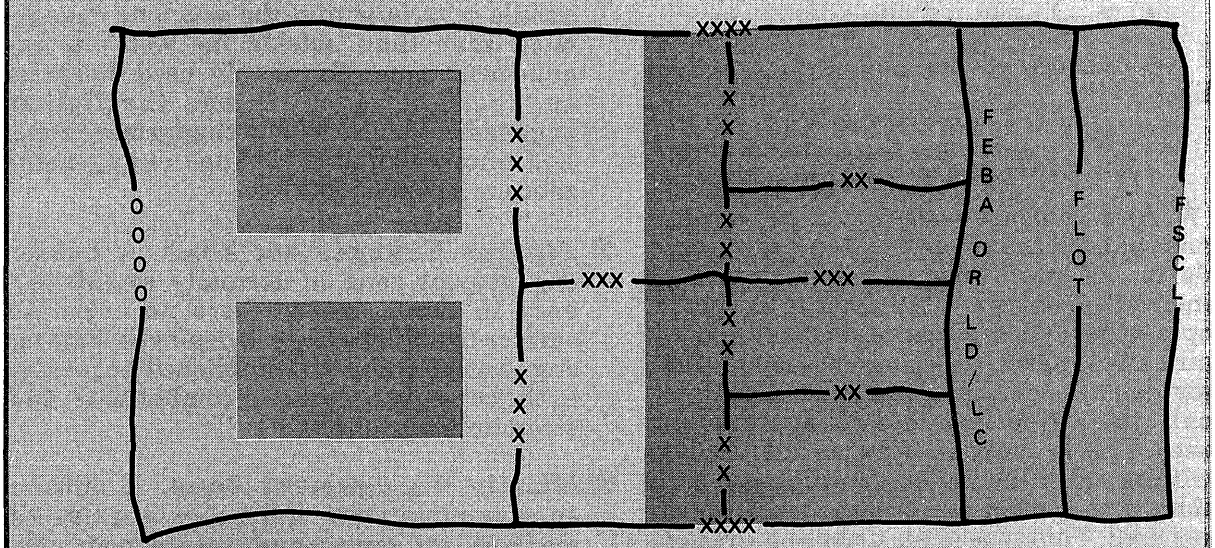
★ A weapons engagement zone is a volume of defined airspace within which a specific type of air defense weapon is preferred for use in an engagement (see the weapons engagement zone boundaries illustration on page 4-20). Use of weapons engagement zones does not preclude engagement of high-priority targets by more than one type of weapon system, if centralized control of each weapon system involved is available. The activation of a weapons engagement zone can be used to delegate identification and engagement authority to respective subordinate units by specifying different (usually more stringent) hostile criteria within the weapons engagement zone than outside the weapons engagement zone. Commonly used weapons engagement zones include the fighter engagement zone, missile engagement zone, and short-range air defense engagement zone.

★ ***Fighter Engagement Zone.*** A fighter engagement zone is normally established only in those areas where no effective surface-to-air capability is deployed. Fighter engagement zones are established frequently in the corps rear area, rear combat zone, and communications zone.

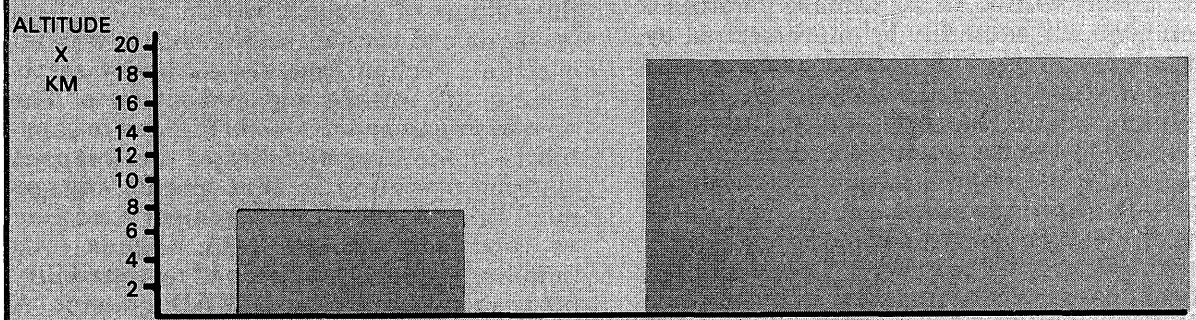
★ ***Missile Engagement Zone.*** A missile engagement zone normally applies to medium- and long-range surface-to-air missiles. A missile engagement zone establishes the volume of airspace within which these weapons can conduct engagements without specific direction from the authority establishing the missile engagement zone. The missile engagement zone is tailored to capabilities and characteristics of the weapons systems operating in that missile engagement zone. A missile engagement zone may be subdivided by the ADA brigade commander into separate areas of responsibility between two different HIMAD systems. A forward Patriot missile engagement zone is usually established between the fire support coordination line and the line formed by rear firing batteries of the forward Patriot battalions. The forward missile engagement zone usually extends between 0 and 15,000 + meters in altitude. The forward missile engagement zone is established to permit freedom of action to Patriot units in the forward areas. A rear missile engagement zone may

be established to prevent potential interference between air superiority fighters, Patriot, and Hawk. Typically, this missile engagement zone is established between 0 and 7,500 meters over critical deep-attack assets. Exact dimensions of a missile engagement zone are determined by the area/region air defense commander. In some cases a missile and fighter engagement zone may overlap.

★ WEAPONS ENGAGEMENT ZONE BOUNDARIES



TOP VIEW OF TYPE AIR DEFENSE REGION, SHOWING WEAPONS ENGAGEMENT ZONE GEOGRAPHIC BOUNDARIES



SIDE VIEW OF TYPE AIR DEFENSE REGION, SHOWING WEAPONS ENGAGEMENT ZONE ALTITUDE BOUNDARIES

LEGEND: MEZ ☐ FEZ ☐

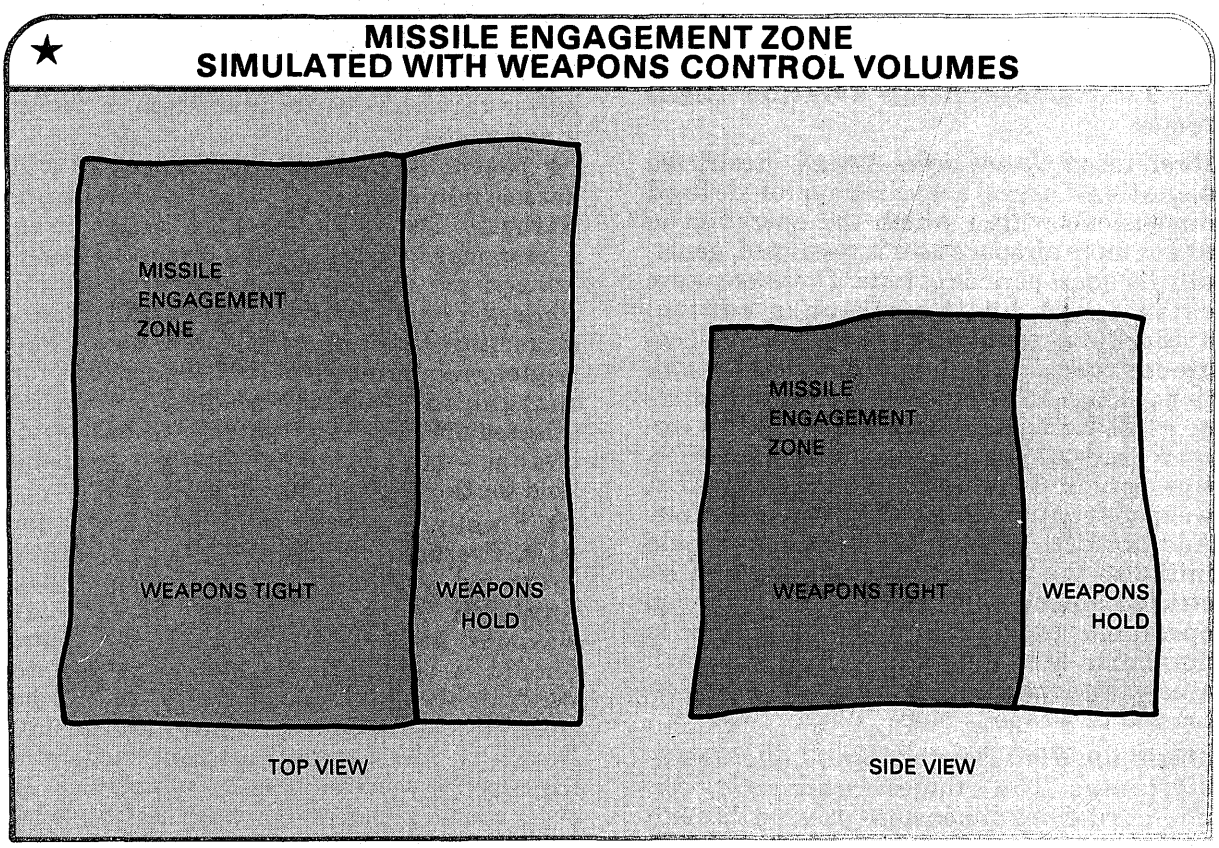
★ The Patriot system cannot automatically process weapons engagement zone information. However, weapons control volumes can be used to represent a missile engagement zone. The missile engagement zone simulated with weapons control volumes illustration shows how a missile engagement zone can be simulated using weapons tight and weapons hold volumes. Since this use of weapons control statuses is not in line with the traditional use of weapons control statuses, this tactic must be coordinated with the area/region air defense commander by the ADA brigade commander.

High Density Airspace Control Zone

★ This zone is airspace of defined dimensions in which there is a concentrated employment of airspace users. These users may include aircraft, field artillery, mortars, naval guns, air defense artillery weapons, and surface-to-surface missiles. The zones are established by the area air defense commander in his capacity as the airspace control authority, upon request of ground force commanders. When a request is approved, the requesting commander is normally given weapons control status authority for SHORAD within the area.

★ High density airspace control zones are established when the level of intensity of airspace use dictates the need for special airspace control measures. The number of such zones will vary depending on the combat situation or the complexities of air traffic control in conjunction with fire support coordination. The establishment of such a zone normally increases temporary restrictions within the zone. The Patriot system does not contain a separate volume for a high density airspace control zone but through the use of other volumes can closely represent one. These measures include the use of safe passage corridors and weapons control volumes.

★ **MISSILE ENGAGEMENT ZONE SIMULATED WITH WEAPONS CONTROL VOLUMES**



Temporary Airspace Restrictions

★ Temporary airspace restrictions can be imposed on volumes of airspace of defined dimensions in response to specific situations and requirements. These volumes can include search and rescue operations areas, air refueling areas, high density airspace control zones, concentrated interdiction areas, weapons free areas, and combat air patrol areas. The declaration of temporary airspace restrictions will include—

- Identification of the airspace user being restricted.
- Period, area, and altitude of restriction.
- Procedures for cancellation or modification of the restriction in event of communications loss.

Three common temporary restrictions are:

1. Restricted operations areas.
2. Minimum risk routes/low level transit routes.
3. Standard Army aviation flight routes.

★ ***Restricted Operations Areas.*** Restricted operations areas are airspace of defined dimensions within which the operation of one or more airspace user is restricted, generally for short periods of time. These areas are established by the airspace control authority in response to the requests of local ground force commanders. Restricted operations areas can be declared for either aircraft or ADA. Restricted operations areas for aircraft are established to maximize ADA effectiveness. In such areas, the normal ADA weapons control status will be weapons free. Additionally, the Patriot battalion should initialize the area as a prohibited and restricted volume. On the other hand, restricted operations areas for ADA are established to maximize aircraft effectiveness. In such areas, the normal ADA weapons control status will be weapons hold.

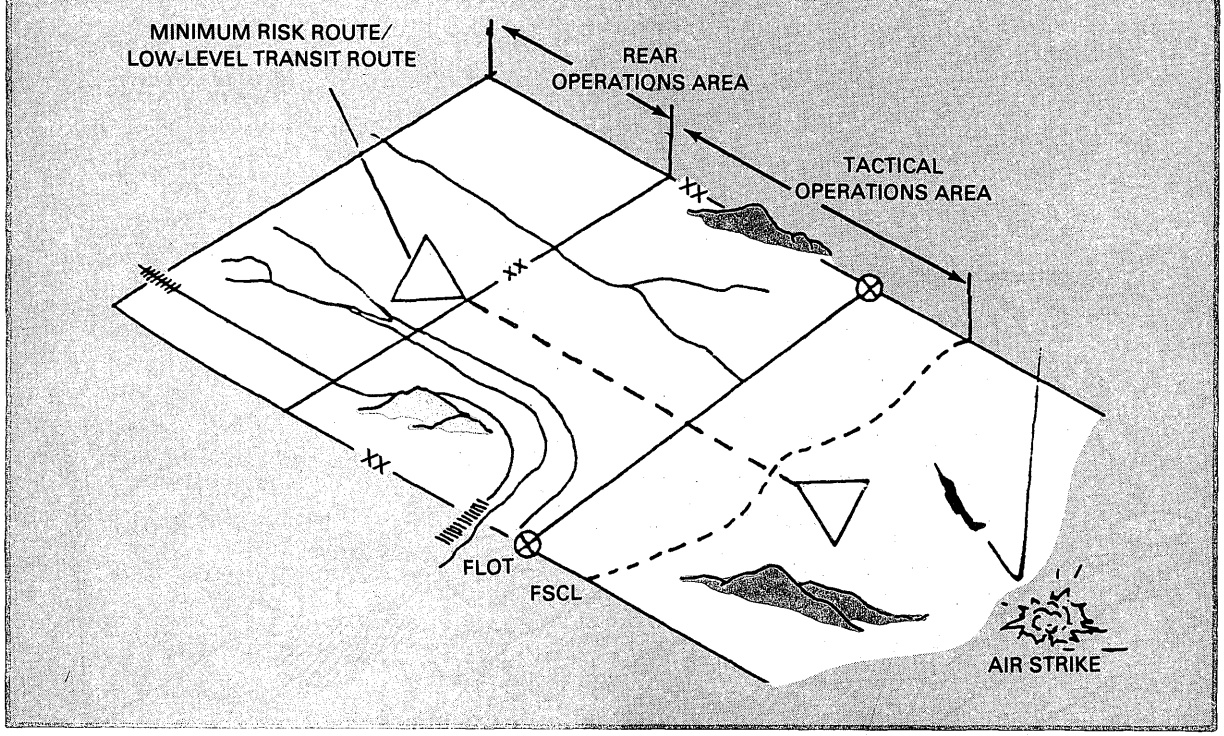
★ ***Minimum Risk Routes/Low Level Transit Routes.*** These routes are temporary corridors of defined dimensions passing through ADA defenses, a high density airspace control zone, or through a restricted operations area (see the minimum risk routes/low level transit routes illustration). They are designed to reduce risk to friendly high-speed aircraft transitting the tactical operations area at very-low-to-medium-altitudes. These routes will normally be confined to that airspace in which ADA is not at weapons free. Such circumstances will exist where there is inadequate timely control capability to permit a more flexible method of air defense. However, aircraft transitting the tactical operations area are not required to use these routes. The individual pilot decides whether to use a route after consideration of flight plan information, route suitability to mission requirements, degree of acceptable risk necessary for mission success, and control and reporting center recommendations. When aircraft do not use these routes, established air defense procedures will apply. Patriot battalions should initialize these routes as safe passage corridors. The size of the safe passage corridors should include the size of the buffer required due to navigation or radar inaccuracies.

★ Normally, close air support aircraft will not use minimum risk routes/low level transit routes. Close air support sorties are flown in response to Army ground force commanders and are coordinated by the forward air controller or other tactical air control system elements with the supported ground unit. The requesting Army unit is responsible for changing the weapons control status of those affected SHORAD fire units to a more restrictive one — such as weapons tight or weapons hold for the appropriate time period.

★ Finally, the weapons control status for ADA fire units whose engagement ranges intercept an *activated* minimum risk route/low level transit route remains at weapons tight for that part of the route. Should it become necessary to change to weapons free, that particular route will be closed by the commander who established it. Normally, the Patriot battalion initializes these routes as weapons tight volumes. If other routes are established for high-speed

aircraft in the rear operations area, the Patriot battalion should treat these routes the same as minimum risk routes/low level transit routes.

★ **MINIMUM RISK ROUTES/LOW LEVEL TRANSIT ROUTES**

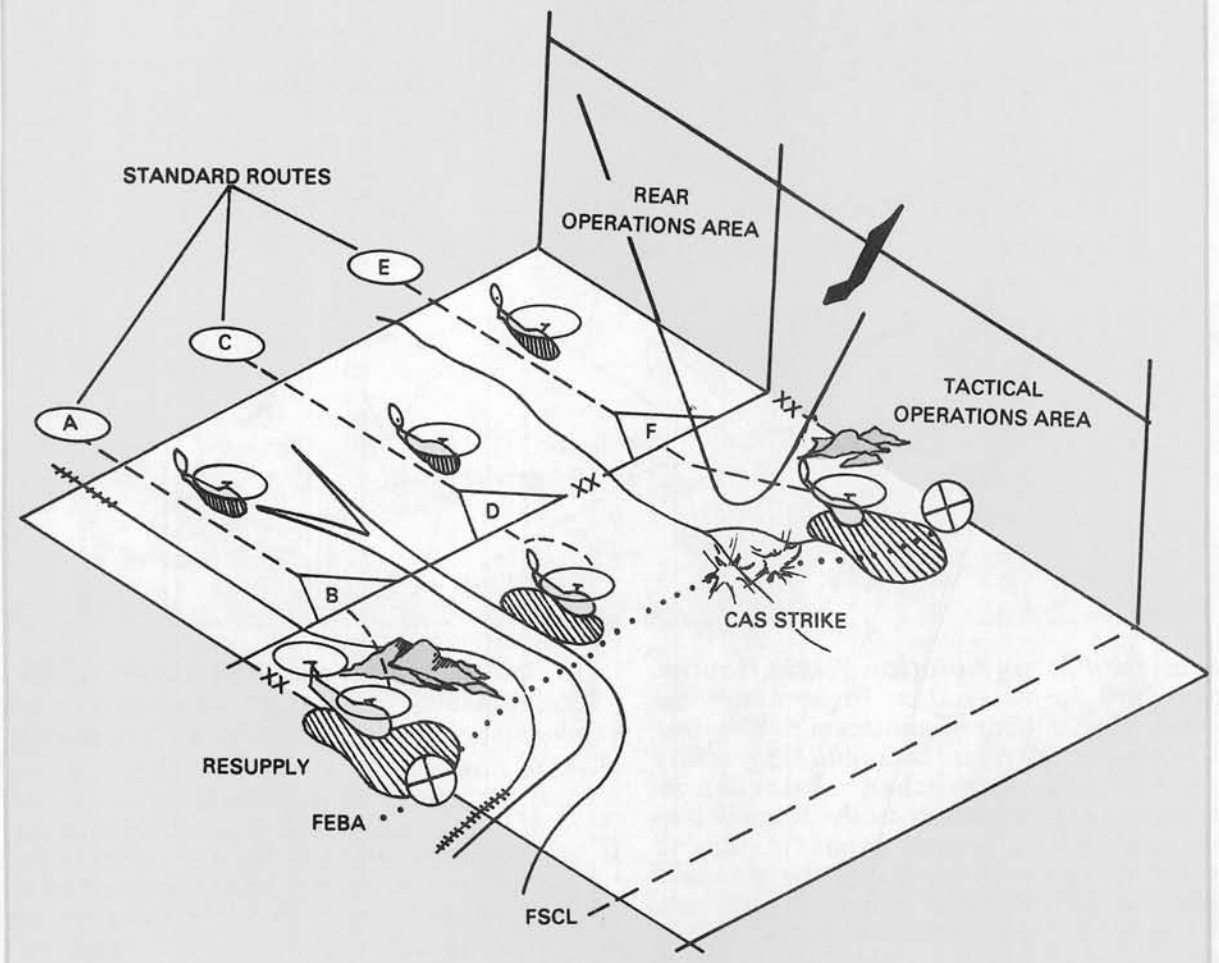


★ ***Standard Army Aviation Flight Routes.*** Standard Army aviation flight routes are established outside of minimum risk routes/ low level transit routes to enable Army rotary wing aircraft to transit the combat zone from the corps rear boundary to the brigade rear boundary with minimum danger of collision with high-speed aircraft (see the standard Army aviation flight routes illustration). When the route information is available, it should be included in the Patriot identification process as a safe passage corridor. The size of the corridor should include a buffer to account for navigation and radar inaccuracies.

★ There are two important factors for ADA in connection with standard Army aviation flight routes. *First,* since high-speed aircraft avoid standard Army aviation flight routes, ADA hostile criteria may include provisions that high-speed aircraft within these routes be declared hostile, unless penetration of the coordinating altitude was previously requested and other rules of engagement have been satisfied. This provides for safe passage of friendly high-speed aircraft. *Second,* the weapons control status for ADA units whose engagement ranges intercept an activated standard Army aviation flight route remains at weapons tight for that part of the route. Should it be necessary to change to weapons free, that particular route will be closed by the

commander who established it. Patriot battalions should initialize standard Army Aviation flight routes as weapons tight volumes.

★ STANDARD ARMY AVIATION FLIGHT ROUTES

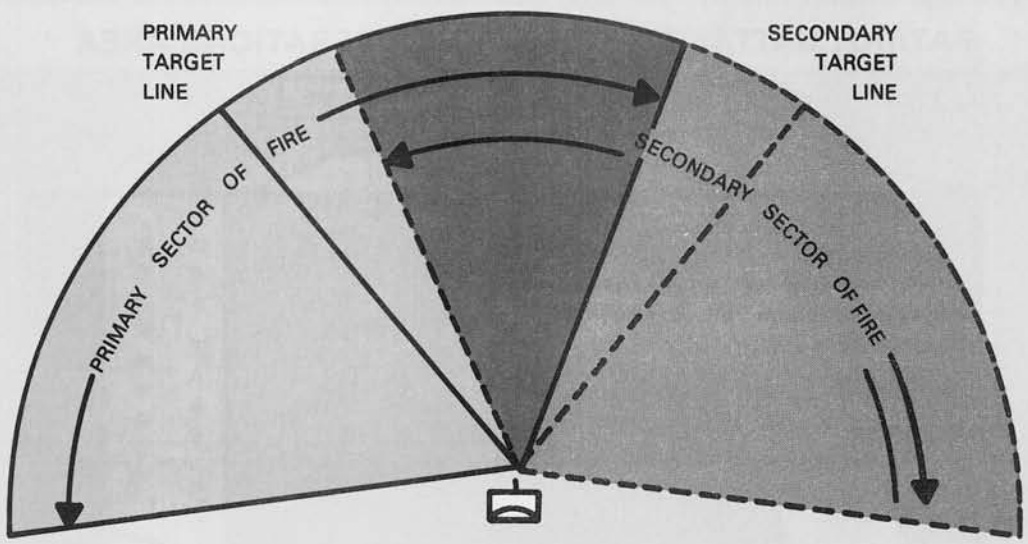


Sectors of Fire and Primary Target Lines

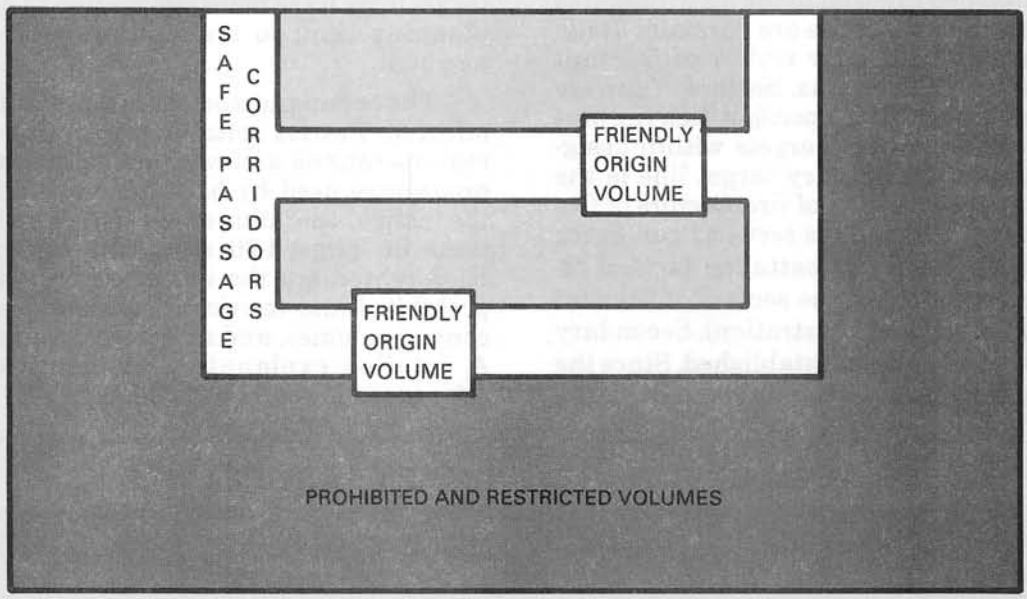
Sectors of fire and primary target lines are established to assist in the distribution of ADA fires. Sectors of fire are normally designated at battalion after review of fire unit radar coverage diagrams. Sectors of fire enable the commander to specify which fire unit is preferred to engage targets within designated areas. The primary target line is the center of a unit's sector of fire. Sectors of fire and primary target lines serve as guides for target assignments by battalion tactical director assistants (see the sectors of fire and primary target lines illustration). Secondary target lines can also be established. Since the engagement decision is automated in the Patriot system, sectors of fire and primary target lines have more application to defense planning than to manual air battle management.

The command and control procedures in effect for Patriot battalions operating in the rear operations area will not be the same as procedures used by battalions operating in the tactical operations area. The two illustrations on page 4-26 show the differences. Highlighted are the use of origin volumes, prohibited and restricted volumes, weapons control volumes, and safe passage corridors. A detailed explanation of identification schemes is found in FM 44-1A.

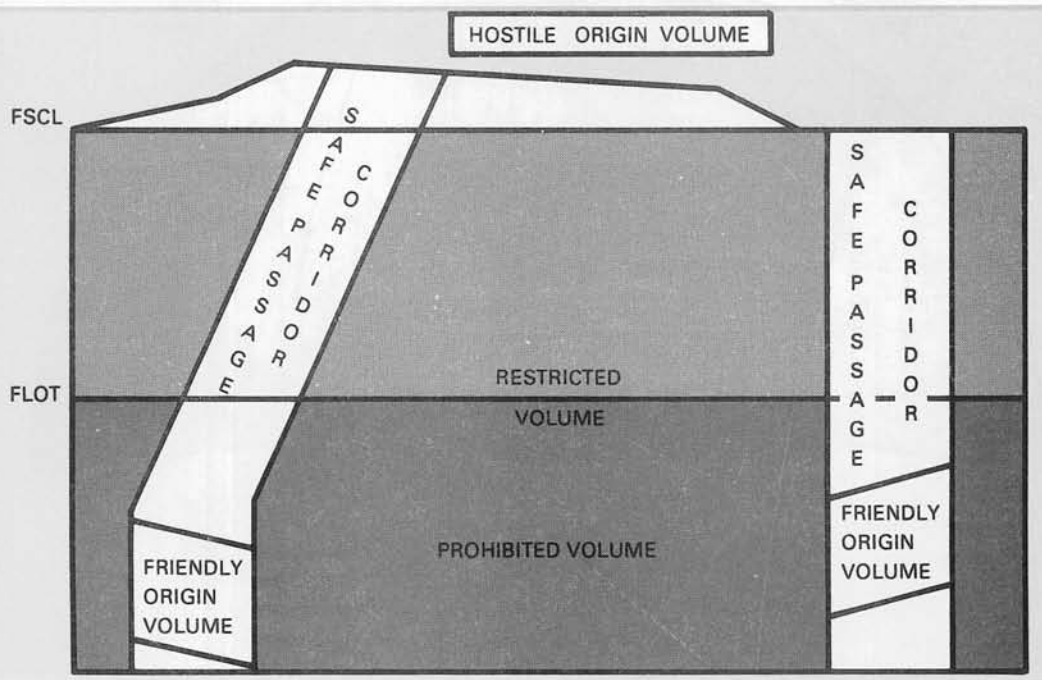
★ **SECTORS OF FIRE AND PRIMARY TARGET LINES**



★ PATRIOT BATTALION IN REAR OPERATIONS AREA



★ PATRIOT BATTALION IN TACTICAL OPERATIONS AREA



CHAPTER 5

Communications

This chapter describes the communications systems needed for effective command and control of the Patriot battalion under field operating conditions. Several communications subsystems and nets are used to provide command and control in the Patriot battalion. The two basic categories of communications are voice and data. Voice communications take place over UHF, VHF, and high frequency (HF) radio as well as land line systems. Data communications are used to pass real-time data between systems and are transmitted over UHF and VHF radio.

★ Threat forces know that the key to success in combat is an effective communications system. The threat will use radioelectronic combat to disrupt as many command and control and weapon system communications as possible. Therefore, communications on the modern battlefield may be considerably degraded or totally ineffective.

REQUIREMENTS

★ The communications system for Patriot battalions must provide reliable, real-time and near real-time information to dispersed Patriot batteries, higher headquarters, adjacent ADA battalions, and supported units. The communications system must be redundant so that communications are available even when the primary system fails. To effectively defeat the air threat, the Patriot battalion must maintain communications to support—

- Control of the air battle.
- Command, administrative, and logistical lines with higher headquarters and subordinate units.
- Liaison with supported units or the units in whose area the Patriot battalion is operating.

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RESPONSIBILITIES

★ Each Patriot battalion commander is responsible for establishing an effective communications system. He exercises command and control of organic signal assets through his communications-electronics officer. Tactical signal communications responsibilities common to all communications-electronics officers are explained in FM 24-1 and FM 101-5. The doctrinal responsibilities for establishing communications also hold true for the Patriot battalion. Communications are established from higher to lower, left to right, and supporting to supported.

BATTALION COMMUNICATIONS

★ External and internal battalion communications are conducted through the use of radio and wire nets. A communications platoon organic to the Patriot battalion provides internal communications for the battalion command post and limited support to the firing batteries.

EXTERNAL COMMUNICATIONS

★ External communications are established with the ADA brigade, adjacent Patriot battalions, supported unit or unit in whose area Patriot is operating, and supporting units. Contingency operations capabilities also are available to communicate with a Hawk battalion or control and reporting center.

Brigade

★ Communications with brigade support control of the air battle and command, administrative, logistical, operations, and intelligence functions.

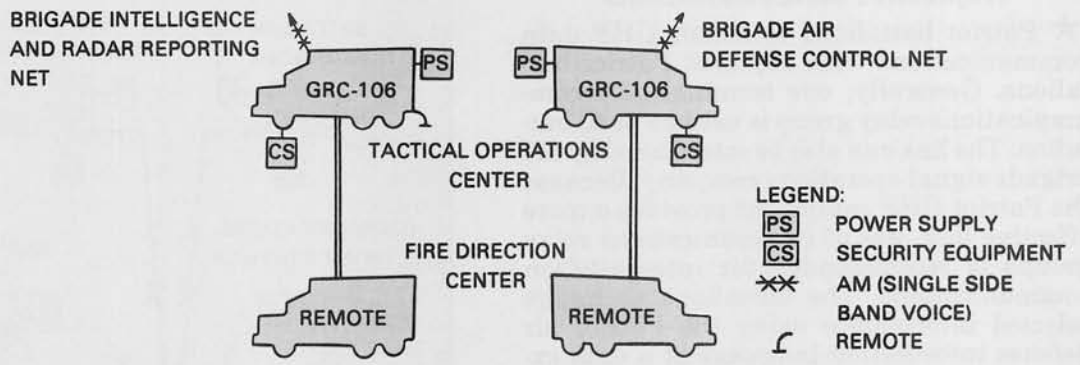
★ ***Control of the Air Battle.*** To support control of the air battle, UHF communications are used. The brigade signal operations company has the task of establishing the link between brigade and battalion. The brigade link may be terminated at a modulator/demodulator in either the information and coordination central or a communications relay group. The brigade signal operations company may terminate both ends of the link or the Patriot battalion may terminate its end. The advantage to using Patriot to terminate one end is that a more effective link would be established due to improved characteristics of the Patriot radio relay terminal—high-powered amplifier and highly directional antennas. The disadvantage is that fewer links are available for multirouting internal communications. This is particularly true when the information and coordination control terminates the link. The advantages to using the brigade signal operations company to terminate the link are the increased availability of Patriot radio relay terminals for multirouting and the potential to use UHF channels for command, administrative, logistical, operations, and intelligence functions by integrating into the battalion switchboard. The disadvantages are that less versatility is available in circuit routing and the possibility of single point jamming is increased.

★ Generally, three channels are used for control of the air battle. One channel is used for the automatic data link which uses Army tactical data link one. One channel is used by the brigade and battalion tactical directors for the identification function. This is called the intelligence and radar reporting line and is usually established on party line two. The third channel is used by the brigade and battalion tactical director assistants for the engagement function. This is called the air defense control line and is usually established on party line one. All voice circuits are terminated at the information and coordination central patch panel. The automatic data link is also terminated there either at the routing logic radio interface unit or a modulator/demodulator.

★ AM is used as a backup to the UHF voice system for air defense control and intelligence and radar reporting as shown in the illustration below. The firing batteries do not have the AM assets to operate in the battalion command net and air defense control or intelligence and radar reporting nets. Also

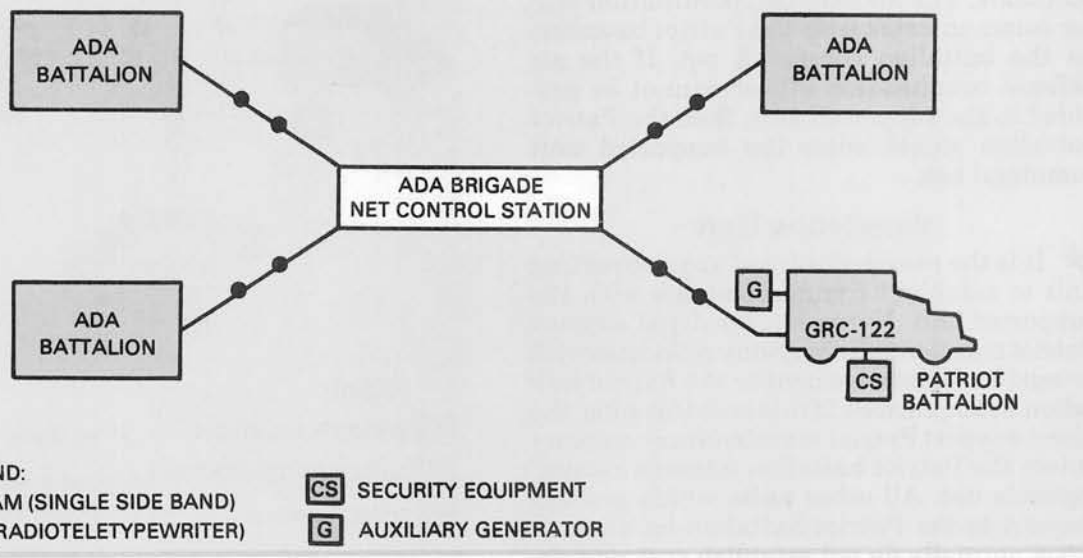
because of the more effective internal communications, only a backup between battalion and brigade is required.

★ **BACKUP AM AIR DEFENSE CONTROL AND INTELLIGENCE AND RADAR REPORTING NETS**



★ ***Command.*** The ADA brigade operates an AM command net in which the Patriot battalion participates. If UHF circuits are available, command communications use the UHF system as the primary means of communications. The ADA brigade also operates an AM radioteletypewriter net which also can be used for command message traffic. The brigade radioteletypewriter net is shown in the illustration below. The brigade station is the net control station.

★ **BRIGADE RADIOTELETYPEWRITER NET**



★ ***Administration, Intelligence, Logistics, and Operations.*** If UHF circuits are available, they should be used to tie-in brigade and battalion staff elements. If UHF circuits are not available, radioteletypewriter is the second means of communications.

Adjacent Patriot Battalions

★ Patriot battalions establish UHF data communications with adjacent Patriot battalions. Generally, one terminal of a communications relay group is used by each battalion. The link can also be established by the brigade signal operations company. Because the Patriot UHF equipment provides a more effective link, use of communications relay groups is recommended for interbattalion communications. The battalions exchange selected information using the Patriot air defense information language at a data exchange rate of 1200 bits per second. The information is exchanged to improve fire and track coordination.

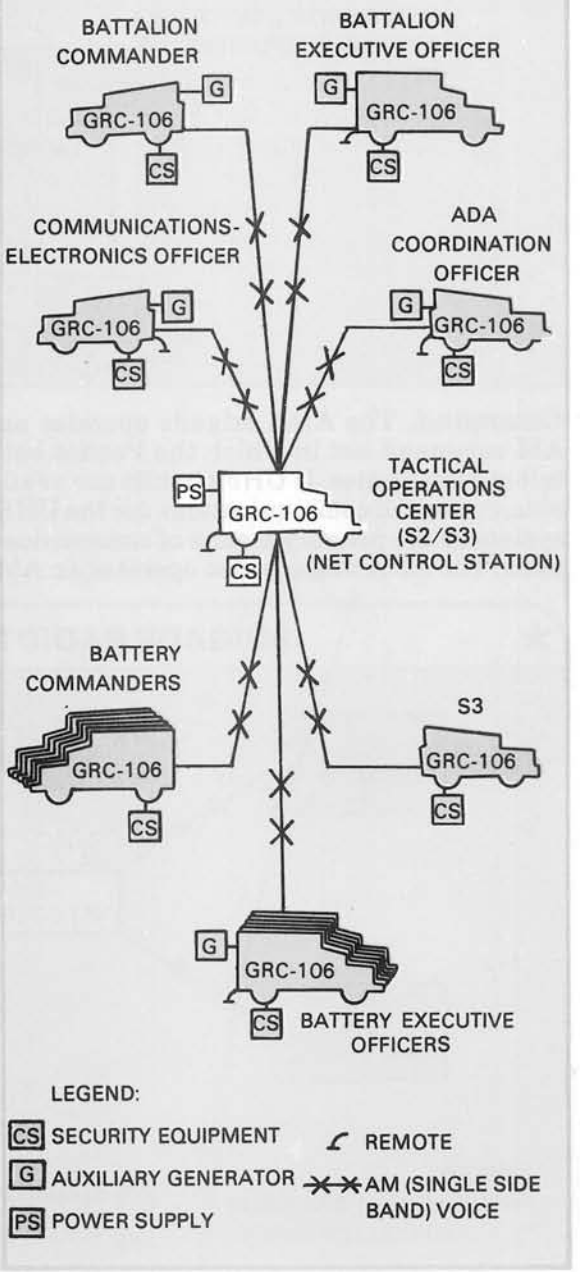
Supported Unit

★ Normally, Patriot battalions do not establish communications with the supported unit or the unit in whose area the battalion is operating. Rather, the Patriot battalion normally sends the air defense coordination officer to that unit to effect coordination of all functions. The air defense coordination officer communicates with the Patriot battalion on the battalion command net. If the air defense coordination officer cannot be provided to the supported unit, then the Patriot battalion would enter the supported unit command net.

Supporting Unit

★ It is the responsibility of any supporting unit to establish communications with the supported unit. Normally, the direct support Patriot maintenance company collocates with or sends a liaison element to the Patriot battalion headquarters. If this is not feasible, the direct support Patriot maintenance company enters the Patriot battalion administrative/logistics net. All other units which provide support to the Patriot battalion on an area basis normally do not establish communications with the Patriot battalion. The Patriot battalion must establish communications with these support units.

★ **BATTALION COMMAND NET**



INTERNAL COMMUNICATIONS

★ Internal communications are established with each Patriot firing battery. These communications support the battalion command function, headquarters battery command function, control of the air battle, and administration, intelligence, operations, and logistics. All radio communications could be augmented by messenger.

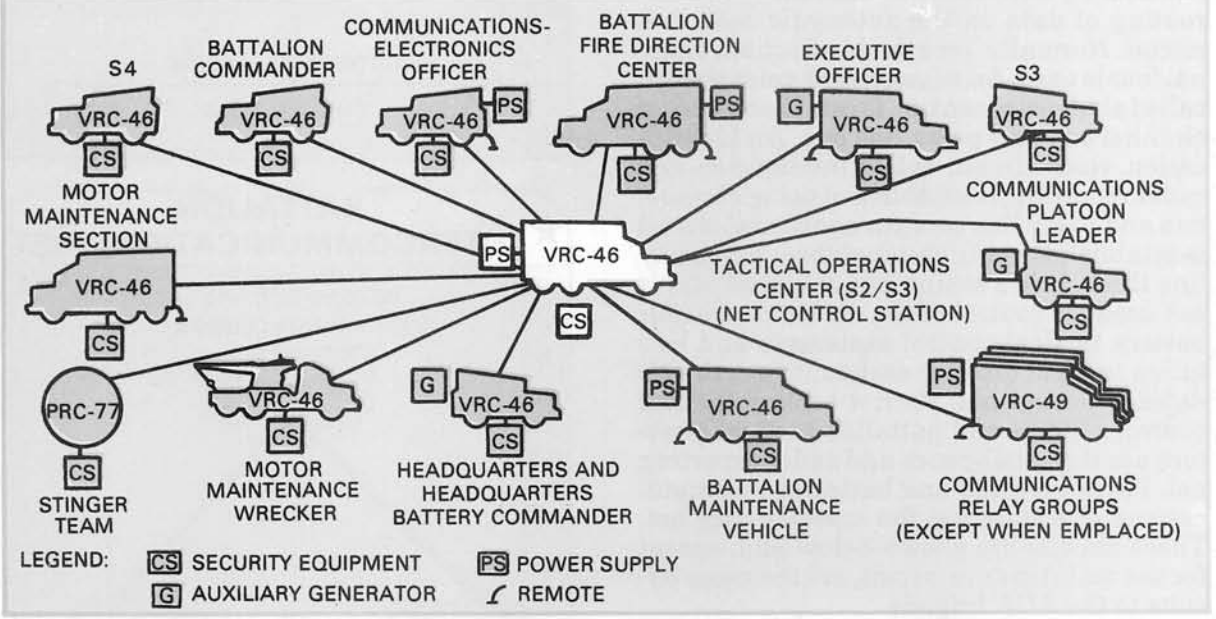
Battalion Command

★ The battalion command net (see the battalion command net illustration at left) is a high frequency net. AM is selected because of its electronic countermeasures resistance, long range, and nonline-of-sight transmission ability. All radios may not be required to operate in this net at the same time. Some should be held in reserve. Some radios may be required for back-up for the brigade voice air battle circuits.

Headquarters and Headquarters Battery Command

★ The purpose of the command net is to provide communications for the command function of the headquarters and headquarters battery. Each station operating in the net is shown in the headquarters and headquarters battery command net illustration. This net is primarily used during movements and between elements at separate positions. Wire is normally the primary means of communications between elements when emplaced.

★ HEADQUARTERS AND HEADQUARTERS BATTERY COMMAND NET



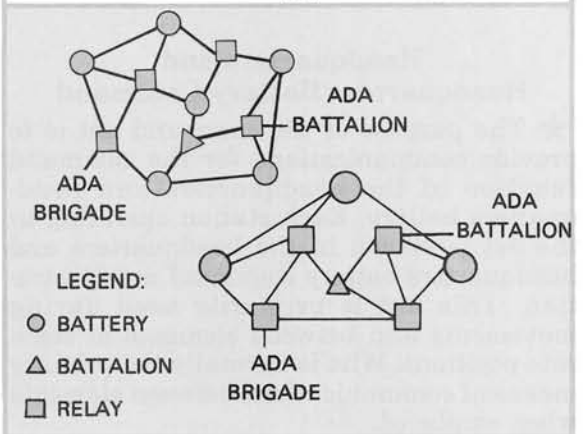
Control of the Air Battle

★ To support control of the air battle, UHF communications are used. Ideally, each firing battery and the battalion fire direction center use all three links available for UHF communications. The number of communications relay groups and number of links used at each is highly terrain dependent.

The air defense command and control structure is heavily dependent upon communications for efficient operations. In order to pass real-time air battle and air traffic information, automatic data links must be established. Several examples of multirouting schemes are shown in the battalion UHF

links/battalion (-) UHF links illustration.

★ **BATTALION UHF LINKS/ BATTALION (-) UHF LINKS**



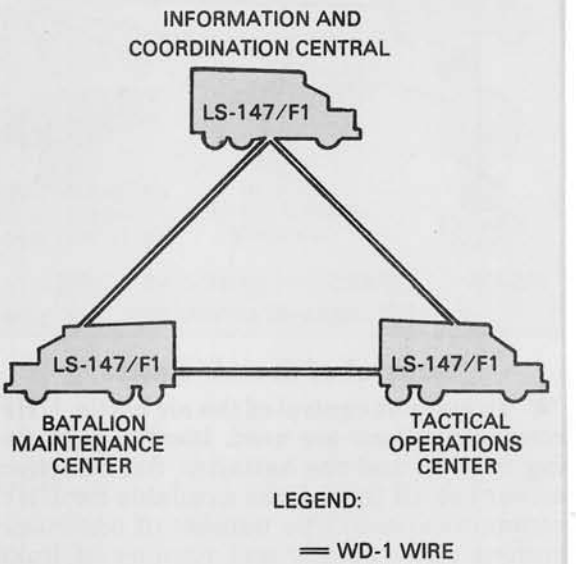
★ To effectively fight the air battle, each firing battery needs three UHF circuits. One channel on each radio is used for the multi-routing of data on the automatic data link circuit. Normally, for standardization, channel four is used. An engagement voice circuit, called air defense control, is established using channel one and party line one. An identification voice circuit, called intelligence and radar reporting, is established using channel two and party line two. An additional circuit is established using channel three and party line three. It is a maintenance circuit and is not used for control of the air battle. Patriot battery tactical control assistants and battalion tactical director assistants use the air defense control net. Patriot battery tactical control officers and battalion tactical directors use the intelligence and radar reporting net. Patriot battery and battalion communications operators use the maintenance net. These circuits are shown below and, except for the maintenance circuit, are the same circuits to the ADA brigade.

★ The information and coordination central is linked to the tactical operations center and maintenance center by wire (see the battalion intercommunications net illustration). This net allows for rapid communications between key elements of the tactical operations center and fire direction center. It can be used to cross tell time-sensitive air battle data such as a change in the airspace coordination order. Maintenance support can also be requested without leaving the information and coordination central.

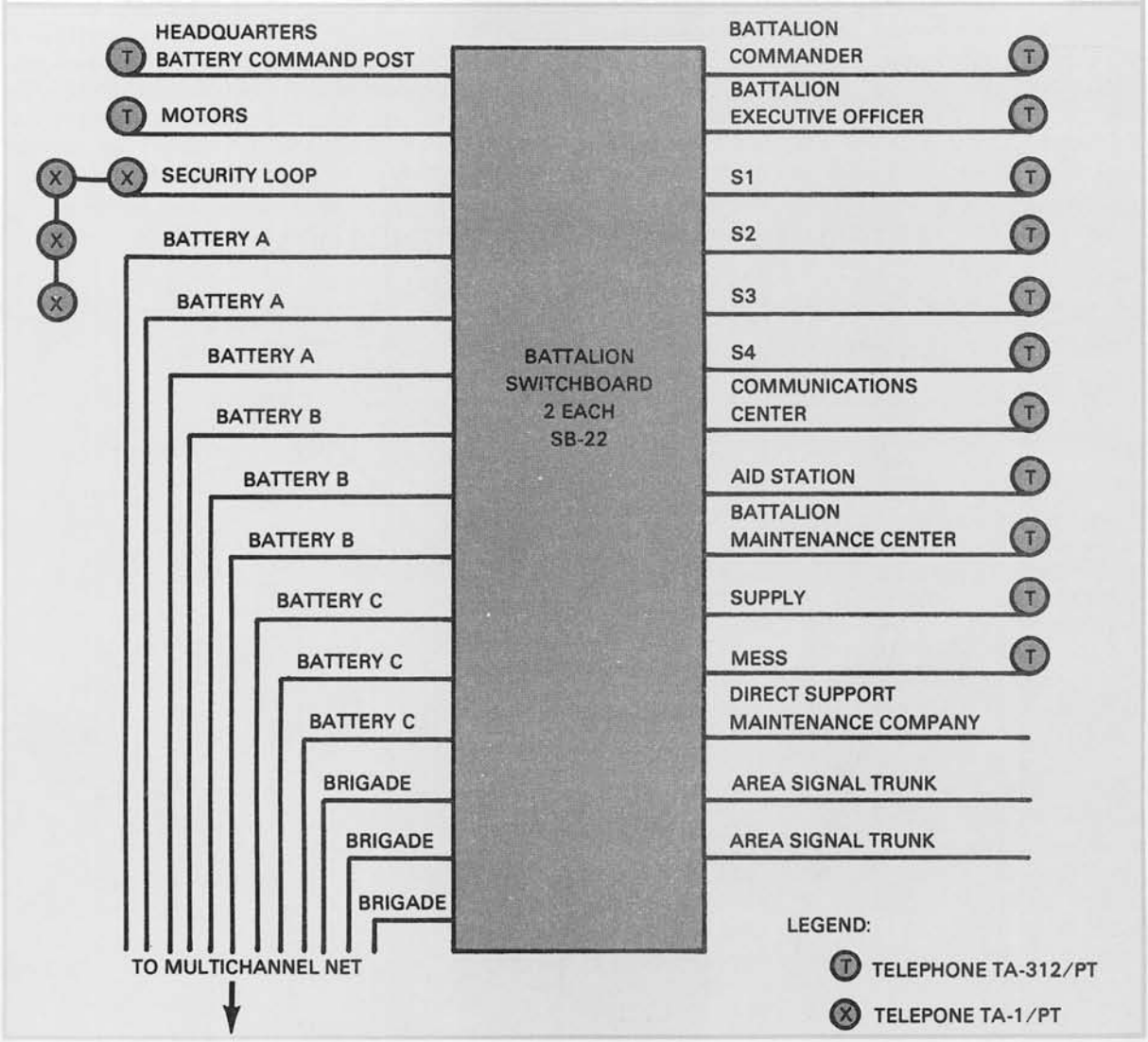
★ **UHF CIRCUITS**

AIR DEFENSE CONTROL	
PARTY LINE ONE	
CHANNEL ONE	
INTELLIGENCE & RADAR REPORTING	
PARTY LINE TWO	
CHANNEL TWO	
MAINTENANCE	
PARTY LINE THREE	
CHANNEL THREE	
AUTOMATIC DATA LINK	
CHANNEL FOUR	

★ **BATTALION INTERCOMMUNICATIONS NET**



★ **BATTALION WIRE NET**



Administration, Intelligence, Operations, and Logistics

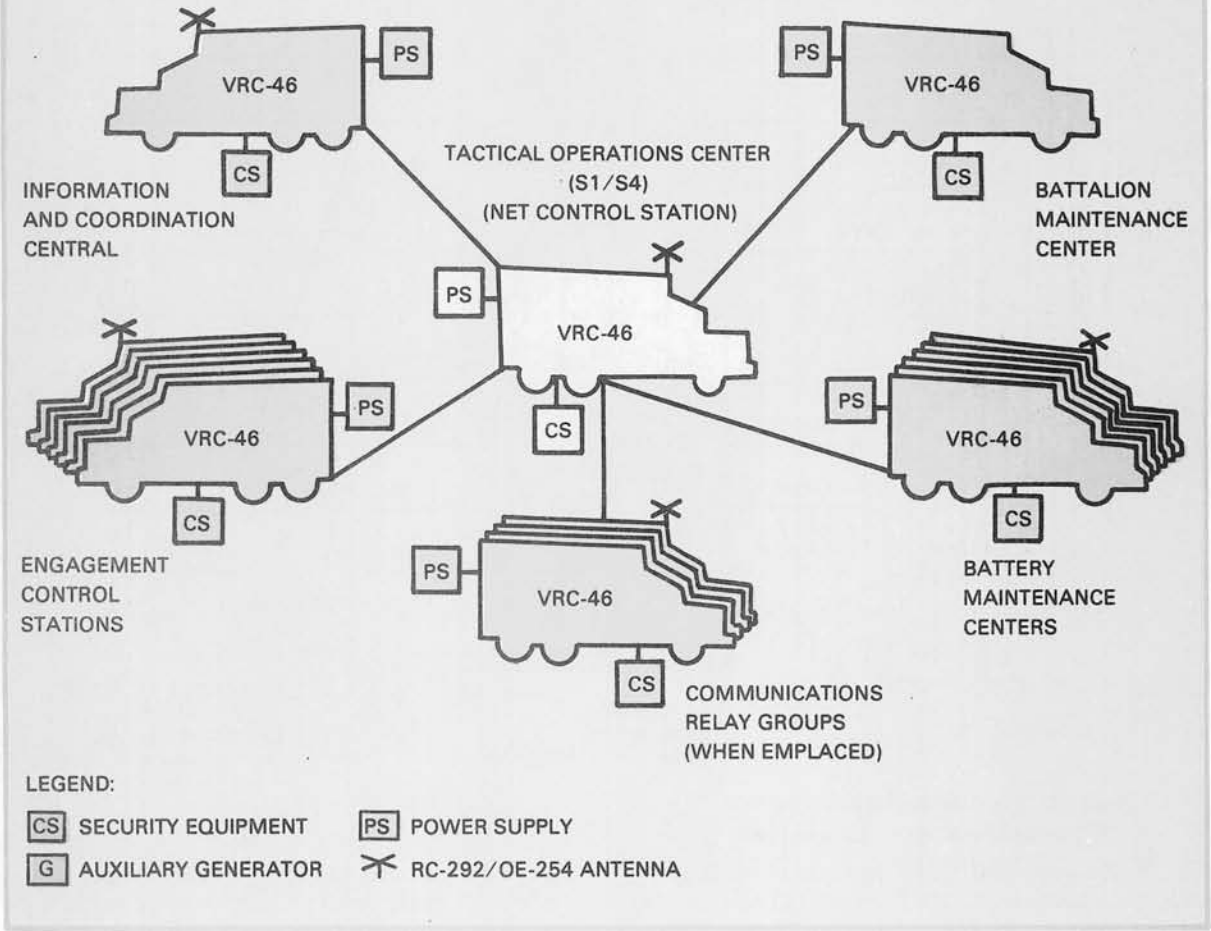
★ Normally, the UHF system which provides communications for control of the air battle also supports other functions. Since the UHF system is operational most of the time, it is also the primary means the staff has of providing command and control of the firing batteries. The total number of circuits is limited by the 12 external wire connections at the information and coordination central. These 12 circuits must be divided out to brigade and each battery. Generally, each battery has a minimum of one circuit and will frequently have two, three, or four. These UHF circuits are connected to switchboards at battalion and battery.

★ The battalion wire net is shown in the illustration above. The battalion wire net is

the primary means of communications between headquarters and headquarters battery elements. The switchboard also provides access to a minimum of one circuit to each firing battery.

★ A radio net provides back-up for administrative/logistics command and control. The purpose of this net is to provide communications for the administrative and logistics functions of the battalion when UHF will not suffice. (See the battalion administrative/logistics net illustration.) The net control station is located at the S1/S4 van. Every station in the net is cryptographically secure. Communications relay groups may operate as radio relays when required.

★ **BATTALION ADMINISTRATIVE/LOGISTICS NET**



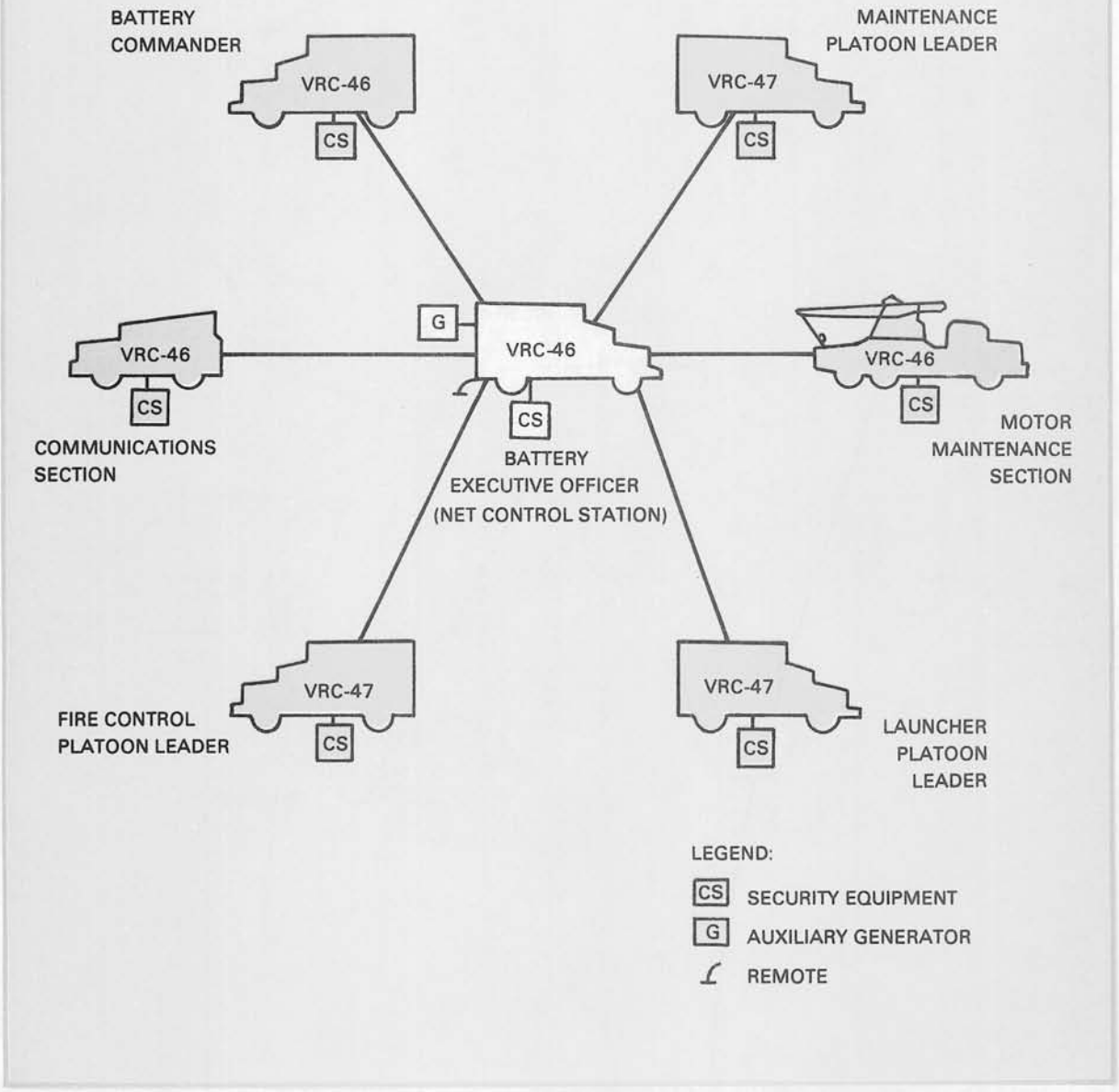
BATTERY COMMUNICATIONS

★ Firing battery communications are provided by the communications section. Each section has communications equipment. External communications have been previously discussed under the battalion communications section. The emphasis of internal communications is on support of the Patriot system and command and control of the battery.

FIRING BATTERY COMMAND NET

★ The purpose of this net (see the firing battery command net illustration) is to provide communications for the battery command function. The net control station is in the battery executive officer's vehicle. This net is primarily used during unit moves. Wire is used when the battery is emplaced.

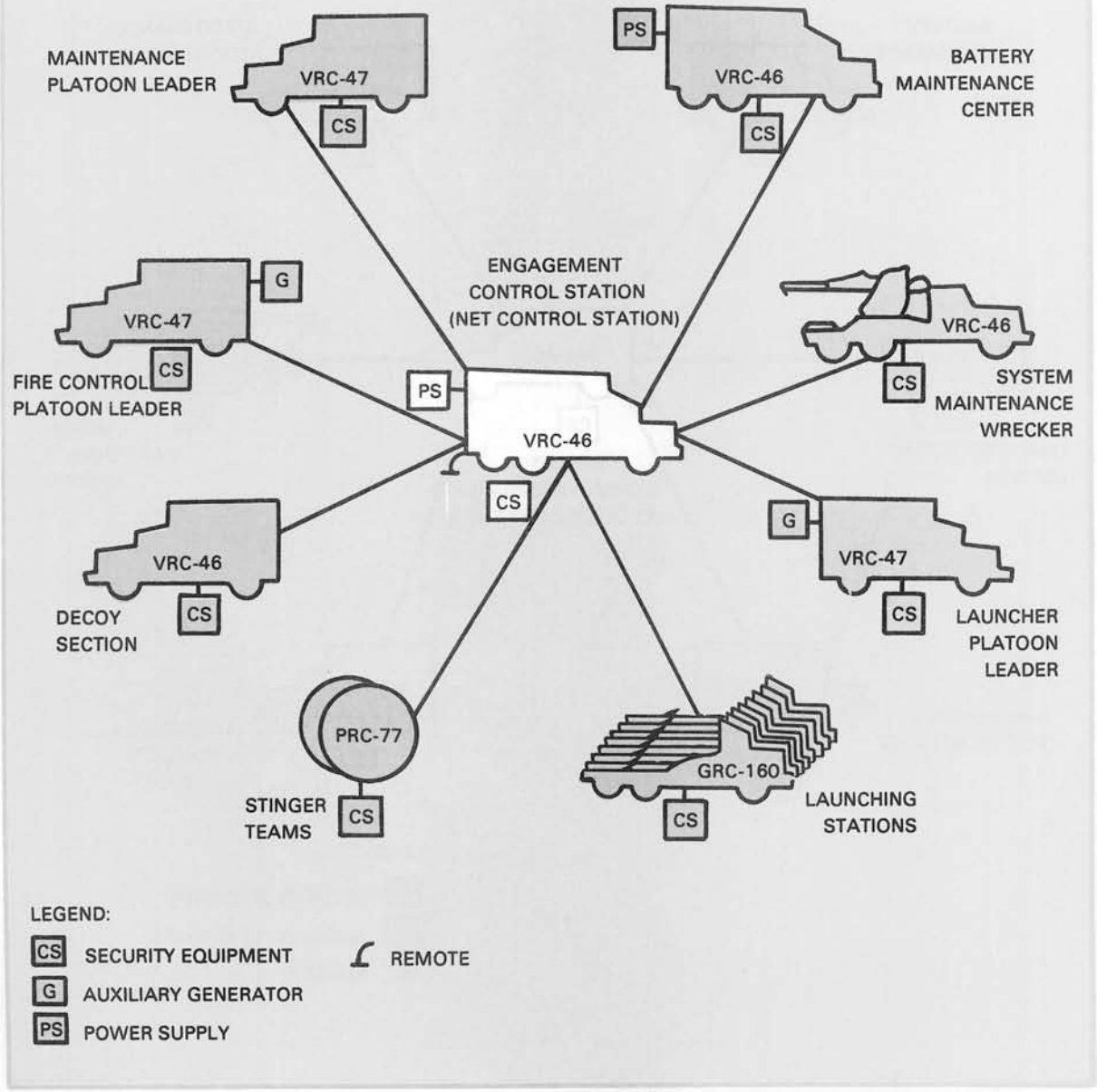
★ FIRING BATTERY COMMAND NET



FIRING BATTERY OPERATIONS NET

★ This net is used for command and control of the fire unit. The net control station for the firing battery operations net (see the firing battery operations net illustration) is the engagement control station. Each station in this net is cryptographically secure. Normally, all elements in this net, except the Stinger teams, use wire communications when possible.

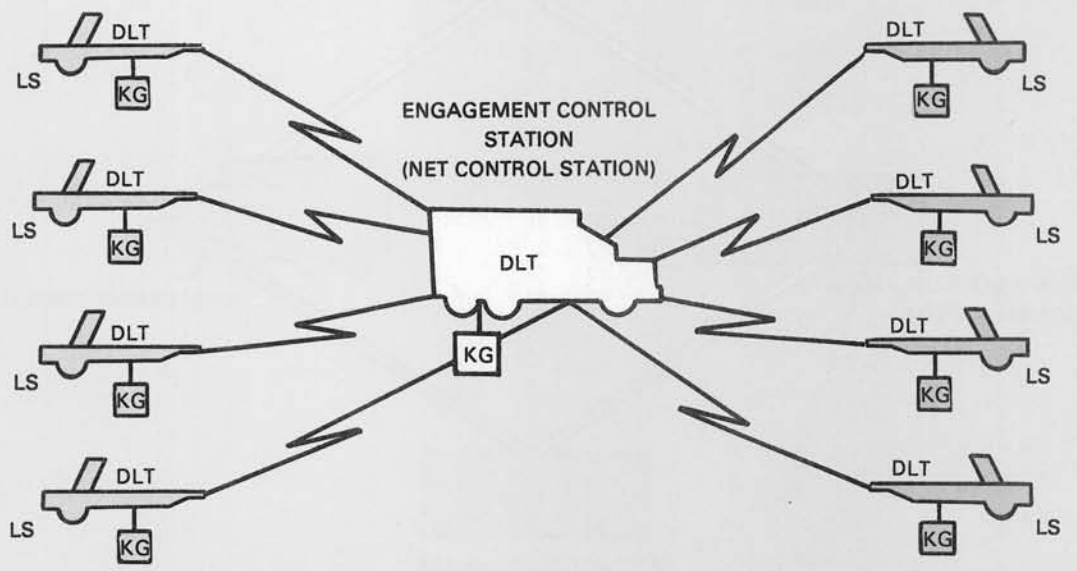
★ **FIRING BATTERY OPERATIONS NET**



FIRING BATTERY DATA NET

★ A data transmission link extends between the engagement control station and the launching stations to launch missiles and also to establish availability and maintainability of the guided missile. The net (see the firing battery data net [VHF data link] illustration) is controlled at the engagement control station by special purpose radio equipment which provides reliable transmission of low data rate messages over a short path in a severe electronic countermeasures environment. This equipment consists of VHF secure digital data radio modules and a standard communication security interface. The net operates with automatic control of the transmit/receive schedule. All command messages originate at the engagement control station, requiring a slaved response from the launching station in the form of a status message. The launching station is incapable of originating data communications. This is the first net which must be established during emplacement.

★ **FIRING BATTERY DATA NET (VHF DATA LINK)**



LEGEND:

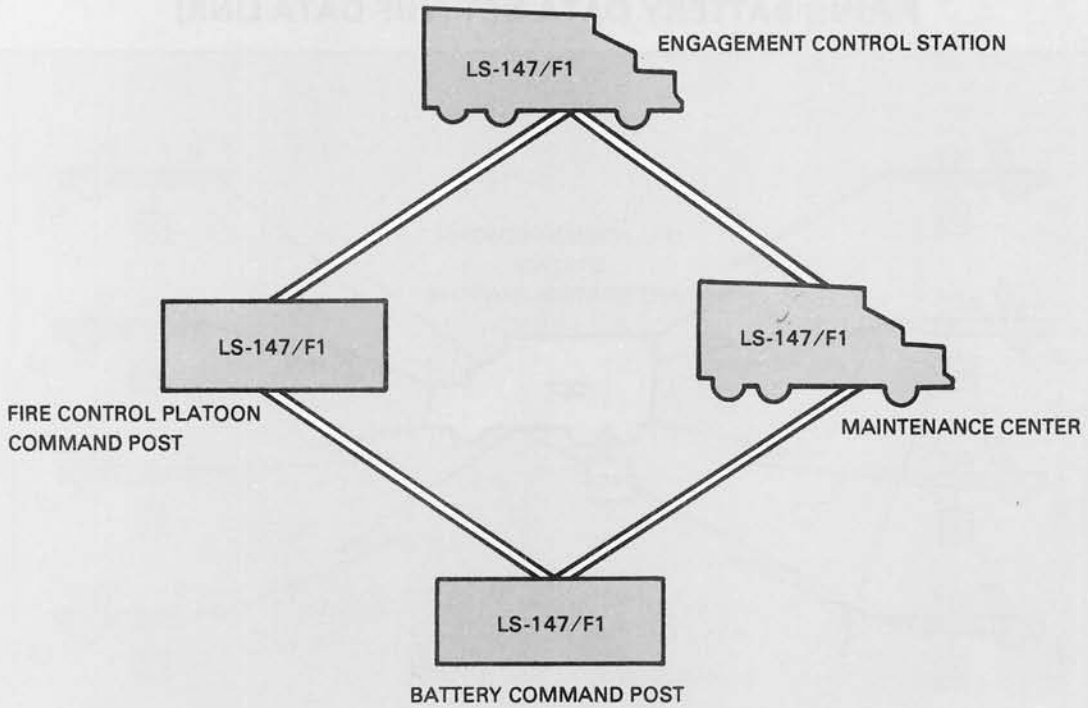
DATA LINK — DLT — DATA LINK TERMINAL

KG ELECTRONIC KEY GENERATOR — LS - LAUNCHING STATION

BATTERY INTERCOMMUNICATIONS NET

★ The engagement control station, maintenance center, fire control platoon command post, and battery command post are linked by wire (see battery intercommunications net illustration). This net allows for rapid communications between key elements of the firing battery. Time-sensitive air battle information can be passed using this net. Maintenance support can also be requested without leaving the engagement control station.

★ **BATTERY INTERCOMMUNICATIONS NET**



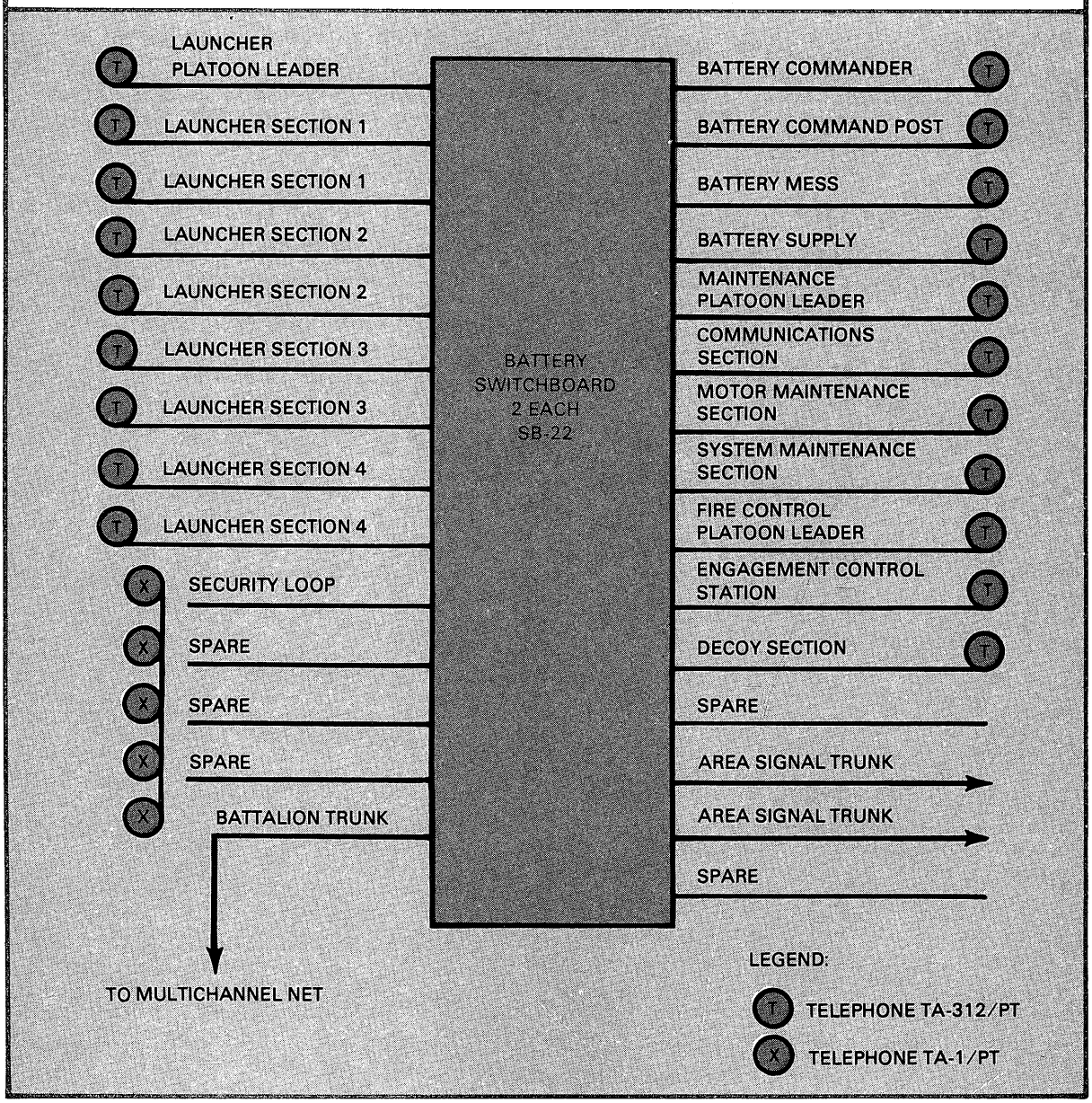
LEGEND:

═ WD-1 WIRE

BATTERY WIRE NET

★ The battery wire net is shown below. The battery wire net is the primary means of communications between elements of the battery. FM radios are used only during movement and until the wire net can be established. A minimum of one circuit to the battalion is available at the switchboard. Normally, the wire lines to the launching sections are run to ground defense positions. See chapter 8 for more details on ground defense.

★ **BATTERY WIRE NET**



CHAPTER 6

Operations

Effective employment of Patriot on the air-land battlefield, which maximizes its greatly improved ADA capabilities, requires sound detailed operational planning. Patriot commanders and operations officers require a thorough knowledge of the Patriot system and the tactics, procedures, and techniques for its employment. For optimum Patriot employment, they must be able to quickly and thoroughly analyze terrain, evaluate the threat, and understand the mission and tactical situation, using all the factors of mission, enemy, troops, terrain, and time (METT-T). Integral to Patriot operations are logistic and administrative planning factors as well as planning for other required support such as engineer assistance in positioning and siting. Extensive training and practiced application during exercises are necessary during peacetime in preparation for war.

Even with the addition of Patriot to the force, a shortage of ADA will continue to exist. ADA commanders must make the best possible operational use of the resources he has available. AD employment principles and ADA employment guidelines, as well as detailed planning guidance on Patriot employment, are discussed in this chapter.

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Section I — ADA MISSIONS AND FORCE ALLOCATION GUIDELINES

ADA TACTICAL MISSIONS AND RESPONSIBILITIES

This section describes the types of missions which can be assigned to a Patriot battalion. The ADA brigade commander selects the appropriate tactical mission for his subordinate battalions based on the mission he receives and on the tactical situation which confronts him. This section also describes how the supported commander's tactical operation may influence force allocation.

Specific responsibilities and command relationships between supported units and supporting ADA units are defined in the assignment of tactical missions. The assignment of a specific mission is inherent to command, and follows the command chain except in those situations where an ADA unit is placed in an operational command/operational control (OPCOM/OPCON) status. In that special situation, the commander exercising OPCOM/OPCON assigns the ADA unit its mission. There are three types of tactical missions which may be assigned to ADA units. These are—

1. ADA standard tactical missions.
2. ADA modified tactical missions.
3. Specific narrative missions.

It is important to note that there is no "normal" tactical mission for *any* ADA unit. Any tactical mission is possible and may be assigned to any ADA unit based upon the situation and the evaluation by the senior ADA commander.

ADA STANDARD TACTICAL MISSIONS

Standard tactical missions are those missions that apply to all types of ADA units, assign mutual responsibilities, and define specific command relationships between supported and supporting units as shown in the illustration on page 6-3. The "STANDARD" in standard tactical missions does not imply that these missions will always be assigned but rather that they are applicable to any type ADA unit. The use of standard tactical missions provides consistency in the rules and relationships between the ADA unit and the supported unit. However, assignment of one of these tactical missions does not negate ADA unit responsibility for its own administrative and logistical support. In some cases, certain logistical support may be provided by the supported unit to assist the ADA unit in accomplishing the mission. Such support depends upon the tactical situation and must be prearranged between the staffs of both units.

The four ADA standard tactical missions are—

1. *General support (GS).* An ADA unit with a GS mission provides support for the force as a whole. It is not committed to any specific element of the supported force.

2. *General support-reinforcing (GS-R).* An ADA unit with a GS-R mission provides support for the force as a whole and augments the coverage of another ADA unit. Additionally GS-R units are not committed to any specific element of the force.

3. *Reinforcing (R).* An ADA unit with a reinforcing mission augments the coverage of another ADA unit.

4. *Direct support (DS).* An ADA unit with a DS mission provides dedicated air defense for a specific element of the force that does not have assigned or attached ADA. The ADA unit is committed to that specific element of the force.

Standard tactical missions are not normally used below battalion level for Patriot units.

The specific command *relationship* and *responsibilities* formed by, and inherent to, the ADA standard tactical missions are shown in the ADA standard tactical missions illustration.

COMMAND RELATIONSHIPS AND RESPONSIBILITIES (ADA STANDARD TACTICAL MISSIONS)

	GENERAL SUPPORT	GENERAL SUPPORT-REINFORCING	REINFORCING	DIRECT SUPPORT
Who establishes AD priorities?	The supported commander.	(1) The supported commander. (2) The supported commander through the reinforced ADA commander.	The supported commander through the reinforced ADA commander.	The supported commander.
Who locates the Patriot battalion? [1]	The commander assigning the mission in coordination with the supported force ground commander.	The commander assigning the mission in coordination with the supported force ground commander.	The reinforced ADA commander in coordination with the supported force ground commander.	The DS ADA commander with approval of the local ground commander.
Who positions Patriot fire units? [2, 3]	Patriot battalion commander in coordination with the local ground commander.	Patriot battalion commanders in coordination with the reinforced ADA unit commander and the local ground commander.	Patriot battalion commanders with approval of the reinforced ADA unit commander and the local ground commander.	Patriot battalion commanders with approval of the local ground commander.
With whom to establish liaison?	As required by commander assigning GS mission.	As required, but including the reinforced ADA commander.	As required, but including the reinforced ADA commander.	Supported unit commander.
With whom to establish communications?	As required by commander assigning GS mission.	As required, but including the reinforced ADA unit.	As required, but including the reinforced ADA unit.	Supported unit.

NOTES:

1. The terms "locates/locating" specify the establishment of a broad operating area (commonly, a "goose egg"). Brigades identify battalion's area of operations.

2. The terms "positions/positioning" specify the selection of an exact point within the operating area. Battalions identify fire unit positions.

3. The terms "sites/siting" specify the placement of individual items of equipment on selected spots within the position and is the responsibility of Patriot battery commanders.

ADA MODIFIED TACTICAL MISSIONS AND SPECIFIC NARRATIVE MISSIONS

It is possible that none of the ADA standard tactical missions will apply in particular situations. In such cases, the ADA commander might issue a tactical mission with certain elements of the standard mission modified or deleted to form a modified tactical mission. Or he might avoid the use of a standard tactical mission altogether and issue a specific narrative tactical mission.

CLASSES AND TYPES OF AIR DEFENSE

Other considerations impacting on the allocation of ADA forces are the classes and types of air defense.

CLASSES OF AIR DEFENSE

Air defense is either active or passive.

Active air defense is direct action taken to destroy or reduce the effectiveness of enemy air operations. It includes the use of aircraft, surface-to-air weapon systems, ECM, and weapons other than ADA used in an air defense role. For further details about the use of small arms in air defense refer to FM 44-8.

Passive air defense includes all measures, other than active air defense, taken to minimize the effects of hostile air action. These include, but are not limited to, the use of cover, concealment, dispersion, movement, and emission control (EMCON).

TYPES OF AIR DEFENSE

Air defense artillery forces are allocated to provide two types of air defense—area defense and point defense. The type of air defense selected by the ADA commander to accomplish the mission is based on providing the greatest degree of protection to the supported commander's priorities within the constraints of available forces and the relative priority of each asset or area.

Area defense is designed for the defense of a broad area. Airborne AD resources have primary responsibility for providing area air defenses because of their flexibility, range, mobility, and reusability. In an area defense, no particular asset(s) receives priority of defense. A belt defense is a specialized application of an area air defense where HIMAD units are deployed in a linear configuration to provide for early attrition of the enemy as he attempts to penetrate to rear areas. This type of defense may be necessary to provide the best coverage of the force commander's priorities. No particular asset(s) receives priority of defense in a belt defense. However, fire units can normally be positioned within a belt to provide the best possible coverage of the ground commander's priorities while maintaining the belt defense. With limited ADA resources, spreading fire units in a thin line inhibits the ability to mass ADA fires. Belt defenses also are vulnerable at the flanks to fly-around tactics. Patriot battalions may be deployed in area or belt defenses.

Point defense is designed for the protection of a limited area, normally in the defense of the vital elements of a force or the vital installations of the rear area. A point defense is characterized by priority of defense being given to specific assets. These assets can either be mobile or static, and they can be either organizations or installations. Even though the ADA weapons involved in a point defense may provide air defense coverage over a wide geographical area, the term "area defense" does not apply because, in a point defense, specific assets are defended in priority. Patriot battalions may be deployed in point defenses.

AIR DEFENSE ARTILLERY SYSTEMS

An additional consideration for the proper employment of ADA forces is the type of ADA system that is to be employed in the defense. SHORAD systems are usually allocated to provide point defense of maneuver elements and other high value assets in both forward and rear areas. SHORAD systems include short-range air defense gun and missile systems, to include man-portable air defense missile systems. SHORAD units may be assigned or attached to corps and ADA brigades. In addition, each division has an organic SHORAD battalion, each armored cavalry regiment has an organic SHORAD battery, and each separate brigade has an organic Stinger platoon. HIMAD systems are deployed throughout the area of operations. Their employment is based on the needs of the force commander to which they are assigned or attached. This normally

results in HIMAD employment in both area and point defenses. For point defenses, priorities may include specified organizations, critical facilities, or installations.

FUNDAMENTAL CONSIDERATIONS WHEN ORGANIZING FOR COMBAT

To provide sound air defense guidance to the supported commander and his own subordinate commanders, the ADA commander must understand the fundamentals of offense, defense, and retrograde operations as they relate to ADA force allocation. Regardless of the type of operation, ADA assets are *never* held in reserve.

ADA IN OFFENSIVE OPERATIONS

While air defense artillery will normally defend a variety of assets in any offensive operation, the top priority for air defense will most frequently be given to the attacking maneuver elements designated as the main effort. When a maneuver brigade is designated as an AD priority by the division commander, it should be supported by at least a battery-size SHORAD unit. As a general rule, a composite task force of ADA gun and missile systems will be required for effective protection. When a division is designated as an AD priority by the corps commander, it should be supported by at least one Patriot battalion. The Patriot battalion would still participate in the integrated theater air defense but would be positioned to afford increased protection to the division. Offensive operations on the modern battlefield will be extremely fluid. ADA elements can expect to support operations characterized by rapid transitions from defense, to the offense, to exploitation. Additionally, simultaneous deep strike operations and rear area battles will be conducted. Frequent, rapid changes in direction and location of the main effort and night combat must be anticipated. Each of these situations must be considered from the outset of the operation in determining the composition and employment of the supporting ADA force.

ADA IN DEFENSIVE OPERATIONS

The immediate purpose of any defense is to cause an enemy attack to fail; however, an underlying purpose of all defensive operations is to create the opportunity to initiate offensive operations. All activities of the defense, to include air defense, must contribute to that end. Corps, divisions, and sister services will organize and fight a synchronized defensive battle within a framework that consists of the following five elements:

1. A deep battle operation in the area of influence to create windows of opportunity for decisive action against leading enemy echelons.

2. A covering force operation to support the main effort by providing forward security.

3. A main effort in the main battle area where forces are positioned to conduct the decisive defensive battle.

4. Rear area combat operations to defend vital rear area assets such as lines of communications, support areas, command and control facilities, and long-range fire support units.

5. Reserve operations in the main battle area or in the covering force area to support the main effort.

There is no single technique for defense prescribed by Army doctrine; therefore, ADA forces are allocated to support any of several combinations of static and dynamic defenses. In its static forms, the defense is oriented on the retention of terrain through the use of firepower from fixed positions. For the defense

to succeed, these fixed positions require protection from air attack.

The dynamic forms of the defense focus primarily on the enemy and depend upon maneuver and firepower to destroy the enemy force. In this technique, the maneuver units will usually be established as priority assets for air defense. Corps, divisions, brigades, and battalions will normally combine static and dynamic forms in developing and executing defensive operations. Supporting ADA commanders must then allocate ADA resources to maneuver elements, fixed firepower positions, reserve forces, command and control facilities, and logistical elements in priority as determined by the supported commander.

RETROGRADE OPERATIONS

A retrograde operation is an organized movement to the rear or away from the enemy. FM 100-5 discusses the three types of retrograde operations:

1. delay,
2. withdrawal and,
3. retirement.

Each type of retrograde operation is characterized by difficulty of execution and risk.

Delay

A delay operation is conducted when there are insufficient forces to attack or defend, or when the defensive plan requires drawing the attacker into a vulnerable position. Delay operations are conducted by withdrawing to successive battle positions each time the enemy deploys for attack, thereby gaining time for reestablishment of the defense. In a delay, air defense artillery resources are frequently allocated to protect elements of the reserve, command posts, forward arming and refueling points, and maneuver choke points, such as bridges and defiles. These assets will be listed as AD priorities in the supported force operations order as determined by the commander.

Withdrawal

In the withdrawal, friendly forces voluntarily disengage from the enemy so that all or a part of their force may be repositioned by the commander. Withdrawal operations depend heavily on deception and security in execution and may be conducted in periods of darkness and limited visibility. Air defense artillery forces will usually be allocated to protect the same type assets as in the delay with special priority given to command and control facilities and reserves: assets which are vital to the execution of a successful withdrawal.

Retirement

A retirement is an administrative movement to the rear by a force that is not in contact with the enemy. The allocation of air defense forces in a retirement depends on the specific tactical situation dictating the operation. The leanness of air defense assets on the modern battlefield will frequently limit the amount of air defense provided for administrative movements.

Section II — DESIGNATION OF PRIORITIES AND DEFENSE PLANNING

DEVELOPMENT OF AIR DEFENSE PRIORITIES

Before any air defense artillery is used on the battlefield, air defense priorities must be established. To assist commanders in this task a step-by-step decision-making process has been developed. When this process is followed by the supported commander in close

coordination with the air defense artillery commander, the degree of support afforded by air defense artillery resources can be optimized. The product of the decision-making process is a prioritized list of selected force assets to be defended by the supporting ADA commander. Development of AD priorities is the basis for planning effective air defenses to meet the needs of the supported commander within the constraint caused by the limited number of available ADA resources.

The first step of the decision-making process is conducted by the supported commander during his estimate of the situation. As he generates courses of action and evaluates his assets, he determines which of these assets require ADA protection. This determination is made by evaluating each asset.

CRITICALITY

Criticality is the degree to which the asset is *essential to mission accomplishment.* Assets are categorized in priority as those which, if damaged—

- Are *capable of preventing* the execution of the plan of action.
- Will cause *immediate and serious interference* with the execution of the plan of action.
- Can *ultimately cause serious interference* with the execution of the plan of action.
- Might cause *limited interference* with the execution of the plan of action.

VULNERABILITY

Vulnerability is the degree to which the asset can survive on the battlefield. Consideration should be given to the asset's hardness, its specific mission in the overall operation, the degree to which the asset can disperse or displace to another position, the degree to which it can provide its own air defense, the amount of engineer mobility and survivability support available, and the amount of protection afforded by passive air defense measures.

RECUPERABILITY

Recuperability is the degree to which the asset can recover from inflicted damage in terms of time, equipment, and available manpower to again perform its mission.

THREAT

The probability of an asset being targeted for attack by enemy air must be assessed if economical allocation of ADA resources is to be achieved. Targeting information provided by intelligence estimates, past enemy attack methods, and enemy doctrine are all useful in determining which assets require active air defense protection.

IMPACT OF AIRLAND BATTLE

The nature of combat in the air-land battle requires commanders to expand the scope of consideration in determining the need for providing air defense protection to any asset. Formerly, combat efforts focused on winning the fight only in the main battle area. The extension of the battlefield in depth, time, and resources, to include a deep battle, close-in battle, and rear area protection, forces commanders to redefine priorities for air defense to include all three battles. Assets that were formerly seen as most vital to main battle operations may not be so vital to the deep battle or to the rear area battle. Conversely, commanders must now consider certain type assets that were formerly not so vital to main battle operations as being high priority assets for the deep attack and for rear area protection.

In determining the need for providing active air defense protection to any asset, commanders should consider certain characteristics which make that asset a lucrative threat target. Since both sides recognize the relationship of winning the deep attack to the outcome of conflict, the enemy's targeting strategies emphasize the early destruction of those assets which contribute the most to deep attack. Some characteristics of deep

attack assets which provide the means for the commander to measure the need for air defense protection include the—

- Contribution the asset makes to the execution and cohesion of the defense or to the momentum of attacking units in the offense.
- Location on the battlefield where the asset makes its greatest contribution to the integrity of the second echelon forces as they prepare to join the battle.
- Effect at the FLOT resulting from destruction of the asset at its present location.
- Threat which the asset poses to enemy air operations which are vital to their deep attack capability.
- Effect on the ground operations that the Threat force desires to achieve by destroying the asset.
- Probability that the asset has been targeted by threat aircraft.

Based on these considerations, there may be times when close-combat elements will use self-defense and passive air defense measures while assets such as corps artillery units, Army aviation forward assets, division artillery, and critical nuclear delivery units will be given priority for active air defense protection. Intelligence acquisition assets, command and control facilities, and specific weapon systems which are vital to deep attack must be given careful consideration by the commander establishing air defense priorities. Failure to do so may result in the degradation of our forces' ability to conduct deep attacks. In the projected scenario of the air-land battle, this is tantamount to defeat.

THE PHASES OF DEFENSE PLANNING

One of the major challenges faced by commanders is the *proper* use of the limited number of air defense resources for the defense of critical forces and assets in the air-land battle. Air defense of the air-land battlefield must be properly planned so as to achieve a balance between defense effectiveness and economy of force. Two factors which impact directly on this problem are the inability of existing ADA resources to provide adequate air defense protection to all the vital assets and the lack of adequate defense planning frequently provided to those defenses. Recently, concepts such as habitual association and the simplistic application of ADA employment guidelines and principles to the exclusion of other factors have reduced defense planning to an unreliable, mechanical process. Such types of mental templating are doctrinally unsound. Proper defense planning is a command responsibility which begins with the establishment of air defense priorities and follows a sequential process of four phases:

1. Analysis phase.
2. Defense design phase.
3. Evaluation phase.
4. Implementation phase.

It is important to note that *defense design* which considers employment guidelines and principles is only one phase of the *defense planning* process and must be preceded by a formal or informal analysis. It is not the purpose of doctrine to dictate specific defenses for specific type assets—these will vary with the changing factors of each tactical situation. However, this section provides commanders with the basic framework from which to conduct effective defense planning in any tactical situation.

ANALYSIS PHASE

Following the establishment of air defense priorities, the Patriot commander begins the sequential process of planning the air defenses to protect those assets. Each air defense must be planned to fit the present and projected tactical situation. Prior to initiating any operation on the battlefield, the Patriot commander must conduct an estimate of the situation in which the factors of

METT-T are considered. The product of this analysis phase is a recommended initial allocation of Patriot units to defend the prioritized assets of the supported force commander. This initial allocation is refined throughout the other phases of defense planning. The allocation function is a brigade and AADCOM responsibility.

Mission

Mission analysis must consider the intent of the supported operation, essential specified and implied tasks to be performed, the degree of risk acceptable to the Patriot unit, constraints or limitations imposed on Patriot fires, probable follow-on operations, and the number and type of assets prioritized by the supported force commander. The Patriot commander analyzes the mission to determine the most effective allocation of air defense artillery resources to support the overall operation.

Enemy

An analysis of the enemy forces likely to be encountered is also critical to planning an effective air defense. Because of the wide variety of options normally available to threat forces for the air attack of friendly assets as compared to the Patriot units available to defend them, air defense planners must plan the defense of a prioritized asset to counter the *most likely* threat against that target. In the past, a worst case threat had been used. This normally resulted in an inefficient allocation of ADA resources. Factors that must be considered are the type aircraft most likely to be used against the asset, most probable avenue of approach, Threat attack tactics, probable ordnance, and likely ordnance release points. The availability of such intelligence permits the planning of a specific air defense for each defended asset designed to counter the most likely air threat. Such threat analysis is critical to the proper and economical allocation of Patriot units.

Terrain

An analysis of terrain is also critical in this initial defense planning phase. All aspects of the topography of the battlefield must be considered: trafficability, relief, vegetation, obtacles. Key terrain, terrain which is mission dependent and which would give either side an advantage if seized or held, must be identified. Dominant terrain surrounding the assets to be defended which provides identification points for the enemy to fix the target can be considered key terrain. It is particularly critical for Patriot units operating in division areas to analyze terrain and identify low-altitude avenues of approach into the divisional rear areas. In situations where specific low-altitude avenues of approach are identified, the Patriot commander may choose to concentrate his unit's coverage on that avenue of approach. Additionally, terrain must be analyzed to identify both friendly and enemy observations and fields of fire. For example, high ground that affords protection as well as line-of-site observation is critical to the positioning of the Patriot firing batteries. Further, considerations must be given to cover and concealment provided by terrain, the impact of weather on terrain, the impact of terrain on communications, and the degree of visibility afforded by terrain. Assets capable of dispersing and blending into the terrain to take advantage of natural concealment may require less active air defense protection permitting a greater allocation of Patriot resources to assets without effective passive air defense means. Engineer topographic units provide terrain data and maps directly to operational elements of the maneuver, weapons, and support systems. Topographic units provide expedient topographic products to meet the specialized needs of command, maneuver, weapons, and support systems. Topographic units can also provide a survey control network to insure weapon systems have accurate azimuth and siting data for effective target engagements.

Troops

This phase in the initial phase of planning is an evaluation of troops available. For the Patriot commander, this is a *total* assessment of his combat power; it involves consideration of such diverse factors as personnel strength, disposition of equipment, state of training, maintenance and supply readiness, adequacy of combat support and combat service support, troop morale, and the quality of his subordinate leaders.

Time

Time is needed to conduct reconnaissance, movement, and logistic support. Time is needed to war-game various courses of action. Some courses of action may be eliminated from consideration because they cannot be executed within the time constraints of the mission.

The commander considers the factors of METT-T, weighs them against the list of AD priorities, and develops an initial allocation of ADA resources to defend those priorities. Beginning with the highest priority asset, he decides how many of each type ADA resource to allocate to the air defense of each asset. Because the Patriot battalion fights as a single unit, the list of assets is reviewed to determine how many assets can be adequately defended. The list of AD priorities and the ADA resources recommended to protect them are presented to the supported force commander for approval. The force commander may approve these recommendations, reduce the list to increase the air defense protection for selected assets, or expand the list to increase the number of assets afforded ADA coverage. He must understand, however, expansion will reduce the effectiveness of the overall defense. It is in this phase of the process that the Patriot commander plays a critical role. As the air defense staff officer, he must provide the supported commander with the advice which can make the difference between adequate and inadequate air defense protection. Finally, those assets approved for active air defense coverage by the supported force commander are listed in the ADA annex of the operations order as air defense priorities.

DEFENSE DESIGN PHASE

After the decision has been made concerning the number and type of ADA resources to be allocated to each priority, the ADA commander begins the second phase of the defense planning process—defense design. Patriot defense design is the process of considering *AD employment principles, ADA employment guidelines,* and *Patriot defense design requirements* in conjunction with the weapon system capabilities to determine the position of specific fire units in the defense of each AD priority. ADA commanders at all levels must design defenses to accomplish the air defense mission for the specific tactical situation. Principles, guidelines, and requirements are provided to ADA commanders to *assist* in increasing the effectiveness of air defenses and enhancing ADA survivability. However, defenses are not designed simply to meet principles, guidelines, or requirements. Providing mass, mix, mobility, and integration in an air defense is pointless if Threat aircraft are permitted to release ordnance and destroy the defended asset prior to being destroyed. The focus for any defense must be the *protection* of the defended asset or area. Principles, guidelines, and requirements must be applied to defense design with this in mind. FM 44-1A provides classified data on system capabilities and planning data. It should be referred to frequently when designing defenses.

AD Employment Principles

Four AD employment principles provide the doctrinal basis for ADA defense design and underlie the effective employment of air defense weapons on the battlefield. The balanced application of these principles to fit the needs of the tactical situation can enhance the effectiveness of the air defense and increase the survivability of ADA. These principles are *mass, mix, mobility,* and *integration.*

Mass is the concentration of combat power. It is achieved through the allocation of a sufficient number of fire units to the defense of priority assets or areas to adequately defend them against the air threat. Mass can normally be achieved by deploying Patriot in battalion strength for a point defense, or an area defense 60 x 60 kilometers. Failure to adhere to the principle of mass risks being defeated in detail by the air threat and destruction of the defended assets.

The mixing of complementary weapon systems goes hand-in-hand with the pinciple of mass. By employing a variety of systems

in sufficient mass, AD complicates the problem of the attacker. He must consider the different characteristics of each weapon system in the formulation and execution of his offensive strategy. Patriot defenses should be mixed with Hawk and SHORAD in composite defenses.

To apply the principles of mass and mix in the dynamic environment of the air-land battlefield, air defense systems must be mobile. Frequent changes in unit positions will be required to defeat the enemy's reconnaissance cycle, thereby enhancing the survivability of Patriot units during suppression attacks. Patriot units in the tactical operations area should move at least twice daily because of the extreme ground and air suppression threat. The Patriot ICC and Patriot units in the rear operations area may move less frequently, but should move at least once daily for survivability. No more than two fire units or one fire unit and the ICC should be moving at any one time.

Integration is the close coordination of effort and unity of action which maximizes the operational effectiveness of an ADA defense while minimizing mutual interference among operating forces. ADA weapons must be fully integrated into the force commander's scheme of maneuver and into the battle for air superiority as well. Effective command and control procedures are implemented through liaison elements and communications links with higher and adjacent headquarters. Integration must also be thought of in terms of defense design, roles, and missions of all participating ADA units.

ADA Employment Guidelines

In conjunction with the AD employment principles, the six ADA employment guidelines are the desirable characteristics of an "ideal" air defense. They are provided as aids to Patriot commanders for positioning individual fire units when designing a specific defense. The commander incorporates a mix of these employment guidelines in his defense planning according to the tactical situation and the availability of AD assets. Applying all of the guidelines in all tactical situations is seldom possible. The size and shape of the asset, the number of fire units available, the adequacy of terrain for coverage and emplacement, and numerous other tactical considerations limit the commander's ability to satisfy all requirements equally. Unfortunately, defenses have often been designed which focus more upon meeting guidelines than upon providing adequate air defense coverage. Such is the case when a SHORAD defense of a critical asset is designed to optimize balance and mutual support with the net result that fire units are emplaced too close to the asset to provide protection from realistic ordnance delivery methods.

In the fluid, dynamic, high-intensity operations expected in future battles, rigidity, lack of originality, and lack of initiative can contribute to defeat. There can be no substitute for the exercise of common sense, flexibility, and initiative to insure that Patriot units successfully accomplish the mission to support the ground operation.

The ADA employment guidelines are as follows:

- Balanced fires.
- Weighted coverage.
- Early engagement.
- Defense in depth.
- Mutual support.
- Overlapping fires.

Balanced Fires. Units are positioned and oriented to provide approximately equal firepower in all directions. This guideline will be difficult to accomplish with less than a full Patriot battalion while still meeting other necessary employment guidelines. Balanced fires are employed to counter an omnidirectional threat.

Weighted Coverage. Units are positioned and oriented so that their combined firepower is concentrated towards the most likely air avenues of approach. Weighted coverage is employed when probable enemy attack

routes can be identified (due to terrain) or when insufficient assets are available to provide balanced fires.

Early Engagement. Units are positioned and oriented so that they are capable of engaging aircraft prior to ordnance release. The expected altitude of the threat will influence how far Patriot units are deployed from an asset or area boundary to achieve early engagement.

Defense in Depth. Defense in depth is that quality of defense which results from positioning mutually supporting fire units to absorb and progressively weaken the attack. Defense in depth subjects the attacking aircraft to an ever increasing volume of fire as it nears the defended asset. It is achieved by deploying ADA forces in mutually supporting echelons and adherence to all other employment guidelines. Defense in depth is maximized through the integration and coordination of all air defense weapons used in the defense. Defense in depth will also significantly reduce the effects of aircraft maneuvers on the ability of fire units to engage.

Mutual Support. Units are positioned and oriented so that one Patriot battery can fire into the dead zone of an adjacent Patriot battery. Mutual support may be provided by or for other ADA units. Mutual support affords a greater degree of survivability to the defense. The distance between batteries to achieve mutual support varies depending on speed and altitude of the threat and Patriot radar coverage. For planning purposes, 20 kilometers between Patriot firing batteries can be used.

Overlapping Fires. Units are positioned and oriented so that their engagement zones overlap. In many instances, because of terrain limitations, the size of the area to be defended or a scarcity of available weapon systems, it may not be possible to achieve mutual support. In that case the defense planner should plan for overlapping fires. In Patriot, overlapping fires are also necessary for triangulation, an ECCM feature.

Defense Design Requirements

The third set of factors the Patriot commander must consider in his defense design is the specific *defense design requirements.* These factors are based on a consideration of the factors of METT-T in conjunction with the specific weapon system characteristics. Defense design requirements are as follows:

- Supported force scheme of maneuver.
- Supported force AD priorities.
- Threat.
- Tactical and technical requirements.
- Terrain and weather considerations.
- Allocation of available fire units.

Supported Force Scheme of Maneuver. Supported force scheme of maneuver is the tactical plan to be executed by the supported force to seize assigned objectives.

Supported Force AD Priorities. Supported force AD priorities are those selected force assets which must be defended in priority by the supporting ADA unit. Development of these priorities is contained in section II.

Threat. Threat includes those characteristics of the enemy which are used to determine the appropriate ADA systems to defend the specific asset, and which are used by the selected ADA force to design the most effective defense for that asset. These include enemy location and strength, type of enemy aircraft and ordnance (including the capabilities and limitations thereof), past enemy attack characteristics, and enemy doctrine.

Tactical and Technical Requirements. Tactical and technical requirements of the defending ADA system are those capabilities and limitations peculiar to individual ADA systems and which impact on defense design. These will vary from weapon to weapon, but can include area requirements for emplacement, terrain slope and firmness requirements, line-of-site requirements, range and firepower limitations, and fire unit signature (electronics, visual, and smoke).

Terrain and Weather Considerations. Terrain and weather considerations are those factors of terrain and weather which impact both upon the threat and the effectiveness of the defending ADA system, and which thereby influence defense design. Again, these will vary from weapon to weapon but can include night and all-weather engagement capabilities, terrain which causes masking, ease of position access, cover and concealment afforded, and effects of inclement weather on terrain and Patriot system effectiveness. FM 44-1A shows performance in a rain environment.

Allocation of Available Fire Units. Allocation of available fire units refers to those considerations which determine how those ADA assets available are allocated for the defense. These include use of all ADA assets (ADA is never held in reserve), the operational status of available fire units and of individual items of fire unit equipment, and organization for combat.

EVALUATION PHASE

Regardless of the tactical situation or the type of ADA weapon systems involved in the defense, the commander who conducts the analysis and defense design phases will always have more than one alternative for providing ADA support. It is his responsibility to evaluate the alternatives to select the plan that provides the most effective, flexible air defense possible to the supported commander. This does not imply that any single plan will provide the degree of support desired by the force commander, or that it can adequately protect each of the designated AD priorities. Each alternative plan, however, must be evaluated against the criteria of the ADA mission—the degree with which a defense reduces or nullifies the effectiveness of attack or surveillance by hostile aircraft or missiles after they are airborne—and the best plan selected.

The evaluation of alternatives must consider the degree of air defense provided by each defense against the expected threat. This is best accomplished by preparing a detailed firepower analysis for each alternative defense design, based on the capabilities of each weapon system as detailed in FM 44-1A, and comparing these design characteristics against the projected threat ordnance release lines. Firepower template construction is also shown in FM 44-1A.

When the detailed defense design evaluation is not feasible due to time limitations or tactical constraints, the judgement and expertise of the commander and his staff must be relied on in the final analysis.

IMPLEMENTATION PHASE

Following the evaluation of alternatives, the commander decides on the specific defense that will be provided to the AD priority or priorities. The ADA commander, regardless of level, is responsible for briefing the supported commander on the capabilities and limitations of the selected defense. Should additional resources be required, the requirement should be identified and appropriate requests forwarded to the next higher commander.

Following this coordination, the ADA commander prepares essential operations plans and annexes to plans and disseminates this information to his subordinates. Each subordinate, in turn, follows the eight troop-leading steps to respond to the requirements of the commander issuing the operations order. These steps (modified as necessary to fit the level of command and the tactical situation) are as follows:

- Receive the mission.
- Issue the warning order.
- Make a tentative plan to accomplish the mission.
- Initiate the necessary movement sequence.
- Reconnoiter.
- Complete the plan.
- Issue orders.
- Supervise and refine.

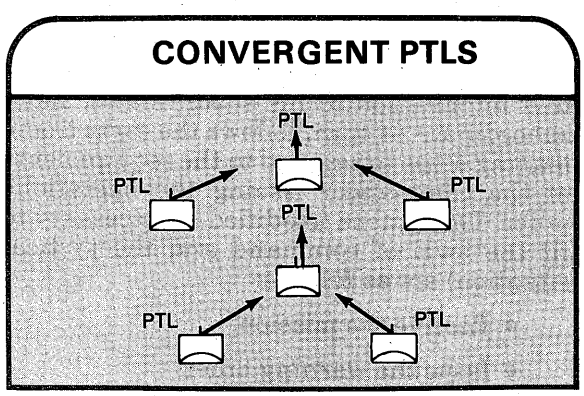
This process is simply a more detailed and specific application of the procedure which resulted in the establishment of AD priorities and established the initial allocation of ADA resources in the defense.

Section III — PATRIOT EMPLOYMENT

FIRING BATTERY EMPLOYMENT

Because Patriot is a sector system, the orientation of the firing batteries takes on additional importance. Conceptually, the firing batteries can be oriented so that their PTLs are parallel, convergent, or divergent.

Effective Patriot defenses can be designed by using the tactic of convergent PTL orientation which is shown in the convergent PTLs illustration. Using this tactic, the primary target line of each Patriot firing battery converges on the primary target line of one or more other Patriot firing batteries within the defense. Ideally, the primary target line of each unit will converge on that of all other units in the defense. The exact orientation of the battery PTLs depends on the tactical situation.



This tactic maximizes mutual support, overlapping fires, and defense in depth. It does so by sacrificing some of the additional area coverage which could be gained by parallel or divergent PTL orientation. However, the coverage provided by employing this tactic can be sustained longer because it is less sensitive to loss of units than the larger area coverage which can be obtained by using parallel or divergent PTL orientation. This latter, less dense coverage collapses rapidly as Patriot units are destroyed or otherwise are not available. More importantly, with convergent PTLs, the area or point defense is much more effective against raids using escort or self-screening jammer aircraft. The use of these ECM tactics increases the need for multiple unit coverage. Balanced fires, weighted coverage, and early engagement depend on the degree of convergence and positioning.

Positioning, specifically separation distance between batteries, proximity to the FLOT, and distance from an asset, is addressed in the following three major paragraphs. The illustrations on pages 6-15 through 6-30 depict a full, six firing battery battalion. Battalions with less than six operational batteries should modify these defense designs to maximize the effectiveness of available fire units. Commanders should vary their use of the planning factors rather than consistently using a standard deployment.

AREA DEFENSES

Typically, Patriot battalions establish area defenses in the tactical operations area. Against phase-one type attacks, the purpose of the area defense is to counter enemy attempts to penetrate to the rear operations area to attack deep strike assets. This equates to a belt defense as deployed in NATO. Against phase-two type attacks, the purpose of the area defense changes to protection of the front-line divisions.

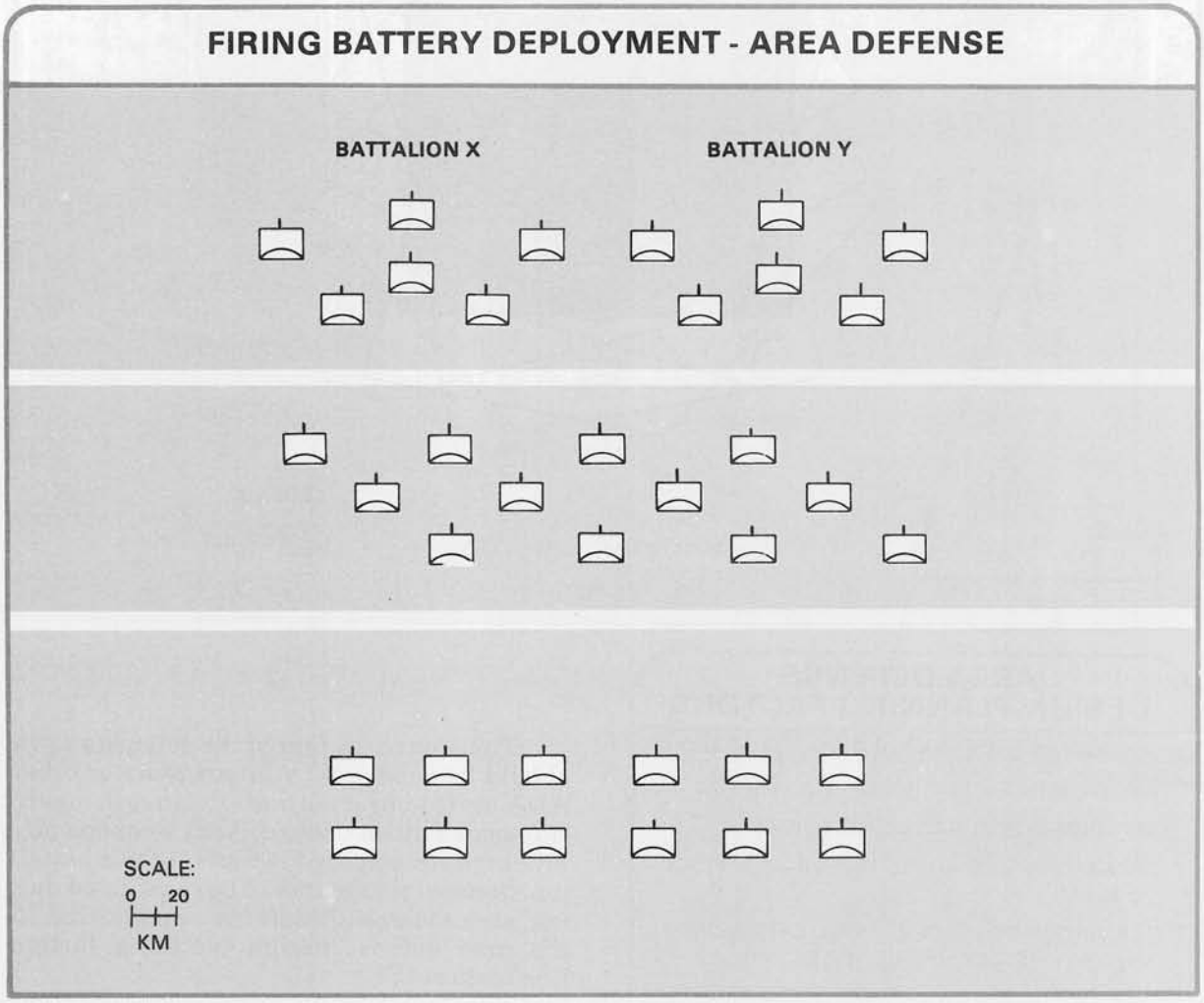
The best multibattalion area defense is one which provides contiguous all-altitude area coverage laterally and in depth throughout the area to be defended. However, the defended area must be sufficiently limited or

there will not be enough Patriot assets to provide such coverage. At times, especially under conditions of reconstitution, even contiguous, lateral area coverage may not be possible. In this case, an area can still be protected by weighting Patriot coverage in limited sectors but not providing contiguous battalion to battalion coverage. Such a defense is analogous to a division conducting defensive operations within an assigned sector. The force is deployed based on the factors of METT-T. Battalions are concentrated on avenues of approach. In the analogous air defense case, the keys to success will be concentrating Patriot coverage on very low- to low-altitude air avenues of approach and deceiving the enemy about the Patriot deployment.

EMPLOYMENT GUIDELINES

Battalions deployed in area or belt defenses should always position their firing batteries to achieve overlapping fires, defense in depth, and weighted coverage. Early engagement and mutual support are also desirable characteristics of an area or belt defense. The following illustration shows various positioning schemes which will achieve all five of the above ADA employment guidelines when combined with the convergent PTL orientation tactic. FM 44-1A explains in greater detail the effect of separation distance on effectiveness of the defense.

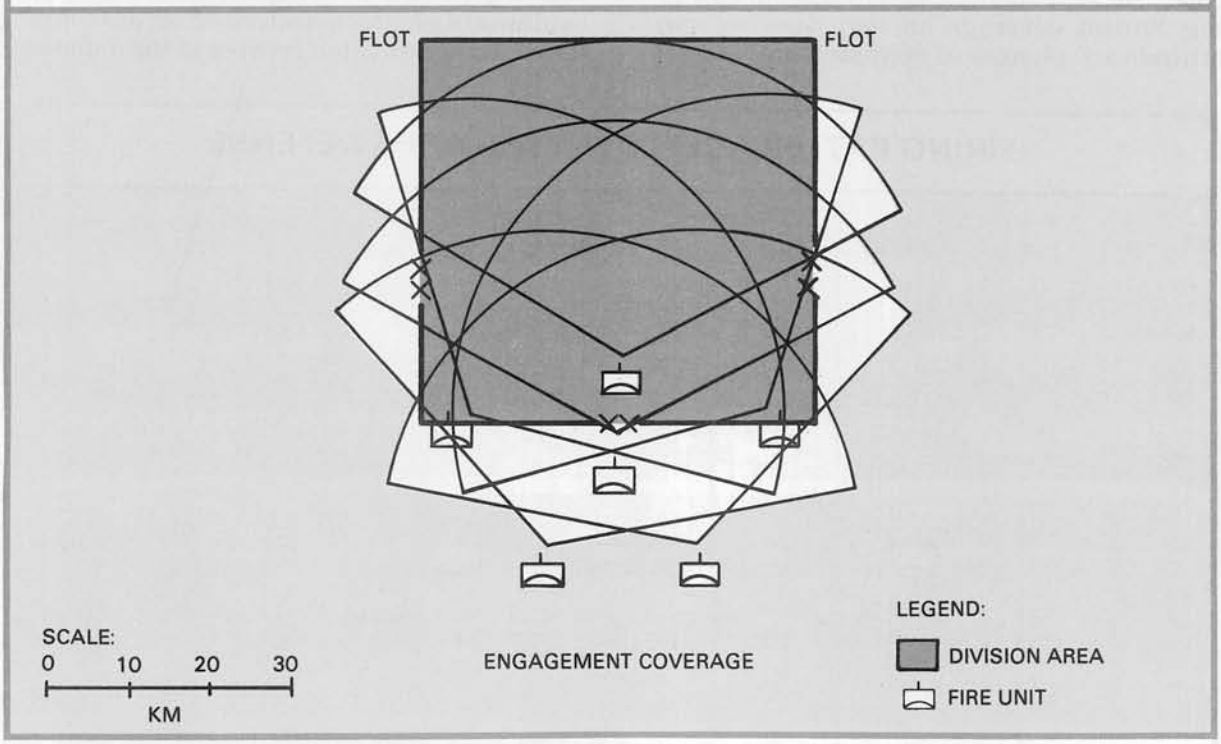
FIRING BATTERY DEPLOYMENT - AREA DEFENSE



AREA COVERAGE

The forward area defense engagement coverage illustration shows a type of firing battery deployment. This also shows the coverage over the defended area. The case illustrates coverage over a typical division-size area and is typical of the belt defense in NATO. This defense design deploys five of six firing batteries of the battalion in a five-pointed perimeter formation, looking much like a pentagon. Three of the five batteries are positioned forward (in the direction of expected attack) to provide early engagement and weighted coverage, while the other two are positioned further back to provide defense in depth. Density of firepower is increased by deploying the sixth fire unit in the center of the formation. The tactic of convergent PTL orientation has been applied.

FORWARD AREA DEFENSE ENGAGEMENT COVERAGE



AREA DEFENSE DESIGN PLANNING FACTORS

MAXIMUM SURVEILLANCE RANGE - SEE FM 44-1A

MAXIMUM INTERCEPT RANGE - SEE FM 44-1A

DISTANCE BEHIND FLOT - 40 TO 60 KM

SEPARATION DISTANCE BETWEEN BATTERIES - 20 TO 30 KM

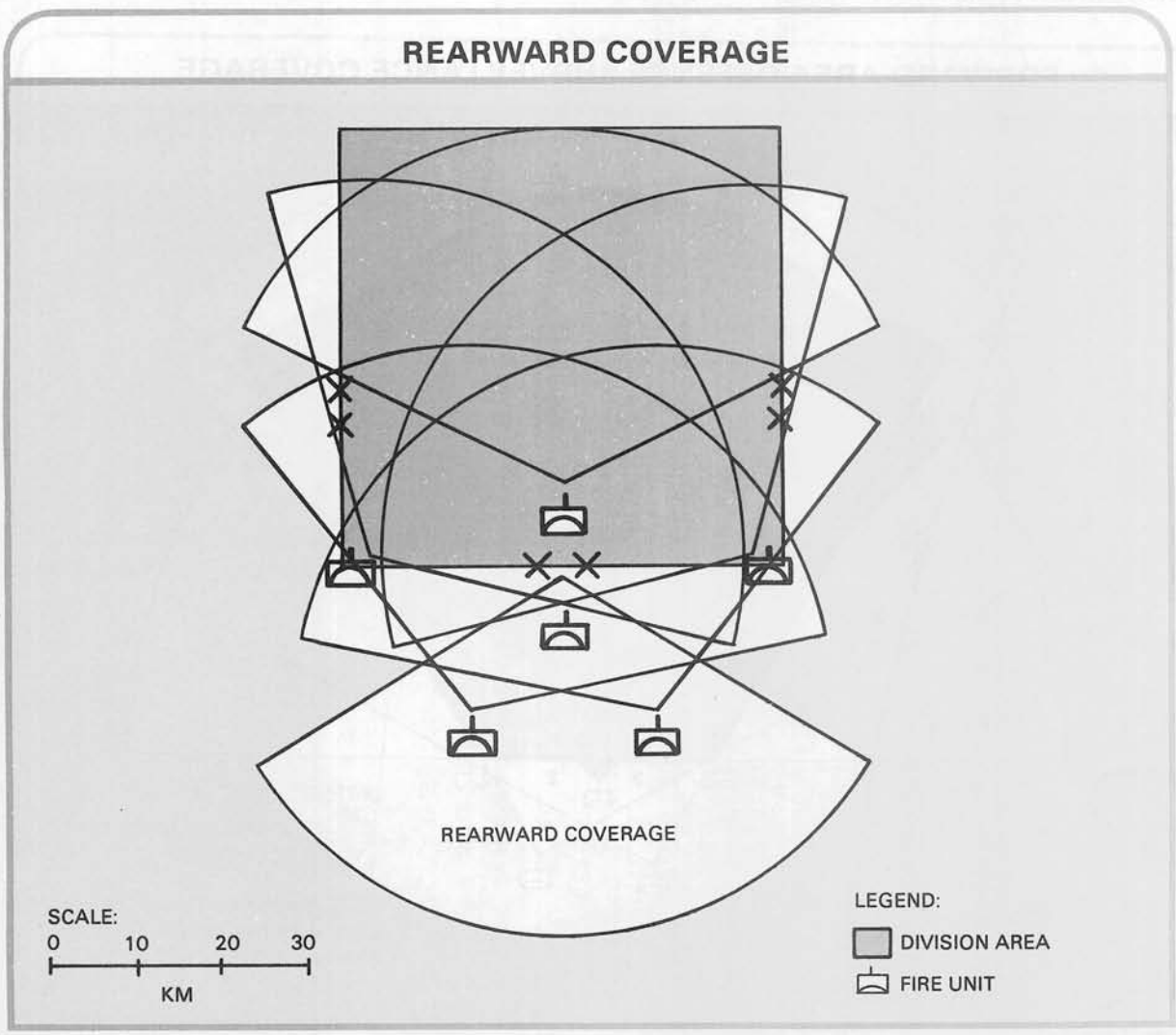
SEPARATION DISTANCE BETWEEN BATTALIONS - 40 TO 50 KMS (CENTERS OF MASS)

The area to the rear of the defense shown should be defended by interceptors or other ADA units to provide more defense in depth. Adjacent Patriot or other ADA weapons provide area coverage to the flanks of this battalion. Some of the factors to be considered during area defense design are summarized in the area defense design planning factors illustration.

PTL SELECTION

Variations in coverage can be easily achieved by shifting primary target lines or assigning secondary target lines for contingencies. For example, the coverage of a leftmost or rightmost unit in a belt defense might be weighted in the direction of an exposed flank. Terrain will often dictate the selection of PTLs. Radar coverage should be optimized for the battalion as a whole rather than for each fire unit. If there is little air defense protection behind the battalion, weighted coverage can still be maintained forward, but one unit might be assigned a target line to protect against attack from the rear (see the rearword coverage illustration). As suggested by this variation, the deployment pattern of five around one easily accommodates a tactic which calls for the center unit to provide supporting fires in virtually any direction. The S3 might consider reallocation of a number of LSs from perimeter units to the center unit. The center unit with additional LSs can position them so that additional firepower can be delivered more rapidly into any sector simply by reorienting the center unit's radar set and launching stations.

REARWARD COVERAGE

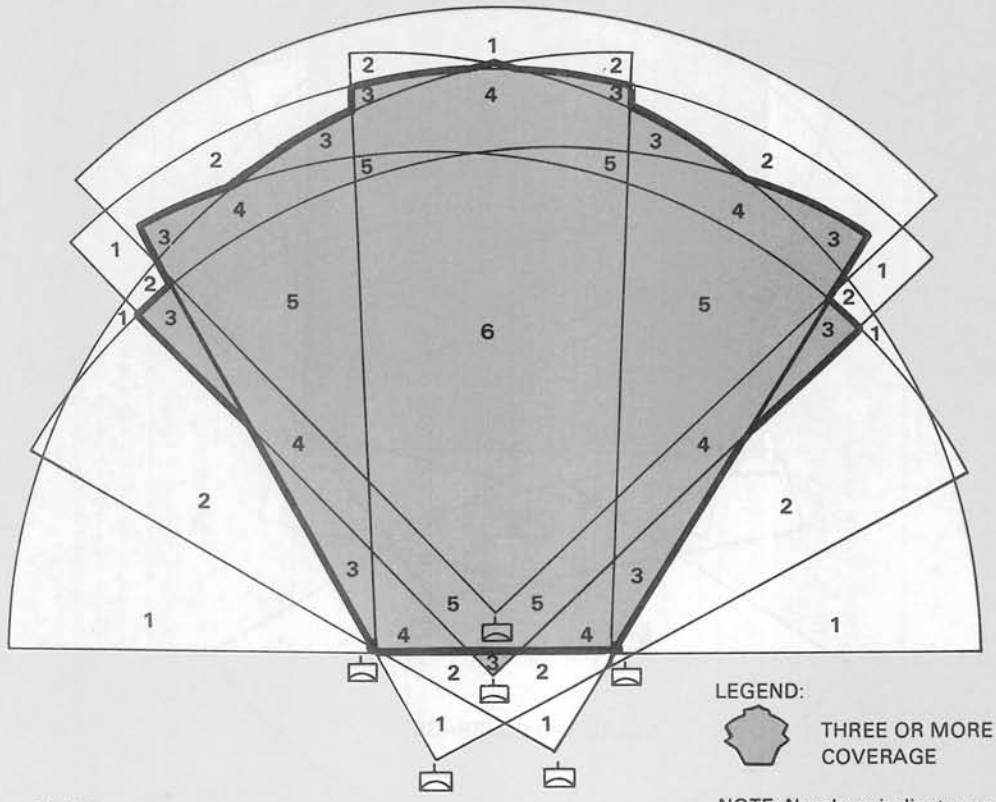


DEFENSE EFFECTIVENESS

Effectiveness of the very low- to very high-altitude Patriot defense depends on how well the applicable employment guidelines are met. Evaluation can be performed qualitatively against quiet (nonjamming) targets and jamming targets along medium- and very low- to low-altitude approaches into the defended area. High- and very-high-altitude approaches are not evaluated due to the improbability of the threat aircraft attacking at these altitudes. After completing this evaluation, weaknesses in the defense will surface. The AD planner then adjusts the deployment scheme of the Patriot battalion. Higher echelon planners may also allocate additional AD resources to offset shortcomings of the Patriot coverage.

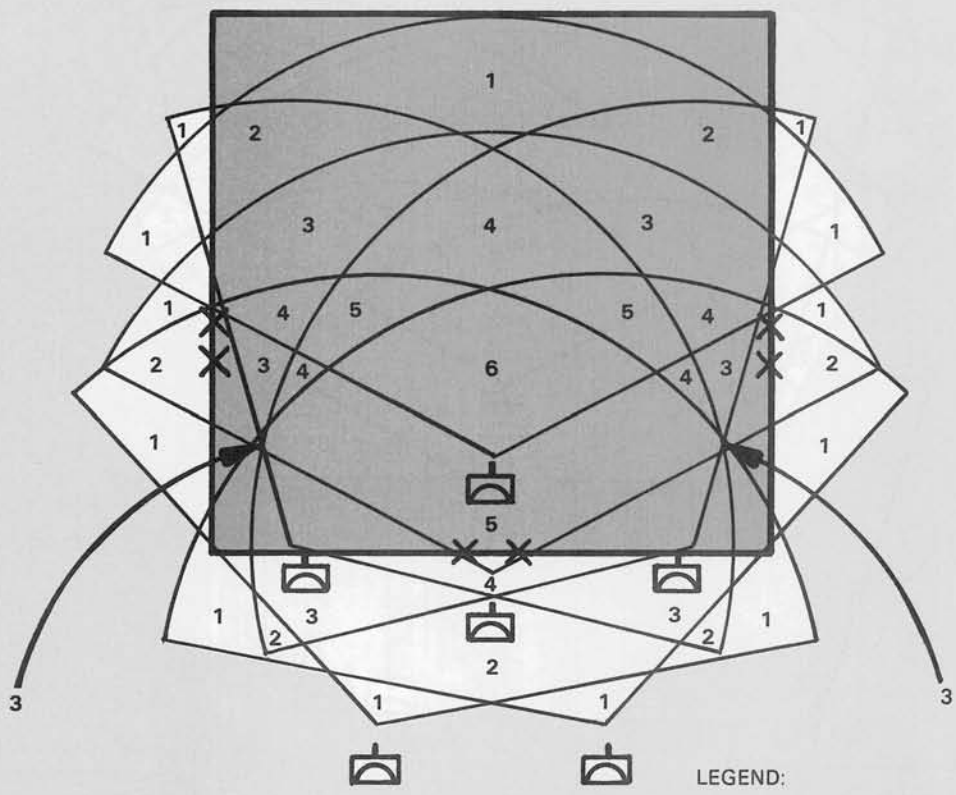
Against medium-altitude attack, proper siting minimizes near-in terrain masking and will generally enable the full planning ranges to be used in evaluation of the defense design. The forward area defense surveillance coverage illustration shows the surveillance coverage for a type of area defense deployment. The number of units providing coverage is shown in the overlap zones.

FORWARD AREA DEFENSE SURVEILLANCE COVERAGE



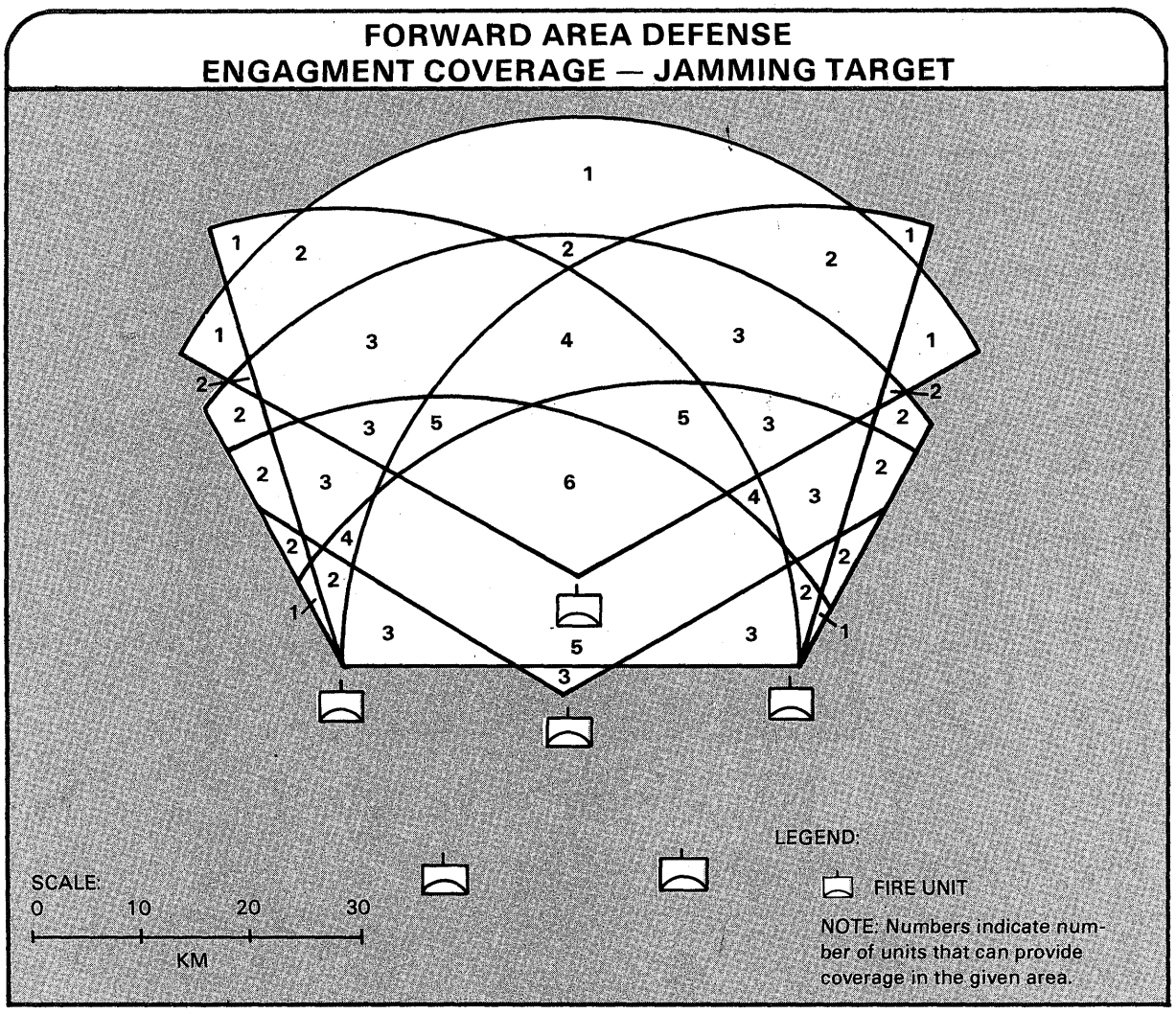
The forward area defense engagement coverage—quiet target illustration depicts an engagement coverage against a quiet target.

FORWARD AREA DEFENSE ENGAGEMENT COVERAGE-QUIET TARGET



Because the use of ECM will be a widely used enemy tactic, defenses are normally designed against jamming aircraft. When planning against a jamming target which requires triangulation to determine the target's actual position, the engagement coverage should be restricted to the area in which three or more fire units can provide

surveillance coverage. Coverage achievable against such a target is shown in the forward area defense engagement coverage-jamming target illustration by combining three or more firing batteries' surveillance coverage with engagement coverage.



The defense design rates high in the priority ADA employment guidelines required of an area defense. It rates good in these guidelines against either a quiet or jamming target since at medium altitude triangulation coverage is excellent. Against quiet targets, the defense rates fair in providing balanced fires in all directions from the perspective of a centrally located asset within the defended area (for example, the main CP in a division); and rates fair-to-poor in mutual support because the two rearmost Patriot units are not covered by another Patriot unit. Against jamming targets, balanced fires degrade because flank fires are withdrawn due to lack of triangulation coverage, and mutual support becomes poor since only one unit is supported by fires of other Patriot units. The area defense deployment versus medium-altitude targets illustration summarizes the qualities of the defense.

AREA DEFENSE DEPLOYMENT VS MEDIUM-ALTITUDE TARGETS

PRIORITY	EMPLOYMENT GUIDELINES	TARGET	
		QUIET	JAMMING
1	OVERLAPPING FIRES	GOOD	GOOD
1	DEFENSE IN DEPTH	GOOD	GOOD
2	WEIGHTED COVERAGE	GOOD	GOOD
3	EARLY ENGAGEMENT	GOOD	GOOD
4	MUTUAL SUPPORT	FAIR TO POOR	POOR
N/A	BALANCED FIRES	FAIR	FAIR TO POOR

Against low- and medium-altitude targets, defense in depth must be provided to the rear and flanks by other weapons capable of engaging at these altitudes (for example, another HIMAD battalion or interceptors). If coverage is not adequate to the flanks of rear, then one or more units of the battalion must orient to cover the vulnerable direction, or be capable of rapid reorientation to do all but very low-altitude attack. A Patriot battalion can provide coverage over an approximate geographic area of 60 by 60 kilometers against nonjamming targets and 50 by 50 kilometers against jamming targets. A greater area could be covered, but at the sacrifice of massed firepower, with much less triangulation capability against very low- and low-altitude jamming aircraft, and at the risk of much less stable coverage as units become nonoperational. Employed in conformance to the guidelines described, a Patriot battalion in the forward area defense will provide excellent medium- to very high-altitude air defense coverage over a typical division-size area of operations. Excellent very low- to low-altitude coverage is provided over the division rear area, however, very low- to low-altitude protection in the MBA and CFA still depends on SHORAD.

POINT DEFENSES

Typically, Patriot battalions establish point defenses in the rear operations area. Patriot battalions would be normally positioned in the communications zone or corps rear. Typical assets which could be defended by Patriot battalions include long-range delivery systems (aircraft and missile), long-range intelligence collection systems, EW systems, command and control facilities, and logistics complexes.

TYPES OF POINT DEFENSE

No less than one Patriot battalion should be deployed in a point defense. However, a single point defense by the Patriot battalion may afford protection to more than one critical asset based on the relative geographic location of the assets. There are basically two types of Patriot point defenses—a weighted defense and a balanced defense. The first type should be used only when there is *very high probability* the attack will come from a particular direction, and there are sufficient air defense weapons whose fires can be brought to bear in the event the attack comes from an unexpected direction. Should the situation lack either of these conditions, the balanced defense should be employed. The balanced point defense is the norm. In either case, Patriot units should be no further than 15-20 kilometers from any asset being protected. The Patriot defense should be oriented on the highest priority asset, resulting in that asset being at or near the center of the defense depending on terrain, attack

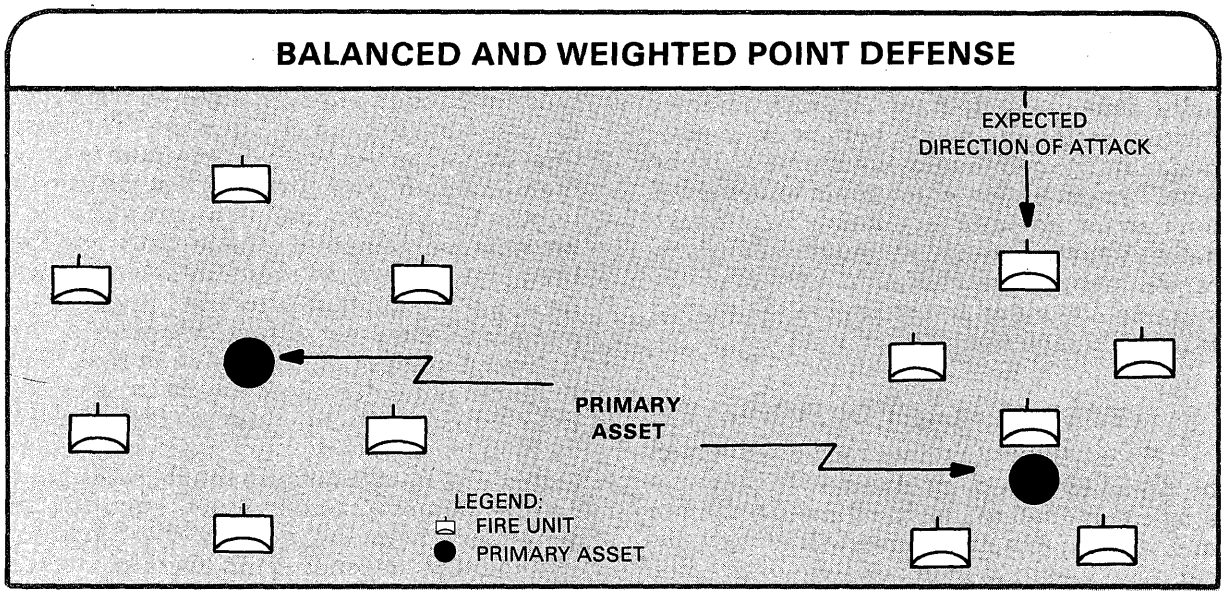
corridors, and relative geographic location of lower priority assets receiving planned protection. When designing the defense, a kill zone for Patriot should be established to take advantage of Patriot's high rate of fire. The size of this kill zone depends on the extent of convergent orientation. In a balanced point defense that uses the inward looking concept, the tactic of convergent orientation is maximized, thus achieving an *intense* kill zone.

If the defended asset is an air base, close coordination must be established between the Patriot battalion and the air base operations center. Normally, a base defense zone which encompasses the Patriot battalion will be established. The air base commander exercises operational control of all AD assets in the base defense zone.

FIRING BATTERY DEPLOYMENT

Firing battery deployment varies only slightly with the type of point defense. In both cases, early engagement, overlapping fires, and defense in depth are desirable characteristics of the defense. In the balanced point defense all six Patriot firing batteries form a perimeter 15-20 kilometers from the center of the primary asset being defended. In the weighted point defense, the majority of the Patriot firing batteries also forms a perimeter around the primary defended asset. However, one firing battery should be located inside the perimeter and usually oriented in the direction where weighted coverage will be provided. However, it could be oriented to protect the defense from attack from the rear, while perimeter units are oriented to provide the weighted coverage. Positioning and orienting the center firing battery in the defense accommodate the tactic described under area defense which calls for the center unit to provide supporting fires in any direction. The balanced and weighted point defense illustration shows the two deployments. Note that the weighted deployment is an elongated variation of the deployment suggested earlier for the area defense and provides for increased mutual support over that provided by a balanced point defense. Also note the positioning of the weighted point defense with respect to the defended asset. This is recommended to insure maximum all-unit coverage in the expected direction of attack. The center unit in the weighted defense is the exception to the planning factor which calls for Patriot units to be positioned 15-20 kilometers from the center of the defense.

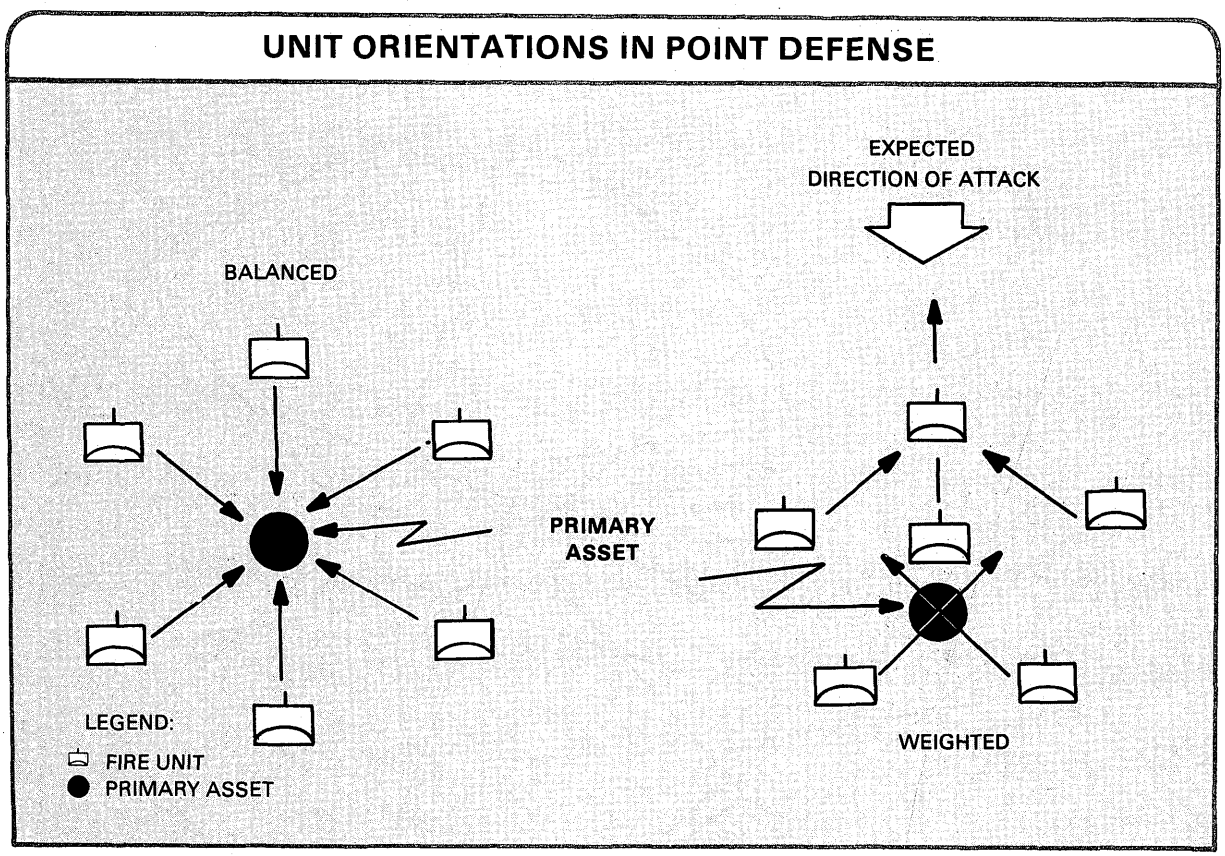
BALANCED AND WEIGHTED POINT DEFENSE



PTL SELECTION

Unit orientation, not deployment, is the primary difference in the two defenses. The following illustration shows the recommended orientations. They are stylized and have not been tailored to local defense conditions such as terrain. The tactic of convergent orientation applies in both cases. In the balanced defense, all target lines converge at the same point—the center of the defended asset.

UNIT ORIENTATIONS IN POINT DEFENSE



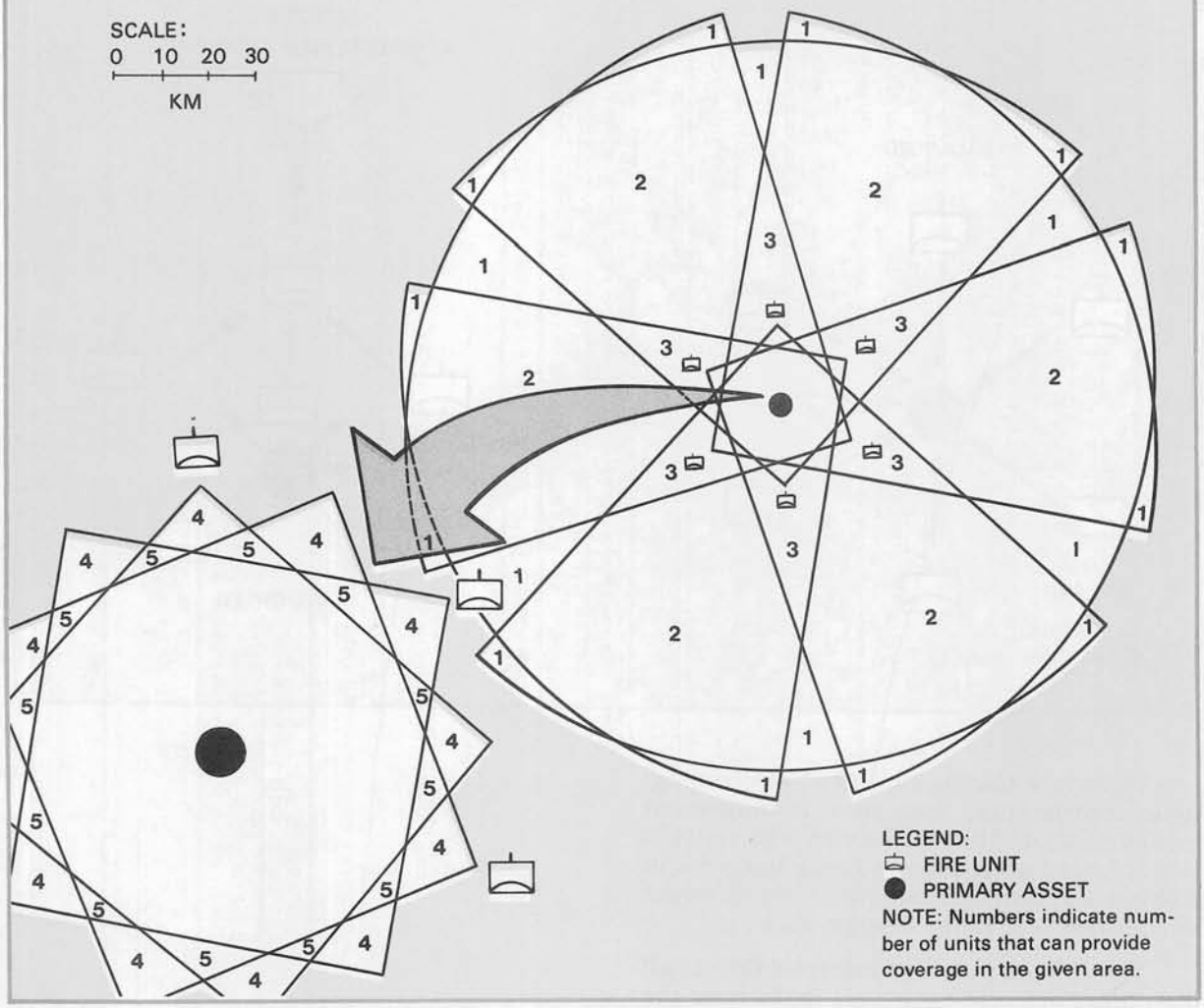
To reduce the possibility of electromagnetic interference, frequency management measures should be coordinated with units in the defended area. Patriot firing batteries in a balanced point defense should use different W-codes (sets of radar frequencies).

The defense provides balanced fires in all directions because each unit looks over the

asset and can engage targets attacking from the opposite side of the defense. In the weighted defense, all unit sectors will overlap the expected direction of attack.

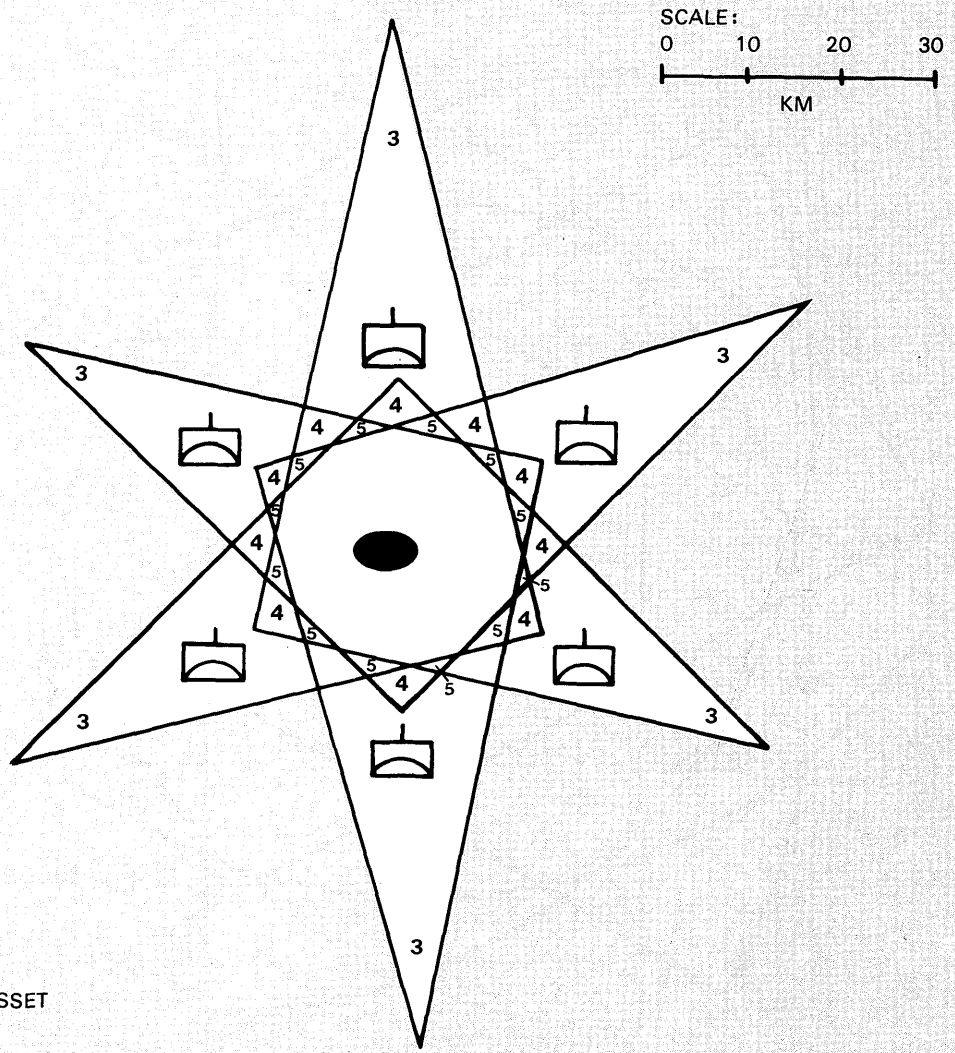
The balanced point defense surveillance coverage—medium altitude illustration depicts the surveillance coverage of a Patriot battalion deployed in a balanced point defense. Surveillance range will be greater than that of forward Patriot battalions because of the reduced SOJ threat.

BALANCED POINT DEFENSE SURVEILLANCE COVERAGE—MEDIUM ALTITUDE



The balanced point defense triangulation area—medium altitude illustration shows where multiple unit (three or more) coverage is provided by the balanced point defense. In these areas triangulation can be supported.

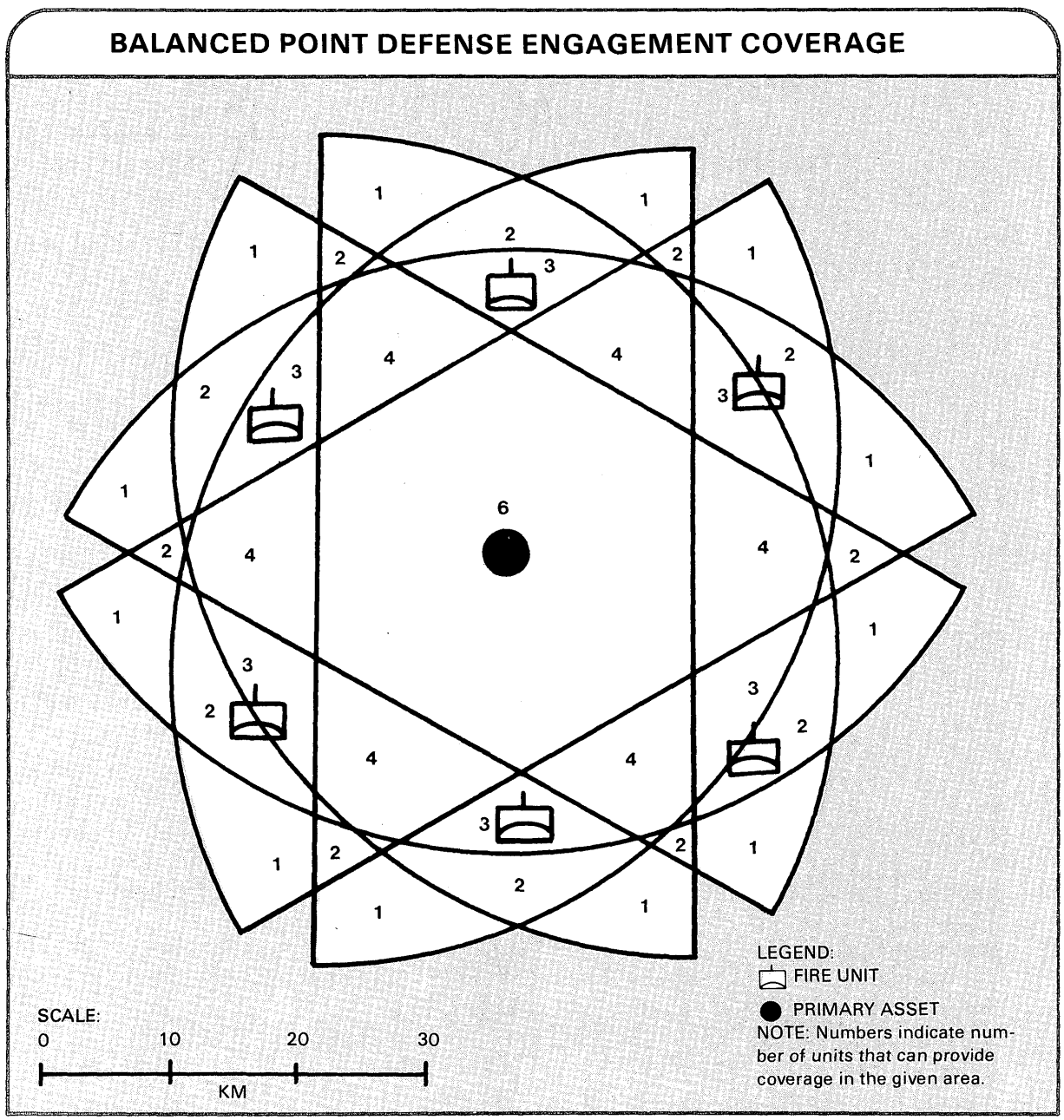
BALANCED POINT DEFENSE TRIANGULATION AREA — MEDIUM ALTITUDE



NOTE: Numbers indicate number of units that can provide coverage in the given area.

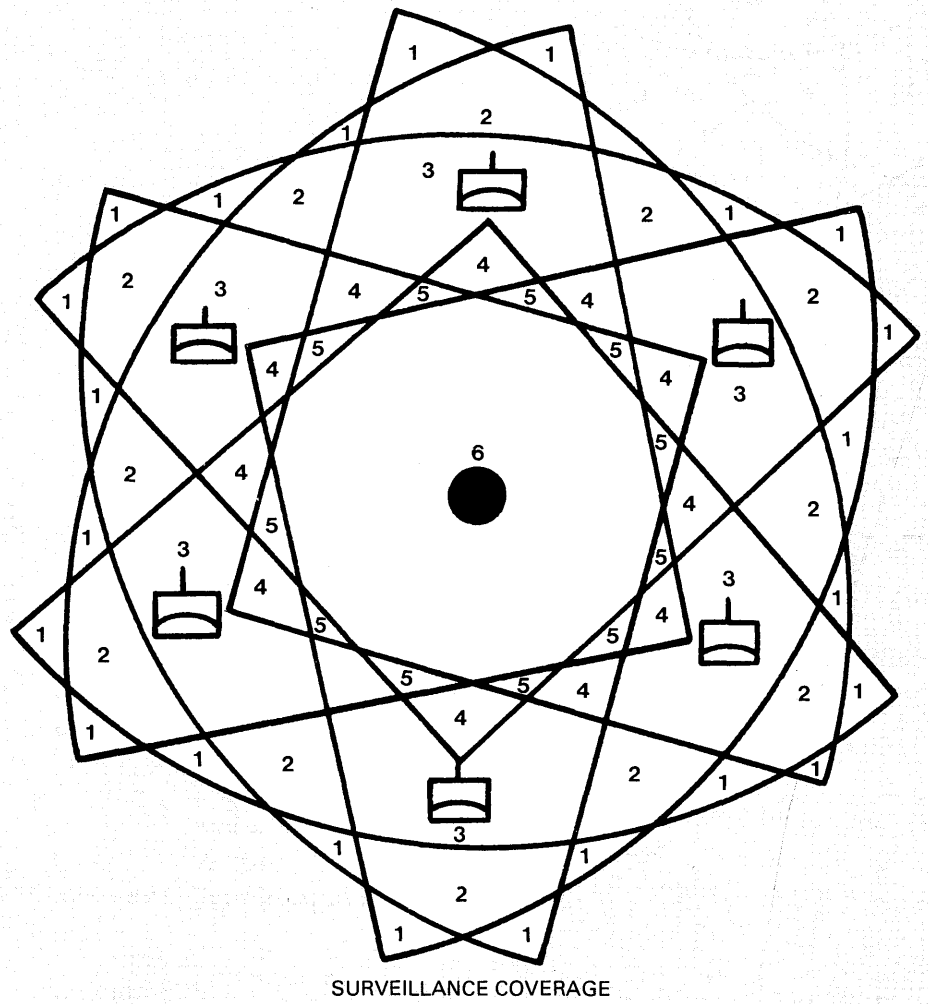
The balanced point defense engagement coverage illustration shows the engagement coverage of the balanced point defense against a medium-altitude threat. At medium altitude, triangulation is not hampered by terrain masking, therefore the full, high probability of kill intercept ranges can be achieved.

BALANCED POINT DEFENSE ENGAGEMENT COVERAGE

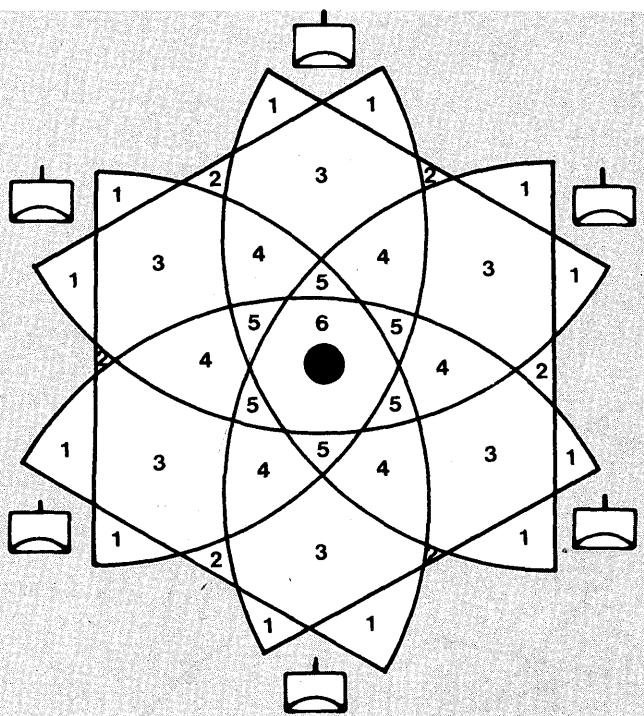


The balanced point defense—low-altitude coverage illustration on this page and page 6-28, shows the surveillance and engagement coverage against a very low- to low-altitude threat. Terrain masking and system performance are the limiting factors which reduce both the surveillance and engagement coverage.

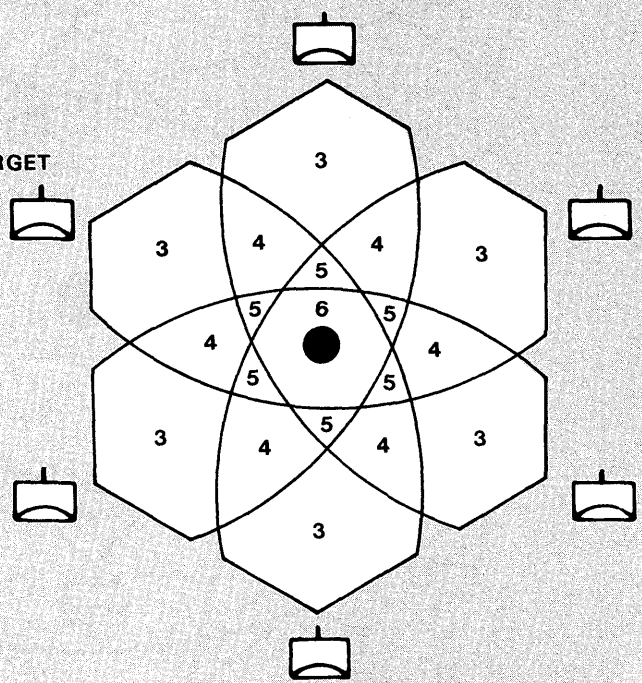
BALANCED POINT DEFENSE-LOW ALTITUDE COVERAGE



BALANCED POINT DEFENSE—LOW-ALTITUDE COVERAGE ILLUSTRATION (CONTINUED)



ENGAGEMENT COVERAGE — QUIET TARGET



ENGAGEMENT COVERAGE — JAMMING TARGET

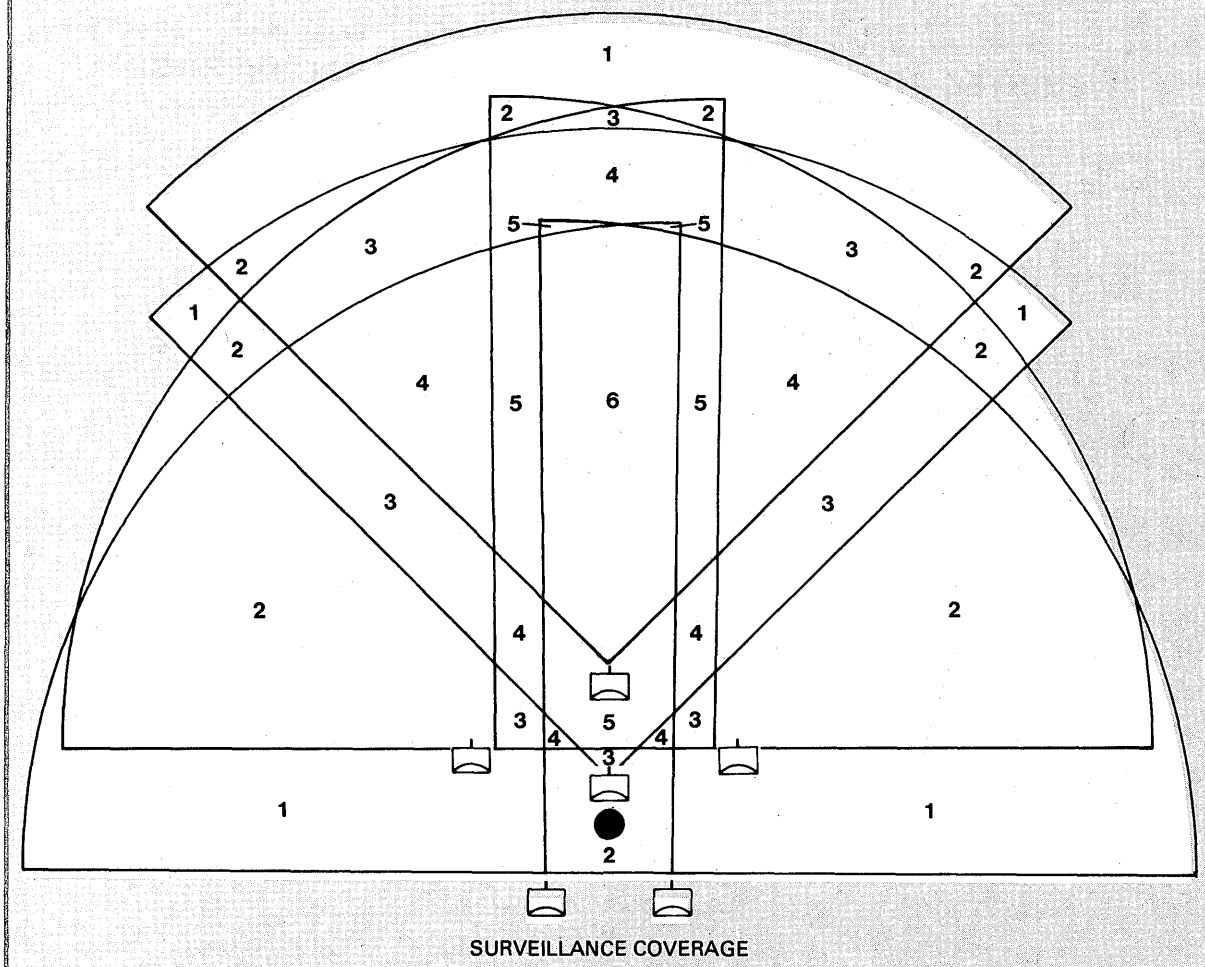
SCALE:
0 10 20 30
KM

LEGEND:
FIRE UNIT
PRIMARY ASSET

NOTE: Numbers indicate number of units that can provide coverage in the given area.

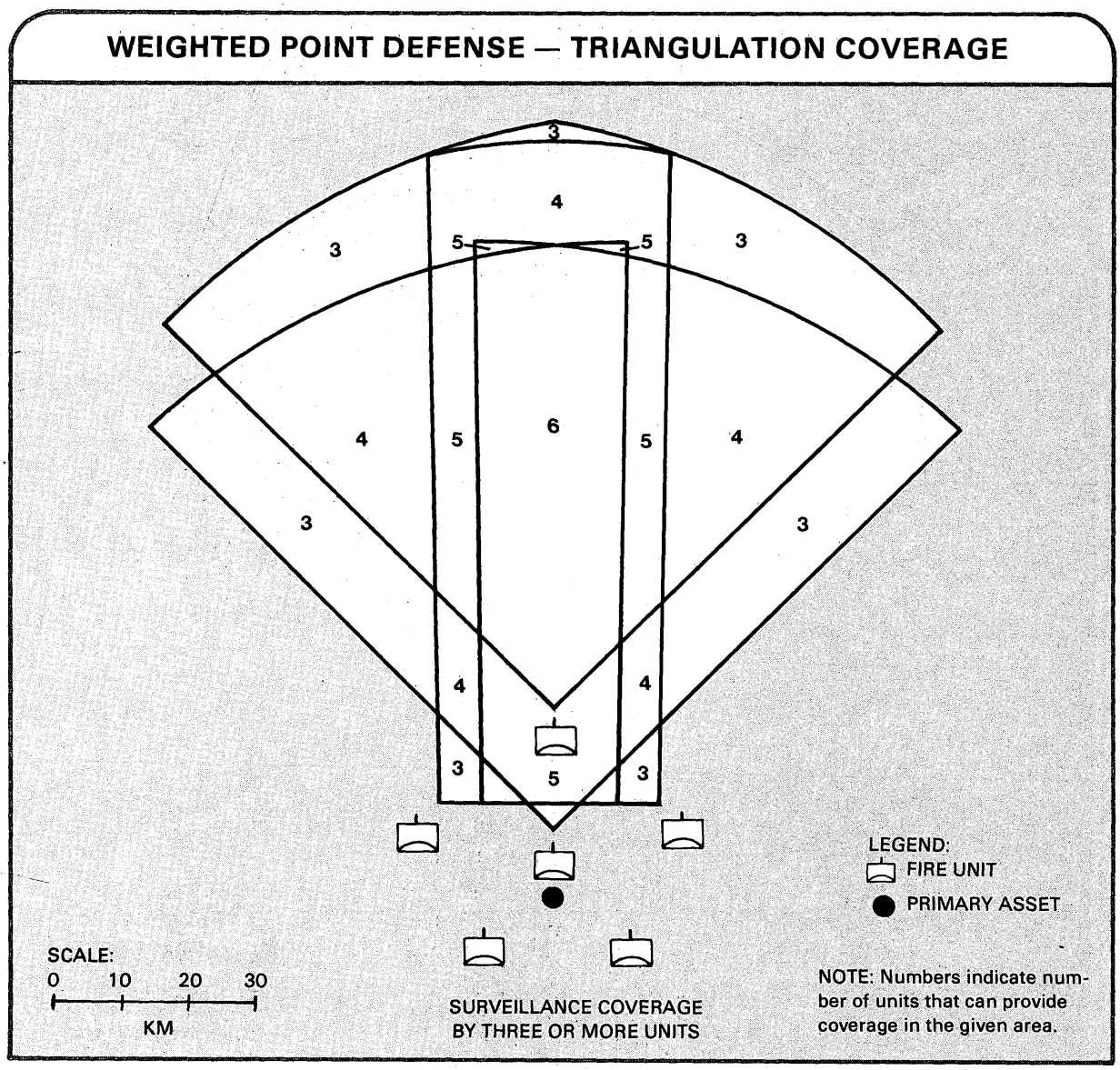
The weighted point defense—surveillance coverage illustration shows surveillance coverage of a weighted point defense against a medium-altitude threat.

WEIGHTED POINT DEFENSE — SURVEILLANCE COVERAGE



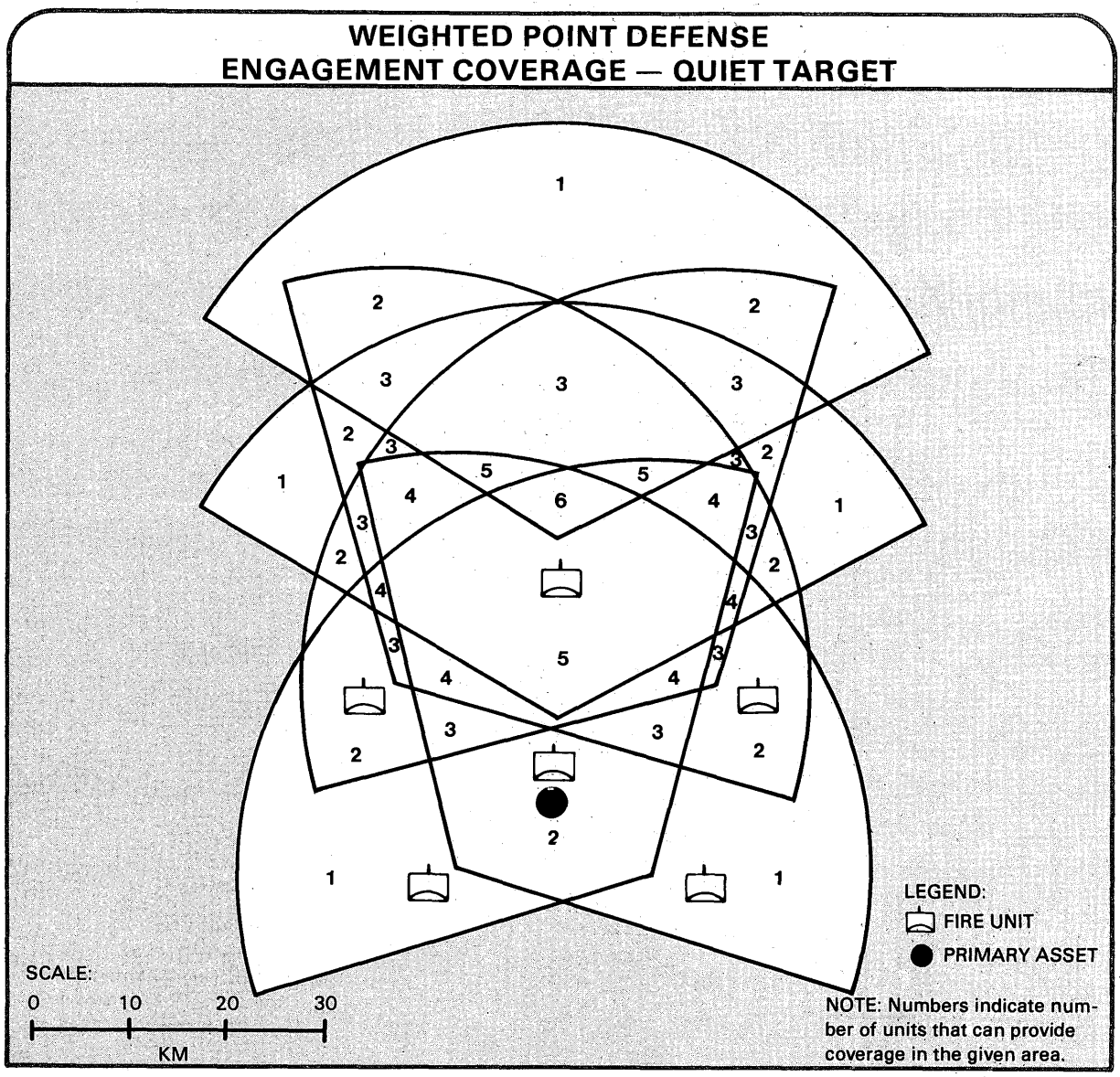
The weighted point defense—triangulation coverage illustration shows the areas of multiple unit (three or more) coverage where triangulation can be supported.

WEIGHTED POINT DEFENSE — TRIANGULATION COVERAGE

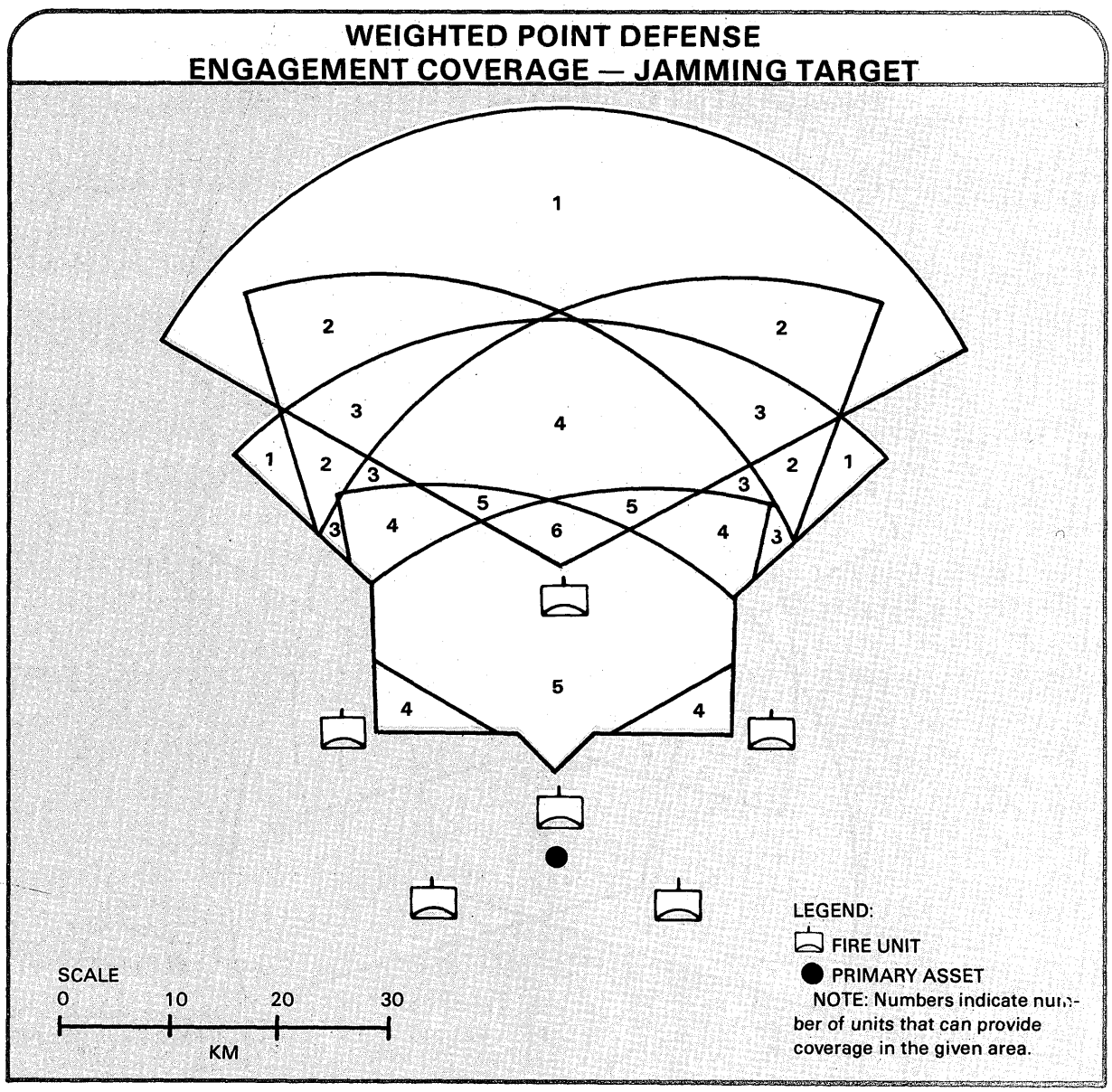


The weighted point defense engagement coverage—quiet target illustration shows the engagement coverage of a weighted point defense against a medium-altitude quiet threat. The weighted point defense engagement coverage—jamming target illustration shows the engagement coverage of the same defense against a jamming target. Since triangulation is excellent at medium altitude, the engagement coverage is virtually unchanged along the weighted direction.

WEIGHTED POINT DEFENSE ENGAGEMENT COVERAGE — QUIET TARGET

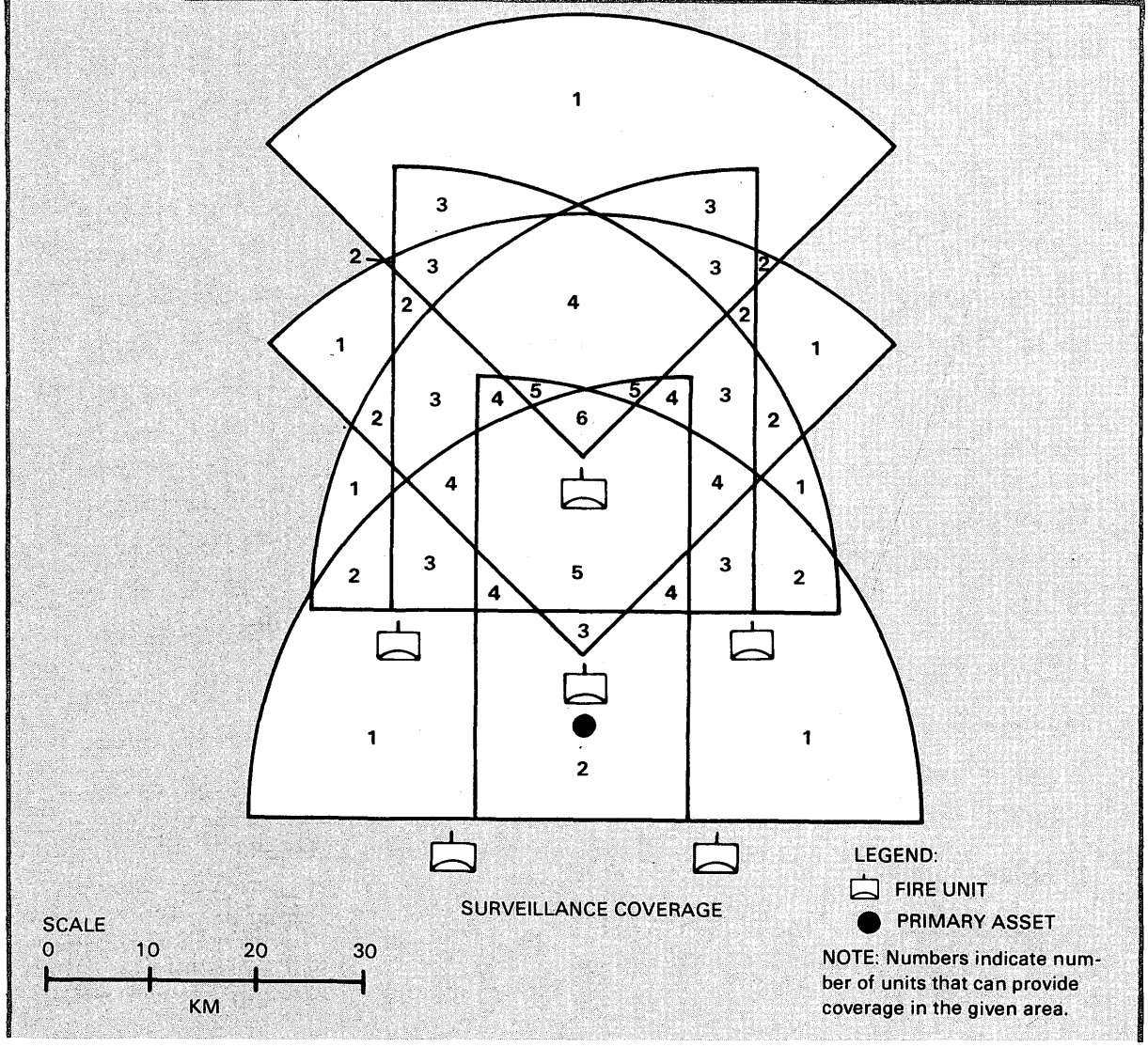


WEIGHTED POINT DEFENSE
ENGAGEMENT COVERAGE — JAMMING TARGET

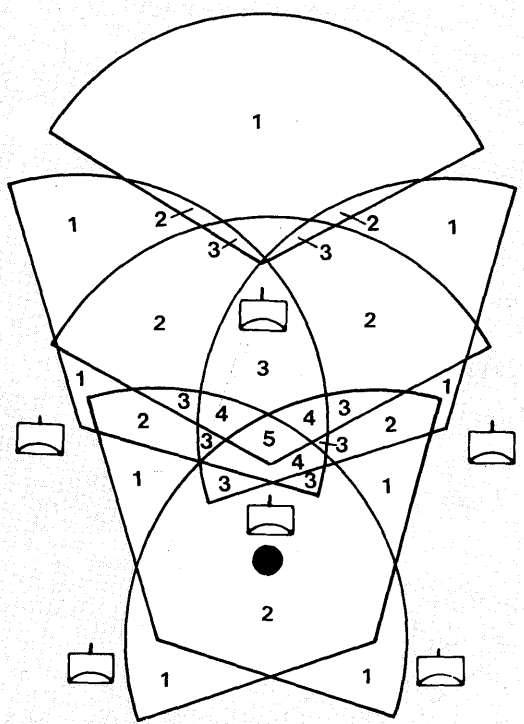


The weighted point defense—low-altitude coverage illustration on this page and page 6-34, shows the surveillance and engagement capabilities against very low-to-low-altitude quiet and jamming targets. Once again the limiting factors are system performance and terrain masking. As the engagement coverage against jamming targets clearly shows, this type of defense is extremely vulnerable to low-altitude attacks from other than the weighted direction.

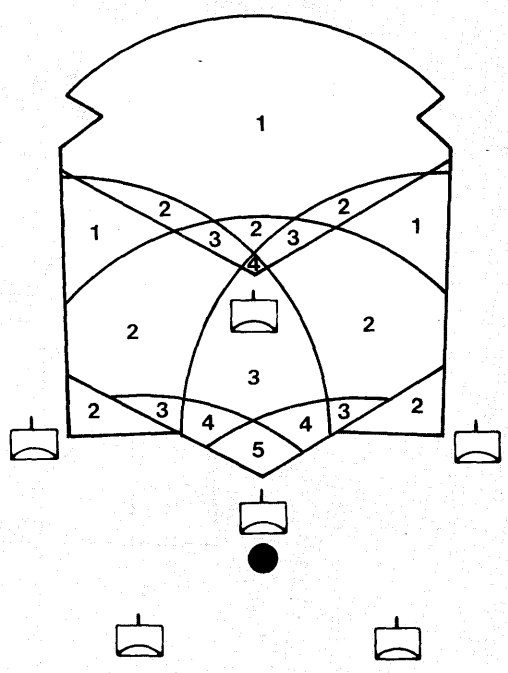
WEIGHTED POINT DEFENSE — LOW-ALTITUDE COVERAGE



WEIGHTED POINT DEFENSE—LOW-ALTITUDE COVERAGE (CONTINUED)



ENGAGEMENT COVERAGE—
QUIET TARGET



ENGAGEMENT COVERAGE
JAMMING TARGET

SCALE:
0 10 20 30
KM

LEGEND:
FIRE UNIT
PRIMARY ASSET
NOTE: Numbers indicate number of units that can provide coverage in the given area.

COMPOSITE DEFENSES

By adhering to the AD employment principle of mix, composite defenses are normally employed in both the tactical and rear operations areas. In the tactical operations area, these composite defenses are not as structured as those in the rear operations area. This is because the HIMAD and SHORAD commanders in the tactical operations area have their priorities established by different commanders. In the rear operations area, AD priorities are established by the force commander.

ALLOCATION OF FORCES

In the tactical operations area, a Patriot battalion (four or more *operational* fire units) and a SHORAD battalion are a sufficient composite force for protection of the divisional forces and for attrition of enemy deep strike aircraft. Where terrain is particularly difficult or in a particularly threatened area, four Hawk fire units may reinforce the ADA coverage. When only a Patriot battalion with less than four fire units is available, a full Hawk battalion is required for adequate coverage. In the rear operations area, a Patriot battalion (four or more *operational* fire units) and a SHORAD battery are an adequate composite force for a typical point defense. Particularly large or high priority point defenses may require the allocation of additional Hawk fire units, up to a full battalion. When only a Patriot battalion with less than four fire units is available, a minimum of four Hawk fire units is required.

TACTICAL MISSIONS

When all units participating in a composite defense are in the same brigade, the brigade assigns narrative missions to each unit and acts as overall defense coordinator. In the absence of a single brigade, Patriot battalion(s) should be given a GS mission. Hawk battalion(s) and SHORAD batteries are normally assigned a GS-R or R mission to support the Patriot unit. This will clearly establish planning and control relationships. The Patriot battalion S3 would be responsible for designing the composite defense (Patriot-GS, SHORAD- and Hawk-GS-R or R to Patriot). He would also be responsible for coordinating with the ADA brigade to recommend the employment of interceptors in the defense to insure that the composite defense will best integrate the interceptor contributions.

COMMAND AND CONTROL LINKS

Patriot and Hawk battalions in a composite defense would normally communicate with each other through the ADA brigade AN/TSQ-73 Missile Minder system. If the brigade FDC is not available, the Patriot ICC would communicate directly to the Hawk battalion AN/TSQ-73 and the Hawk battalion to the CRC. The Hawk battalion FDC would not attempt to control the Patriot battalion.

HAWK EMPLOYMENT

When Hawk and Patriot are employed together within the forward area, Hawk should be employed according to defense vulnerability. For example, Hawk should be employed to extend very low- to low-altitude area defense forward into brigade zones, especially when SHORAD defenses are weak. If divisional SHORAD defenses are adequate but defenses to the flank and rearward of Patriot coverage are questionable, then Hawk should be employed to provide defense in depth and mutual support, provide rear and flank coverage, and to fill in lateral very low- to low-altitude coverage, thus allowing maximum forward coverage by Patriot. In the rear operations area, Hawk is sited along low-altitude avenues of approach and to provide mutual support to Patriot units.

SHORAD EMPLOYMENT

In the division area, SHORAD units are employed according to the division's AD priorities. However, in rear operations area point defenses, a SHORAD battery reinforces the coverage of the Patriot battalion. Chaparral squads are positioned 2-3 kilometers to the rear of Patriot units to force suppressor aircraft higher in altitude, to provide mutual support and defense in depth, and to destroy or neutralize suppressor aircraft. This

employment of SHORAD, although a departure from traditional SHORAD employment, results in more effective defense of the asset(s).

Illustrations on pages 6-36 through 6-38 show examples of composite defenses.

COMPOSITE DEFENSE PLANNING FACTORS

ALLOCATE COMPLETE BATTALIONS (BATTERIES FOR SHORAD) OR MULTIPLES THEREOF

AADCOM/ADA BRIGADES

- ASSIGN TACTICAL MISSIONS TO PATRIOT, HAWK, AND SHORAD
- PATRIOT - GS
- HAWK AND SHORAD - R OR GS-R

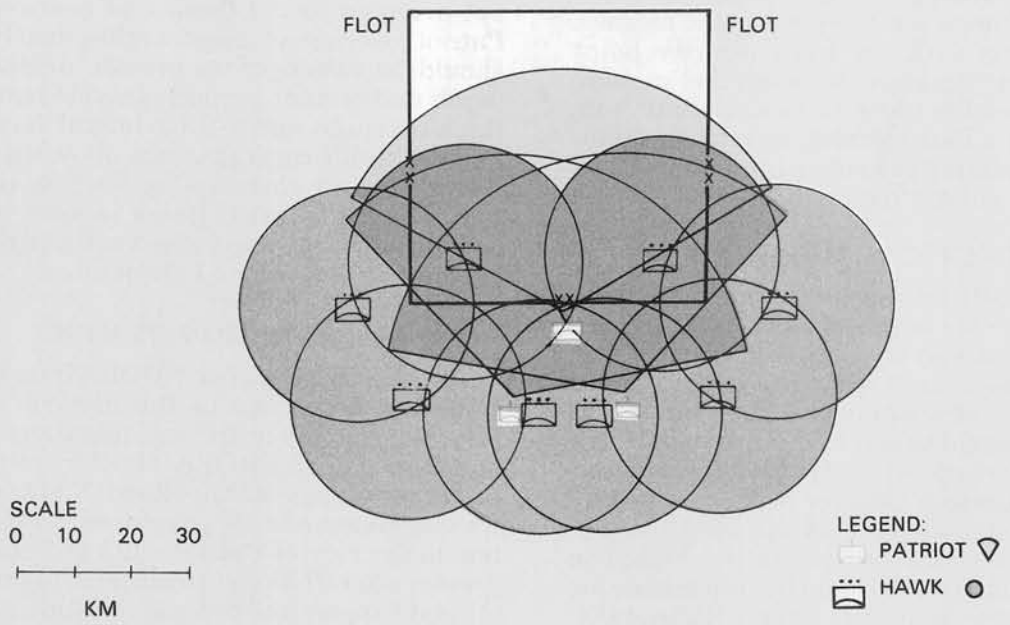
SELECT PATRIOT POSITIONS FIRST

SELECT HAWK/SHORAD POSITIONS BASED UPON MISSION, PATRIOT COVERAGE, AND BLUE AIR AVAILABILITY/EMPLOYMENT

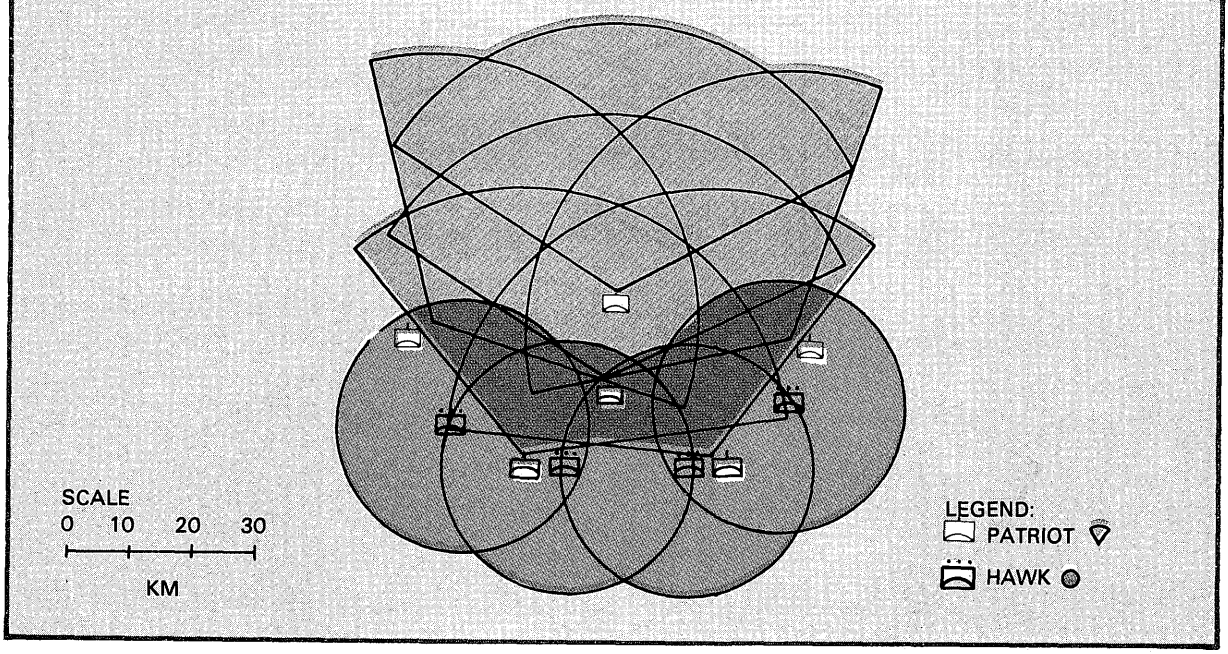
PATRIOT-HAWK FIRE UNIT SEPARATION DISTANCE

- AREA DEFENSE - 5 TO 10 KM (HAWK REINFORCES PATRIOT)
  10 to 20 KM FORWARD OF PATRIOT (HAWK REINFORCES SHORAD)
- POINT DEFENSE - 5 TO 10 KM

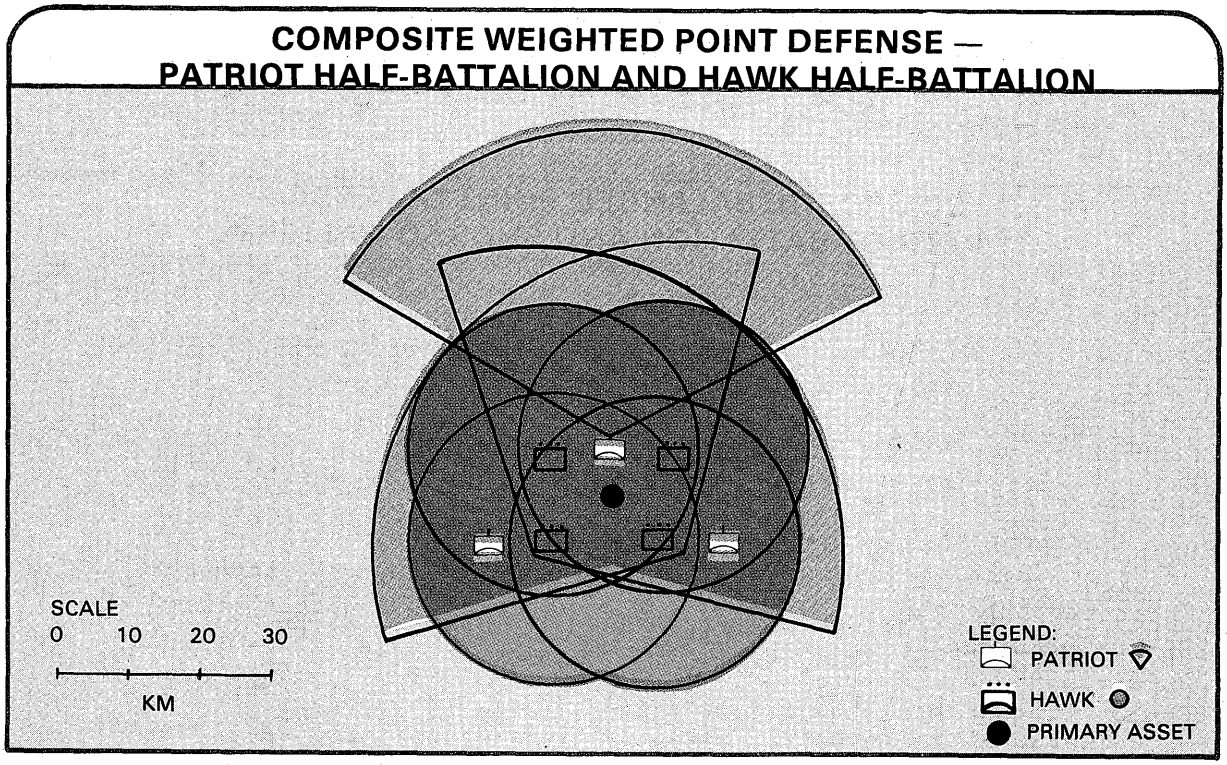
COMPOSITE AREA DEFENSE — PATRIOT HALF-BATTALION AND HAWK BATTALION



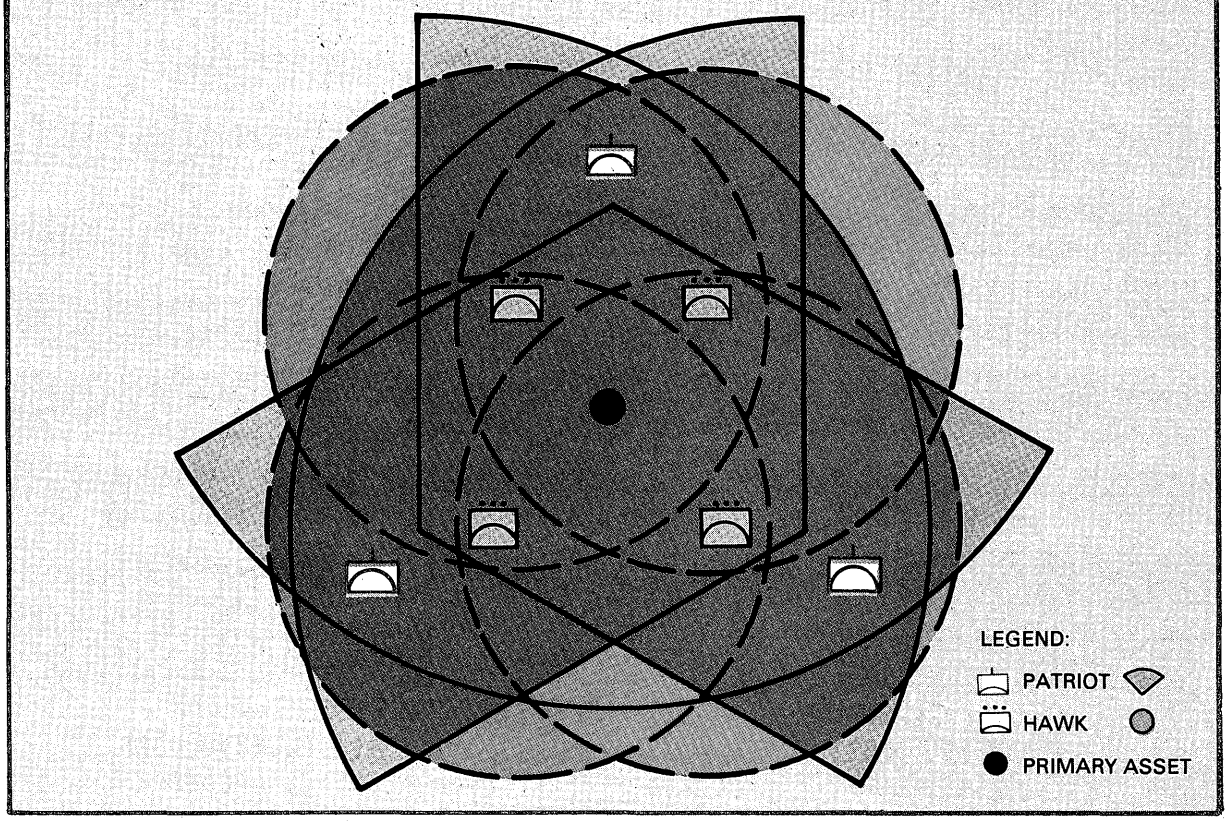
COMPOSITE AREA DEFENSE — PATRIOT BATTALION AND HAWK HALF-BATTALION



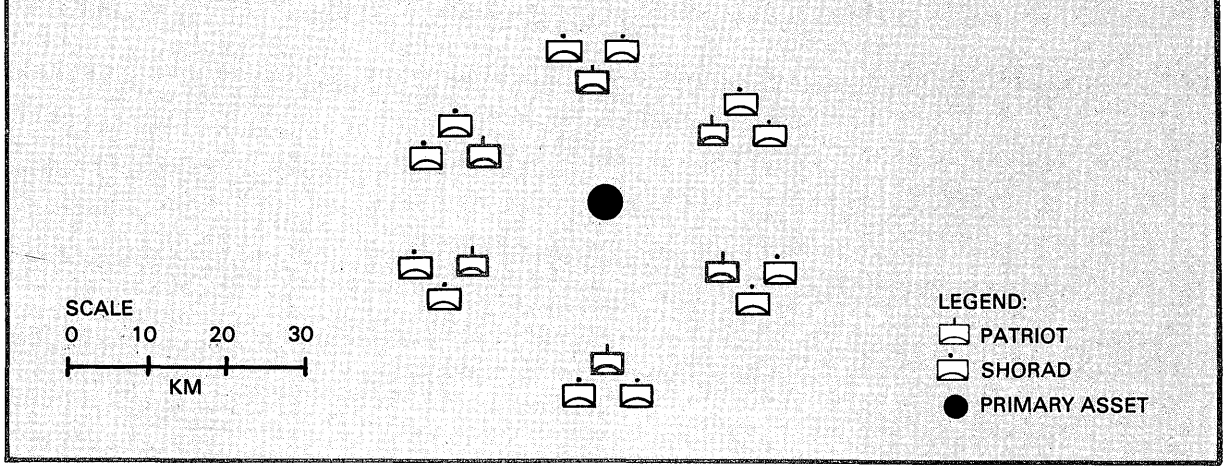
COMPOSITE WEIGHTED POINT DEFENSE — PATRIOT HALF-BATTALION AND HAWK HALF-BATTALION



COMPOSITE BALANCED POINT DEFENSE — PATRIOT HALF-BATTALION AND HAWK HALF-BATTALION



COMPOSITE BALANCED POINT DEFENSE — PATRIOT BATTALION AND SHORAD BATTERY



CHAPTER 7

Reconnaissance, Selection, and Occupation of Position

As with all other ADA units, reconnaissance, selection, and occupation of position (RSOP) is a way of life for Patriot units. As well as shooting and communicating, Patriot units are always moving. This chapter discusses the purpose of Patriot RSOP and some major considerations peculiar to movement of Patriot units. Procedures required to conduct the RSOP are included. Although all position requirements are not detailed, those essential to Patriot operations are. Requirements not detailed are those common to all Army units including other types of ADA units.

PURPOSE

The purpose of a Patriot RSOP is to move a Patriot unit into a position from which it can accomplish its mission. For a Patriot firing battery, this is a position from which the unit is able to deliver effective air defense fires against the enemy air threat. For the battalion headquarters, this includes a position from which the battalion fire direction center can effectively control the air defense fires of each firing battery and the battalion support elements can adequately support the battalion. Patriot units move to—

- Respond to major shifts of friendly forces.
- Reestablish defenses of critical assets when they move.
- Respond to changes in mission assignments.
- Displace to alternate positions for survivability.
- Insure overall defense integrity.

Patriot units are normally deployed as battalions and, in many cases, are part of a larger integrated air defense. As a result, when a firing battery conducts an RSOP, it is usually a part of a multilevel operation conducted by the air defense headquarters (usually an ADA brigade HQ) and the Patriot battalion, as well as the firing battery. This involves locating, positioning, and siting.

LOCATING

The location of the battalion is determined either by the defense or brigade commander. (The term "location," when used in this context, specifies the establishment of a *broad* operating area.)

★ CONTENTS

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FIRING BATTERY POSITION REQUIREMENTS 7-10
BATTALION COMMAND POST POSITION REQUIREMENTS 7-14
POINTS FOR EMPHASIS 7-14

POSITIONING

The battery is positioned by the battalion commander. (The term "positioned," when used in this context, specifies an exact area within the operating area.)The battalion commander will commonly designate a four- or six-digit grid coordinate for the new position. Normally the battery commander will have some leeway in occupying the position, based on his ground reconnaissance.

SITING

Siting of equipment within the position is always accomplished by battery personnel. (The term "siting," when used in this context, specifies the placement of individual items of equipment on selected spots within the position.)

Based on time available, locating, positioning, and siting can become very centralized (in a peacetime environment) or very decentralized (in a rapidly changing, fluid wartime environment). RSOP procedures discussed in this chapter are based on a wartime environment in which positioning is accomplished by battalion and siting is accomplished by battery personnel.

GENERAL CONSIDERATIONS

The procedures used by Patriot units in performing RSOPs are almost identical to those performed by other units. Differences take into account the size and weight of Patriot equipment which affect all aspects of a Patriot RSOP. The procedures also account for the tactical and technical characteristics of the Patriot system which affect the positioning of the unit and the siting of each item of equipment.

★ **ROAD MARCH WEIGHTS AND DIMENSIONS**

EQUIPMENT	WEIGHT kilograms (pounds)	HEIGHT meters (feet)	WIDTH meters (feet)	LENGTH meters (feet)
Radar set	35,534 (79,008)	3.61 (11.83)	2.87 (9.42)	16.83 (56.08)
Engagement control station	16,963 (37,398)	3.53 (11.58)	2.62 (8.58)	9.65 (31.67)
Antenna mast group	14,742 (32,500)	3.66 (12.0)	2.44 (8.58)	10.37 (34.0)
Electric power plant with fuel trailer	15,132 (32,500)	2.63 (8.62)	2.46 (8.07)	14.38 (47.17)
Launching station	35,721 (79,380)	3.99 (13.1)	2.87 (9.42)	16.83 (56.08)
Information and coordination central with electric power unit	19,862 (43,789)	3.53 (11.58)	2.49 (8.17)	14.38 (47.17)
Communications relay group with electric power unit	17,867 (39,389)	3.53 (11.58)	2.46 (8.07)	14.38 (47.17)
Guided missile transporter	25,465 (56,140)	2.84 (9.33)	2.44 (8.0)	10.17 (33.38)

VEHICLE SIZE AND WEIGHT

Although the Patriot missile system is fully mobile with all tactical equipment mounted on wheeled trailers or vehicles, Patriot equipment is both oversize and heavy. For this reason, mobility is limited to road surfaces, bridges, and terrain that can be negotiated by these oversize vehicles. The illustration on page 7-2 provides a listing of weights and overall dimensions of Patriot equipment in a road march configuration. (All dimensions include authorized prime movers.)

VEHICLE WEIGHT CLASSIFICATIONS

As can be seen by the road march weights and dimensions illustration, personnel conducting either route reconnaissance or road movements and all vehicle drivers must be extremely conscious of the bridge classification system explained in FM 5-36. The Patriot vehicle expedient classification guide illustration lists vehicle classifications for the major items of Patriot equipment. Calculations were made for vehicle class number being 85 percent of the gross curb weight.

PATRIOT VEHICLE EXPEDIENT ★ CLASSIFICATION GUIDE

EQUIPMENT	CLASS NUMBER
RADAR SET	34
ENGAGEMENT CONTROL STATION	16
ANTENNA MAST GROUP	14
ELECTRIC POWER PLANT WITH FUEL TRAILER	14
LAUNCHING STATION	34
INFORMATION AND COORDINATION CENTRAL WITH ELECTRIC POWER UNIT	19
COMMUNICATIONS RELAY GROUP WITH ELECTRIC POWER UNIT	17
GUIDED MISSILE TRANSPORTER	24

SITING AND ALIGNMENT ACCURACIES

RADAR SET	
SITE:	± 40 METERS
ALTITUDE:	± 10 METERS
AZIMUTH:	± 2.8 MILS IF SURVEY LEVEL OF CONFIDENCE IS ENTERED INTO TAB 81 ± 5.8 MILS IF COMPASS LEVEL OF CONFIDENCE IS ENTERED INTO TAB 81
ROLL:	± .3 MILS
CROSS ROLL:	± .3 MILS
LAUNCHING STATION (RELATIVE TO THE RADAR SET)	
SITE:	± 10 METERS (± 10 PERCENT OF SEPARATION DISTANCE BETWEEN THE LAUNCHING STATION AND RADAR SET UNDER HASTY SITING CONDITIONS)
ALTITUDE:	± 2 PERCENT OF SEPARATION DISTANCE BETWEEN THE LAUNCHING STATION AND RADAR SET
AZIMUTH:	± 2 MILS

Survey

★ The effectiveness of a Patriot battalion depends on accurate siting and alignment of the battery radar sets and their respective launching stations. Accurate siting and alignment of the radar sets are essential for the battalion FDC to correlate targets, perform site calibration, and to triangulate. Therefore, without accurate siting and alignment information, a battalion FDC cannot effectively manage the air battle. Further, without accurate siting and alignment information for the launching stations and their respective radar sets, a battery's ability to acquire missiles with the radar set is jeopardized. Thus, it is incumbent upon the commander to assure the unit's proficiency in survey. The required siting and alignment accuracies for the radar set and launching station are shown in the illustration above.

★ The normal technique for obtaining survey data is to employ the battalion survey section. Alternate techniques are deliberate and hasty surveys conducted by the firing batteries. Site survey by an engineer or field artillery survey crew is another possibility. However, it is not very likely because the number of survey crews available in any theater is limited.

Battalion Survey Section

★ The survey section is responsible for providing survey data to the firing batteries for siting and orienting the radar sets and launching stations. A survey information center and two survey crews compose the survey section. Each crew has one position and azimuth determining system as the primary survey tool. Each crew also has a theodolite as the alternate survey tool, which is used only if the primary is inoperative. The survey section works under the operational control of the S3. The survey information center sends a survey crew to survey each battery position. Depending on the situation, the survey crew may go directly to the new position, to a rendezvous position to link up with the battery RSOP party, or to the current battery position. Once at the new position, the survey crew obtains grid coordinate data on the radar set and launching station sites identified by the RSOP OIC. The survey crew also provides azimuth data to a known data point to establish a north reference.

Deliberate Survey

★ When the battalion survey section is not able to provide survey data to the firing batteries, the battery should perform a deliberate survey. The following deliberate survey techniques from FM 6-2 exceed the minimum accuracy requirements when performed with an M2 aiming circle. Refer to FM 6-2 for detailed procedures.

Traverse from a Survey Control Point Closed on the Original or a Second Survey Control Point. Traverse provides highly accurate siting and alignment data. Two methods of distance determination can be used with traverse. Horizontal taping is the most accurate and preferred method. Subtending is an alternate method; however, with subtending, accuracy is relative to the size of the measured target. Therefore, subtending a 60 meter baseline is much more accurate than subtending a 6 foot range pole.

Simultaneous Observation of a Celestial Body. Simultaneous observation of a celestial body provides the ability to transfer azimuth control. It requires a base station with an accurately aligned M2 and radio communications between the base station and the flank (receiving) station.

Polaris-Kochab. Polaris-Kochab method of orienting the M2 aiming circle provides highly accurate alignment to true north.

Hasty Siting and Alignment

Hasty methods can be used to acquire siting and alignment data for the radar sets and launching stations. However, these methods are subject to larger errors than obtained using deliberate survey techniques and do not provide a self check for accuracy. Hasty methods should not be used unless the tactical situation does not provide the time for deliberate survey. Once emplaced with hasty techniques, the siting and alignment should be redetermined by deliberate survey as soon as possible. The hasty methods are—

- Resection (siting).
- Graphic resection (siting).
- Map spotting (siting).
- Declinated M2 aiming circle magnetic needle orientation (alignment).

The Survey Team

Accurate determination of unit siting and alignment data is dependent upon the survey team's proficiency with deliberate survey techniques. This proficiency is itself dependent upon survey team cohesion and frequent reiterative training. The formalization of survey duties into a unit TSOP is encouraged to reduce the time required for survey. The following illustration shows the composition of a typical survey team. These team members are part of the RSOP party shown on page 7-6.

★ COMPOSITION OF A TYPICAL SURVEY TEAM

SURVEY OFFICER	(ALSO RSOP OIC)	1
SURVEY NCOIC	(TI-59 COMPUTER)	1
M2 AIMING CIRCLE OPERATOR		1
TAPE MAN		2
FORWARD STATION OPERATOR		1
REAR STATION OPERATOR	(MANUAL COMPUTER)	1
		7

Planning the Survey

★ Planning the survey includes an evaluation of—

- Time available.
- Terrain.
- Weather.
- Trigonometric list of the destination area.
- Ability to transfer azimuth control via radio with simultaneous observation.

Based upon this evaluation, the survey officer decides upon the techniques to be used to conduct the survey. The deployment of the survey team may be in advance of the RSOP party's deployment. However, it normally deploys as part of the RSOP party since many personnel of the RSOP party perform two or more duties. To facilitate the survey planning, the battalion should acquire trigonometric lists of the survey control points in its area of operation. Trigonometric lists are generated and maintained by the survey section of corps and division field artillery battalions.

ROAD AND TERRAIN COMPETITION

Two aspects often overlooked in RSOP planning is the competition between Patriot units and other units of the supported force for use of roads and key terrain. Due to the type, size, and weight of equipment, Patriot flexibility is limited. Even though the number of vehicles in a Patriot unit is comparatively small, use of road nets within corps and division areas almost always requires clearance from the area commander. In many cases, this will also be true in the communications zone.

Equally important is the coordination required to insure that the positions selected for the battalion CP and firing batteries are available for occupation and use. Again, this requires close coordination with the area commanders. In a corps area, the corps air defense officer can assist in obtaining use of the required real estate, particularly if he is also the ADA brigade commander. When it is necessary to position a Patriot unit within a division area, the SHORAD battalion commander, as division air defense officer, serves both as a point of contact and an ally in coordination with the division G3 for obtaining use of real estate. The Patriot ADA coordination officer usually establishes liaison with the division ADA officer for this purpose.

Normally, necessary coordination for road clearances and use of real estate is made at ADA brigade or battalion level. However, in a particularly fast-moving situation, a Patriot battery commander might have to make the necessary arrangements with the local commanders.

MOVING TO NEW POSITIONS

The procedures used to conduct RSOPs are SOP items and must be part of every unit's tactical preparation. These procedures must be thoroughly understood and practiced repeatedly by unit personnel. SOPs must cover both day and night movements and occupations of position. They should include loading plans for each way in which a unit might move—rail, sea, air, and road.

The three RSOP phases are—

1. Conduct the reconnaissance and select the position.

2. Move the unit to the position.

3. Occupy, organize, and improve the position.

CONDUCT THE RECONNAISSANCE AND SELECT THE POSITION

Basic actions required to conduct the reconnaissance and select the position include—

- Receive the battalion movement warning order.
- Issue the battery movement warning order.
- Plan the reconnaissance.
- Prepare for movement.
- Reconnoiter and select the route and position.
- Plan and prepare for the occupation.

Receive the Battalion Warning Order and Issue the Battery Warning Order

The movement warning order is issued by the headquarters directing the move, modified as required at each command level, and issued to the next lower echelon. The movement warning order can be written or verbal and can be passed in person or over tactical communications. It must include (as a minimum) the new mission, the coordinates of the new position, and times of release for march order, crossing the start point (SP) and release point (RP), and assuming operational status at the new position.

Plan the Reconnaissance

Planning includes deciding—

- Routes to be used and positions to be examined.
- Composition of the reconnaisance party (see the composition of a typical RSOP party illustration).
- Extra supplies and equipment needed.

★ **COMPOSITION OF A TYPICAL RSOP PARTY**

OIC (SURVEY)	1
NCOIC (SURVEY)	1
CREWMAN (NBC)	1
CREWMAN (MINE DETECTION, EQUIPMENT GUIDES)	2
CREWMAN (SECURITY, SURVEY)	6
DRIVERS (EQUIPMENT GUIDES, SURVEY)	3
	14

Normally, the RSOP party organization is provided in unit SOPs to fit most tactical situations. When issuing the battery warning order to the RSOP leader, the commander should direct any changes he feels necessary. The actions taken to form the RSOP party must not affect the mission capability of the unit. The illustration above shows the make-up of a typical firing battery RSOP party. Those members of the RSOP party who are also on the survey party are identified. To provide for security while on the move and at the new position, the RSOP party should take three M249 machine guns.

Prepare for Movement

Preparing for movement includes briefing personnel on the mission, plans, and requirements and instructions on operations to be conducted during the absence of the commander. All elements of the standard five-paragraph order should be addressed in the briefings. Nonmission-essential equipment may be broken down at this time.

Reconnoiter and Select the Route and Position

★ As soon as the RSOP preparations are completed, the leader departs with the reconnaissance party. He reconnoiters the routes to the new position and the position itself.

Route reconnaissance. Route reconnaissance includes—

- Insuring that the route meets equipment, height, weight, and width requirements.
- Avoiding built-up areas when possible. If not, insuring Patriot equipment can pass through such areas.
- Noting possible ambush locations.
- Marking necessary fuel and rest stop locations.
- Determining if road markers or road guides are needed.
- Finalizing the route.
- Selecting alternate routes.

Position reconnaissance. Selected positions are reconnoitered for suitable sites. The position reconnaissance insures that the position—

- Provides immediate access.
- Provides concealment.
- Affords good radar coverage. (RSOP party prepares hasty coverage diagrams. See FM 44-15-1.)
- Meets equipment requirements (size, slope, firmness, etcetera). Engineer support is requested, if necessary.
- Is free of enemy ground forces and NBC contamination.

Sites within the position are selected for—

- Patriot equipment—which requires commanding fields of view and fire, dispersal to maximum cable length, concealment, and relatively level terrain.
- Position security—which requires mutually supporting ground fire, cover and concealment, all-around defense perimeter, and communications.
- Support elements—which require cover, concealment, and dispersion.

Plan and Prepare for the Occupation

Based on sites selected for Patriot equipment, plans are made for organizing the order of march of the main body of the unit as well as briefing guides as to routes from the RP to each site. Sequence of the order of march must allow for—

- Orderly access to the area relative to different items of equipment and equipment sites.
- Quickest emplacement times for critical items of equipment.
- Convoy protection in case of air attack or ambush.

MOVE THE UNIT TO THE POSITION

Unit SOPs provide the details of Patriot

road movements and should include responsibilities, road march procedures, convoy organization and formation, routes and guides, and both air and ground security measures to be taken during the road march. Significant events of road movement include—

- March order and load equipment.
- Assemble the march column.
- Cross the SP.
- Move to the new position.
- Clear the RP.

March Order and Load Equipment

The time when the Patriot unit is released from the air battle is called release time and is normally specified in the movement order. At release time, all mission-essential equipment can be march ordered. The march ordering of equipment is an activity in which significant amounts of time can be saved. This savings depends on the quality, type, and amount of crew drill training. The march order crew drill must be practiced regularly. Because many Patriot unit moves are conducted at night, crew drill must be practiced under blackout conditions. Remember, as much non-mission-essential equipment as possible should be march ordered and loaded prior to release time.

Assemble the March Column

The order of march is designated by the battery commander. This is normally an SOP item and is based on the factors in planning and preparing for the occupation. Stinger crews are positioned in the convoy to provide weighted coverage toward the front and rear. M60 machine guns are positioned to weight the front and rear of the convoy. M249 machine guns are positioned throughout the convoy. Vehicles must remain dispersed until shortly before the convoy departs. Frequently vehicles will be dispersed into two nearby assembly areas — one for the maintenance platoon and battery headquarters and one for the fire control platoon and launcher platoon.

Prior to departure, the drivers and air guards of each vehicle are briefed on the route of march, actions to be taken upon ground or air attack, convoy speed, planned halts, and actions to be taken when vehicles break down. During the briefing, strip maps should be distributed.

Cross the SP

Because the unit will usually have road clearance only for the amount of time needed to road march to the RP, the unit should cross the SP at the time specified in the movement order. Crossing the SP too early or late may result in two convoys competing for the use of the same route. Interval between vehicles is established at the SP.

Move to the New Position

Procedures in the unit motor movements SOP should be followed. Since Patriot units in convoy are vulnerable to both ground and air attack, security procedures must be routinely practiced. Radio silence should be maintained to reduce the possibility of compromising the new unit position and of the enemy detecting and attacking the convoy.

Clear the RP

The RP must be cleared by the entire convoy at the correct time so that there are no road clearance conflicts with other convoys. The RSOP party equipment guides meet the battery vehicles and quickly guide them to the correct sites. First priority goes to siting mission-essential Patriot equipment.

OCCUPY, ORGANIZE, AND IMPROVE THE POSITION

When the Patriot unit clears the RP, guides from the reconnaissance party lead each item of equipment to the site selected for it during the reconnaissance. The most critical task is to make the unit operational as soon as possible. Tasks that are accomplished during occupation and organization of a position are—

- Emplace the Patriot system.
- Establish communications.

- Assume operational status.
- Improve the area (camouflaging and revetting).
- Establish local security.
- Select alternate positions.
- Prepare hasty radar coverage diagrams.

Emplace the Patriot System

Once the main body reaches the position, all unit efforts are focused on rapidly attaining a minimum engagement capability. Teamwork is the key to becoming mission capable as rapidly as possible. The only personnel not assigned emplacement tasks are the security forces.

Establish Communications

The battery normally monitors the battalion AM command net while on the move. However, every effort is made to maintain radio silence. Since communications systems are integral to the Patriot system, data link terminal and UHF communications are established simultaneously with the emplacement of the Patriot system. Priority of effort should go first to establishing data link terminal and then UHF communications. Data circuits are established prior to voice circuits.

Assume Operational Status

All Patriot mission-essential equipment is emplaced and integrated with the engagement control station. The firing battery must also be integrated with the battalion FDC via the UHF system. The battery is then prepared to conduct ADA operations in an integrated battalion defense.

Improve the Area (Camouflaging and Revetting)

Erecting camouflage systems will reduce the possibility of visual detection. Normally, positions will not be occupied long enough to make the construction of revetments worthwhile, unless engineer equipment is readily available. Improving the position should continue as long as the position is occupied. Additional operations security measures are found in chapter 8.

Establish Local Security

★ Members of the reconnaissance party provide initial security of the new position. They select perimeter defense positions, establish sectors of fire for M60 machine guns, and prepare range cards. All personnel not needed to prepare the Patriot system for operation are integrated into the ground defense. Once the unit becomes operational, members of the fire control and launcher platoons will replace many of those ground defense personnel from the maintenance platoon and battery headquarters. Stinger teams are deployed as the main body arrives. This results in one launching station taking more time to be emplaced; however, there is no adverse impact on the firing battery reaching minimal engagement capability. Ground defense is explained in greater detail in chapter 8.

Select Alternate Positions

Alternate positions are positions generally close to the primary position from which the unit can accomplish its mission if the primary position becomes untenable or unsuitable. Tentative alternate positions are selected during the map reconnaissance of the primary position. RSOPs for alternate positions are conducted as soon as the unit has become operational at the primary position.

Prepare Hasty Radar Coverage Diagrams

Radar coverage diagrams are graphic representations of radar target detecting and tracking capabilities. FM 44-15-1 explains how to prepare radar coverage diagrams. Hasty coverage diagrams are forwarded to the battalion S3 where they are evaluated to determine if there are any gaps in the battalion defense. The masked terrain maps which are generated by the Patriot system support fire direction decisions; however, they do not support defense planning.

FIRING BATTERY POSITION REQUIREMENTS

★ Primary areas selected in a new position are those for the fire control platoon, launcher platoon, and battery support elements. In addition, sites are selected for security forces and the Stinger teams. The site selected for the radar set provides the basis for siting other major items of equipment. Guidelines for site selection are listed below.

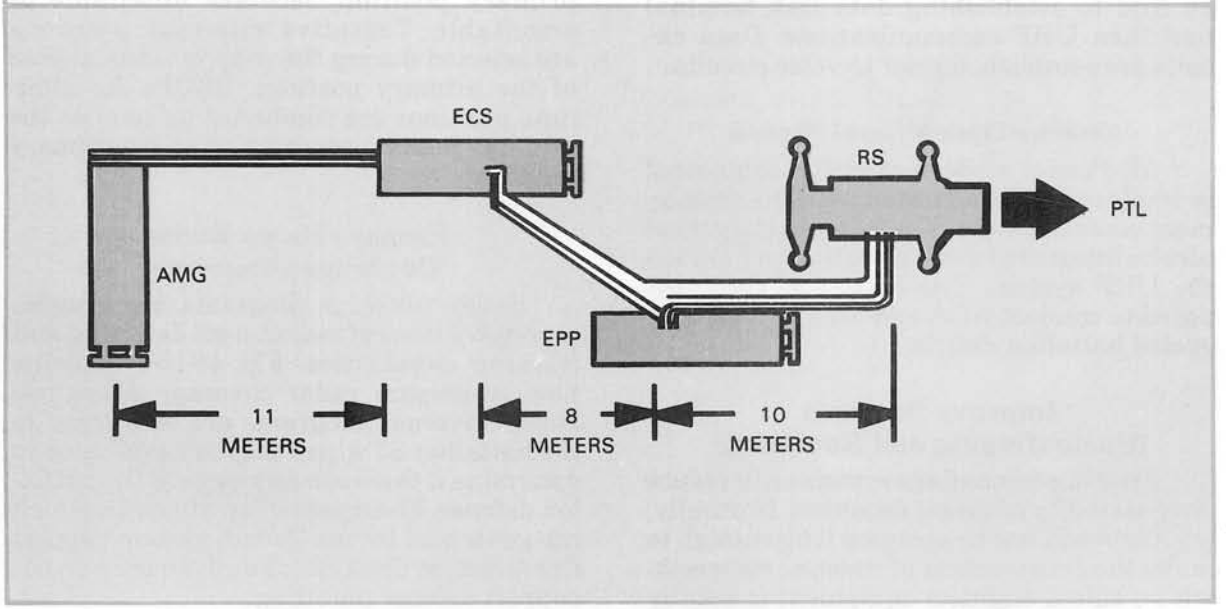
FIRE CONTROL PLATOON

★ The typical emplacement configuration for the fire control section is shown here. Note that the engagement control station, electric power plant, and antenna mast group are sited to the rear of the radar set, thereby keeping them out of the primary and secondary search sectors of the radar set. The section requires an area approximately 30 meters by 35 meters. Data and power cable lengths limit the distance the radar set, engagement control station, electric power plant, and antenna mast group can be set apart. (Cable lengths are shown in cable lengths illustration.)

CABLE LENGTHS

CABLE	TOTAL LENGTH meters (feet)	USEABLE LENGTH meters (feet)
POWER	23 (75)	16 (52)
RADAR/WEAPON CONTROL INTERFACE UNIT	38(125)	30 (100)
ELECTRIC POWER PLANT SIGNAL	23 (75)	16 (52)
ANTENNA MAST GROUP	15 (50)	11 (35)

TYPICAL EMPLACEMENT CONFIGURATION FOR THE FIRE CONTROL SECTION



Radar Set Considerations

The radar set must have an unobstructed field of view along the primary and secondary sectors of fire. Continuous-wave clutter sources, such as generators, should not be located in radar field of view. A radiation hazard exists in the track sector 120 meters forward of the radar set. Terrain slope must not exceed 10°. Radar set site universal transverse mercator grid coordinates must be determined through resection, map spotting, or measurements from benchmarks if engineer survey data is not available. If sited in a tree line on the forward slope of a hill, siting must still allow for reorientation to secondary target lines.

Engagement Control Station Considerations

★ The engagement control station is sited to the rear of the radar set and in a concealed area, if possible. Orient the door away from the radar set to minimize any RF hazard.

Antenna Mast Group Considerations

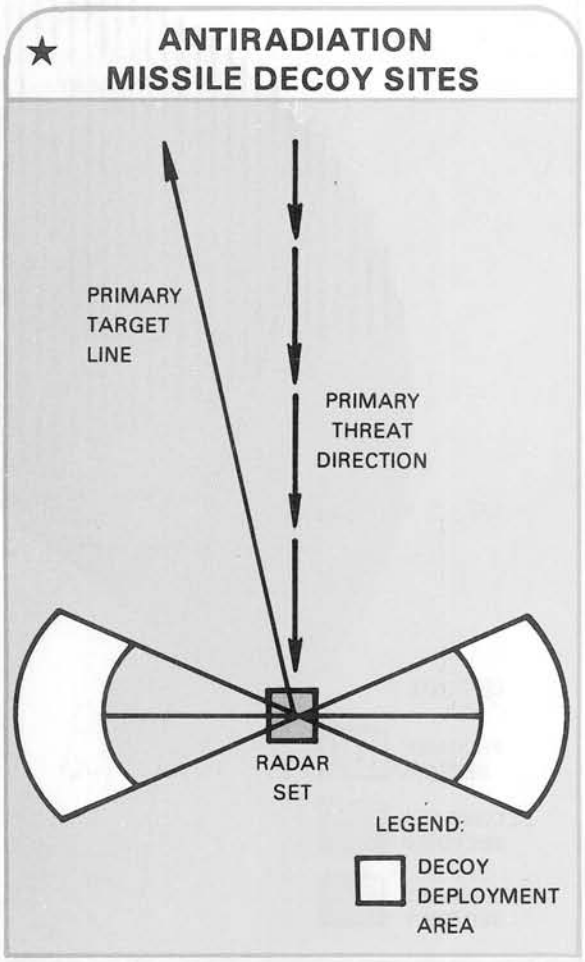
★ The primary consideration in siting the antenna mast group is to provide line-of-sight communications to the battalion FDC and adjacent firing batteries (or to the appropriate relays). As with the engagement control station, the antenna mast group must be to the rear of the radar set, in a concealed area (if possible). The antenna mast group requirement for level terrain is by far the most stringent leveling requirement of all pieces of Patriot equipment. The antenna mast group must be leveled within one half of a degree in both pitch and roll.

Electric Power Plant

★ The electric power plant is sited to the rear of the radar set in a concealed area, if possible.

Antiradiation Missile Decoys

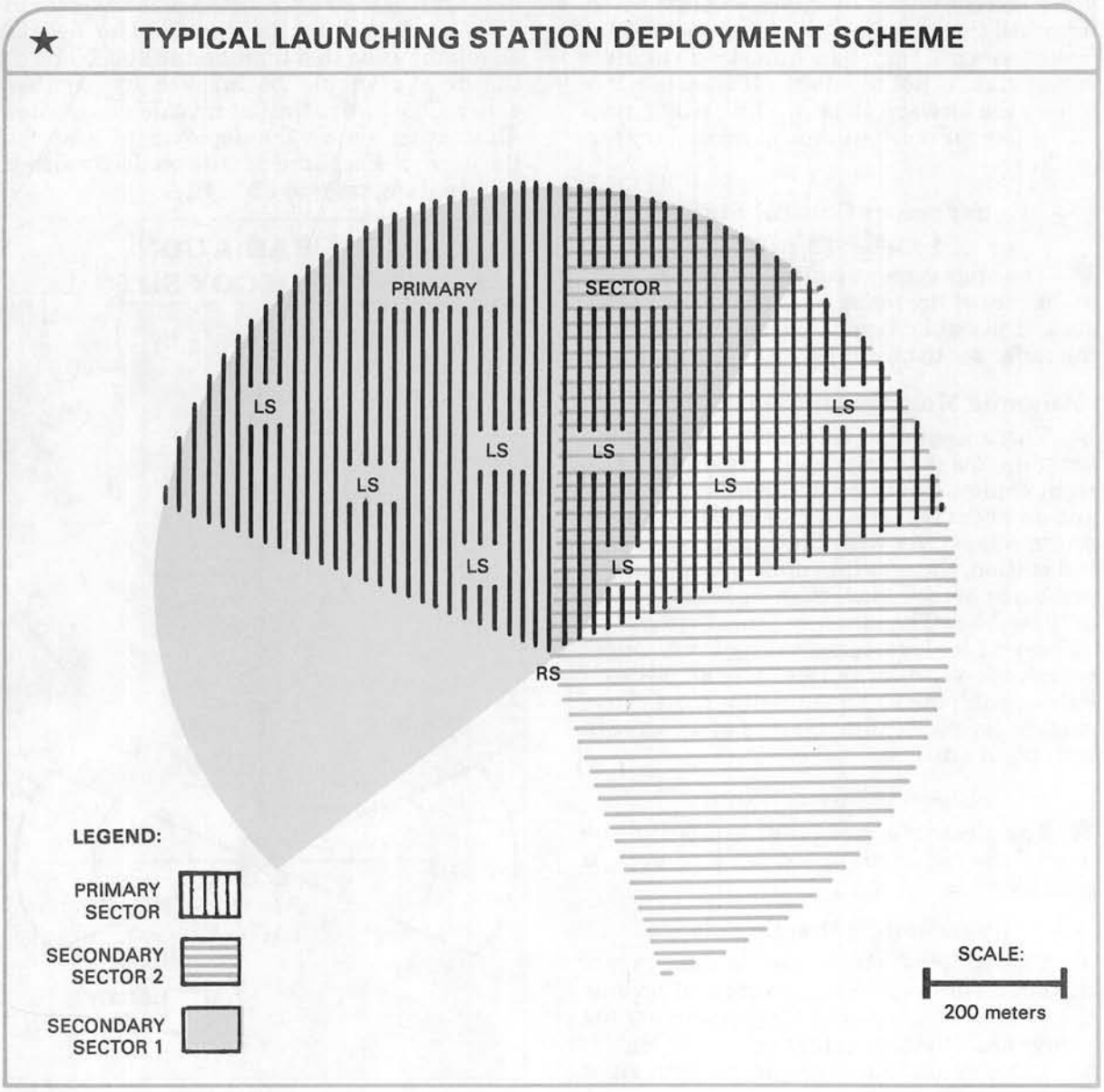
★ The antiradiation missile decoys are sited in an area 400-600 meters on either side of the radar set. It is immaterial whether the decoys are sited to the right or the left. But, in no case should decoys be placed both right and left of the radar set. The emplacement area is further limited in azimuth. The decoys can be emplaced in an azimuth limited sector to either side of a line perpendicular to the primary threat direction. The primary threat direction and the primary target line may not coincide. Each decoy should have clear line of sight in the primary threat direction. The decoy furthest away from the radar set should also be closest to the threat. The decoys should be sited in a diamond shape. None of the decoys should be masked by another decoy. The antiradiation missile decoy sites illustration shows the deployment area for the decoys. For more details on decoy siting information, refer to FM 44-1A.



LAUNCHER PLATOON

★ The typical launching station deployment scheme illustration shows deployment of launching stations relative to the radar set. The doctrine is to deploy so that 100 percent of the launching stations are available in the primary sector and at least 50 percent of the launching stations are available if the radar set is reoriented to cover either of the secondary sectors.

★ TYPICAL LAUNCHING STATION DEPLOYMENT SCHEME



Launching Station Considerations

The launching station site must be accessible. The ground must be able to support the weight of the launching station. Terrain slope must not exceed 10 degrees. A 6-meter by 15-meter clear area is required for the emplacement of the launching station. (If missile reload is conducted or planned at the site, an additional 10 by 15 meters is required to allow a guided missile transporter to park alongside the launching station.) Because of missile backblast, approximately 90 meters behind the launching station must be kept clear of personnel and equipment. The site must be inside a sector which is 20 degrees wider on each side than the radar track sector. Minimum and maximum separation distances between the radar set and launching stations are 120 and 1,000 meters respectively. Minimum distance between launching stations is 90 meters. Grid coordinates and azimuth reference to the radar set for each launching station are determined as time permits. First priority is given to launching stations that have line-of-sight. Second priority is given to launching stations that do not have line-of-sight to the radar set.

The alignment of the Patriot radar set and launching stations must be with respect to true north. This is because system coordinates used by Patriot are in longitude and latitude. Therefore, the north reference for the radar set and launching stations provided by the survey element of the RSOP must be a true north reference.

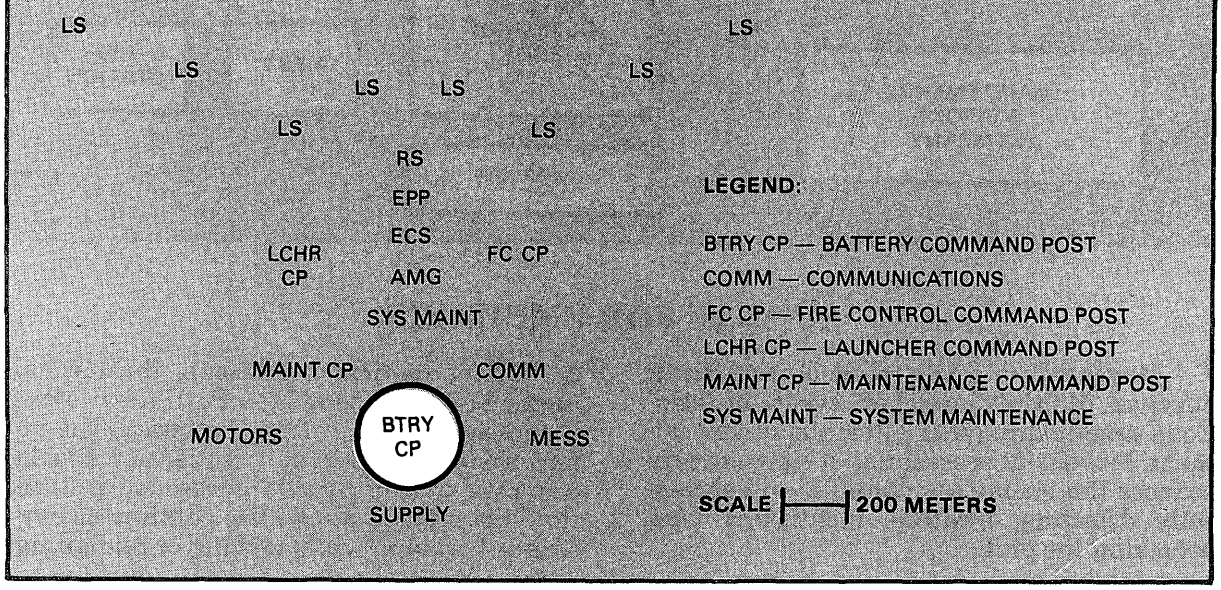
On-Site Missile Reload Considerations

A missile storage area, if required, is also selected. Pre-positioned guided missile transporter or guided missiles would be sited here until needed.

SUPPORT ELEMENTS

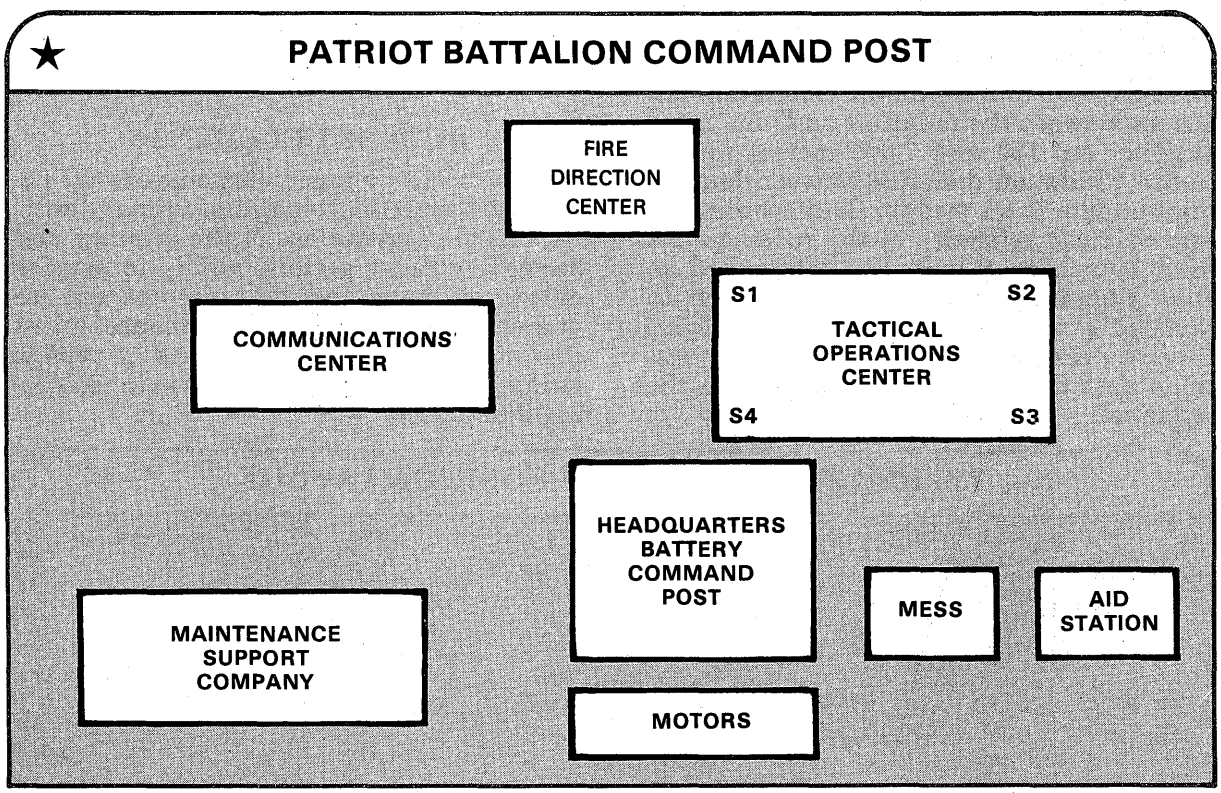
The battery support elements are sited to support the tactical elements. Primary criteria include staying out of the primary and secondary radar sectors, ability to provide effective support, good access routes, and use of areas that provide cover and concealment and enhance camouflage efforts. A typical firing battery position is shown in the following illustration.

TYPICAL FIRING BATTERY POSITION LAYOUT



BATTALION COMMAND POST POSITION REQUIREMENTS

The battalion command post contains the battalion tactical operations center, the fire direction center, and the battalion support elements. The Patriot battalion command post illustration shows a typical deployment of the CP. The primary consideration for positioning the CP is a location from which command and control of the firing batteries can be accomplished. This involves line-of-sight communications directly (or through communications relay groups) with the firing batteries, higher headquarters, and adjacent battalions. As with any other position, access to and within the position, security, cover and concealment, trafficability, and room for support elements are considerations. The battalion CP may be collocated with, or adjacent to, a firing battery to assist in local security and to reduce communications requirements. In some instances it may be advantageous to deploy the battalion support elements to a separate position to facilitate the support forward concept and to decrease the likelihood of detection and attack.



POINTS FOR EMPHASIS

Movement is a key method of insuring survival. Multiple launches reveal unit positions despite any other attempts at concealment. Movement is essential; it significantly reduces the enemy's probability of successfully detecting, locating, identifying, and attacking the unit.

★ Under tactical conditions, the normal method of movement for a Patriot battalion is by leap-frogging firing batteries. The information and coordination central should be moved during periods of lessened air traffic. This method allows the continuous coverage of an area while moving or realigning

the defense. In the extremely fluid environment of the modern battlefield, the RSOP party may be required to move from the occupation of a selected fire unit position immediately into an RSOP for the next fire unit position. This may entail the almost continuous movement of the RSOP party. The ability of the battlion FDC to manage the air battle is dependent upon the accuracy of the siting and alignment information of the batteries' radar sets. The ability to successfully engage aircraft requires accuracy of the launching station and radar set siting and alignment information. Without adequate accuracies, the functions of target correlation, site calibration, triangulation, and even missile acquisition are not assured. The Patriot battalion must maintain proficiency in the survey techniques which give the required accuracies.

The following illustration shows a typical combat day movement schedule. The day is divided into eight 3-hour blocks. Air defense warnings (red, yellow, and white) are shown for each three-hour block. At no time are more than two firing batteries or one firing battery and the ICC conducting movement. During the period of a higher air defense warning only one unit is moving.

As can be seen from the preceding discussion, RSOP with Patriot units may be continuous and complex. It is mandatory that careful planning be accomplished for the execution of the RSOP to be successful. With adequate training, many of the actions of the RSOP become "second nature" and are accomplished routinely. A Patriot unit can perform its mission only when in position and ready to fire. The time required for unit movement is out-of-action time. Units move frequently to accomplish their mission and survive on the battlefield. The Patriot unit must be able to move and regain an operational capability at a new position in the shortest possible time. This can only be accomplished through detailed, practiced RSOP procedures, that cover both day and night operations.

★ TYPICAL COMBAT DAY MOVEMENT SCHEDULE

3-HOUR BLOCK	1	2	3	4	5	6	7	8
AIR DEFENSE WARNING	W	W	W	W	W	Y	Y	R
BATTALION								
HHB	S	S	S	M	S	S	S	S
A	M	S	S	M	S	S	S	S
B	M	S	S	S	M	S	S	S
C	S	M	S	S	M	S	S	S
D	S	M	S	S	S	M	S	S
E	S	S	M	S	S	S	M	S
F	S	S	M	S	S	S	S	S
BATTALION MINUS								
HHB	S	S	S	M	S	S	S	S
A	S	S	M	S	S	S	S	M
B	S	M	S	S	S	S	M	S
C	M	S	S	S	S	M	S	S

LEGEND:
W — WHITE M — MOVEMENT S — STATE OF READINESS/EMISSION CONTROL Y — YELLOW R — RED

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CHAPTER 8

Operations Security

For Patriot units to successfully accomplish their mission on the air-land battlefield, information about friendly unit activities, plans, and operations must be denied to enemy forces until it is too late for these forces to effectively react. Operations security (OPSEC) and ADA survivability are synonymous for all practical purposes.

Generally, OPSEC includes the coordinated application of a wide range of techniques and procedures to deny information to an enemy. It is primarily common sense systematically applied to a unit's situation and mission. Countersuppression actions are taken to protect friendly operations from attack. OPSEC and countersuppression actions and procedures fall into four categories, the first three of which are OPSEC areas:

- Countersurveillance - action to protect the true status of friendly operations.
- Countermeasures - actions to remove or reduce the enemy intelligence and electronic warfare threat.
- Deception - actions to create a false picture of friendly activities and operations.
- Countersuppression - actions taken to directly defend or enhance the defensive capability of the unit.

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Section I — COUNTERSURVEILLANCE

AREAS OF COUNTERSURVEILLANCE

Measures and actions in this subcategory are those taken to prevent location of the unit by visual, electronic, or photographic means. Countersurveillance encompasses the following four areas:

1. Signal security (SIGSEC).
2. Electronic counter-countermeasures.
3. Information security.
4. Physical security.

Countersurveillance measures comprise the bulk of the actions available to the unit commander when incorporating OPSEC into his operations.

SIGNAL SECURITY

Signal security encompasses actions units can use to minimize enemy interception and analysis of radar and radio signals. Categories of SIGSEC are electronic security (ELSEC), communications security, and TEMPEST.

Electronic Security

ELSEC is the protection of transmissions from noncommunication devices. It includes measures such as approved operating procedures, proper siting techniques, maintenance procedures, and training programs. Radar emission control is the principal ELSEC measure and is addressed in section II.

Communications Security

COMSEC includes measures taken to deny the enemy information from friendly communications. This includes crypto security, transmission security, emission security, physical security of COMSEC information, and measures to insure the authenticity of communications.

Crypto Security. Crypto security centers on the use and control of speech secure equipment and codes. This equipment currently consists of bulk encryption devices, such as the KG-27 used with the AN/GRC-103 UHF radio, and the VINSON family of speech secure devices.

This equipment sends an unintelligible signal to receivers not having the same equipment. If the enemy has a limited SIGINT capacity, monitoring these secure nets will probably be of lower priority than nets operating in the clear.

These secured radio nets allow easy, rapid communications and are not as vulnerable to certain forms of electronic countermeasures. To maintain secure nets, it is essential that proper encryption codes and authenticators are used. Codes are changed regularly as prescribed.

Transmission Security. When using directional antennas (dipole, flyswatter, dish), units should position antennas to keep transmission lobes from facing directly toward the enemy. This will decrease vulnerability to ESM and ECM. Whenever possible, emplace equipment where terrain will mask transmitters from the enemy.

Emission Security. Brevity is also one of the keys to COMSEC. Unless a need exists to transmit, radios should remain silent. Necessary AM and FM transmissions should be kept short, 20-30 seconds to include short concise RATT messages. As much reporting as is tactically feasible should be transmitted via written reports and courier. The remainder should be channelled into the UHF system because that system normally operates 24 hours a day.

Physical Security of COMSEC Information. COMSEC materials must be very closely controlled. Limited dissemination is very important. Generally, radio operators should not have more than two or three changes of secure codes. If operations lend themselves to closer control, the new codes should be issued on an "as needed" basis.

Additionally, physical security of radio encryption equipment is of great importance. If a properly coded KY-57, for example, fell into enemy hands, the enemy would have access to the most sensitive unit communications. Therefore, speech secure devices should be guarded much the same as classified paper; properly stored, accounted for, and used.

Authenticity of Communications. In cases when secure nets are not available, tactical operations (TACOPS) codes must be used. To prove authenticity of clear text messages, authentication tables are required. It is imperative that all radio transmissions be secured or authenticated.

TEMPEST Hazards

This addresses those SIGSEC considerations that are less obvious. For example, radios and telephones may "leak" transmissions, known as TEMPEST hazards. If radio-frequency shielding of radio and command shelters (ECS, CRG, and ICC) is damaged, the unit may be transmitting in directions that are unplanned. Another common TEMPEST hazard is collocating secured wirelines with nonsecured ones. These lines must have, as a minimum, a 6-foot separation.

ELECTRONIC COUNTER-COUNTERMEASURES

Electronic counter-countermeasures are taken to protect friendly electronic emitters from enemy detection, location, and identification. ECCM, *in this OPSEC context,* includes use of proper power settings, antenna siting, masking and remoting radio antennas, equipment checks for radiation leakage, and proper training.

Siting

Units should attempt to emplace the radar set and radio antennas so that side and backlobes are absorbed or blocked. If this is not possible, try to orient these lobes parallel or away from enemy forces. This will reduce their vulnerability to jamming and detection.

Power Levels

Sometimes it is possible to burn through ECM by stepping up the power of the transmitter. To preserve this option, always operate on the lowest power level that will suffice. This will also reduce the range at which the threat can detect Patriot transmissions.

Antennas

Radar antennas are directional by design, as are certain radio antennas. Directional radio antennas should be used whenever possible. They will also channelize the signal and have the effect of boosting the radiated power in the desired direction.

INFORMATION SECURITY

Compromise of information security is the primary means whereby enemy forces receive the bulk of their intelligence. Some sources are lost documents, classified waste improperly disposed, passing sensitive information in the clear, discussing classified matters in unsecured areas, and generally failing to follow proper plans and procedures.

Control

The most important area is document control. Not only do documents contain a wealth of information, but, in addition, their compromise almost always affects more than one organization.

Considerations Two things to consider in document control are administrative control and physical security. Administrative control is the use of access rosters and classification markings. Physical security is the protection of documents during storage, use, and transportation.

Dissemination. Custodians should verify clearances and the need-to-know of everyone requesting access to classified information.

Only the minimum information necessary to the mission should be extracted or distributed to verified using personnel.

Denial. Units must always be prepared to deny their classified material to enemy forces. Measures range from simple evacuation to the destruction of materials. Since rapid destruction may become necessary, documents should be maintained in central storage facilities. If documents and equipment must be destroyed use document destroyers and thermite grenades. Document destroyers are placed in file drawers while thermite may be placed on the outside of the container. It is better to overuse flame devices than to leave classified materials for the enemy.

Field Security Procedures

Units should exercise the same care and safeguards over classified material in the field as is practiced in garrison. However, certain addition procedures should be implemented as the conditions are not always the same.

Storage. In many cases, regular four-drawer safes are too heavy to transport or are unavailable. Usually, field safes or field filing cabinets are used. These containers are generally too small for the number of documents in a Patriot unit. Additionally, a field filing cabinet is not secure. Therefore, documents should be kept in a continually manned location (CP, staff operations vans).

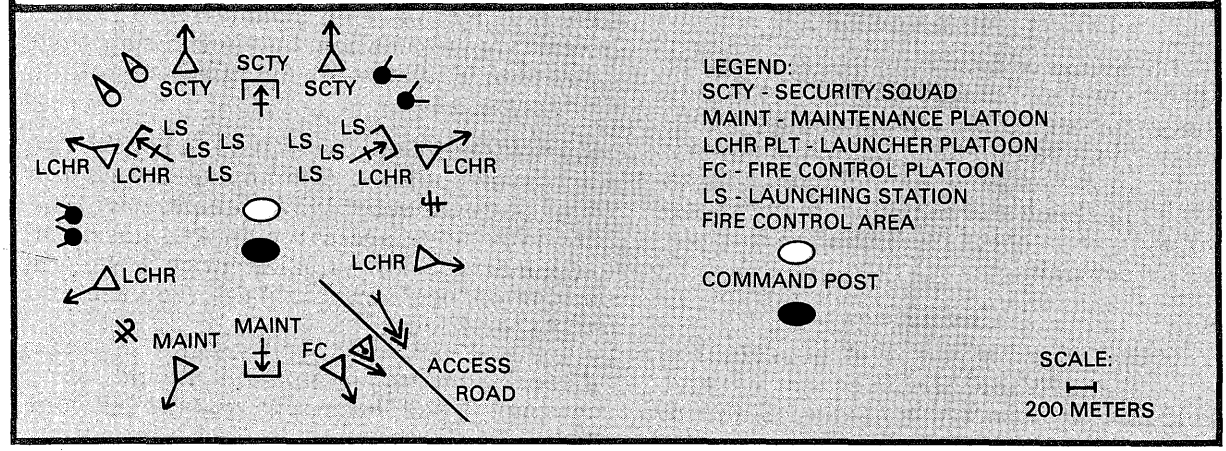
Classified waste. These papers (carbons, typewriter ribbon, extra or superceded material) must be securely stored until destroyed. It is recommended that this material be burned daily.

Site Police. A thorough clean up of paper scraps should be conducted to insure no classified material is inadvertently lost. All other document waste should be buried.

PHYSICAL SECURITY

Actions and measures used to defend a Patriot position are discussed in this paragraph. As a Patriot firing battery normally disperses over an area 1,000 meters in radius, commanders must be prepared to defend a large perimeter. To accomplish this, all available means of defense must be employed. The typical firing battery ground defense scheme illustration shows a sample ground defense.

TYPICAL FIRING BATTERY GROUND DEFENSE SCHEME



Barriers and Entry Control

All high-speed avenues of approach (roads, trails, open terrain accessible to vehicles) should be blocked if possible. Methods to accomplish this include:

- Mines.
- Wire barriers.
- Road blocks (vehicular).
- Earthworks (engineer support needed).
- Cratering (engineer support needed).

One route should be left open and monitored by an entry control point (ECP). If an access route is not blocked, it should be covered by light antitank weapon, M203, or crew-served weapons. If units have access to indirect fire support, (field artillery, mortars) preplanned missions should be coordinated. Whenever possible, units should use available engineer support to assist in constructing barriers.

It is necessary to have access to the position, however, the ECP must be rigidly controlled. To achieve control, it is necessary to halt vehicles and personnel. For this reason, an ECP must either be covered, or have a covered holding area nearby. Communications to the unit command post are essential. Most organizations collocate their ECP with a bunker, providing medium weapon coverage and communications through the perimeter defense net.

The function of the ECP is to halt, identify, and record the passage of personnel and equipment in and out of the battery position. Personnel who are not assigned to the unit should not be allowed to enter until authorized by the CP. The ECP is normally manned by an element from battery headquarters.

During night operations, personnel manning an ECP should split into two teams. These are the security team and control team. The control team challenges and records entries and exits, while the security team provides cover from a concealed overwatch position.

Bunkers/Weapons Sites

Sites for M60 machine guns should be selected to provide all-around defense. Sites are selected to give the best defense the terrains allows. Then use trip flares, booby traps, and Claymore mines, and employment of reaction forces to cover gaps in the machine gun fields of fire. Insure that LAWs are available along vehicle approach routes. If time permits, crew-served weapon sites should be bunkered to enhance their survival. These weapons are the backbone of the defense and will be targeted. Weapon sites should be dug for all individual and crew-served weapons. Bunkering is a desirable second priority.

Each weapon site should have a range card showing sectors of fires. The bunkered sites must have communications to the command post. Wire communications are preferable; FM radio serves as a backup until wire is laid. These sites are continuously manned.

Observation Posts/Listening Posts

Observation posts (OP) or listening posts (LP) along covered avenues of approach should be continuously manned. Properly positioned OPs and LPs provide early warning and may provide fire direction if artillery support is available. Typically, the security squad mans two OPs, the launcher platoon mans four OPs, fire control platoon mans one OP, maintenance platoon mans one OP, and battery headquarters mans the ECP. These posts must have communications to the CP via wire lines. These short stretches of wire will not hamper unit mobility, as the posted personnel can recover the wire as they return to the perimeter. If the battery is not augmented with a security squad, adjustments must be made in the ground defense plans.

The wire lines also provide a ready guide for personnel returning to the perimeter at night. By following the lines, soldiers will enter the perimeter at the same place each time. To facilitate safe passage and control, wire lines are routed through a bunker or ECP.

In addition to OPs and LPs, small patrols may be employed as an additional physical security measure. The security squad is trained on patrolling techniques.

Reaction Forces

To counter small-unit, sabateur, and terrorist attack, two quick-reaction teams are designated and on standby. These teams have the following tasks:

- Defend the firing battery with emphasis on the fire control and launcher platoons.
- Contain penetrations.
- Counterattack to restore the perimeter.
- Act as hunter teams to suppress snipers.

The fact that these teams are available does not remove the requirement for all available personnel to respond to ground attack and return fire. Both quick-reaction teams should not be dispatched to the same area unless necessary. This will prevent overcommitting manpower to a feint attack.

Alarm Systems

It is not feasible to disseminate voice warnings to all soldiers. Therefore, audible and visible area alarms are used. Standard means for both types are prescribed in a variety of publications such as STANAGs and joint manuals. Control of the alarms is automatic (as with chemical M8 series) or manual. Manual alarms can be sounded by anyone detecting a hazard, or on direction of the CP.

Due to the large area covered by a Patriot unit, audible alarms originating from a single source will probably not be heard throughout the area. Additional alarm points and visual markers must be used to insure all personnel receive warnings of hazards. These alarms range from vehicle and equipment horns and sirens, metal ring and bar systems to colored flags and geometric shapes. All unit personnel must be trained to recognize and react properly to all alarms.

Control of Ground Defense Operations

All activities conducted to insure the unit is defended must be integrated into a central control element at the battery CP. This gives the commander an ability to oversee his entire defense from one location; to direct actions and monitor the status. The CP also collects tactical information from bunkers, ECPs, OPs, LPs, and quick-reaction teams.

The CP must have communications with the subordinate elements. Wire is preferred, and two separate networks should be available. Rapid relay of NBC reports and warnings to and from the perimeter is also accomplished over the ground defense nets.

STANDING OPERATING PROCEDURES

As a general rule, countersurveillance procedures such as camouflage, concealment, pattern painting, and light and noise discipline are covered in SOPs. SOPs also cover the way units make use of buildings, forests, roads, and equipment.

CAMOUFLAGE AND CONCEALMENT

These are the two traditional methods of reducing visibility on the battlefield. With the great variety of detectors available to modern armies, they have become more important than ever before.

Camouflage Screen Systems

These systems come in two types: radar/infrared scattering and radar transparent. The radar/infrared scattering is the primary system and comprises the bulk of the unit's issue. Radar/infrared scattering screens are used to camouflage selected unit equipment except radar and radio antennas. The transparent screens are used specifically for that purpose as radars and radios can operate beneath them without significant signal degradation. As these screens are not interchangeable, care must be exercised to insure each is used for its intended purpose. There are also different color schemes for each; woodland and jungle.

Camouflage screen systems are lessened in value if the support systems are not prop-

erly employed. The poles and spreaders must be placed to raise the screen off the top and away from the sides of the item being camouflaged. This prevents the outline from being revealed. In the case of the radar transparent screens, poles should not be placed in front of the antenna lens. Care must be used when camouflaging the LS. The front of the launch tube and rear of the LS must be kept clear.

Vegetation And Terrain

The Patriot system is unique among ADA systems in that it can be almost completely concealed without affecting system operations. The RS and LS can be sited in woodlines, as long as openings exist for their tactical operation. Equipment in fields should be placed near the edges to blend the camouflage with the woodline. Emplacing in and around woods has the following advantages:

- Camouflage is natural and less likely to attract attention.
- Radar/infrared scattering screens can be employed primarily along the sides of equipment to help defeat side-looking airborne radar (SLAR) surveillance.
- Air under trees is cooler; branches and leaves spread heat from equipment and shadow heat sources. This reduces infrared detectability.
- Trees provide some natural protection against small arms, fragments, and NBC. Trees also reduce and screen missile backblast and launch flash.
- Personnel can move more freely when concealed by woods.
- Trees absorb radar and radio sidelobes and backlobes.

In the event a unit is employed in an area that is built up, a modified approach is taken. Equipment can be emplaced in and around buildings without great difficulty. Trucks and generators should be parked and camouflaged in places where shrubbery would normally be found. A camouflaged item standing in the middle of a paved area is not hidden. As another example, placing a radar set in a courtyard will block side and backlobe radiation. The buildings also provide shelters, billets, CP and decontamination facilities, and landline communications.

TONE DOWN

By itself, camouflage and concealment are not sufficient to completely hide a unit (it may be impossible). Even a well concealed position can be revealed if proper tone down has not been accomplished.

Reflective Surfaces

Reflectors, lights, and windows will reflect and "flash" sunlight if they are not properly covered. Anything, such as canvas, clothes, grass, mud, and sandbags, can be used to perform this function. The only limiting factor is the ingenuity of the soldiers and leaders.

Infrared Sources

One common method of tone down for vehicle windshields is to raise the hood. This method is good if the engine is cold. Raising the hood when the engine is hot just exposes a very good infrared source to enemy detection. Camouflage paints issued to US forces are infrared absorbing, therefore the hood should stay down until the block has cooled. Other infrared sources that are easily identified include:

- Exhaust pipes.
- Tires (heated by road march).
- Exhaust vents.
- Power cables.

Everything should be covered with proper camouflage screening and/or infrared paint. Tires can be smeared with mud. Cables should be buried or covered. Units may consider carrying a supply of white material to serve as winter camouflage.

Tracks

When driving into positions, it is inevitable that some tracks (ruts in mud or soft earth, trampled grass and weeds) will be left. These tracks are excellent indicators of occupied positions, as well as individual sites within a position. After the system is operational, the following actions should be accomplished:

- Fill in any rutted areas.

• Rake over or standup any flattened weeds or grasses.

• Move vehicles away from the points where they entered the woods.

Until erased, any tracks left by the vehicle will act as a pointer to the vehicle's site.

To avoid leaving trails in obvious locations the following rules apply:

• Enter and travel through fields and meadows on the edges. Tracks are harder to see near boundaries, and often trails are already established.

• When crossing a plowed field, whenever possible cross in the same direction as the furrows.

• Emplace equipment near the edges of open areas, close to woods or roads and trails. This provides covered routes or even already existing farm trails to equipment locations.

• Refuel the 15-kw generator on the Patriot LS using 5-gallon fuel cans. This will avoid leaving trails with the unit tanker.

If revetting is to be accomplished, obtain dirt from covered or distant locations, or use the dirt excavated when placing equipment in trenches or dugouts.

NOISE AND LIGHT DISCIPLINE

Even if all other passive defense measures are implemented perfectly, they are useless without proper noise and light discipline.

Noise discipline will be somewhat hard to implement fully due to the requirement to operate generators. Current models are reasonably quiet and the noise can be deadened further by vegetation and buildings. Using ducting materials can further muffle sound. The following are other sounds that should be minimized:

• Metal striking metal.

• Loud voices.

• Ringing telephones.

• Gunfire.

These sounds are not necessarily loud, but they are distinctive and catch attention easily.

While noise control is a consideration 24 hours a day, light discipline really only comes into play during night operations. White light can be seen for extremely long distances at night, and even the red "blackout" lights are visible a good distance. To reduce the light signature from unit locations perform the following:

• Cover bottom flaps of all tents. Repair holes and tears to prevent leaks. Keep ventilation flaps closed at night; the night air is cool enough to keep temperatures down.

• Keep the M14 protective airlock installed on the ECS/ICC.

• Turn out all lights when entering or exiting tents/vans. Proper entry control will eliminate problems. Use shades on all lights. Use blue or green bulbs whenever possible.

• Use blackout drive when moving at night. When flashlights must be used, use a blue or green filter. Try to avoid shining the light upward.

• Emplace away from likely ground approach routes. Emplace in covered locations whenever possible.

• Use no fires. Mess burners are kept inside at night.

• Keep covers on control panels with indicator lights closed. Open them under cover; (a poncho or blanket).

• Make every effort to emplace LSs in woods, and clear flammable material from the backblast areas. Trees help screen the flash from the launch; clearing the back area will reduce the fire hazard.

SITE HARDENING

As with all electronic equipment, Patriot units are vulnerable to damage from small arms fire and fragmentation.

The most common method of gaining protection from hostile fires is to use the existing terrain. Except for the radar set, emplacing in gullies, ravines, woods, even buildings, provides cover (and concealment) from attack. Patriot units have no organic earthmoving equipment. Any major site improvement will have to be done by supporting engineer units. If engineer support is available, revetments should be constructed for the system and personnel areas.

To enhance unit ability to survive ground and air attack, fortifications may be devised, especially for crew-served weapons. Obviously, the degree of hardening depends on how long the unit will be occupying a particular position. Bunkers and foxholes should have overhead cover as a defense against napalm and NBC. This overhead cover could not hamper small arms fire against aircraft.

Whether or not time exists to revet and fortify, proper dispersal of equipment enhances survival. In a highly mobile situation, dispersal may be the only way to protect the system.

Section II — COUNTERMEASURES

MOVEMENT

Countermeasures are actions taken to reduce the enemy threat by removing or covering indicators of unit presence, or actions that offset an inherent weakness of the unit.

Movement is a primary method of insuring survival. Multiple launches will reveal unit positions despite any other attempts at concealment. Movement is critical to Patriot survival. Patriot firing batteries should move at least once daily.

To maintain the Patriot unit's mobility, planning and care in execution must be exercised. The Patriot equipment is large and heavy, so emplacement and convoy movements will become more important than for previous HIMAD systems. Silent moves could be the normal. Movement procedures are detailed in chapter 7.

RADAR EMISSION CONTROL

Radar equipment should only radiate when required. Repairs and checks should be accomplished in a quiet mode whenever possible. Initialization parameters should be loaded or obtained from other sources to avoid having to radiate unless active surveillance, mapping or engagement is being conducted. Only radars needed for early warning should radiate; all others can wait in ambush. When two or more units can maintain surveillance over the same area, coverage can be alternated between units. Units should plan to change PTL of firing batteries at intervals, if this can be done without degrading the battalion radar coverage. EMCON schedules are prepared at battalion level. Emission control schedules for three and six operational firing batteries are shown in the emission control schedule illustration. In this example, each battery is in two hours of standby, when the unit exercises EMCON, and one hour of surveillance operations when the unit actively performs surveillance. This radar blinking makes RDF efforts less successful. Shorter radar blinking periods increase survivability by reducing the effectiveness of enemy RDF equipment, but may cause increased radar maintenance. EMCON combined with movement are two keys to Patriot survival on the air-land battlefield.

EMISSION CONTROL SCHEDULE

THREE OPERATIONAL FIRING BATTERIES
30 MINUTE INTERVALS

BTRY	1	2	3	4	5	6
A	E	E	S	E	E	S
B	S	E	E	S	E	E
C	E	S	E	E	S	E

SIX OPERATIONAL FIRING BATTERIES
30 MINUTE INTERVALS

BTRY	1	2	3	4	5	6
A	E	E	S	E	S	E
B	E	E	E	S	E	S
C	S	E	E	E	S	E
D	E	S	E	E	E	S
E	S	E	S	E	E	E
F	E	S	E	S	E	E

LEGEND:
E - EMCON
S - SURVEILLANCE
BTRY - BATTERY

Section III — DECEPTION

DECEPTION OPERATIONS

Deception operations are taken to mislead an enemy. They may include the following:

- Dummy equipment.
- Demonstrations.
- Distortion of an activity so it is not what it seems.
- Feints.
- Manipulation of electronic signatures.

Deception operations may be conducted because a commander sees an opportunity to deceive the enemy. A deception may be required because countersurveillance operations are not sufficient to mislead the enemy so an operation can succeed.

By properly using deception techniques, units can enhance the effectiveness of their other defense measures.

DUMMY POSITIONS

If enemy forces believe a false position is real, they will either cease looking or be less sensitive to indicators of an actual position. Dummy positions can be one or two items of equipment "accidentally" exposed to enemy surveillance. These exposed "end items" can be wooden mockups; cannibalized, destroyed, or non-operational pieces of equipment. Building fires in concealed sites near the dummy items can give false infrared and smoke signatures. A deliberate dummy position generally requires more equipment, and thus more time. The advantage of a deliberate position over a hasty site lies in its believability. A deliberate position has more ancillary items, such as camouflage nets, tents, and personnel.

Another form of deception is infrared deception. Infrared sensors are commonly

found on the battlefield, therefore, giving false infrared indicators raises the believeability of a dummy position. When a unit cannot disperse or hide its infrared emissions, it might be possible to disguise it. For example, when emplaced in built-up areas, generator exhaust can be ducted into buildings thereby simulating normal furnace output.

DECOYS

Patriot ARM decoys are currently under development. These decoys will deceive the seekers of ARMs as to the actual site of their intended target—the Patriot RS. The decoys also serve to reduce the accuracy of threat RDF sensors.

Section IV — COUNTERSUPPRESSION

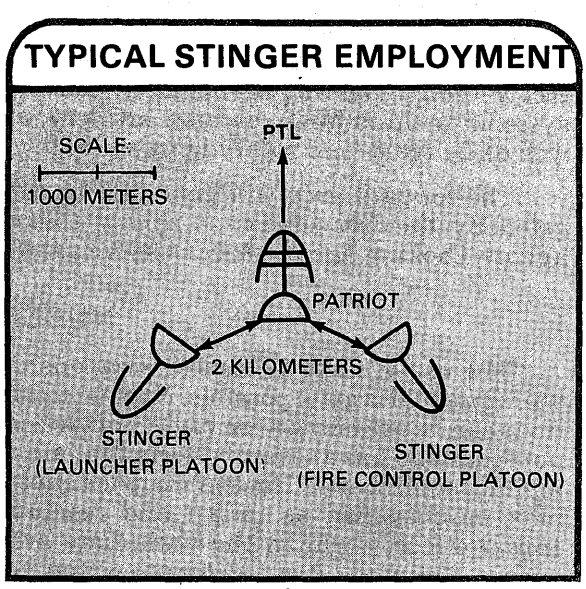
STINGER AND SMALL ARMS FIRES

Countersuppression actions are those actions a unit takes to increase its survivability if attacked. Self-defense against air attack and NBC defense techniques are covered in this section. Ground defense has been previously covered in section I.

The Patriot battery has a mix of Stinger and small arms available for close-in defense against air attack. Each firing battery has two Stinger teams and HHB has one. Patriot units have M16 rifles, and M60 and M249 machine guns available.

STINGER EMPLOYMENT

In defense of a firing battery, Stinger teams should be positioned on nearby terrain astride likely air avenues of approach approximately 2 to 3 kilometers from the fire control area. To provide coverage where the Patriot system cannot engage, the Stinger teams are normally positioned approximately 120° on either side of the PTL. A typical Stinger deployment is shown in the typical Stinger employment illustration. This deployment of Stinger teams allows for two potential intercepts prior to ordnance release. Because the battery TCO and TCA cannot see targets out of the radar's track sector, Stinger team members must be trained to visually identify aircraft without the benefit of early warning alerting or cueing. (In some cases, Stinger teams may be able to tie into a SHORAD battalion early warning broadcast net (EWBN). FM 44-18 contains more detail on Stinger team operations.



SMALL ARMS

Small arms are used for self-defense against attacking aircraft. Small arms have a limited range in an AD role and require close coordination to be effective. Effective range in the AD role of the M16 rifle and M60 and M249 machine guns is 350 meters.

The primary consideration in using small arms against aircraft is volume of fire. All fighting positions should be able to fire on overflying aircraft (especially the crew-served machine guns) so that attacking aircraft can be driven off before significant damage is done. Early warning must be disseminated to these weapons positions from the unit CP or ECS. FM 44-8 describes techniques which any unit can use to counter air attack.

NBC DEFENSE TECHNIQUES

NBC defense techniques must be fully integrated into all aspects of operational planning and execution. The Soviets have a large and versatile arsenal of chemical and nuclear munitions. In some Soviet forces, commanders have delegated authority to use chemical munitions to the division level.

Since some chemical agents are persistent, they are an excellent method of hindering ADA units. Chemical contamination of areas or equipment could greatly hamper the ability of ADA units to accomplish their mission.

While this section is not intended to present an in-depth overview of NBC defense measures, it will highlight the important areas for consideration.

CHEMICAL AGENTS

Patriot units can expect to face the full range of chemical agents and munitions, with the preponderance of type being influenced by the unit's mission and location. For example, unit's located in the rear operations area can expect to see persistent chemical agents delivered by long-range rockets, tactical ballistic missiles, and aircraft spray tanks and ordnance. The more forward units will receive non-persistent agents from delivery systems such as MRL, cannon artillery, as well as by fixed- and rotary-wing aircraft.

The forward area will generally be targeted by the less-persistent agents (blood agents, choking agent, gaseous nerve agent) in massive strikes. The intent is to cause large scale casualties over a wide area to disrupt and disorganize the defense. The non-persistency of these agents allows the Threat to advance with relatively little hazard to its own forces.

The rear area forces can expect to receive more persistent types of chemicals, such as liquid nerve agent and the blister agents. These will be targeted on airfield operations areas to slow the counterair and CAS sortie generation rate; on logistics complexes to slow resupply; on supply routes to slow or reroute traffic, or to create choke points for air interdiction.

NUCLEAR STRIKES

The use of tactical nuclear weapons on the battlefield is quite possible. Nuclear munitions can be used for a wide variety of tactical purposes and have several effects that are of military significance. Nuclear weapons effects may be classified as initial and residual. Initial effects occur in the immediate area within 1 minute after a detonation and are most important to the commander since they will create personnel casualties and materiel damage within the timespan of the current operation. The principal initial casualty-producing effects are blast, thermal radiation, and initial nuclear radiation. Other initial effects (EMP and transient radiation effects on electronics [TREE]) affect electri-

cal and electronic equipment. Residual effects, such as fallout, are primarily of long-term interest but, under certain circumstances, may also have serious impact on success or failure in the immediate battle area.

INDIVIDUAL AND COLLECTIVE MEASURES

The purpose of this paragraph is to outline both individual and collective measures for defense against chemical, biological, and radiological hazards on the air-land battlefield.

The objective of individual and collective protection against NBC hazards is to survive and fight. To reduce the impact of these hazards, the primary principle is to avoid both immediate and residual contamination hazards. Whenever possible, units avoid intentional or inadvertent entry into known or suspected areas of contamination. If the unit is in a clear area which subsequently becomes contaminated, the unit leaves the area as soon as operationally possible. When contamination cannot be avoided, protection is required—protection for each soldier and in many cases, collective protection for selected teams or crews. Protection enhances survivability against both the immediate and residual hazards and supports mission accomplishment for limited periods of time (several hours for individual protection, days for collective protection). If the residual contamination hazard must be reduced or eliminated, decontamination is eventually required. Therefore, the following three fundamental measures form the basis for defense against NBC hazards:

1. Contamination avoidance.
2. Protection.
3. Decontamination

Factors to Consider

Flexibility is essential to adapting the three NBC defensive fundamentals to situations anticipated on the battlefield. When subjected to an NBC hazard, each commander assesses the following factors in planning his course of action:

- The assigned mission.
- The impact of casualties and equipment damage on his ability to accomplish the mission.
- Identification of the type, degree, and persistency of the hazard.
- Influence of weather and terrain on the hazard.
- Impact of prolonged operations in partial or full protection.
- Time required and available to react.
- Estimate of effort necessary to eliminate or reduce the contamination hazard.
- Probability of follow-on NBC attacks.

Contamination Avoidance

Contamination avoidance refers to those individual and unit collective measures taken to evade or minimize the immediate and residual NBC hazards. Contamination avoidance reduces, and sometimes eliminates, requirements for protection and decontamination. Contamination avoidance is achieved as follows:

- Take passive OPSEC measures.
- Limit contamination spread.
- Detect, identify, and mark contamination hazards.
- Issue contamination warnings.
- Relocate to an uncontaminated area.

Protection

Prior to enemy use of NBC weapons, commanders evaluate the impact of NBC hazards on mission performance. Based on this analysis, appropriate levels of individual and collective protection are established. Individual protection enhances the soldiers survivability and capability for continued

operations in an NBC environment. Individual protection includes the following:

- Prophylactic measures.
- Protective uniform.
- Decontamination and first aid kits.
- Field protective mask.

Collective protection is provided in both the ECS and ICC. This equipment provides total collective protection—overpressure plus an environmental control system.

Decontamination

Decontamination is the removal or neutralization of hazardous levels of NBC contamination from personnel and materiel. Extensive time and logistical support factors make decontamination a requirement a commander wants to avoid or circumvent in an intense battle. These reasons highlight the importance of contamination avoidance. If commanders can keep their soldiers, equipment, and supplies from becoming contaminated, decontamination may not be required. Decontamination is undertaken only if it helps preclude casualties and enhances combat effectiveness.

The decontamination system emphasizes simplicity, speed, and thoroughness. Partial decontamination of unit equipment and supplies is performed as far forward as possible and at the lowest levels by operators and crew personnel using on-board decontamination systems. The intensity and fluidity of combat on the battlefield establishes partial decontamination as the expected mode of operation. Complete decontamination is accomplished only when absolutely necessary and requires the assistance of specially trained teams.

Emergency Decontamination. Emergency decontamination is the immediate neutralization or removal of contamination from exposed portion of the skin. Emergency decontamination is performed to enable the soldier to survive. It is conducted by the individual soldier, or if he is incapacitated, by another soldier.

Partial Decontamination. Partial decontamination is the removal or neutralization of all visible or detectable contamination from individual clothing and equipment and from those surfaces of equipment that operators or crew personnel must contact to perform their mission. Its objectives are to prevent contamination of clean soldiers and equipment, limit the spread of contaminated soldiers and equipment, and reduce requirements for complete decontamination. Partial decontamination is conducted by unit personnel as a normal, ongoing function.

Complete Decontamination. Complete decontamination reduces all or most of the contamination hazard to a level which permits removal of the individual protective mask and gloves. The objective is to increase combat effectiveness by eliminating the requirement for soldiers to fight and operate in full protective clothing. Because complete decontamination requires time and additional resources, it is conducted only when necessary to continue the mission or to support another requirement, (maintenance, rest and relief, reconstitution). Decontamination assistance is provided by decontamination teams at battalion level. Specialized decontamination units at corps and division levels conduct or assist in complete decontamination of unit equipment.

NUCLEAR WEAPONS EFFECTS DEFENSE TECHNIQUES

Defense techniques are proposed configurations and procedures for employment of personnel and equipment to lessen or minimize their vulnerability to nuclear weapons effects. These techniques are intended to be field expedients. Defense techniques fall into three general categories: actions taken before, during, or after a nuclear attack.

Defensive Actions Before a Nuclear Attack

An enemy nuclear attack will probably come with little or no warning. Warning of a planned nuclear strike by friendly forces can be expected only minutes before the designated time-on-target. In either case, there will

be little time to take protective actions. Individual and unit defensive measures must be automatic and instinctive. Therefore, long-range planning, training, and maintenance for operations on the nuclear battlefield as well as an understanding of the optimum protective postures for "strike-warned" troops are essential.

Preparation of the Battlefield. As with conventional operations, knowing the terrain and using it to our advantage is basic. Prior reconnaissance will help in finding cover, such as caves, ditches, and culverts, during an attack. Extraordinary consumption of expendable materials, medical supplies, and water can be anticipated. Knowing the location and availability of water sources can greatly help decontamination efforts.

Preparation of Personnel. The need for training is obvious. If we expect the soldier to continue combat operations after a nuclear attack, he must be taught how to recover from the effects of the nuclear explosion and how the unit plans to operate in a nuclear environment.

Unit Operations. Operationally, the most effective means of surviving on the nuclear battlefield is to avoid being detected and targeted from the start. Dispersed units and equipment are less likely to be detected and are less likely to be destroyed by the effects of a nuclear attack. Camouflage not only reduces detection, but can significantly reduce the effect of thermal radiation. Cover is the best protection from nuclear attack. Whenever the tactical situation allows, critical facilities, personnel, equipment, and supplies should be dug in or placed in the best shelter available. The basements of masonry and light steel buildings can provide significantly more blast and radiation protection than wheeled vehicles.

Recommended Protective Postures for Personnel. Some of the actions to consider for self protection on the nuclear battlefield are as follows:

- Protect your eyes. Do not look at the fireball.
- Minimize exposed skin areas.
- Protect exposed skin areas.
- Keep clothes loosely fitted.
- Wear headgear at all times.
- Remove dark camouflage face paint.
- Wear ear protection.

As stated before, digging in, or taking cover before an attack provides the best protection from nuclear effects. Some considerations when digging in are—

- Earth is a good shielding material.
- Dig round foxholes.
- The smaller the foxhole opening, the better.
- A deep fighting position/foxhole gives more radiation protection than a shallow one.
- Keep as low as possible.

An overhead covering of earth or other material will reduce the amount of thermal and initial radiation that reaches the soldier and help prevent the entrance of fallout. Massive overhead cover is best, but it must be able to withstand the blast wave. The following are important factors to remember in construction of effective overhead cover:

- Choose dense covering materials.
- Cover in depth.
- Provide strong supports.
- Cover as much of the opening as possible.
- Vehicles make good expedient overhead cover.

Certain type of buildings offer excellent shelter from the effects of nuclear detonations and require a minimum of time and effort to adapt to your needs. Choose the buildings carefully. The strongest structures are heavily-framed steel and reinforced concrete buildings, while the worst choices are the shed-type industrial buildings. European

rural and urban structures can provide good protection. Characteristics to look for include pre-WWII design and construction; full basements constructed of concrete and stone; thick-walled, masonry structures; and buildings with the least amount of glass. Select a shielded building. Get below ground level, if possible. Your position inside of the building can make a difference.

Generally, wheeled vehicles not only provide little or no protection from the effects of nuclear explosions, but are particularly vulnerable to vehicle overturn and therefore expose driver and passengers to increased risk. Mitigation techniques are to—

- Avoid the use of wheeled vehicles.
- Protect yourself inside the vehicle.
- Secure all loose equipment inside the vehicle.
- Prepare alternate shelters.
- Park the vehicle inside a shelter.

Recommended Protective Posture for Equipment. Equipment is vulnerable to the same basic nuclear effects that personnel are. However, air blast will normally dominate by dragging, overturning, or crushing equipment. Nuclear radiation can cause TREE. In general, the same procedures used to protect personnel will be needed to protect equipment. These general procedures are listed below:

- Dig in.
- Secure all loose equipment.
- Seek shelter.
- Anchor or tie down when possible.

Blast damage to wheeled vehicles is one of the predominant effects which can be expected from a nuclear burst. The majority of damage will be the direct result of vehicle turnover. Some considerations are—

- Place vehicles tail-end to the blast.
- Place two or more vehicles side-by-side.
- Leave brakes and transmissions disengaged.
- Remove, cover, or tape glass.
- Protect critical areas of the vehicle.
- Anchor or tie-down vehicle and cargo.
- Cushion and shock-secure sensitive equipment.
- Protect vehicles in slot trenches.
- Do not park vehicles on asphalt.
- Consider removing vehicle canvas and seats.

Tactical communications and electronic equipment are vulnerable to nuclear blast and thermal effects. In addition, such equipment requires EMP protection.

Some blast and thermal defense techniques are—

- Cover (not bury) wires and cables.
- Turn horn antennas away from the blast.
- Leave covers and wrappings on wire and cable reels.
- Protect generators and other support equipment.

Some EMP mitigation techniques are—

- If the mission permits, as a general rule, remove exterior conductors.
- Use UHF equipment in preference to VHF equipment when possible.
- Avoid use of broadband radios.
- Shut down and protect *unneeded* and *redundant* radio systems.
- When possible, use antennas that have small radiating elements.
- Keep cable and wire runs as short as possible.
- Keep cable runs as straight as possible—*avoid loops.*
- Keep cables and wires on the ground where practical to do so.
- Use shielded, twisted pair cables where options in use of cables exist.

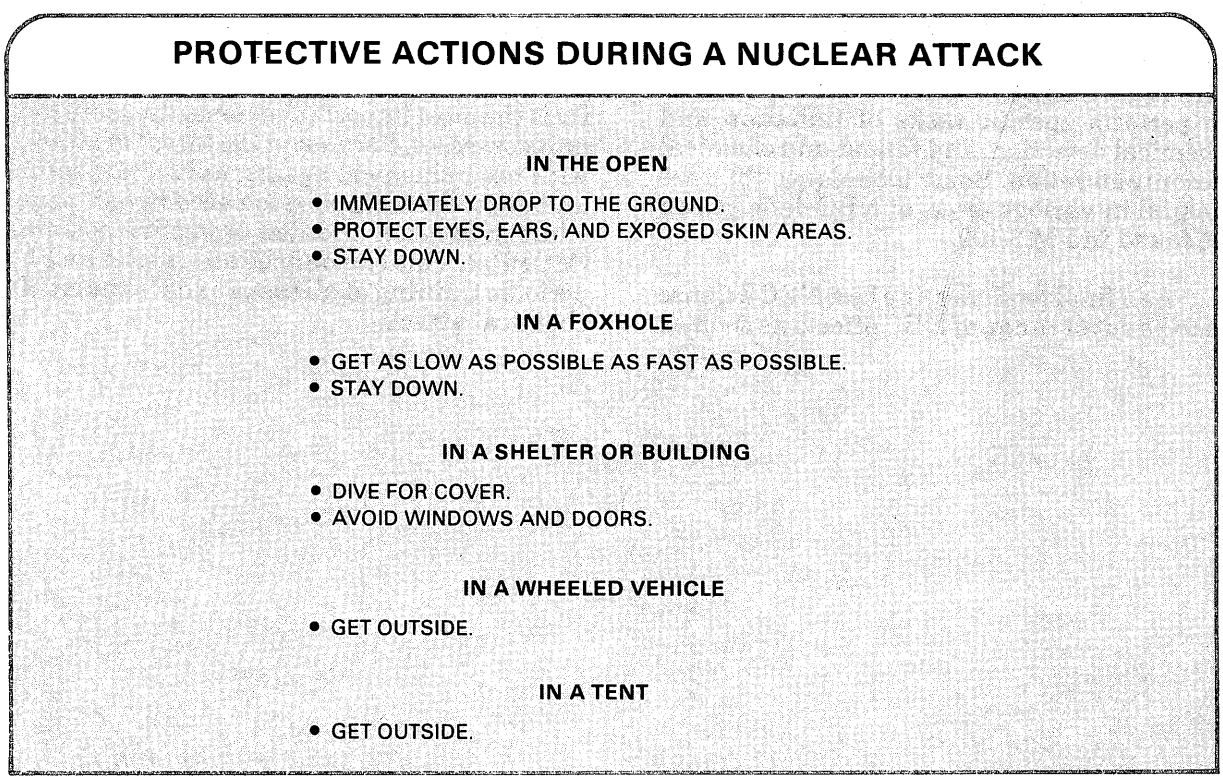
- Use shielding against EMP.
- An effective EMP shield requires that all openings be closed with metal covers.
- Maintain EMP shields and shelters. Pay special attention to gasketing, cable shields at connectors, power system filters, holes in shelters, and access panels.
- Keep exterior grounds short and of low impedance.
- Establish good exterior grounds when possible.
- Use a common ground for equipment.
- Insure all antenna guy wires are properly insulated.
- Avoid the use of commercial sources of power.
- Keep a supply of critical spare parts.

Blast and thermal radiation may damage computers that are also potentially vulnerable to both EMP and TREE. EMP can cause system upset, permanent or temporary loss of memory, or damage. Some defense techniques are:

- Store duplicate tapes at two separate locations.
- Store critical information and programs on drums, disks, or tapes.
- Shield handheld calculators from EMP.

Defensive Actions During a Nuclear Attack

An enemy nuclear attack will no doubt come without warning. The first indication will be a very intense light followed by extreme heat. Initial radiation comes with the light and the blast wave and hurricane-like winds follow within seconds. There will be little time, possibly a second, to take protective actions. Illustration below shows what can be done during a nuclear attack.



Defensive Actions Immediately After a Nuclear Attack

Immediately after a nuclear attack is the time when several actions, if planned for and taken soon after the burst, can reduce the eventual effects of the detonation.

DEFENSIVE ACTIONS IMMEDIATELY AFTER A NUCLEAR ATTACK

THINGS TO REMEMBER

- STAY DOWN AND/OR UNDER COVER UNTIL THE DEBRIS STOPS FALLING.
- STAY CALM.
- CONSIDER OPTIONS BEFORE MOVING.

THINGS TO DO

- LOOK BEFORE MOVING.
- BEWARE OF WEAKENED STRUCTURES AND TREES.
- PUT OUT FIRES BEFORE THEY SPREAD.
- RIGHT OVERTURNED VEHICLES AS SOON AS POSSIBLE.
- FIELD STRIP AND CLEAN WEAPONS (IF REQUIRED).
- IMPROVE COVER IF POSSIBLE.

General Defense Measures Summary

Many of the OPSEC techniques already discussed are also applicable to NBC. Each unit must also have well trained NBC teams to perform specific tasks of radiation and chemical detection, and fallout and chemical decontamination. Some techniques that are helpful in various areas of NBC defense can be found in FM 3-100.

As a final reminder, the best NBC defense is to be out of range of NBC effects as soon as possible. Movement from contaminated areas, out of fallout or chemical hazard areas, should be one of the unit's highest priorities. Mobility is the most important defense measure the unit possesses. Because of the threat of attack with toxic chemical agents, units must train and be proficient in mission accomplishment while in mission oriented protective posture (MOPP) 4. This can only be attained through periodic training of all tasks under simulated chemical attack.

CHAPTER 9

Combat Service Support

The combat service support system develops and maintains maximum combat power by sustaining combat forces. It may include administrative, chaplain, food, finance, legal, maintenance, medical, supply, transportation, and other logistical services.

The success of any combat operation is highly dependent on combat service support planning, timeliness, and the efficient use of available resources. The combat success of any ADA unit relies on the combat service support system's ability to—

- Arm. Provide the proper type and quantity of equipment, arms, and ammunition, when and where needed.
- Fuel. Insure the availability of fuel stocks at the right place and the right time.
- Fix. Provide maintenance support to return noncombat ready and damaged equipment to the user with minimum delay.
- Man. Insure that weapon systems are manned by personnel who are fit to fight and properly trained through effective use of a responsive personnel service support system.

This chapter focuses on combat service support of the Patriot battalion.

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MODERN COMBAT SERVICE SUPPORT

Commanders must plan tactics and support concurrently to insure that the concept of the operation is logistically supportable. They consider the constraints that support planners identify and modify unsupportable plans or accept the risks involved. To develop the support scheme and evaluate the combat service support system's ability to support a particular operation, commanders should consider—

- Supportability. If the resources are sufficient, is the support system capable of getting them where they are needed for the initial operation and for sustainability?
- Risk. To how much risk will support resources be exposed by the tactical scheme? When the support structure is austere, how will the loss of a few support personnel and facilities affect the maintenance effort?
- Future Operations. At the end of the current operation, how well will the support system be able to support contingencies or future operations?
- Availability. Are there sufficient combat service support resources (trained soldiers; ammunition; repair parts; trucks; tools; and petroleum, oils, and lubricants) to provide the support required? Will shortages require that priorities be established? If so, approximately when?

COMBAT SERVICE SUPPORT CAPABILITIES

All commanders and staff officers should know the capabilities of their support units, as well as the assistance available from the next higher headquarters. To plan realistically, anticipate problems, and reduce their impact, commanders should also be aware of the status of their—

- Ammunition stocks.
- Fuel.
- Transportation system capacity.
- Maintenance capabilities (mechanics and spare parts).

AUSTERITY

Future conflicts will be intense and consume resources rapidly. Austerity will be the rule. Efficient tactical support planning will be mandatory. Commanders will have to conserve resources, especially ammunition, fuel, and repair parts. When capabilities do not meet requirements, commanders must establish priorities for support. For greatest efficiency, the maintenance system must repair damaged equipment far forward in the battle area, preferably on site.

REQUIREMENTS

The combat service support system supports weapon systems and the soldiers who man them. Those who direct the support effort insure that critical weapon systems, such as Patriot, have sufficient missiles and fuel, that they are quickly repaired or replaced, and that soldiers are available to operate them. Combat equipment is armed, fueled, fixed, and manned as close to the point of employment as possible. Supplies are provided to forward units according to the commander's priorities. Replacement personnel are moved forward to maintain the strength of frontline units. Weapon system replacement operations provide major weapon systems in a ready-to-fight condition.

ORGANIZATION

★ Each level of command has a combat service support element to provide its support. From firing battery level through battalion level, support elements are built into the command's table of organization and equipment to provide specified types and quantities of support. At corps level and above, combat service support is designed

and organized to provide the amounts and types of support required by the force. Generally, combat service support requirements for Patriot batteries are provided by—

- Organizational operators and mechanics, maintenance clerks, administrative clerks, supply clerks, and medics.
- Corps support command units.
- Theater army area commands and functional commands in a multicorps theater.
- Air defense support command.

COMBAT SERVICE SUPPORT RESPONSIBILITIES

The combat service support provided at each level is explained below.

Battalion

★ The combat service support elements of the battalion provide organizational maintenance (less teletypewriter and multichannel radio) and supply, transportation, personnel, medical, and food service. Most of the combat service support elements are part of the firing batteries.

Corps

★ The corps support command provides corps-wide supply, maintenance, and field services to units located in the corps area. This includes support in the areas of health services, personnel and administration, transportation, ammunition, and civil affairs. It does not provide maintenance of the Patriot system.

Theater Army

★ The theater army provides support to units located in the communications zone, through two types of commands: functional commands and theater army area commands. Functional commands provide a specific type of service in support of the entire theater. Theater army area commands provide a variety of services within a designated area in the communications zone. The theater army area command is responsible for rear area protection and provides most direct support and general support supply, maintenance, and field services. However, units of the theater army area commands do not provide intermediate maintenance support of the Patriot system.

Air Defense Support Command

★ The logistics mission of the air defense support command is to provide sources of logistics management/operations as follows:

- Supply and maintenance management for class II (maintenance-related), V, and IX supplies.
- Receipt, storage, and issue of all class IX supplies by air defense support command maintenance support units.
- Provision for general support missile maintenance to include operation of theater reconstitution points for theater air defense weapon systems.
- Management of the general support supply base assets needed to support air defense missile systems.
- Provision of intermediate Patriot missile system maintenance.
- Provision of backup direct support missile maintenance.
- Provision of intermediate/direct support maintenance services for system support equipment and other nonmissile peculiar items as needed to maintain mobility and self-defense capabilities. The net result is an addition of DS automotive maintenance and related class IX supply capabilities.
- Operation of direct exchange (DX) supply support for selected equipment in the command.

• Management of Army air defense command property records in accordance with current regulations, directives, and automated procedures.

• Peacetime management, commitment, and obligation of funds needed to execute the Army air defense command mission.

• Management of modification work orders, product improvement programs, and other similar equipment improvement programs.

• Coordination of command transportation requirements (both air and ground).

ORGANIZATION

★ The organization of combat service support elements is tailored at each level to the mission and logistical requirements of the supported unit.

Battalion

★ Each Patriot battery's headquarters section provides unit administration, supply, and mess functions. Each Patriot firing battery has a maintenance platoon which provides unit maintenance of all equipment with primary emphasis on Patriot, power generation, communications, and automotive equipment. Each Patriot battalion provides personnel and administrative support, medical support, communications maintenance support, and supply support (less maintenance). The Patriot battalion also provide NBC and quartermaster support.

Corps

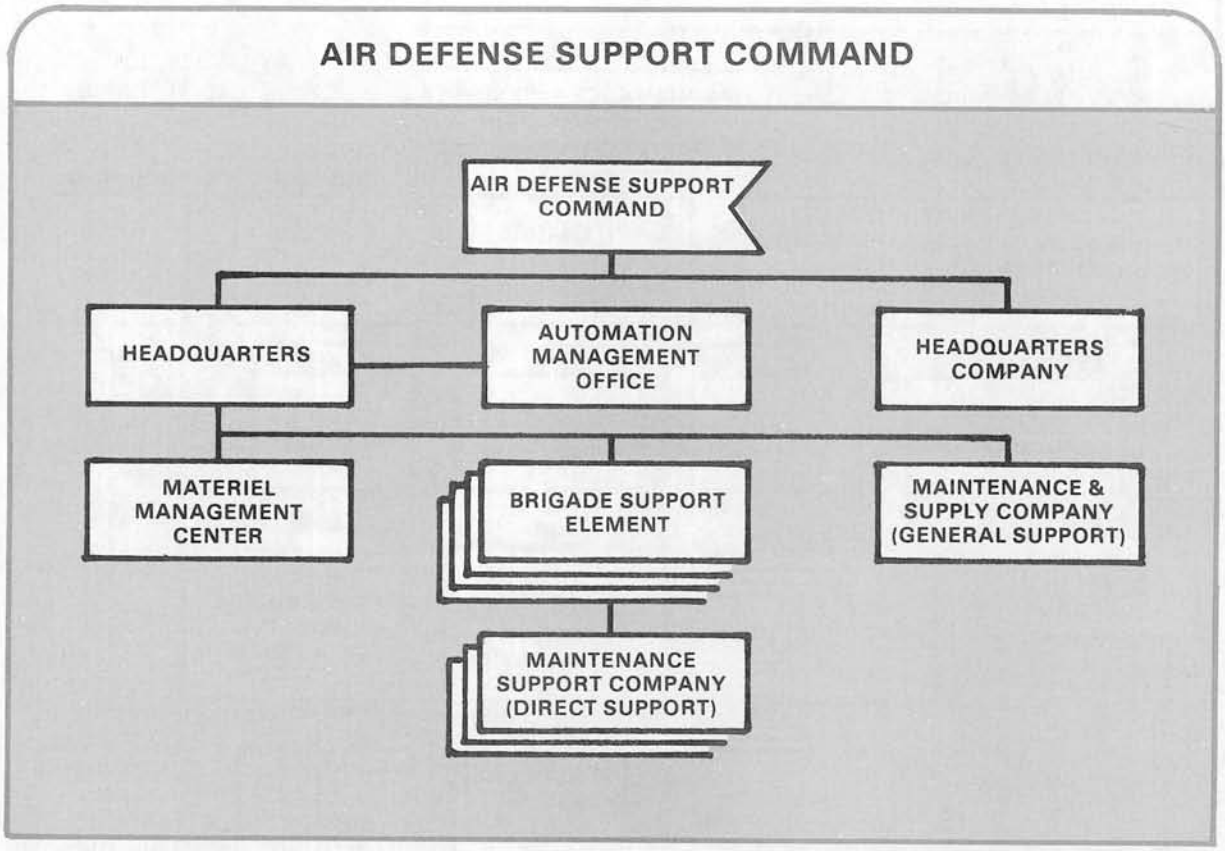
★ The corps support command is a flexible organization which can be tailored to support a larger or smaller corps by adjusting the number and types of combat service support units assigned or attached. A mature corps support command designed to support a large corps consists of a materiel management center, finance support center, movement control center, support groups, ammunition group, personnel and administration battalion, petroleum supply battalion, transportation brigade, civil affairs brigade, and medical brigade.

Theater Army

★ Functional commands of the theater army are the medical command, personnel command, transportation command, and engineer command. The theater army area command normally consists of a materiel management center, area support groups, conventional ammunition group, graves registration battalion, personnel and administration battalion, area finance support center, aviation support battalion, petroleum supply battalion, and explosive ordnance disposal center.

Air Defense Support Command

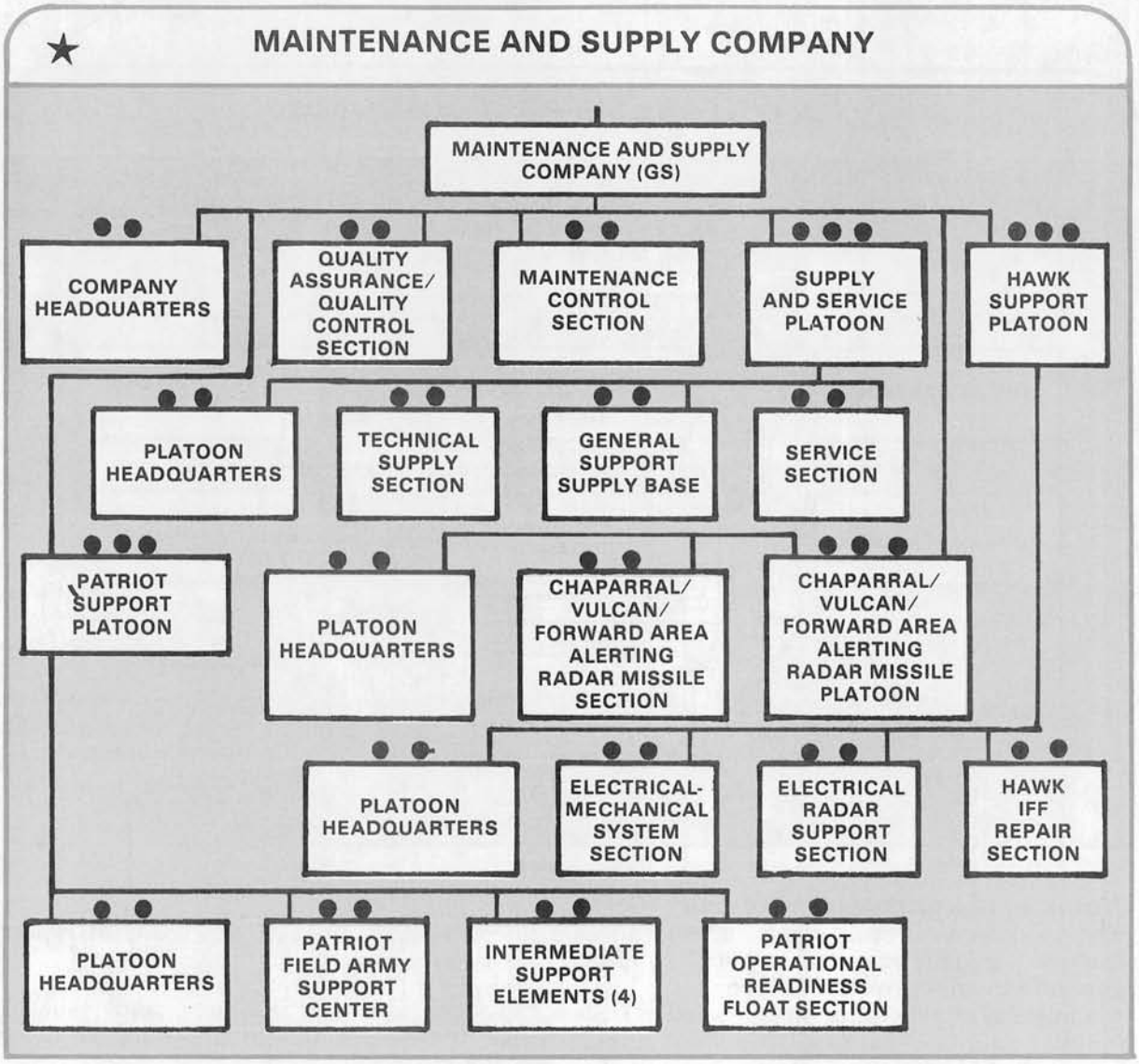
The creation of an air defense support command will establish a technical chain of command from the maintenance support company commander through the air defense support command commander to the Army air defense command deputy commander for support. The air defense support command organization incorporates innovative features of command and control for its 11 to 15 direct support units, a materiel management center, DS and GS maintenance, and a general support supply base. This results in an Army air defense command support structure somewhat similar to the support designed for a division. The activation of the materiel management center will provide centralized management of material assets as well as autonomous operation by the air defense support command DS and GS companies in emergencies. The complete structure of this new organization is depicted in the air defense support command illustration.



★ ***Maintenance and supply company (GS).*** The air defense support command will also include a missile maintenance and supply general support company. This company has the mission of providing missile system GS maintenance and backup DS maintenance for selected air defense systems as required. This company provides—

- GS maintenance and general support supply base for Hawk and IFF.
- Intermediate maintenance and general support supply base for Patriot.
- Missile DX and class IX supply support to maintenance support companies.
- Receipt, storage, and issue of general support supply base.
- DX for selected items.
- Receipt, storage, and issue of repair parts.
- Storage, maintenance, and issue of operational ready floats for Hawk and Patriot systems.
- Quality assurance/quality control inspection for supported systems.
- Operation of the collection and classification point for damaged missile systems.
- Organizational maintenance for all organic equipment.

The organization of the maintenance and supply company is shown in the maintenance and supply company illustration.



★***Maintenance Support Company (DS)***

The base of the air defense support command will be the direct support organization currently organic to each Hawk battalion, the support platoon organic to each Patriot battalion, and the ordnance detachment assigned to each Chaparral/Vulcan battalion. Each of these elements will be redesignated as a maintenance support company (DS). Each Patriot battalion will be supported by a maintenance support company. It is the focal point for logistics support. It provides technical advice and assistance to the Patriot battalion. This company will be capable of performing its own unit administration, supply, mess, and unit maintenance function. The Patriot maintenance support company provides—

- One-stop DS maintenance for non-Patriot peculiar equipment.
- DS maintenance for engineer ground support, signal, and automative equipment.

• Receipt, storage, and issue of 5,000 line items (authorized stockage level).

• Maintenance support teams to supported batteries as required.

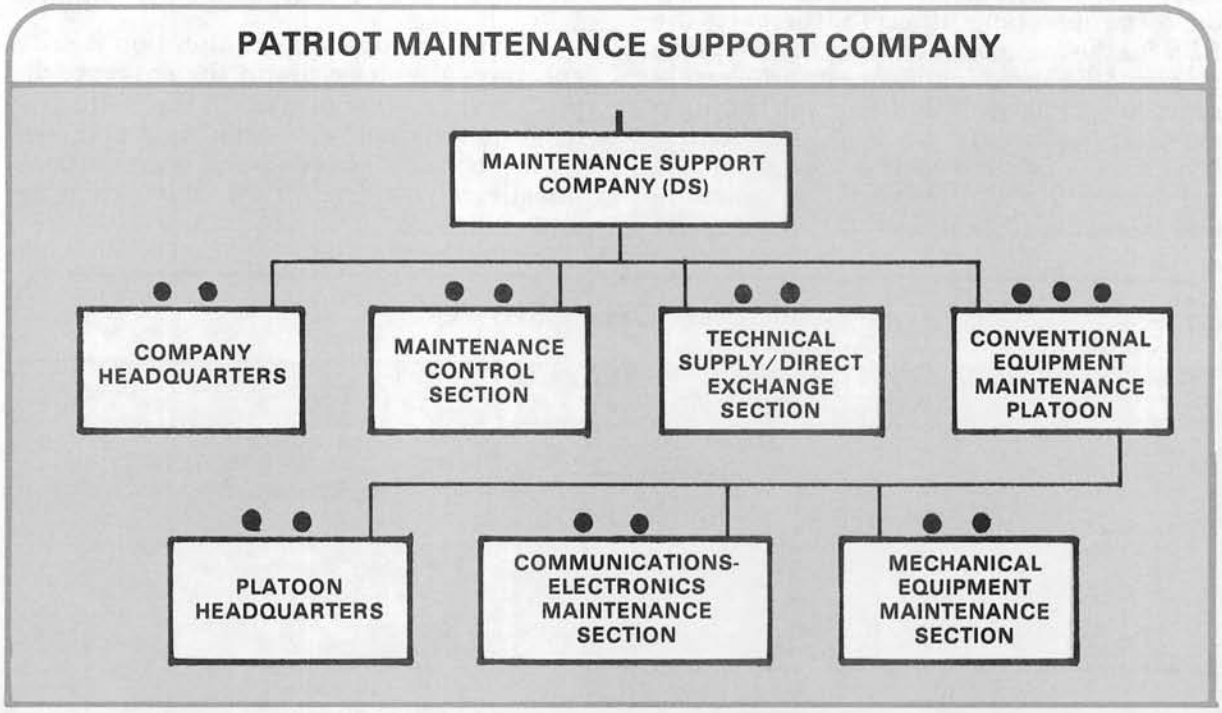
• Maintenance of operational readiness float.

• Direct exchange support for selected items.

• Data transmission services to the materiel management center for own and supported units.

• Unit maintenance for organic equipment.

The organization of the Patriot maintenance support company is shown in the Patriot maintenance support company illustration.



OPERATIONS

The combat service support operational system performs specialized functions at all levels in a theater of operations.

LOGISTICS

Logistics services include the functional areas of supply, maintenance, field services, and transportation. Specifically addressed under the area of supply are ammunition and POL.

Ammunition

The combat service support system sustains combat capability by providing unit basic loads of ammunition and ammunition resupply.

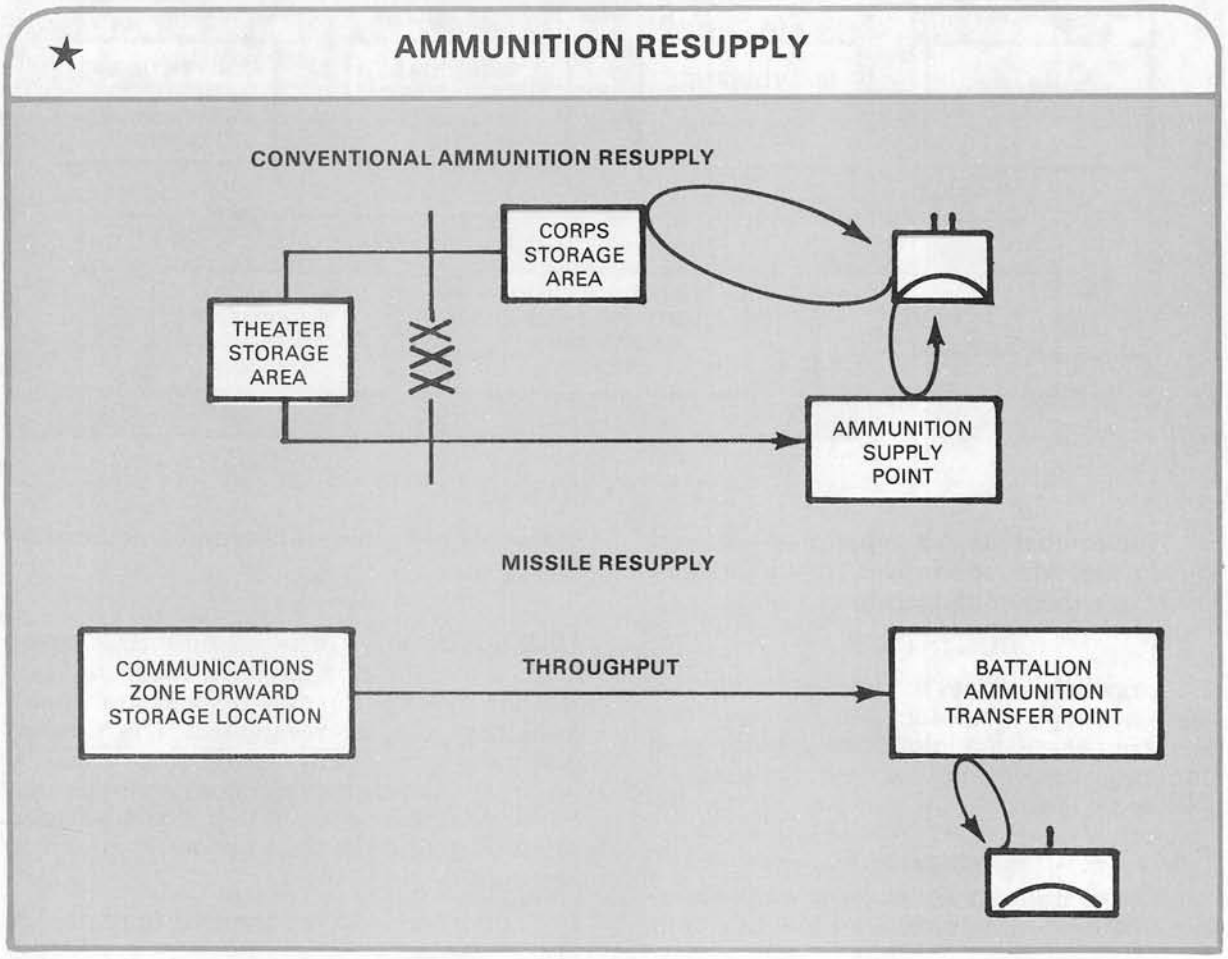
Unit basic load. Units are authorized basic loads of ammunition, expressed in rounds per weapon system, to sustain them in combat until they can be resupplied. The theater commander normally establishes a unit's basic load based on its mission, the types and numbers of its weapon systems, its transport capability, and the time necessary to effect resupply.

The basic load is carried into battle on

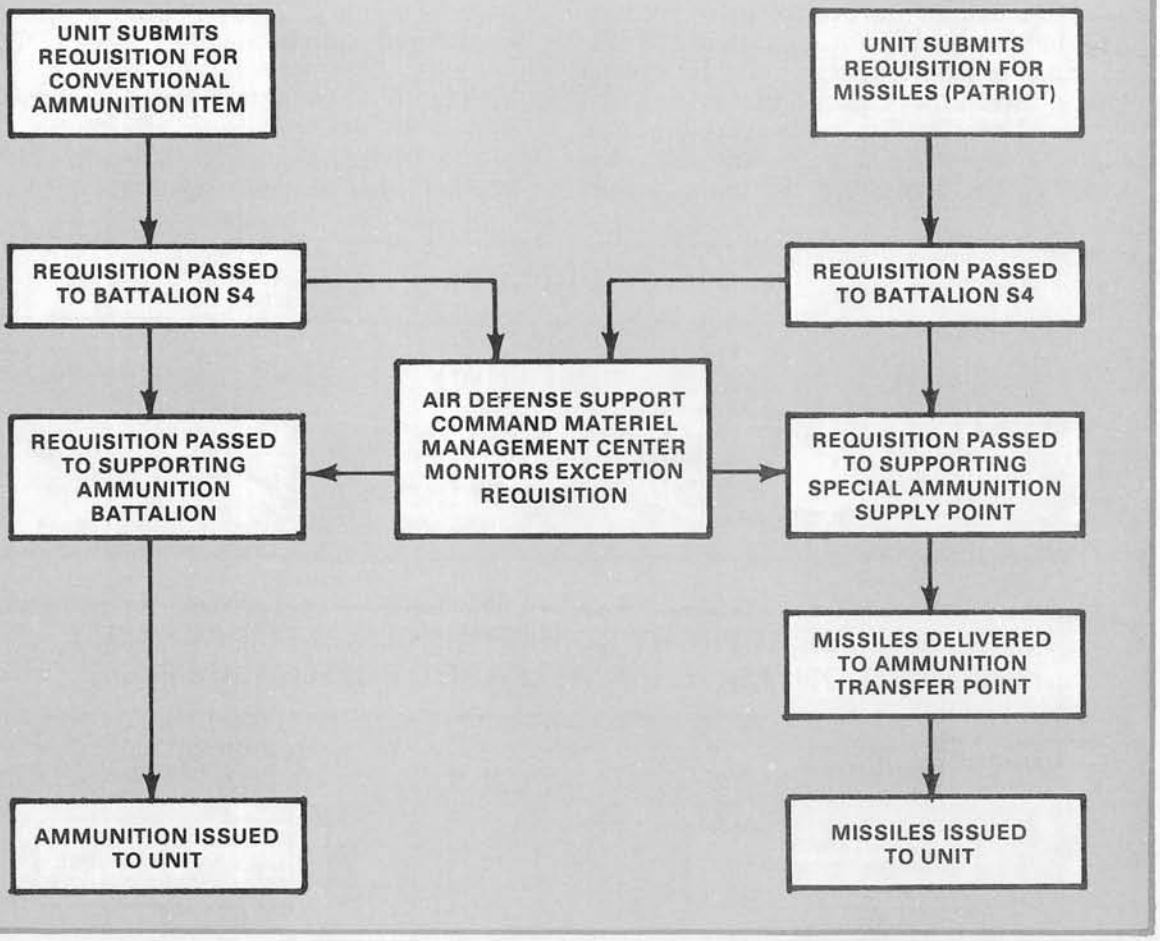
the unit's cargo vehicles and with the individual soldier. Standing operating procedures should prescribe distribution of the basic load.

Resupply. To determine the requirements for a specific operation or time period, Patriot units develop a required supply rate (RSR) for each type of ammunition. Expressed as rounds per weapon per day, the RSR may derive from experience or from reference manuals. The operations officer (S3) prepares the RSR for the commander during the planning stages of the operation. Requests are consolidated at each level until they reach the highest Army headquarters in the theater. At that level the G3, G4, and commander review the requirements and availability of ammunition. Based on this review, the commander establishes a controlled supply rate (CSR), the actual resupply rate. The CSR is expressed as rounds per weapon per day by ammunition item. Those ammunition items for which the CSR is less than the RSR will normally be identified in the appropriate annex of operations orders or in combat service support plans or orders. After consulting with their operations and logistics staff officers, commanders will normally establish priorities for the allocation of ammunition.

Timely resupply of ammunition is critical. Basically, it occurs in the sequence depicted in the ammunition resupply illustration below. Ammunition requisition as shown in the class V conventional ammunition/ missile request-issue flow illustration on page 9-9.



★ **CLASS V CONVENTIONAL AMMUNITION/MISSILE REQUEST-ISSUE FLOW**



★ Since Patriot firing batteries do not have organic transportation for missile resupply, the battalion provides all missile resupply transportation. Initially the battalion will move missiles from the nearest ASP directly to the firing batteries. Loaded guided missile transporters should be prepositioned with the firing batteries that are expected to take the brunt of phase one suppression attacks. Subsequently it is advantageous to move launching stations to the rear for resupply and reloading. This takes advantage of the 8:1 ratio of launching stations to guided missile transporters in a battalion. The battalion normally establishes an ammunition transfer point for Patriot missiles. The theater Army throughputs missiles directly to the ammunition transfer point. The Patriot battalion's guided missile transporters then reload battery launching stations.

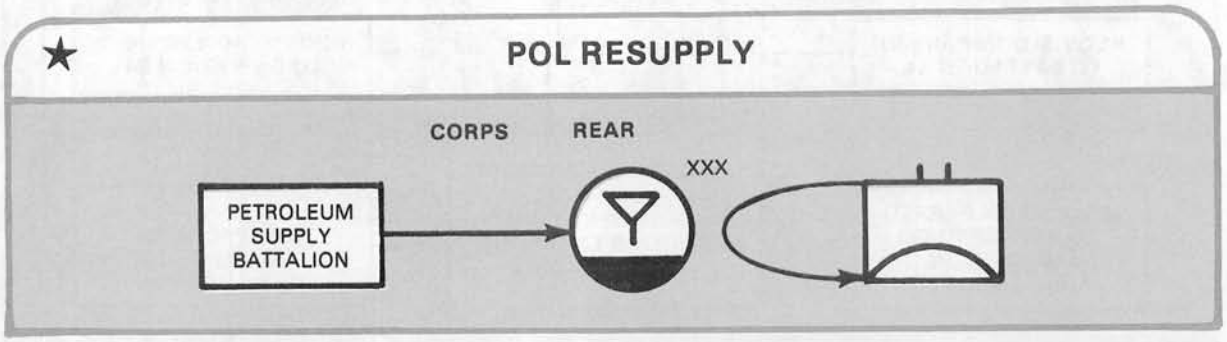
Petroleum, Oils, and Lubricants

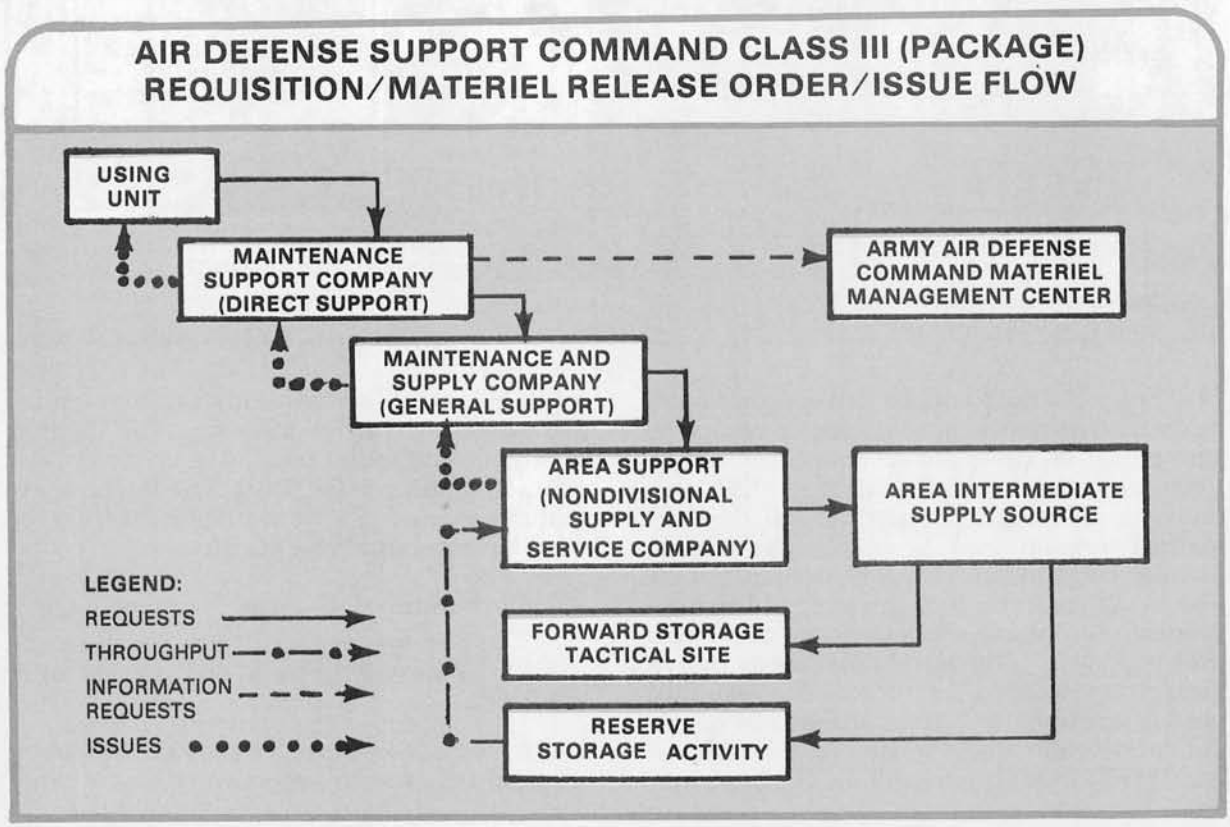
The CSS system maintains combat capability by providing bulk POL supply and resupply.

Bulk POL. A dedicated supply system manages, transports in special containers, and

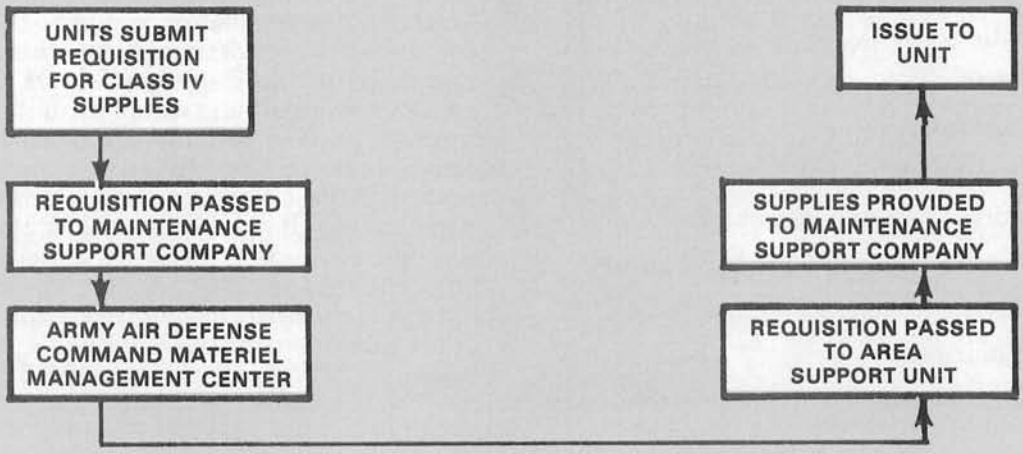
issues the supply of bulk petroleum. As long as fuel is available, it moves on demand to refill storage containers of subordinate units. The initial allocation is derived from estimates that using units project based on experience or standard planning data in FM 101-10-1. Such estimates should consider special factors, including terrain and weather and the type of mission. Forecasts are refined and consolidated at the brigade, and then forwarded to the corps materiel management center. Established requirements are compared to force capabilities. The limited storage and distribution capabilities for fuel tankers, tank and pump units, and trailer-mounted pods in Patriot battalions must be considered and planned for.

Resupply. Resupply follows a process as shown in POL resupply illustration. The requisitioning process is shown in the illustration below and on page 9-11.

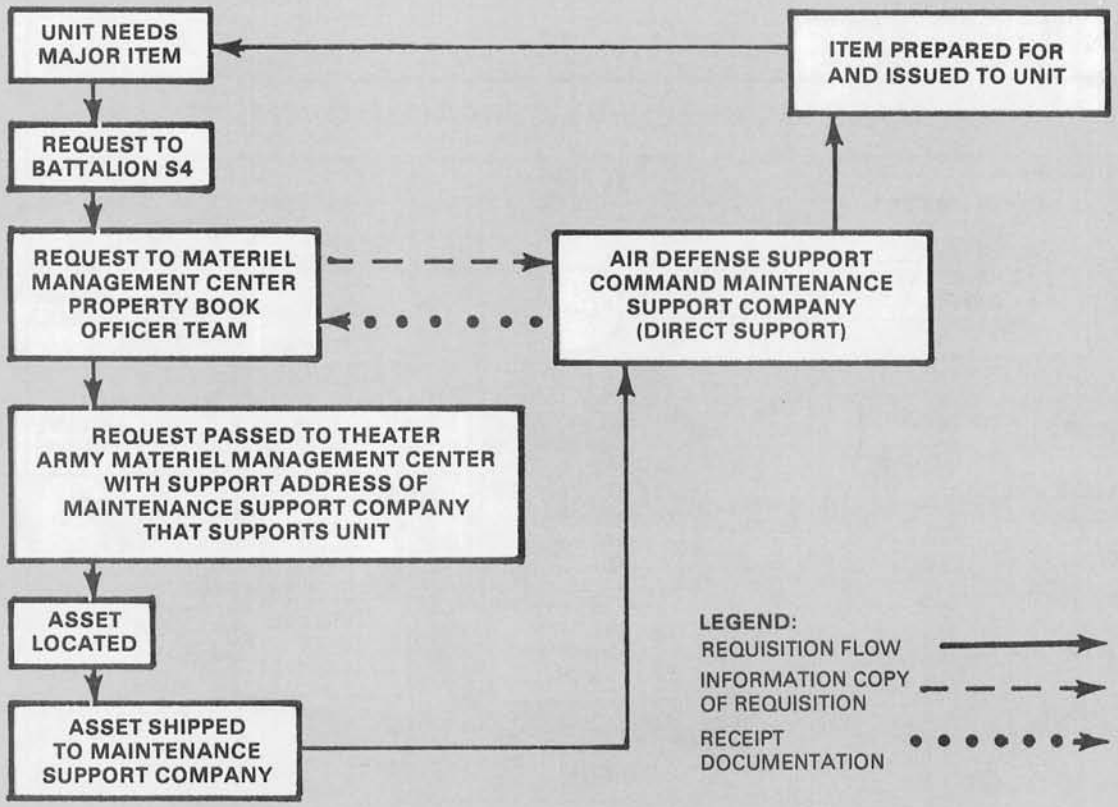




AIR DEFENSE SUPPORT COMMAND CLASS IV REQUISITION FLOW



AIR DEFENSE SUPPORT COMMAND CLASS VII REQUISITION FLOW



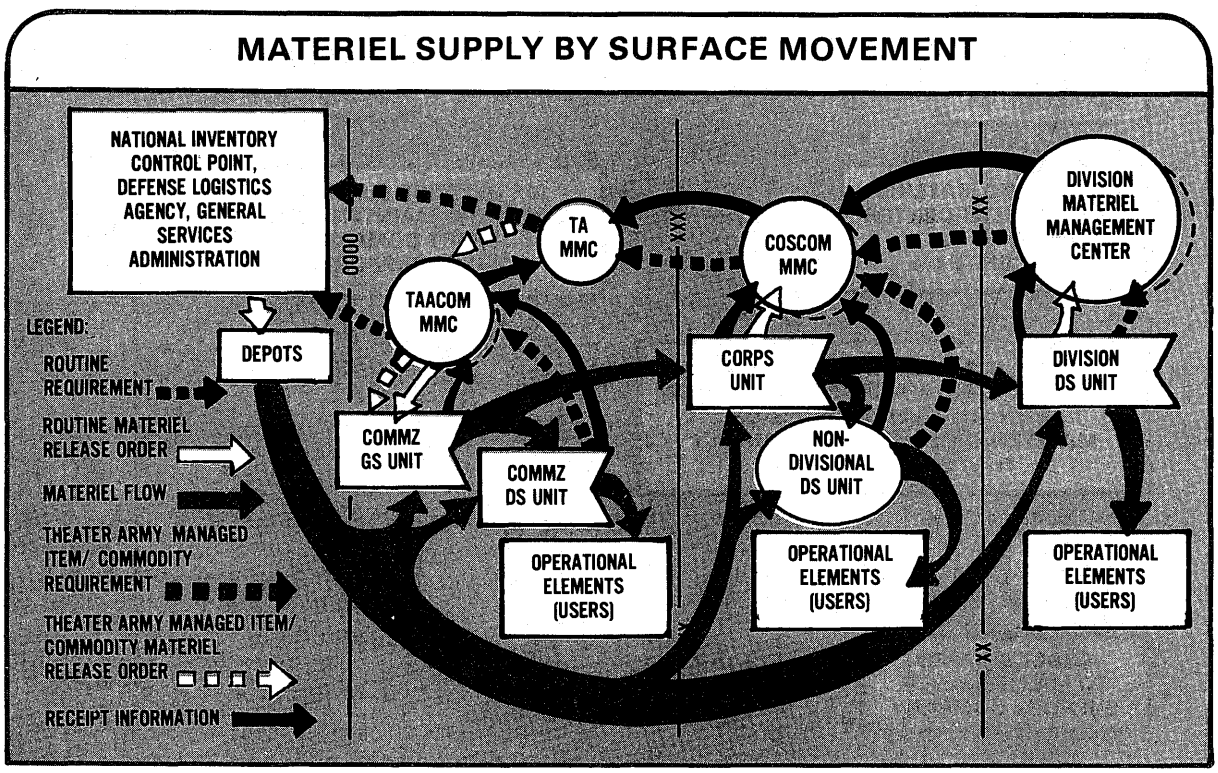
Other Supplies

The combat service support system maintains combat capability by providing—

- Rations.
- Water.
- Clothing.
- Personal-demand items.
- Individual and unit equipment.
- Fortification and barrier materials.
- Major end items of equipment.
- Repair parts.
- Items intended to support nonmilitary programs.

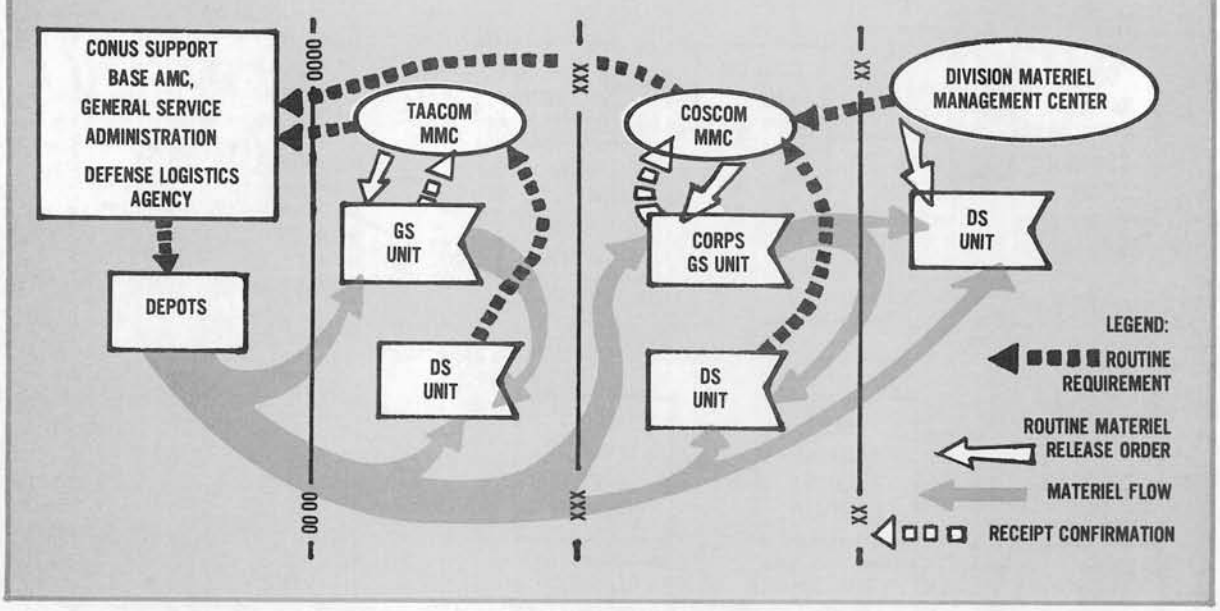
Due to the nature of Patriot maintenance, the availability of repair parts is critical. Requisitions for repair parts for nonoperational Patriot equipment are submitted to the maintenance support company. If the part is not available, the remaining firing batteries of the battalion are queried. Should the battalion be unable to locate the part within the battalion, the requisition would be passed to the brigade which determines if other Patriot battalions within the brigade have the part on hand. Requisitions which cannot be filled from within the brigade are passed to the corps or theater army materiel management center. Units operating in the communications zone will normally pass requisitions directly to the theater army materiel management center. Requisitions for supplies other than Patriot repair parts follow the usual flow for nondivisional units. Medical supplies and equipment are obtained through medical channels.

Normally, the wartime supply system for materiel provided by surface movement in a fully developed theater of operations follows an established sequence such as that shown in the materiel supply by surface movement illustration below.



The wartime supply system for items provided by air lines of communication in an established theater also follows an established sequence as shown in the supply by air lines of communication illustrations below and on page 9-14. In a contingency operation, the highest Army headquarters deals directly with the CONUS support base.

SUPPLY BY AIR LINES OF COMMUNICATION

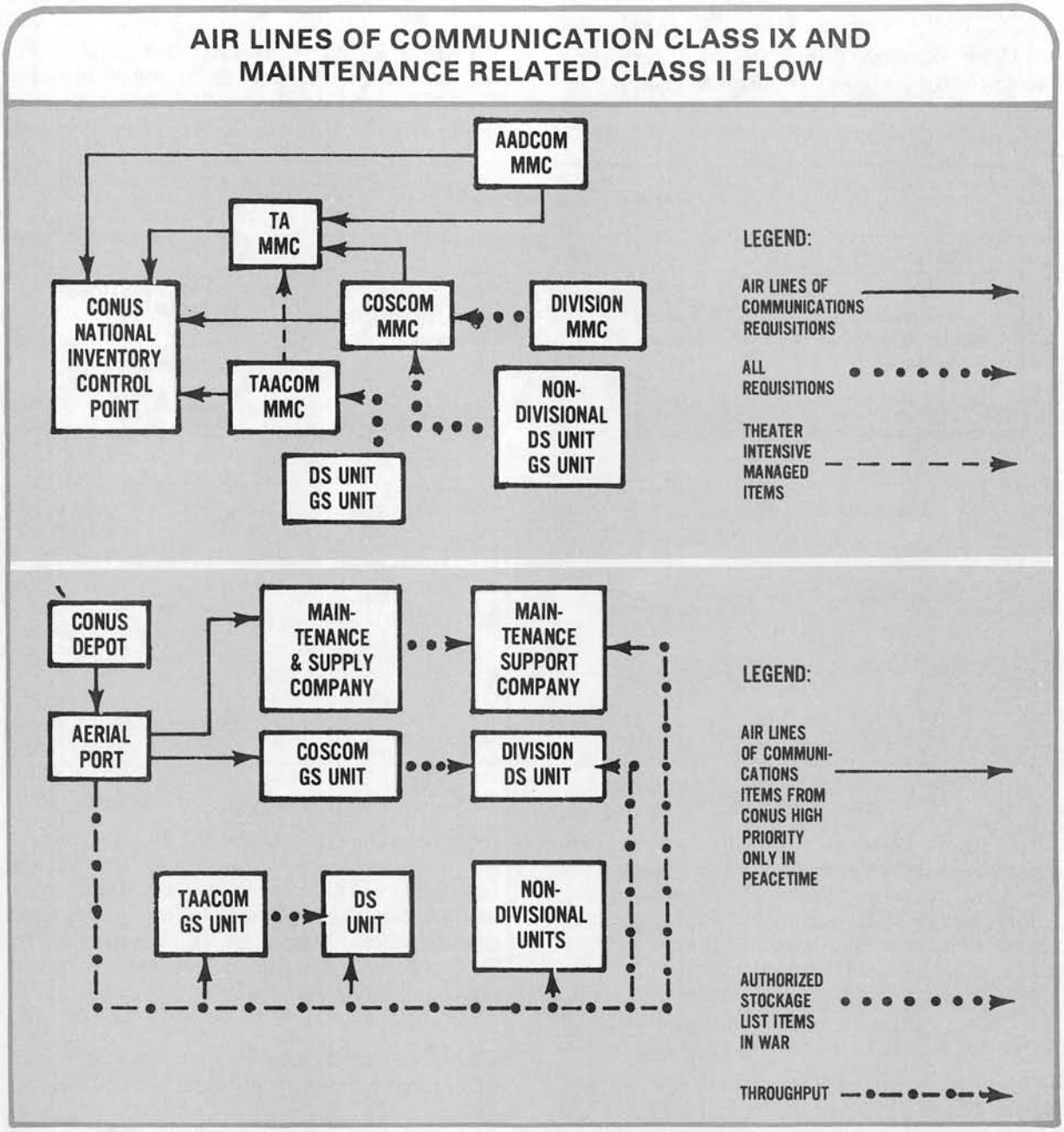


Maintenance

The combat service support system maintains combat capability by providing forward support, recovery and evacuation, repair parts supply and direct exchange, and battlefield controlled exchange and cannibalization. Organizational maintenance for conventional items (trucks, radios, etcetera) in Patriot units is especially important for units to be able to move and communicate.

Forward support. Organizational maintenance teams assess equipment damage. They determine the appropriate disposition based on the extent of damage and the combat situation. To reduce the time required to return equipment to battle, DS contact teams repair it as far forward as possible. This is the essence of the forward support maintenance concept. Under this concept, maintenance support teams from battalion and corps maintenance units assist the Patriot battery mechanics. Teams consider controlled exchange of parts or components prior to evacuation, but they do not remove parts from systems which can be repaired quickly. Extensively damaged systems may be sources of repair parts.

Recovery and evacuation. Recovery operations remove materiel from forward units to nearby safe locations for immediate repair or, if forward repair is not practical, to the unit's trains. Each unit is responsible for recovering its own damaged equipment. Wreckers and other recovery vehicles move equipment that cannot be repaired on site to collection points along designated routes. Immovable items remain in place until supporting maintenance units can recover them.



Evacuation operations move equipment from the recovery site or maintenance collection point to an area where it can be repaired or cannibalized or from which it can be evacuated farther. Maintenance, supply, and transportation elements coordinate evacuation efforts.

Repair parts supply and direct exchange. Direct support maintenance units supply repair parts. Units can exchange selected recoverable and repairable components for serviceable items. Direct support and general support maintenance units requisition repair parts through supply channels.

Battlefield controlled exchange and cannibalization. Forward maintenance support also involves battlefield controlled exchange and cannibalization. In controlled exchange, maintenance units remove serviceable parts from unserviceable but economically repairable equipment, using them to repair like equipment so that it can be returned to combat immediately. Unserviceable parts should stay with the equipment from which the serviceable parts were taken. Controlled exchange decisions should be made as close to the damaged or disabled equipment as possible, preferably by using unit maintenance personnel. Both using and support units will practice controlled exchange extensively on the battlefield. To cannibalize is to remove parts from irreparable equipment for stockage or immediate use. Guidelines for cannibalization and controlled exchange are established at higher headquarters.

Field Services

Field services generally include—

- Laundry.
- Bath.
- Clothing exchange.
- Bakery.
- Textile renovation.
- Salvage.
- Decontamination.
- Graves registration.
- Clothing renovation.
- Post exchange sales.
- The provision of general duty labor.

In the division area, the supply and transportation battalion is responsible for providing water. Elements of the COSCOM provide water in the corps rear area.

In peacetime, most support units do not have graves registration or clothing exchange and bath capabilities. During wartime these capabilities are provided by augmentation units.

If graves registration platoons are not available during the early stages of combat, it may be necessary to train unit personnel in recovery, identification, care, and disposition of remains. Remains are evacuated to collection points in the division support area and from there to a corps collection point.

COSCOM field services companies provide laundry service. COSCOM detachments also perform post exchange sales, when provided. The supply and service company, when augmented with a clothing exchange and bath platoon, provides clothing exchange and bath services.

The supply and service company salvages damaged and irreparable equipment. The company operates salvage collection points. These points are normally collocated with the maintenance battalion's maintenance collection points. It also operates salvage collection points in support of units in the corps rear area.

Transportation

As the connecting link between other logistic functions, transportation moves personnel and materiel. It moves repaired equipment from maintenance units to storage areas or using units and moves supplies, including repair parts, where they are needed. It also moves personnel replacements from reception areas to combat units.

The transportation elements within a theater perform three functions: modal operations, terminal operations, and movement management. Modal operations move personnel or materiel in any conveyance by air, rail, road, and water. Terminal operations shift cargo from one mode of transportation to another or from one type of transport within a mode to a different type. Only echelons above the division have terminal operations capability. Movement management involves the staff planning and coordination necessary to the transportation system's effectiveness.

PERSONNEL AND ADMINISTRATION

Personnel support operations maintain unit strength and provide morale and welfare

services to the individual soldier. Personnel support includes—

- Personnel services.
- Chaplain activities.
- Administrative services.
- Legal services.
- Health services.
- Comptroller and finance services.
- Morale and welfare support services.
- Personnel automatic data processing support and services.
- Public affairs.

Personnel Services

Accurate strength accounting necessary for long-range tactical planning is handled through the Standard Installation/Division Personnel System. To support current operations, units feed personnel status reports to the battalion Personnel and Administration Center by the administration/logistics net. Precision and detail may be sacrificed in the interest of timeliness. Personnel staff officers provide immediate staff reports to commanders and operation centers at each echelon.

Troop Replacement

The theater replacement system requires centralized planning and decentralized execution. Timely individual and unit replacements keep combat units effective. Headquarters Department of the Army (HQDA) coordinates and directs the flow of replacements. Without waiting for theater requisitions, HQDA assigns personnel replacements for the first 60 days. It does so based on the strength of the deployed force and on estimated battle losses. Using requisitions and casualty reports from the theater, it reevaluates and updates the estimates to maintain a constant replacement flow.

Commanders may have to adjust strength among batteries or battalions, moving soldiers from one unit to maintain the effectiveness of another. Reorganizing units at brigade level will provide quick replacements until the requisition process provides support. However, commanders must judge unit effectiveness by more than personnel strength. Seldom is it good practice to break up a proficient team in combat.

Within the theater, replacement requisitions begin at the lowest level that can accurately determine needs. Each level of command validates and adjusts its requirements, with critical military specialties receiving the highest priority.

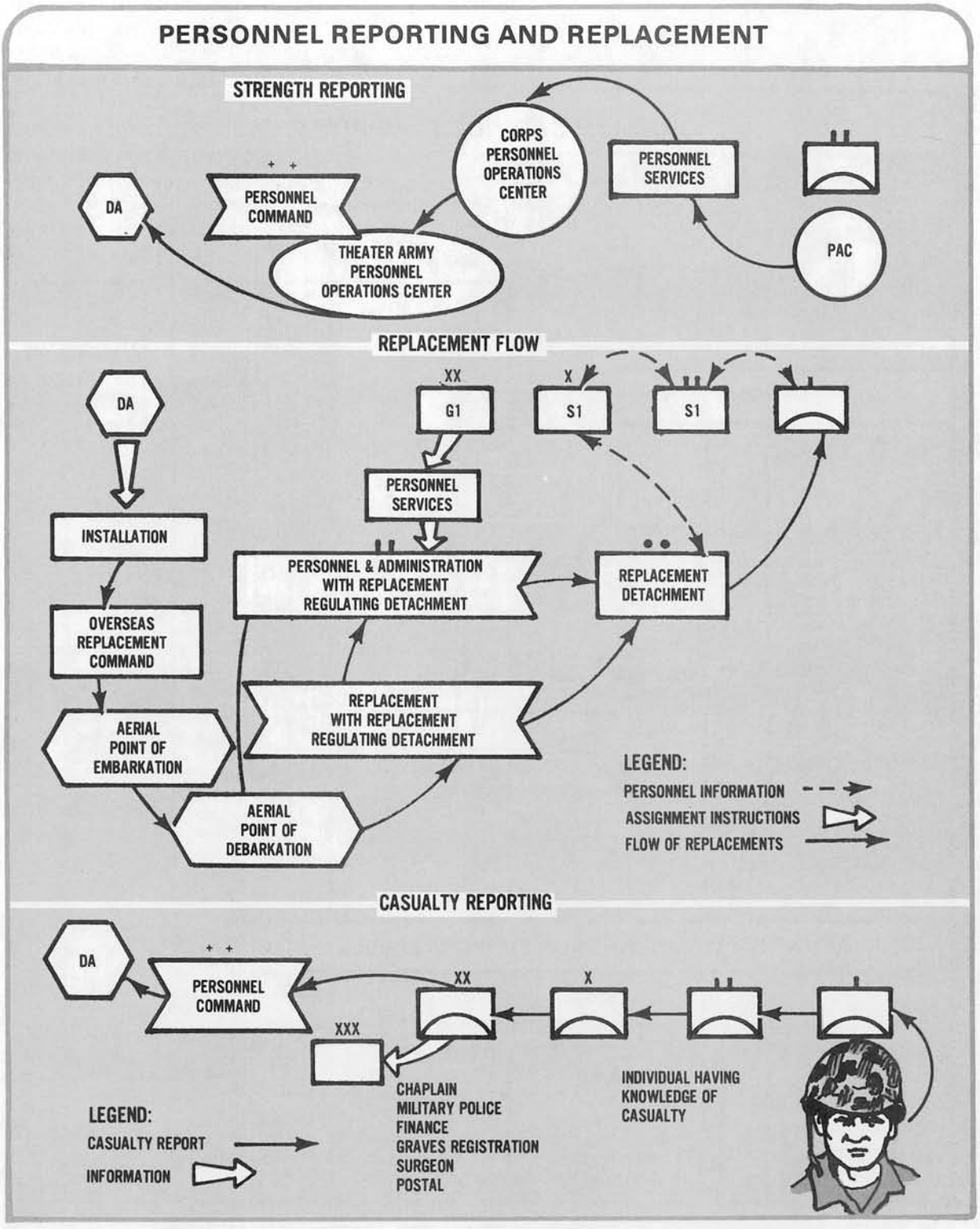
Casualty Reports

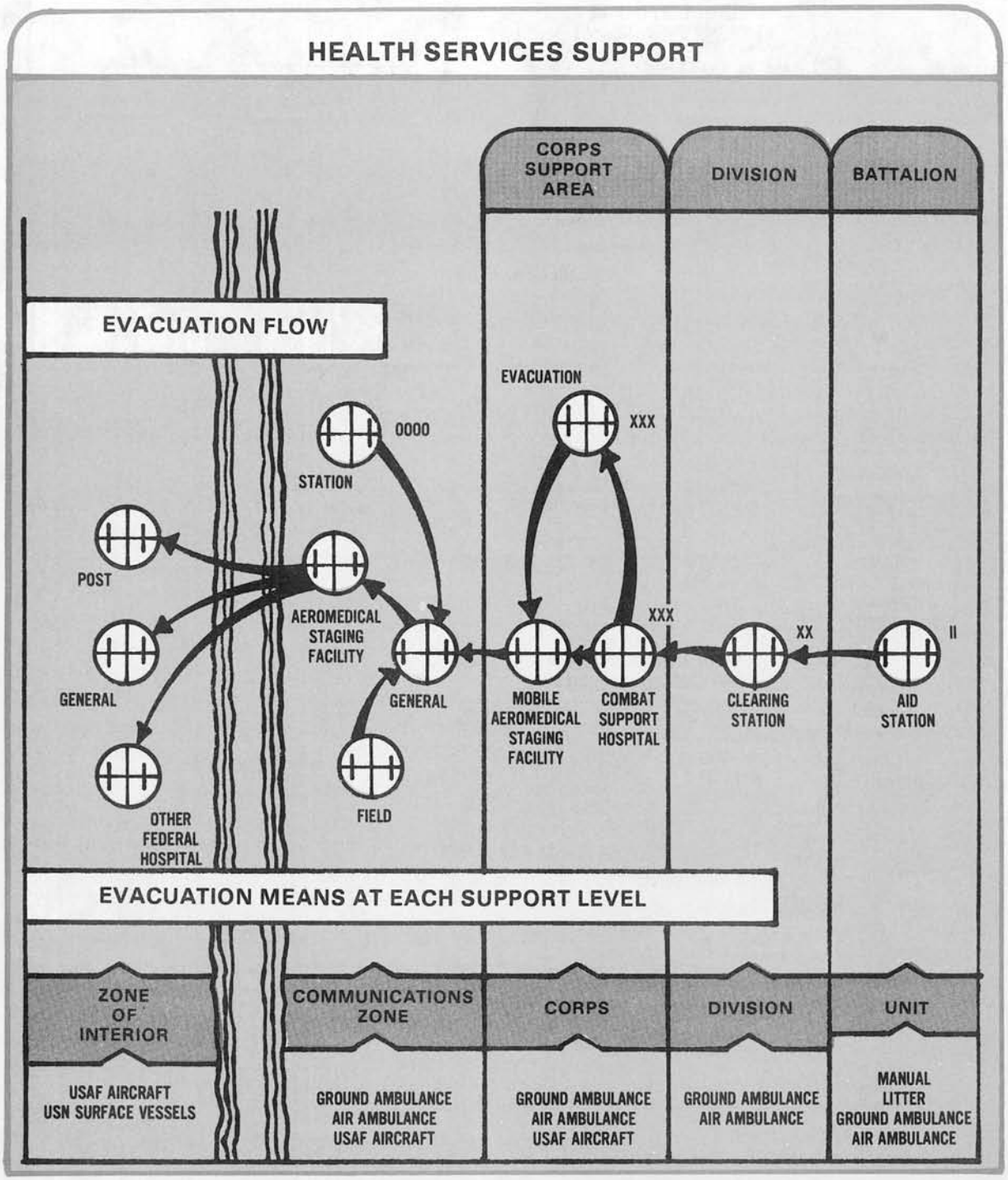
Prompt and accurate casualty reporting is essential. Casualty reporting channels account for personnel, and they influence the flow and distribution of replacements. Casualty reporting and its interaction with replacement operations is shown in the personnel reporting and replacement illustration.

Health Services

In all wars involving US troops, more soldiers have been hospitalized by disease and noncombat injuries than by enemy action. The ratio has run as high as 3 to 1. The health service mission is to conserve fighting strength by promoting and maintaining the general health of all soldiers in the theater. Health service support includes—

- Medical treatment and hospitalization.
- Intratheater medical evacuation.
- Medical regulating.
- Blood bank services.
- Medical materiel supply and maintenance.
- Dental services.
- Veterinary services.
- Preventive medicine.
- Medical consultation.


PERSONNEL REPORTING AND REPLACEMENT
STRENGTH REPORTING
DA
PERSONNEL COMMAND
CORPS PERSONNEL OPERATIONS CENTER
THEATER ARMY PERSONNEL OPERATIONS CENTER
PERSONNEL SERVICES
PAC
REPLACEMENT FLOW
DA
INSTALLATION
OVERSEAS REPLACEMENT COMMAND
AERIAL POINT OF EMBARKATION
AERIAL POINT OF DEBARKATION
XX
G1
PERSONNEL SERVICES
PERSONNEL & ADMINISTRATION WITH REPLACEMENT REGULATING DETACHMENT
REPLACEMENT WITH REPLACEMENT REGULATING DETACHMENT
X
S1
S1
REPLACEMENT DETACHMENT
LEGEND:
PERSONNEL INFORMATION
ASSIGNMENT INSTRUCTIONS
FLOW OF REPLACEMENTS
CASUALTY REPORTING
DA
PERSONNEL COMMAND
XX
X
XXX
CHAPLAIN
MILITARY POLICE
FINANCE
GRAVES REGISTRATION
SURGEON
POSTAL
INDIVIDUAL HAVING KNOWLEDGE OF CASUALTY
LEGEND:
CASUALTY REPORT
INFORMATION


HEALTH SERVICES SUPPORT
CORPS SUPPORT AREA
DIVISION
BATTALION
EVACUATION FLOW
EVACUATION
XXX
0000
STATION
POST
AEROMEDICAL STAGING FACILITY
XXX
XX
II
GENERAL
GENERAL
MOBILE AEROMEDICAL STAGING FACILITY
COMBAT SUPPORT HOSPITAL
CLEARING STATION
AID STATION
OTHER FEDERAL HOSPITAL
FIELD
EVACUATION MEANS AT EACH SUPPORT LEVEL
ZONE OF INTERIOR
COMMUNICATIONS ZONE
CORPS
DIVISION
UNIT
USAF AIRCRAFT
USN SURFACE VESSELS
GROUND AMBULANCE
AIR AMBULANCE
USAF AIRCRAFT
GROUND AMBULANCE
AIR AMBULANCE
USAF AIRCRAFT
GROUND AMBULANCE
AIR AMBULANCE
MANUAL
LITTER
GROUND AMBULANCE
AIR AMBULANCE

Health service support within a theater of operations is organized into levels: unit, division, corps, and communications zone (COMMZ). A system of increasingly sophisticated treatment organizations, beginning with the unit aidman, provides medical treatment and hospitalization. In general, each level of health service support has treatment capabilities similar to the levels just below it, as well as additional, more sophisticated capability. Each level of medical support has air or ground medical evacuation assets. The preferred method for evacuation is by air. Use of air evacuation, however, depends on availability, the treatment required, the locations of adequate treatment facilities, tactical situations, and weather. Patients will be evacuated no farther than required for treatment. A system of medical regulating elements located at the medical command and control headquarters controls this flow.

Medical support for Patriot units is provided by the battalion medical section supported by division or corps medical elements on an area basis. Forward of the division rear boundary, casualties are evacuated to the nearest division clearing station. Evacuation is normally the responsibility of the division medical personnel, however, Patriot unit commanders must be able to evacuate their own casualties since demands on the division medical elements will likely be heavy. In the corps rear area, casualties will be evacuated to the nearest combat support hospital.

To insure that soldiers are physically able to fight, commanders must establish comprehensive programs of health preservation and restoration. The theaterwide health services system provides four levels of medical support, evacuation, and treatment facilities as shown in the health services support illustration.

AIR DEFENSE SUPPORT COMMAND CONCEPT OF OPERATIONS

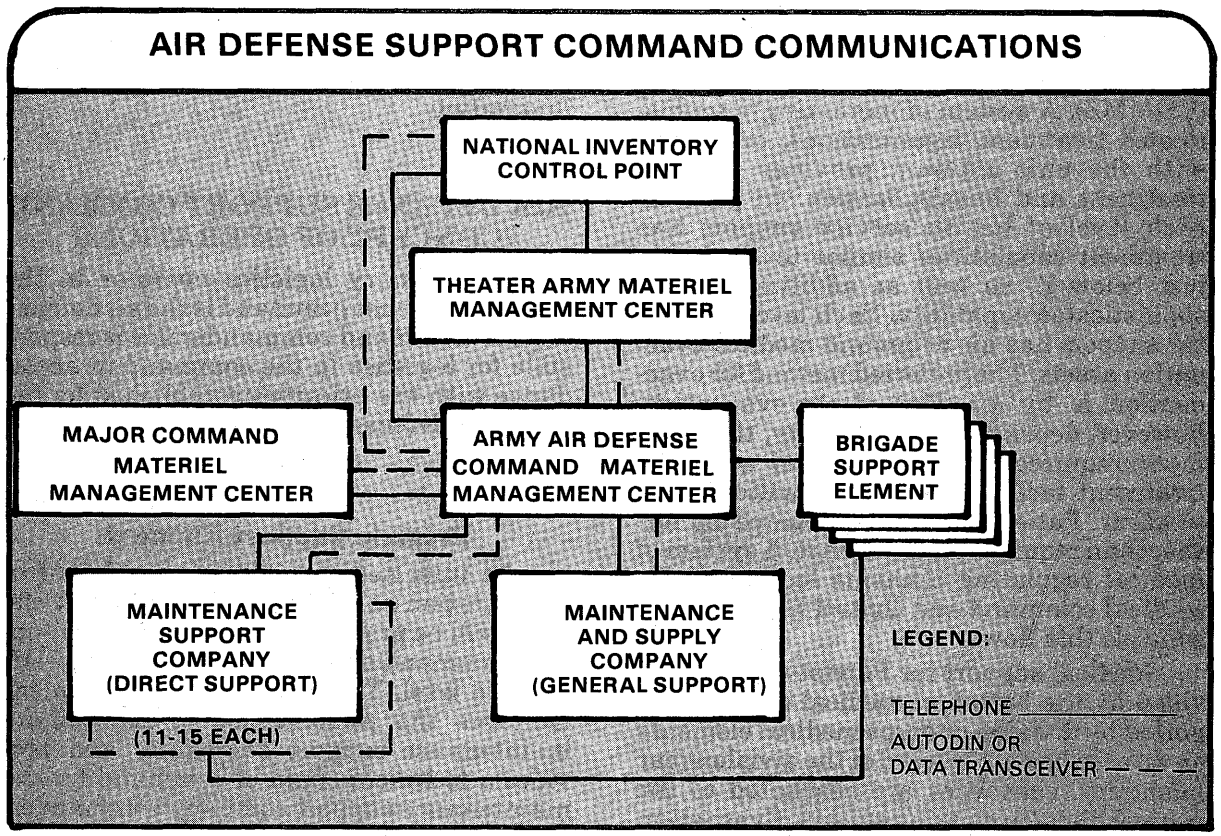
The primary logistics operator in the Army air defense command is the air defense support command commander. He is responsible for logistics in the command in accordance with the priorities established by the Army air defense command commander.

Brigade Support Element

An intermediate command and control organization called the brigade support element will be provided by the air defense support command and will function at the ADA brigade level. The brigade support element monitors the performance of subordinate maintenance support companies and provides a technical chain of command for the maintenance support company commander. The brigade support element commander is the logistics operator for the ADA brigade. As such, he coordinates the priority of logistical support in accordance with the ADA brigade commander's priorities. The brigade support element monitors the use of operational readiness floats in the maintenance support companies, coordinates the efforts of the DS companies and, when necessary, directs company-to-company transfer of operational readiness floats equipment to meet operational needs.

Supported Units

★ Supported units would evacuate all equipment needing DS repair to the maintenance support company. Items not within the repair capability of the maintenance support company would be transported to an appropriate general support unit by the maintenance support company. This results in a single logistics point of contact for ADA customers. All requisitions for class II (maintenance-related) and IX items needed by the Patriot battalion would be passed through the maintenance support company to the materiel management center. Unit commanders requisition replenishment equipment from managers of the materiel management center. Subsequently, the major item will be provided to the unit through support channels via the general support supply base, or through an air defense support command maintenance support company.



Communications and Automatic Data Processing Support

★ Communications and automated data processing support are essential elements of this logistics structure. Continuous support is mandatory if the logistics system is to function. Each maintenance support company must be able to communicate with the Army air defense command materiel management center. The materiel management center must have access to ADP service and the command logistics base. The materiel management center must have its organic mobile computer system to enable it to interface with air defense support command DS and GS units. The air defense support command communications illustration shows the required communications nets.

Separate Brigade Support

When an ADA brigade force is separately deployed, the ADA battalions will be supported by the normally assigned maintenance support companies. A brigade support element would be attached to the ADA brigade for integration of logistics support activities in the brigade. If necessary, the brigade support element may be augmented by materiel management personnel from external sources in order to provide the brigade with the required management capability.

Separate Battalion Support

When an ADA battalion is deployed separately in support of a force, it would be supported by its normal maintenance support company.

RECONSTITUTION

★ Reconstitution is defined as emergency actions taken to restore units to a specified level of combat effectiveness by the replacement of personnel and equipment based on specified priorities. Reconstitution should be undertaken when a unit has sustained severe battle losses in personnel and equipment. Reconstitution transcends normal day-to-day force sustainment actions. Reconstitution actions that will be required to maintain maximum combat power on the battlefield during war are described.

THE OPERATIONAL CONCEPT

★ Reconstitution is a term for actions required to restore the combat capabiity of an incapacitated unit. The three types of reconstitution actions are reorganization, regeneration, and redistribution. These actions can be taken either singly or in combination.

Reorganization

★ Reorganization is the restoration of combat effectiveness by the cross-leveling of assets within a unit or by the formation of a composite (smaller) unit at a full or overstrength level. By cross-leveling assets a unit could, for example, distribute its assets so that all subordinate units would be at 75 percent strength. By forming composite units, a mauled six-battery battalion could be reorganized into four full strength batteries. Reorganization is the means by which combat power can best be maintained during the early stages of war and is the reconstitution option most easily executed by commanders.

Regeneration

★ Regeneration is the rebuilding of a unit in which the mission capability has been reduced or degraded. Regeneration is accomplished through the replacement of personnel and equipment, the reestablishment of effective command and control, and the conduct of essential training. Where plans exist for forces to be withdrawn after having accomplished a prescribed mission, the positioning of preconfigured refurbishment packs in an agreed regrouping location should be considered.

Redistribution

★ Redistribution is the reallocation of unit personnel, equipment, and supplies to another unit, or returning them to the personnel replacement or supply system. The unit flag is then retired or held, pending regeneration. Redistribution occurs when the unit is no longer mission capable and the tactical situation or lack of assets make it impractical for the commander to select another reconstitution option. Redistribution is the least desirable reconstitution option.

LOCATION AND RESPONSIBILITIES

★ Reconstitution is best accomplished in a designated area which is not under immediate or direct enemy threat. Factors governing selection of this area will include the size of the unit to be reconstituted, lines of communications available, and future employment plans for the reconstituted unit. The responsibility for managing reconstitution efforts, other than reorganization, is normally retained by the commander two levels

higher in the chain of command than the unit requiring reconstitution. For example, the battery is reconstituted by the brigade. Responsibility for reconstituting the battalion rests with the Army air defense command. The priority of effort is to fire units, fire direction centers, and combat service support units, in that order unless otherwise specified.

LOGISTICS AND PERSONNEL ASSETS

★ Logistics and personnel assets for reconstitution are provided in the form of individual equipment and personnel replacements, complete unit replacements, a combination of individual and unit replacements, or through the combining of units. Primary support comes from corps, air defense support command, or theater Army area commands. During the early stages of war, reorganization is the primary means of reconstitution by which combat power can be maintained in the combat zone. For example, if a battalion experiences heavy losses to its batteries during an attack, one of the brigade commander's options is to direct combining the assets of six batteries to make four combat effective batteries.

SPECIAL EXTERNAL ASSISTANCE

★ In cases where a unit has been severely mauled or has suffered a nuclear or chemical strike, a state of shock may exist. Special external reconstitution assistance may be required. Some of the units that may be necessary in these circumstances are—

- Decontamination teams to decontaminate casualties, personnel, command and control means, weapon systems, vehicles, and equipment.
- Medical augmentation teams to conduct mass casualty treatment of radiation and chemical injuries.
- Adjutant general forward elements to assist with casualty reporting and strength accounting.
- Maintenance support teams to assist in the assessment of equipment damage and to establish priorities for recovery, repair, and cannibalization.
- Graves registration teams to assist with identification and disposition of remains. Special handling of contaminated remains must be coordinated with decontamination teams.
- Clothing exchange and bath teams to provide clothing exchange and bath facilities. This augmentation also could assist the decontamination team.

REQUIREMENTS, PRIORITIES, AND COORDINATION

★ Commands at the appropriate level, in coordination with the unit being reconstituted, identify requirements, recommend priorities, and coordinate available resources. Where refurbishment packs already exist, it will be necessary only to make adjustments to the supplies being provided to reflect actual versus planned requirements. The air defense support command coordinates requirements beyond its capabilities with the theater Army. The Army air defense command when applicable, specifies replacement needs to theater Army support elements such as the theater Army materiel management center and personnel command. Theater Army provides necessary logistics and personnel support to coordinate the replacement of soldiers and equipment and to assist an ineffective unit in becoming mission capable.

EXCESS SUPPORT RESOURCES

★ Reconstitution actions in ADA units can create an imbalance with their support elements. Combat service support reconstitution requirements could be relatively lower than combat requirements, and hence the reorganization or regeneration of ADA units may result in a temporary excess of resources. Such excess assets should be redeployed to fill logistic shortages elsewhere. However, full support effort will need to be reestablished if and when the units become fully reconstituted.

TIME TO START RECONSTITUTION

★ The level to which a unit is depleted before the commander decides to reconstitute varies according to the tactical situation. During intense combat, a unit reduced to 60 percent or less may be required to stay on line due to constant enemy pressure. Another unit reduced to 70 percent may have the flexibility to pull back and be reconstituted, depending on its mission and that of its higher command. The commander directing reconstitution determines the priority of units to be reconstituted within the command and the level to which reconstitution is to be accomplished. For example, the commander decides whether to accept less than full combat readiness or to allow the time needed to bring a unit to 100 percent combat effectiveness.

TIME TO COMPLETE RECONSTITUTION

★ A unit is reorganized or regenerated as quickly as practical to be returned as a mission capable force. The time it takes to accomplish the reconstitution process is dependent on many variables, including the following:

- Quality of the damage assessment.
- Speed of reporting, processing of requests, and decision making.
- Selection of reconstitution option and assignment of priorities.
- Availability of transportation and distances to be traveled.
- Status of units and level of effectiveness desired.
- Location of the reconstitution site(s).
- Requirements for decontamination.
- Availability of replacements and equipment.

RECONSTITUTION EMPHASIS

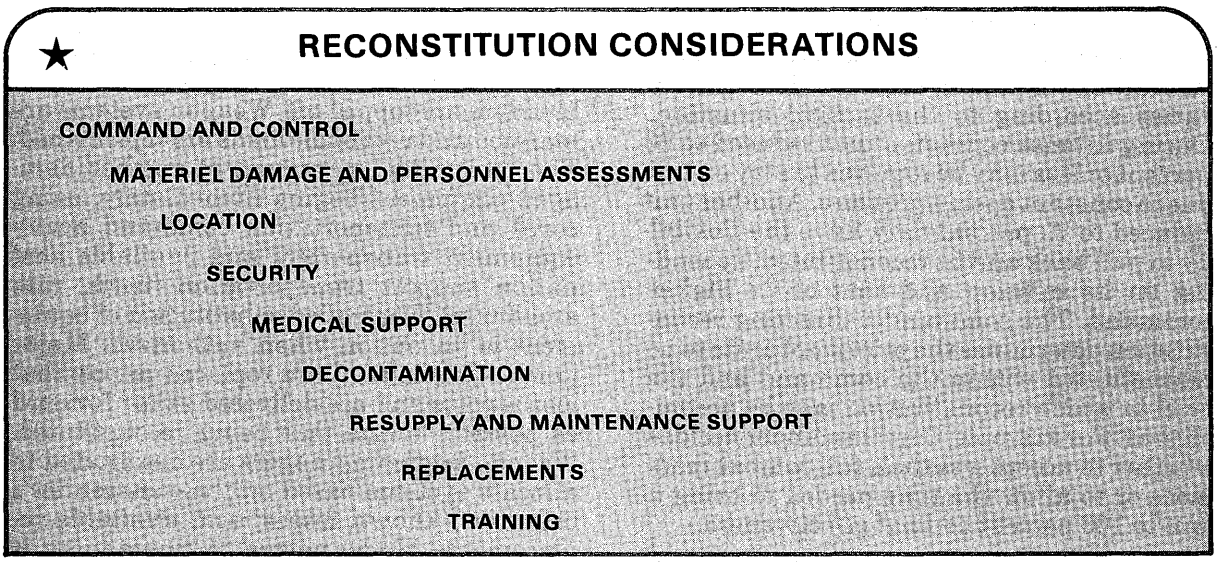
★ Reconstitution emphasis is on refueling, rearming, and remanning operational systems. This is followed by resupply of essential major items of equipment, critical repair parts, water, and rations. All operational vehicles and combat systems are refueled. All fuel tank trucks and fuel storage tanks/bladders are topped off. Weapon systems are rearmed and unit basic loads are replenished. The retrograde movement of combat damaged equipment begins immediately, using corps and transportation command heavy equipment transporters and available host nation support transportation (truck, rail, and barge). Controlled substitution of equipment is an option when authorized. Major items of equipment are replaced per combat loss reports and are delivered as far forward as possible to the unit being reconstituted. Weapon system managers are designated to allocate systems based on the commander's priorities, known losses, and available replacements. Under normal circumstances, it is the maintenance and supply company which brings a weapon system into a "ready for issue" condition; but, depending upon the echelon of unit being reconstituted, it may be the maintenance support company which completes this action. Weapon systems are transported or driven to the reconstitution area. Crews link up with the weapon system in a designated area and prepare for combat operations.

PREPOSITIONED MAJOR END ITEMS

★ The air defense support command must be able to rapidly replace battlefield equipment losses by using forward positioned class VII. This equipment is stored in operational condition. Some of these class VII packages are configured in unit sets to facilitate the introduction of complete units into combat. Such packages should be configured to support rapid reconstitution of those elements most likely to suffer heavy losses, for example, batteries in enemy air corridors.

RECONSTITUTION CONSIDERATIONS

★ Prior to reconstituting a unit, the nine factors shown in the reconstitution consideration illustration must be addressed. The reconstitution considerations are described in the following paragraphs.



Command and Control

★ Key personnel and equipment are replaced as required so that an adequate command and control capability exists.

Materiel Damage and Personnel Assessments

★ Assessments are made in the following five major categories: command and control, personnel, equipment, supply, and training. The unit commander conducts detailed assessments to determine losses and remaining capabilities. The assessment is quickly and accurately conducted (by military occupational specialty position and line item number). This information is then provided, through operational channels, to the commander two levels above the unit being evaluated for use in making reconstitution decisions. This information is also passed expeditiously through the S1 and S4 channels.

Location

★ In the combat zone, reconstitution is best undertaken in a secure location. This location is designated by the appropriate commander. In the communications zone a reconstitution location is designated by the theater Army area command commander after coordination with the appropriate territorial commander. The reconstitution site should be located near a railhead or main supply route to facilitate logistical operations. It may be necessary to conduct reconstitution in a forward position. When reconstitution in a forward position is necessary, the time chosen should be when contact with the enemy is at its lowest intensity, such as during night or adverse weather.

Security

★ For reconstitution at either a rear or forward position, security is provided or existing security is augmented, as required. This is necessary since the unit normally has a reduced security capability and unit priority is placed on the reconstitution effort. Area security assets are normally tasked with this mission.

Medical Support

★ Emergency treatment which returns soldiers to duty decreases the requirement for replacements and enhances the total reconstitution process. As such, emergency treatment starts as far forward as possible and continues in the reconstitution area. Every effort is made to treat nonincapacitating injuries as soon after injury as possible, rapidly returning the soldier to duty. This process may require additional forward medical resources.

Decontamination

★ Necessary decontamination of personnel and equipment is performed either at the reconstitution site or, preferably, en route to a uncontaminated reconstitution site, if tactically possible.

Resupply and Maintenance Support

★ Units receive needed supplies at the reconstitution site. Emphasis is placed on reestablishing basic loads of ammunition and topping off vehicles with fuel. Recovery and repair operations receive maxium attention to return major end items to the unit. Repaired end items are a major source of replacement.

Replacements

★ Personnel replacements (crew and individual) are moved to the reconstitution site and integrated into the unit. Other replacements are provided by cross-leveling personnel among subordinate elements of the unit. Commanders at all levels should recognize the importance of allowing a reconstituting unit time to settle and establish internal cohesion before it is again committed to battle.

Training

★ Necessary training brings the newly reconstituted unit up to the appropriate level of combat effectiveness. Ability to train is affected by the location of the reconstitution site and the tactical situation. Emphasis is placed on crew training. Training requirements are normally greatest when the unit is being regenerated.

RECONSTITUTION PROCESS STEPS

★ The steps of the reconstitution process are identified in the reconstitution process steps illustration. For illustrative purposes, a battery is being reconstituted.

★ **RECONSTITUTION PROCESS STEPS**

BATTALION COMMANDER EVALUATES UNIT EFFECTIVENESS.

BRIGADE COMMANDER MAKES ASSESSMENTS.

BATTALION COMMANDER RECOMMENDS HOW AND WHERE THE BATTERY SHOULD BE RECONSTITUTED.

BRIGADE COMMANDER DECIDES ON HOW TO RECONSTITUTE.

BRIGADE COMMANDER PROVIDES SITE FOR RECONSTITUTION, AND BATTERY MOVES TO THE SITE.

BRIGADE COMMANDER ESTABLISHES PRIORITY OF FILL FOR PERSONNEL AND EQUIPMENT AND THE LEVEL OF EFFECTIVENESS TO WHICH THE BATTERY IS TO BE RESTORED.

BRIGADE COMMANDER ESTABLISHES THE TIME WHEN RECONSTITUTION WILL BE ACCOMPLISHED.

THEATER ARMY AND THE AIR DEFENSE SUPPORT COMMAND PROVIDE FLOW OF EQUIPMENT AND PERSONNEL REPLACEMENTS.

RECONSTITUTION ACTIVITIES ARE CONDUCTED ON SITE.

★ The determination of combat effectiveness is normally made by the commander one level above the unit being considered for reconstitution. The determination of unit effectiveness involves many indicators. Commanders assess the potential of their units to perform the assigned mission. These indicators are measured quantitatively or evaluated subjectively. The following four broad areas provide indicators critical to determining the ability of a unit to continue assigned missions:

1. Personnel status. Commanders evaluate unit strength, type of casualties, the presence of key personnel, weapon system crew status, and level of training. This includes evaluating mission capable personnel and the effectiveness of the remaining chain of command.

2. Weapons, equipment, communications, and supply status/combat service support capability. Commanders evaluate the status of major weapon systems, vehicles, and communications equipment. They assess remaining ammunition and fuel supplies and the capability of combat service support elements to resupply the unit and to repair or replace damaged weapons and equipment.

3. Combat support status. The availability of combat support is critical to the ability of ADA units to continue assigned missions. Commanders evaluate the availability of electronic warfare, signal, intelligence, engineer, and military police support.

4. Morale. In addition to the tangible indicators described above, the commander considers a number of subjective factors that bear on the ability of the unit to continue its assigned mission. Among the most important of these intangible indicators are unit leadership, soldier personal readiness, esprit de corps, commitment, and cohesion.

★ The following broad guidelines are provided to help determine when a commander should make a reconstitution assessment:

- When personnel strength approaches 60 percent.

- When availability of major equipment approaches 70 percent.

- When the commander perceives that the unit's potential for effective combat, in terms of leadership, organizational climate, soldier motivation, and unit cohesion is severely degraded to a point of ineffectiveness.

★ It should be noted that these guidelines are approximate and will vary with the tactical situation. The final determination will be a command decision based on the commander's subjective evaluation of all the quantitative and qualitative indicators of the unit's capability for mission accomplishment.

RECONSTITUTION RESPONSIBILITIES

★ Responsibilities of the level of command conducting the reconstitution of a unit and other selected units are explained below. For illustrative purposes, a battery is being reconstituted.

S3

★ The S3 coordinates staff effort for reconstitution, receives and distributes information concerning reconstitution actions, aligns reconstitution efforts in conjunction with command priorities, and recommends priorities to the commander for the accomplishment of reconstitution. The S3 also advises on availability of personnel and equipment for reconstitution, identifies critical shortfalls, and recommends method of reconstitution in coordination with the S1 and S4. The S3 insures a coordinated flow of personnel, units, and equipment to the unit being reconstituted.

S1

★ The S1 determines availability of replacement personnel in coordination with

the Army air defense command and coordinates personnel replacement requirements based upon established priorities and equipment and weapon system availability.

S2

★ The S2 advises on the threat situation facing units which are candidates for regeneration or redistribution and provides rear area threat assessments for prospective reconstitution sites.

S4

★ The S4 recommends allocation of critical items of supply (less medical and cryptographic), coordinates movement requirements and maintenance support for the reconstitution process, and assists in coordinating host nation support to support the reconstitution process.

S5

★ The S5 assists in coordinating host nation support for the reconstitution process and coordinates the temporary augmentation of qualified language personnel to expedite language communications required to obtain additional host nation support at all levels.

Engineer

★ The engineer officer provides recommendations to the S3 on allocation and redistribution of engineer units, personnel, and equipment during the reconstitution process.

Communications-Electronics Officer

★ The communications-electronics officer provides recommendations to the S3 on allocation and redistribution of communications personnel, materiel, and units during the reconstitution process.

Surgeon

★ The surgeon provides, in coordination with the S1, recommendations to the S3 and S4 on allocation and redistribution of medical personnel, materiel, and units during the reconstitution process.

Public Affairs Officer

★ The public affairs officer provides a public affairs team to advise and assist in dealing with press requirements.

Chemical Officer

★ The chemical officer coordinates decontamination requirements.

Air Defense Support Command

★ The air defense support command directs and coordinates the reconstitution effort of subordinate organizations, provides requirements to higher headquarters, specifies materiel and personnel priorities, and designates locations for reconstitution activities within area of responsibility after coordination with the theater Army area command.

Theater Army Support

★ The theater Army area command reconstitutes units as directed by the theater Army.

★ The personnel command determines the availability of replacement personnel, monitors the availability of personnel for assignment as replacements, directs the replacement flow per established fill plan and any S3 assigned priorities, and provides recommendations through the G1 to the G3 on distribution of personnel with critical specialties.

★ The medical command returns the maximum number of personnel to duty, coordinates requirements for medical materiel and supplies for on-site support, and assists the reconstituting units to improve equipment on hand status through the US Army Medical Materiel Agency.

★ The theater communications command provides communications for reconstitution efforts within the communications zone.

★ The provost marshall coordinates additional area security assets required at reconstitution sites and advises on route and area security considerations associated with selection of and movement to reconstitution sites.

APPENDIX

Battery and Battalion Air Battle

This appendix addresses the division of labor within the engagement control station and information and coordination central. In developing the division of labor, two concepts were evaluated. One concept recommended that both operators perform the same functions but in separate geographic sectors. The other concept separated the operator tasks into two functional areas—weapons control and friendly protection—and assigned one functional area to each operator. The second concept was judged to be more effective because it evenly distributed operator tasks, exploited system automation, and retained the appropriate officer/NCO division of responsibilities. Although this appendix does not outline the exact procedures to be used during an air battle, it does specify areas of responsibility and authority for each operator as well as identifying recommended display console conditions.

This appendix also provides guidance on when to fight or fix the Patriot system when fault indications exist. The use of the fault alert filter is also addressed.

BATTERY AIR BATTLE

The ECS is manned by a crew of three—one officer and two enlisted personnel. The officer (usually a lieutenant) is a 14E and is called the tactical control officer. He operates manstation three and performs the friendly protection function. One enlisted soldier is an E5/E4 24T who operates manstation one and is called the tactical control assistant. He performs the weapons control function. The second enlisted soldier is an E4/E3 31M who operates manstation two (the communications station behind manstation one). He is called the communications operator.

TCO RESPONSIBILITIES

★ The TCO is responsible for everything that does or does not happen during battery air battle operations. Specifically, he is responsible for identifying all targets. He should have the friendly protect and the ECCM assist switches enabled in the console mode group. The alerts associated with identification processing, equipment status/faults and A-scope are displayed on this manstation. Other switches should be activated as outlined in the tactical control officer responsibilities illustration on page A-3.

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FIGHT OR FIX GUIDANCE A-8
FAULT ALERT FILTER USE A-13

★ The TCO insures that the system is in the assigned identification mode. He activates and deactivates the SIF and Mode 4 IFF as appropriate. He monitors the situation display, alert line, and tabular display area. He uses the track amplifying data tab to identify targets. The TCO also uses this tab to assist him in determining whether or not the target is a false target. False targets normally have erratic speed, direction, and altitude readings. If it is a false target, the TCO should press the DROP TRACK switch/indicator.

Most of the firing doctrine changes will be accomplished at the battalion FDC and sent to the various batteries. The TCO monitors this function and insures that the changes are implemented. He implements changes which are provided to the battery via voice communications. These changes would encompass activation/deactivation of assets and volumes, change weight sets and KAA-63 codes, and authorize hostile indicators (ECM, pop-up). The activation/deactivation of a weapons control volume would be done by the TCO.

In assuring that nonhostile aircraft are not engaged, he is responsible for applying the engagement overrides (hold fire, cease fire, and engage hold). The removal of engagement overrides is primarily the responsibility of the TCO. However, the cease fire may be removed by the TCA as dictated by the situation.

The manual IFF interrogation of targets is performed by the TCO. IFF response evaluation and Mode 4 enabling/disabling is done by the TCO in coordination with the TCA.

★ ECM target evaluation is done by the TCO. He uses the A-scope presentation as appropriate to assist him. He works with the battalion FDC in attempting to range resolve the ECM track. The TCO should also monitor system operation and activate the manual clutter mapping and weather mode as necessary.

System reorientation orders are received and acknowledged by the TCO but the actual reorientation is performed by the TCA.

The TCO monitors party line 2 (intelligence and radar reporting) for target identification information. He also maintains close coordination with the TCA and keeps the battery CP advised. As the TCO, he provides guidance and leadership as appropriate. In the event that only one console is operational, the TCO operates that console and performs the TCA's functions also.

TCA RESPONSIBILITIES

★ The TCA monitors and initiates all the engagements. In the automatic engagement mode, the system engages targets more effectively than two operators can. The TCA's primary task is to monitor and operate the system to engage nonfriendly targets. Therefore, he is responsible for controlling system functions which affect engagement. The TCA must have the weapons control switch enabled in the console mode group. The alerts associated with weapons control, engagements, radar status, and radar faults are displayed on manstation one as a result of enabling the weapons control switch. Other switches should be activated as outlined in the tactical control assistant responsibilities illustration on page A-4.

The TCA insures that the system is in the correct mode of control and engagement mode. Further, he is responsible for having the correct weapons control activated and when directed, for activating the areas enable indicator. He also controls system radiation based on directions provided and mission requirements. Launching station activation is accomplished by the TCA. He also monitors the status panel for the launching

station status, missile count, DEFCON, and state of readiness. The TCA assigns kill status when appropriate. The display areas that are monitored by him are the situation display, tab area, alert line, and the status panel. These are not listed in any priority sequence and their order varies depending on the situation.

★ The TCA engages targets employing the rules of engagement and supplemental fire control measures in effect. In the centralized mode of control and semiautomatic engagement mode, all engagements are directed by the battalion FDC. This direction is given as verbal or digital fire control orders. The TCA acknowledges the fire control order and engages the target when the target can be intercepted with a high probability of kill. If the target must be engaged immediately, the battalion FDC must give a voice command such as "Engage 005 Now". The TCA always has the authority to engage in self-defense.

★ TACTICAL CONTROL OFFICER RESPONSIBILITIES

FUNCTION
Friendly protection

CONSOLE
Manstation three

SWITCH ACTIVATION
CONSOLE MODE
Friendly protect
ECCM assist
MAP DATA
Identification areas
Origin volumes
TRACK DATA
Friends, unknowns
Track numbers

Other switch/indicators momentarily as required to clarify situation.

RESPONSIBILITIES

- Identify targets.
- Insure system is in assigned identification mode.
- Activate/deactivate SIF and Mode 4.
- Identify false targets based on track amplifying data tab.
- Monitor situation display and alert messages.
- Monitor party line 2 for air battle communications.
- Apply/remove cease fire, hold fire, and engage hold.
- Monitor clutter conditions and activate clutter mapping and weather mode.
- Perform A-scope evaluation.
- Make firing doctrine changes.
- Direct radar emission control schedule.
- Direct system reorientation.
- Monitor status monitor alerts and assess selected alerts.

★ TACTICAL CONTROL ASSISTANT RESPONSIBILITIES

FUNCTION

Weapons control

CONSOLE

Manstation one

SWITCH ACTIVATION

CONSOLE MODE

Weapon control

MAP DATA

Weapons control volumes

TRACK DATA

Unknowns (WEAPONS FREE)

Hostiles

Track numbers

LNIP

PIP

Other switch/indicators momentarily as required to clarify situation.

RESPONSIBILITIES

- Engage targets.
  CENTRALIZED (semiautomatic)
  - ° Engage targets as directed by battalion.
  - ° Engage targets in self-defense.
    DECENTRALIZED (semiautomatic)
  - ° Engage targets in order of the TBE queue.
  - ° Engage targets in self-defense.
    INDEPENDENT (semiautomatic)
  - ° Same as decentralized.
    AUTONOMOUS (semiautomatic)
  - ° Same as decentralized semiautomatic.
    DECENTRALIZED (automatic)
  - ° Monitor engagements.
    INDEPENDENT (automatic)
  - ° Same as decentralized.
    AUTONOMOUS (automatic)
  - ° Same as decentralized.
- Release cease fire.
- Reorient system.
- Place system in assigned mode of control.
- Place system in correct engagement mode.
- Place appropriate launchers to operate.
- Check that system is in assigned weapons control status.
- Activate/deactivate areas enable.
- Activate/deactivate radiation.
- Control alternate search sectors.
- Monitor party line 1 for air battle communications.
- Monitor situation display, alert messages, and status panel.
- Monitor status monitor alerts and assess selected alerts.
- Monitor system test indicators.

In the decentralized mode of control and in the semiautomatic engage mode the TCA manually engages targets in the order of the TBE queue. In the automatic engage mode he monitors the engagements. The TCA provides kill assessments as appropriate.

In the independent and autonomous modes, the TCA would function the same as in the decentralized mode of control.

The TCA monitors cease fires applied to targets within his area of responsibility. He may apply engage hold on a target as appropriate.

Strobe engagements are performed by the TCA. He is directed by the TCO when to use this method of engagement as this is an exception to the normal method of engagement. The TCA should monitor the voice communications party line 1 (air defense control).

COMMUNICATIONS OPERATOR RESPONSIBILITIES

The communications operator is the systems communications monitor. As such he monitors the tactical FM sets. He makes periodic checks of the data link terminal, routing logic radio interface unit, and the three UHF racks. He is responsible for having the assigned address in the routing logic radio interface unit. He assists the TCO in making assessments of communications faults. He monitors and periodically checks the antenna mast group. He is responsible for rotating and elevating the UHF antenna, when required. He implements all communications ECCM in the engagement control station, including use of the power amplifiers.

BATTALION AIR BATTLE

The ICC is manned by a crew of three—one officer and two enlisted soldiers. The officer is an 03 14E and is called the tactical director (TD). He operates manstation three and performs the friendly protection function. One enlisted soldier, E6/E5 24T, operates manstation one. He performs the weapons control function and is called the tactical director assistant (TDA). One enlisted soldier, E4/E3 31M, operates manstation two (the communications station behind manstation one) and is called the communications operator.

TD RESPONSIBILITIES

★ The TD is responsible for everything that does or does not happen during battalion air battle operations. Specifically, he identifies all targets. He should have the engage control and the friendly protect switches activated. Alerts associated with identification, engagements, weapons control, and engagement overrides are displayed on this manstation. Other switches should be activated as outlined in the tactical director responsibilities illustration on page A-6.

The TD insures that the information and coordination central and engagement control stations are in the assigned state of readiness, DEFCON, and identification mode. He monitors the battalion status panel and notes the information and coordination central and higher echelon communications status. He calls up the appropriate tab (fire unit status tab 07) and notes the IFF status. If it is incorrect, he contacts the batteries and directs them to enable/disable SIF and Mode 4 as appropriate. He performs or directs IFF interrogations as required. He also supervises the battalion radiation schedule.

He is responsible to resolve target identities. His main thrust is to insure that friendly aircraft are not made eligible for engagements. He is responsible to apply all engage overrides (HOLD FIRE, CEASE FIRE, or ENGAGE HOLD). He also releases the overrides when required.

He monitors the higher echelon net and alert messages and responds to all but engage commands. He monitors party line 2 (IRR).

He assesses environmental control unit, manstation three, and communications faults. In the event that only one console is operational, the TD operates that console and performs the TDA's functions also.

★ TACTICAL DIRECTOR RESPONSIBILITIES

FUNCTION
Friendly protection
CONSOLE
Manstation three
SWITCH ACTIVATION
CONSOLE MODE
Engage control
Friendly protect
MAP DATA
Identification areas
Origin volumes
TRACK DATA
Friends, unknowns
Track numbers
SOURCE/ADDRESS SELECT
Source - all
Other switch/indicators momentarily as required to clarify situation.

RESPONSIBILITIES

- Identify targets.
- Resolve identification conflicts.
- Insure that FDC is in assigned state of readiness and DEFCON.
- Assign states of readiness and DEFCON to batteries.
- Insure that FDC is in correct identification mode.
- Insure that batteries are in assigned identification mode.
- Monitor battalion status panel and note FDC equipment and higher echelon communications status.
- Insure that the batteries' SIF and Mode 4 is correct.
- Call up fire unit status tab and note batteries' status to include IFF.
- Monitor the situation display and alert messages.
- Apply/release HOLD FIRE, CEASE FIRE and ENGAGE HOLD as required.
- Apply/request IFF interrogation as required.
- Monitor higher echelon alerts and respond to all but engage commands.
- Monitor status monitor alerts and assess selected alerts.
- Monitor and operate party line 2.

TDA RESPONSIBILITIES

★ The TDA monitors and initiates all engagements. In the semiautomatic engagement mode the TDA assigns all engagements. In the automatic engagement mode he monitors and assigns engagements within the battalion. He should have the engage control and equipment control switches enabled. The alerts associated with weapons control, engagements, and equipment status appear on this manstation. Other switches should be activated as outlined in the tactical director assistant responsibilities illustration on page A-7.

★ The TDA is responsible to perform all functions associated with engaging targets. He monitors the battalion status panel and insures that the FUs are in the assigned mode of control and weapons control status to include areas enabled. If they are not, he directs them to the appropriate condition via voice or switch actions. He monitors the batteries' equipment and communications status indicators, as well as missile inventory. He calls up the appropriate tabs and notes the batteries' operational status and missile status. He insures that the batteries and the

FDC are in the assigned engagement mode. He directs the batteries to activate/deactivate radiation based on the TD's orders and the battalion EMCON plan, and he keeps track of their radiation status.

In the semiautomatic engagement mode, the TDA assigns all engagements. This is done by using TBE queue as the principal indicator of what targets are most threatening and are to be assigned to which batteries. He responds to all higher echelon engagement alerts and takes whatever action is required. His authority to engage is provided as a voice command or alert message from higher echelon when the battalion is centralized. In the decentralized mode of control his authority to engage is based on the rules of engagement and supplemental fire control measures in effect.

The TDA monitors cease fires applied to targets within his area of responsibility and may apply engage hold on a target as appropriate.

The TDA monitors status monitor alerts and assesses weapons control computer, peripherals, and manstation one faults. He also monitors the system built-in test equipment panel. He monitors voice communications party line 1 (air defense control).

★ TACTICAL DIRECTOR ASSISTANT RESPONSIBILITIES

FUNCTION
Weapons control
CONSOLE
Manstation one
SWITCH ACTIVATION
CONSOLE MODE
Engage control
Equipment control
MAP DATA
Weapons control volumes
TRACK DATA
Unknowns (WEAPONS FREE)
Hostiles
LNIP
PIP
Track numbers
SOURCE/ADDRESS SELECT
Source - all
Other switch/indicators momentarily as required to clarify situation.

RESPONSIBILITIES

- Assign engagements from TBE queue.
- Check battalion status panel and insure that all batteries are in assigned engagement mode and weapons control status to include areas enable.
- Note batteries' equipment status, communications status, and missile inventory.
- Call up fire unit status tab and note batteries' status and radar frequency code.
- Insure that FDC is in assigned engagement mode and weapons control status.
- Direct radar activation/deactivation.
- Monitor situation display, tab area and battalion status panel.
- Monitor and operate party line 1.
- Monitor status monitor alerts and assess selected alerts.
- Monitor system test indicators.
- Monitor higher echelon alerts and respond as required.

COMMUNICATIONS OPERATOR RESPONSIBILITIES

★ He monitors the FM nets, records messages, and passes the information on to TD. He periodically checks the UHF stacks, routing logic radio interface unit, and antenna mast group. He is responsible to set the assigned address in the routing logic radio interface unit. He assists the TD in assessing communications faults. He implements all communications ECCM in the information and coordination central including the use of the power amplifiers.

FIGHT OR FIX GUIDANCE

★ The fight or fix guidelines and synopsis provide guidance to the tactical control officer and the tactical director in deciding the appropriate response to system failures that occur during actual combat. The objective of fight or fix guidance is to bring as much ADA capability to bear against the enemy as is possible and logical, despite system failures. The fight or fix guidelines should be used upon the order to assume battle stations. For training purposes the guidelines could be used when batteries are ordered to to assume blazing skies. Patriot's status monitor and built-in test equipment conduct frequent checks on Patriot's many functions. Whenever the results of a test action are outside of established engineering parameters, an appropriate indicator is given to the operator via the display and control console and the fire platoon status console in the engagement control station. The appropriate indicator is presented as soon as possible on the alert line unless the fault alert filter is activated. In this case the fault must exist for three minutes after initial fault detection. The fault alert filter is described on page A-13.

★ The fight or fix decision process consist of three elements. An initial decision is made by the TCO when presented with fault indications. A review is conducted by the TD at the battalion FDC. An analysis and review by the battery system maintenance technician is also required. The Status Monitor Handbook provides a best estimate of the effect of a reported fault on tactical capability.

TACTICAL CONTROL OFFICER ACTIONS

★ When presented with an equipment fault alert, the TCO will display and hard copy the operational assessment, fault data, and fire platoon status tabs. The TCO notes the set of fault indicators and makes an initial decision to continue air defense operations or to enter diagnostics based upon the guidance of the fight or fix guidance illustration on page A-9. The TCO immediately notifies the TD of the fault indications present and of the initial fight or fix decision. The TCO calls for the battery system maintenance technician to immediately assess the fault indications and to review the decision. TCO furnishes all amplifying information on the residual capabilities to the TD as it becomes available.

★ FIGHT OR FIX GUIDANCE

STATUS MONITOR INDICATIONS	RECOMMENDED ACTION	COMMENTS
HANG OR CRASH	MUST FIX	Must fix if rebooting does not clear problem.
RADAR GROUP ISOLATED (ALERT)	MUST FIX	Must fix if rebooting does not clear problem.
REORIENT NO GO OR MORE THAN ONE DEGREE AZIMUTH CHANGE WITHOUT A TAB 09 COMMAND	MUST FIX	Radar set's indicated azimuth is probably wrong.
SEARCH NO GO TRACK NO GO MISSILE GUIDANCE NO GO OR TRACK NO GO MISSILE GUIDANCE NO GO	DECISION	Targets which may appear on the display can be engaged, if they are stable and if the fault data tab does not display either TVMAP or RTG faults. If either TVMAP or RTG (or both) faults are indicated, the unit can be used for surveillance support only.
MISSILE GUIDANCE NO GO	DECISION	No guidance is available if the fault data tab displays either TVMAP or RTG. A unit without guidance may support battalion surveillance if search and track are available (go or degrade).
MISSILE GUIDANCE DEGRADE	DECISION	With the fault data tab displaying TVMCP, there is reduced guidance capability against jamming targets.
ALL OTHER DEGRADES	FIGHT	Notify battery command post.

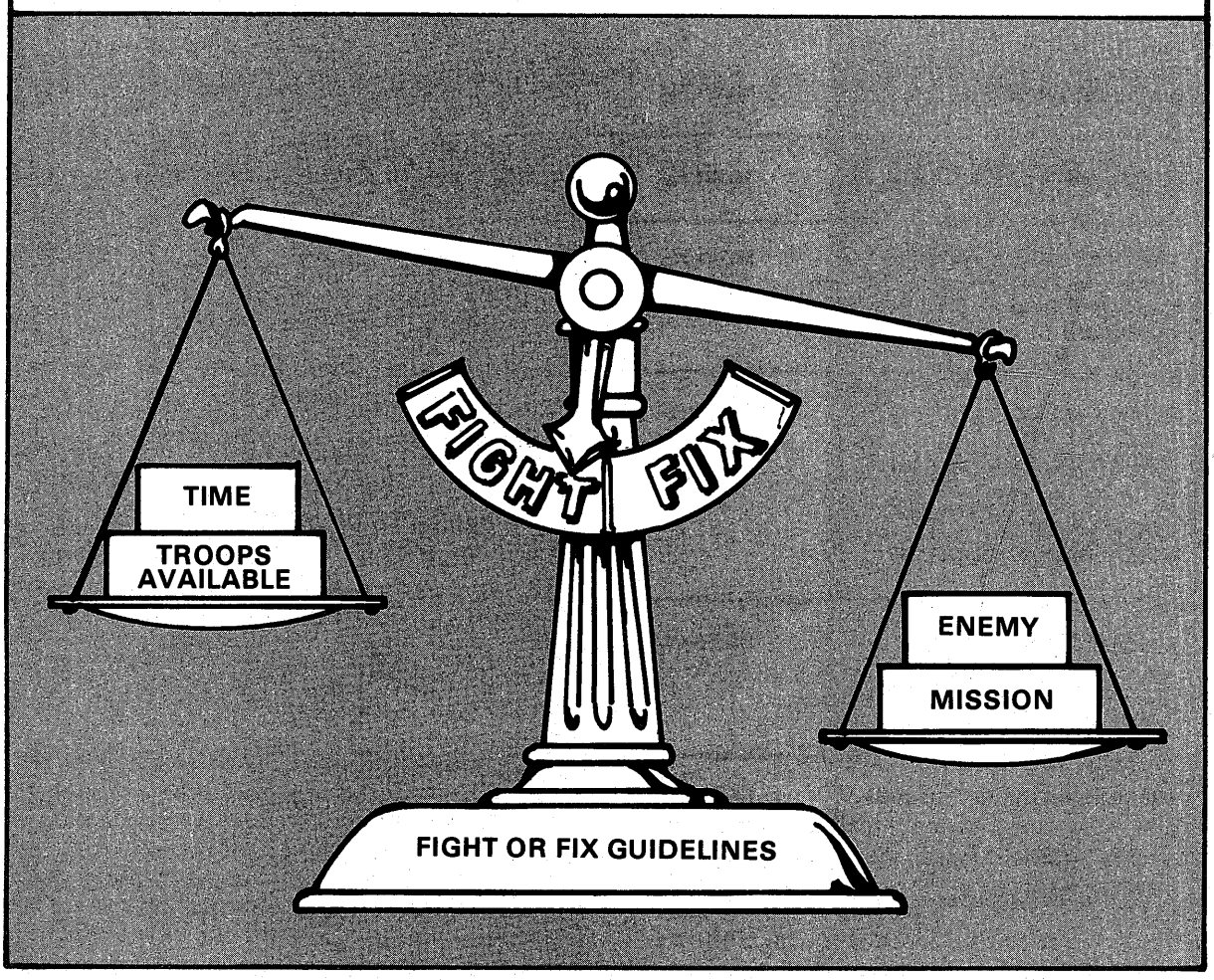
TACTICAL DIRECTOR ACTIONS

★ Upon notification of the set of fault indications and the initial fight or fix decision, the TD reviews the decision from the battalion's perspective (see the fight or fix decisions illustration). The TD reviews the situation by considering the following:

- Apparent residual air defense capability of the battery.
- Overall equipment status of the battalion.
- Tactical situation and the battalion's need for the subject battery's residual capability to support the tactical situation.
- Probable time available to conduct diagnostics/corrective maintenance before the air battle.

The TD will consult with the battalion system maintenance technician as required and recommend the continuation or changing of the initial fight or fix decision to the battalion commander or his designated representative.

★ FIGHT OR FIX DECISIONS



SYSTEM MAINTENANCE TECHNICIAN ACTIONS

★ Upon notification of a fight or fix decision, system maintenance technician should report to the engagement control station as soon as possible to gather and analyze all of the available fault indications. He can use all available maintenance manuals and his expertise to assess the location of the problem, the impact of the problem on the air defense artillery mission and the system's residual capabilities. He will provide information as soon as possible to the TCO and recommend a course of action.

CATEGORIES OF RESPONSES

★ Status monitor and the built-in test equipment provide an extensive amount of equipment status information to the operator. Much of the equipment status information, however, is either redundant or not tactically significant during wartime conditions. Thus, fight or fix guidance draws from the tactically significant fault indicators considering that an operator must make prompt decisions in response to a fault indication during an air battle. Fight or fix categorizes the tactically significant faults into response categories of must fix, decision, and fight. There is a subset of the fight category, fight while fix, in which the fault can be corrected without interrupting the air defense artillery operations.

Must Fix

★ With the following fault indications, there is no system residual capability and if initial immediate operator corrective actions do not clear the fault, the system must be fixed.

★ ***System fix or crash during normal operation.*** A system hang or crash could result from failure or from an EMP. Normally the operator will immediately attempt a reload. If unsuccessful, a decision to fix must result. One condition which can result in the inability to recover from a hang or crash is a fault, prior to the crash, in either tactical tape cassette (that fault becomes a must fix). In addition, a fault condition may occur where the display of data becomes so erratic that the operator realizes he has unreliable data.

★ ***Reorientation no go.*** A reorientation no go fault is a serious system fault that will not permit correct system operation. This fault occurs when a reorientation has been attempted and failed. The result is that the north reference is lost. Actual target position is probably in error although it appears to be normal on the situation display. Missile acquisition may not be possible and the system cannot support battalion operations.

★ ***Radar group isolated.*** A radar group isolated alert occurs when there is no data communications between the weapon control computer and the radar set. The operator should attempt to reestablish that data link by depressing the RADIATE-DISABLE switch/indicator. If the failure persists he should reload the software. If the failure still persists, the problem must be fixed.

Decision

★ The fault indications in this category do not of themselves mean that no residual air defense capability is retained. Neither do these faults mean that sufficient residual capability exists relative to the air defense mission such that a fight decision is automatically made. Fault indications in this category require a quick correlation between the operational assessment tab, target symbology, and the fault data tab information.

★ ***Search no go.*** In most cases, a search no go in the operational assessment tab indicates that status monitor has detected a condition that prevents successful search and track operations. However, these fault indications can be generated by conditions which have little effect on the system's capabilities to search and track. The operator should correlate his operational assessment tab indication with the presence and stability of target symbology on the scope. If all or some of the same target symbols are still displayed and if they are stable, the operator should continue engagements. In case of continued operations, the FDC operators should be aware

that some targets within the battery's radar coverage may go undetected. In such cases, the TD should use the adjacent batteries' overlapping coverages in the affected sector to manually oversee the sector.

★ ***Track no go.*** A track no go in the operational assessment tab normally is accompanied by a serach no go. The same guidance and rationale for a decision apply for track no go as it does for a search no go.

★ ***Missile guidance no go.*** There are two basic sets of conditions that can generate a missile guidance no go in the operational assessment tab. First, missile guidance is never assessed at a level higher than search and track. Therefore, everytime a search or track no go is displayed, missile guidance no go will be displayed whether or not any fault exists in the guidance system. The absence of actual guidance problems is verifiable by displaying the fault data tab. If TVM-AP is absent from the fault data tab display, then the system should be used to engage those eligible targets that continue to be displayed.

★ The other conditions that can generate a missile guidance no go are TVM-AP problems. This condition is indicated by TVM-AP being displayed in the fault data tab. In this case, no residual missile guidance capability exists and the only decision remaining is whether or not to retain the battery for surveillance support to the battalion.

★ ***Missile guidance degrade.*** An operational assessment tab indication of missile guidance degrade can be generated by varying degrees of equipment failures which might result in an increase in miss distance.

★ When TVM-CP is displayed in the fault data tab, performance against jamming targets will be significantly reduced and the battery should not be used to engage jammers. The battery could be used to engage triangulated jammers but if the triangulation support is lost during the engagement, the missile will most likely be ineffective. Therefore, another battery should be selected, if possible, to engage jamming aircraft. The affected battery can still engage quiet targets effectively, so long as the targets remain as quiet targets.

★ If TVM-AP is displayed in the fault data tab with a missile guidance degrade in the operational assessment tab, some guidance degradation may exist. The high lethality envelope might be smaller. But the fact that the problem was not assessed as a no go signifies that the problem is not grave. Therefore, the affected battery's firepower should be used, if needed.

Fight

★ All other status monitor indicators fall into this category. These faults vary in impact upon the air defense artillery mission from no adverse affect to moderate impact. However, the faults in this category are such that the battery should be used, if needed. In many cases, system contingency modes or redundancies compensate for the lost capability. In other cases, some capability is lost and there is no back up, but the fire unit can still make significant contributions to the battalion's conduct of the air battle.

★ ***Search/track degrade.*** A degrade in either search or track can result in modification of the normal search/track envelopes for the system. The system is expected to retain all of its functional capabilities within the reduced envelope. Targets under track are expected to be reliable. However, there may be targets within the search coverage that are not displayed (these would be at longer ranges).

★ ***Target evaluation degrade or no go.*** A target evaluation degrade or no go is usually associated with display error. Distortions on the situation display may confuse the operator and manual switch actions may require repetition. Such faults should be apparent to the operator. If the condition seriously hampers the operator, his tasks can be transferred to the other display console.

★ ***Target identification degrade or no go.*** Target identification faults refer to the IFF system. Since other means for target identification exist, these faults would result in a decision to continue operations for as long as

contingency identification exists. Contingency modes include—

• Alternate IFF modes in instances where the identification fault applies to only a single mode of the IFF system.

• Told-in target identification from higher echelons.

• Passive identification via the automated track history comparison to the passive criteria initialized in the tactical data base.

★***Reorientation degrade.*** This condition indicates that the achieved radar set azimuth differs from that expected. It can occur at system start-up following maintenance in which the radar set was rotated manually. It can also occur following a radar set retrain command in which the radar set failed to achieve its expected azimuth within two degrees. The system can normally be used if the current azimuth satisfactorily covers the assigned search sector. Otherwise, reorient the radar set to the desired azimuth.

★***Tactical tape cassette.*** The tactical tape cassettes contain the program tapes and the local site dependent data base. Cassette faults can result in the system being unable to restart or to reorient. Cassette one contains the tactical programs; a fault in this cassette prevents the system from reloading, for example, for EMP recovery. Cassette two contains the site dependent data base as well as certain programs required to support system reorientation. A fault in this cassette prevents both rapid reloading and system reorientation.

Fight While Fix

★ This category is a subset of the fight category. The only difference between the two is that faults in this category can be corrected without interrupting the battery from its conduct of the air defense artillery mission.

★***C-E faults.*** C-E faults are degrades and no go's in the UHF communications system as shown on the communications indicator on the firing platoon status panel. These faults can be due to breakdowns of individual links within the network and can be repaired while the net is operational. If the fault is serious enough to result in a no go, the battery can continue to fully support search, track and guidance in an autonomous mode.

★***Launching station low fuel.*** The launching station low fuel warning indicates 2 hours or less of fuel for the generator. Refueling of individual launching stations is accomplished while the remainder of the system continues operation.

★***Hot missile count.*** The hot missile count can drop due to missile launches or due to failures in the missile. Reload or replacement of rounds is accomplished while the remainder of the battery continues operations.

★***Launching station no go.*** Launching station corrective maintenance and missile reload is performed without interruptions to the remainder of the battery's operations. If the indication is a digital data link red indication for all activated launchers, the problem is most likely in the data link terminal at the engagement control station. Otherwise, only those launching stations displaying DDL RED require maintenance and the remainder can be used to support engagements.

FAULT ALERT FILTER USE

★ In order to minimize the impact of intermittent fault alerts on tactical operations, a switchable filter of fault alerts is incorporated into the system.

ENGAGEMENT CONTROL STATION

★ Only faults which can be intermittent are filtered. That is, those faults detected through the routine, cyclic status monitor activity. The filter is enabled by means of the EQUIP CONTR switch on each display console.

Not all faults are filtered by activation of the EQUIP CONTR switch. When the filter is

enabled radar set faults which have been stable for a least 3 minutes are reported. All other faults are not displayed on the alert line. Failures of items other than the radar set will continue to be detected and status displays will be updated to repeat these faults. Radar set failures that are associated with specific events, such as an RU AZIMUTH FLT generated by a reorientation attempt, will continue to be reported. The filter is recommended for use during initialization and conduct of the air battle. In this way, intermittent faults will not distract the operator or bog down the alert reporting system.

INFORMATION AND COORDINATION CENTRAL

★ At the battalion FDC, use of the EQUIP CONTR switch causes fault alerts to be displayed at one, two, or no consoles. Prior to the conduct of the air battle, the filter should be used to direct alerts to manstation one. During the conduct of the air battle, the filter should be enabled at both manstations. Since the tactical director assistant is a trained maintenance person, he is able to interpret and assess the majority of the alerts. Normally, the tactical director will have the filter enabled so that he does not receive the status monitor alerts.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986-491-421/40044

Glossary

AADC	Area Air Defense Commander
AADCOM	Army air defense command
AADCP	Army air defense command post
ACA	airspace control authority
AD	air defense
ADA	air defense artillery
ADC	air defense control
ADE	air defense emergeny
ADIZ	Air defense identification zone
ADL	automatic data link
admin	administrative
ADOA	air defense operations area
ADOLT	air defense operations liaison team
ADP	automatic data processing
ADSCOM	air defense support command
ADW	air defense warning
aid sta	aid station
ALOC	air lines of communications
amb	ambulance
AMG	antenna mast group
APOD	aerial port of debarkation
APOE	aerial port of embarkation
ARM	antiradiation missile
ASF	aeromedical staging facility
ASM	air-to-surface missile
ATDL-1	Army tactical data link-1
ATGM	antitank guided missile
ATP	Allied Tactical Publication
AUTODIN	automatic digital network
BITE	built-in test equipment
BOC	battalion operations center
BSE	brigade support element
CAP	combat air patrol
CAS	close air support
CBU	cluster bomb unit
C-E	communications-electronics
CEOI	Communications-Electronics Operation Instructions
CFA	covering force area
clr sta	clearing station
COMMZ	communications zone
COMSEC	communications security
CONUS	Continental United States
COSCOM	corps support command
CP	command post
CPOC	corps personnel operations center
CPU	central processing unit
CRC	control and reporting center

CRG	communications relay group
CRP	control and reporting post
CSH	Combat Support Hospital
CSR	controlled supply rate
CSS	combat service support
DARCOM	US Army Material Develoment and Readiness Command
DEFCON	defense readiness condition
DEFREP	defense readiness posture
DLA	Defense Logistics Agency
DLT	data link terminal
DMMC	division materiel management center
DS	direct support
DSU	direct support unit
DX	direct exchange
ECCM	electronic counter-countermeasures
ECM	electronic countermeasures
ECP	entry control point
ECS	engagement control station
ECU	environmental control unit
ELSEC	electronic security
EMCON	emission control orders
EMP	electromagnetic pulse
EPP	electric power plant
EPU	electric power unit
ESJ	escort jammer
ESM	electronic warfare support measures
evac	evacuation
EW	electronic warfare
EWBN	early warning broadcast net
FDC	fire direction center
FEBA	forward edge of the battle area
FEZ	fighter engagement zone
FIDOC	firing doctrine
FLOT	forward line of own troops
FSCL	fire support coordination line
FSL	forward storage location
FU	fire unit
gen	general
GM	guided missile
GMT	guided missile transporter
GOC	group operations center
GRREG	graves registration
GS	general support
GSA	General Services Administration
GS-R	general support-reinforcing
GSSB	general support supply base
GSU	general support unit
HCU	hard copy unit
HE	high explosive
HF	high frequency
HHB	headquarters and headquarters battery
HIDACZ	high density airspace control zone
HIMAD	high- to medium-altitude air defense

HUMINT	human intelligence
ICC	information and coordination central
ID	identification
IFF	identification, friend or foe
IM	intermediate maintenance
IMINT	imagery intelligence
IRR	intelligence and radar reporting
JCS	Joint Chiefs of Staff
LAW	light antitank weapon
LLTR	low level transit route
LNIP	launch now intercept point
log	logistics
LP	listening post
LS	launching station
MASF	mobile aeromedical staging facility
MBA	main battle area
MC	maintenance center
METT-T	mission, enemy, troops, terrain, and time
MEZ	missile engagement zone
MMC	Materiel Management Center
MODEM	modulator/demodulator equipment
MOPP	mission oriented protective posture
MP	military police
MPC	message processing center
MRL	multiple rocket launcher
MRO	materiel release order
MRR	minimum risk route
MS1(2 or 3)	manstation one(two or three)
NBC	nuclear, biological, chemical
NCS	net control station
NICP	national inventory control point
NOE	nap-of-the-earth
OP	observation post
OPCOM	operational command
OPCON	operational control
OPSEC	operations security
ORF	operational ready float
OSRC	Overseas Replacement Command
P&A	personnel and administration
PAC	Personnel and Administration Center
PER	peripherals
PERSCOM	Personnel Command
PFE	process for engagement
PIP	predicted intercept point
PLL	prescribed load list
POL	petroleum, oils, and lubricants
PS	personnel service
PTL	primary target line
R	reinforcing
RADC	region air defense commander
RAP	rear area protection
RATT	radio teletypewriter

RDF	radio direction finding
repl	replacement
RF	radio frequency
RLRIU	routing logic radio interface unit
ROA	restricted operations area
ROE	rules of engagement
RP	release point
RRA	retired, refitted aircraft
RRD	replacement regulating detachment
RS	radar set
RSOP	reconnaissance, selection, and occupation of position
RSR	required supply rate
SAM	surface-to-air missile
SASP	special ammunition supply point
SHORAD	short-range air defense
SHORADEZ	SHORAD engagement zone
S/I	switch indicator
SIDPERS	Standard Installation/Division Personnel System
SIF	selective identification feature
SIGINT	signal intelligence
SIGSEC	signal security
SLAR	side-looking airborne radar
SOC	sector operations center
SOJ	stand-off jammer
SOR	state of readiness
SP	start point
SSJ	self-screening jammer
STANAG	Standardization Agreement
STL	secondary target line
TA	theater Army
TAACOM	Theater Army Area Command
TACC	tactical air control center
TACOPS	tactical operations
TAMMC	theater army materiel management center
TAPOC	theater Army Personnel Operations Center
TBE	to-be-engaged
TBM	tactical ballistic missile
TCA	tactical control assistant
TCO	tactical control officer
TD	tactical director
TDA	tactical director assistant
TOC	tactical operations center
TOE	table of organization and equipment
TREE	transient radiation effect on electronics
TSOP	tactical standing operating procedures
TVM	track-via-missile
UTM	universal transverse mercator (grid)
WAD	weapons alert designator
WCC	weapons control computer
WCS	weapons control status
WEZ	weapons engagement zone
ZI	zone of interior

References

REQUIRED PUBLICATIONS

Required publications are sources which users must read in order to understand or comply with FM 44-15.

JOINT CHIEFS OF STAFF PUBLICATIONS (JCS PUB)

JCS-8, Doctrine for Air Defense from Oversea Land Areas

JCS-9, Doctrine for Unified Defense of the United States Against Air Attack

FIELD MANUALS (FM)

1-103, Airspace Management and Army Air Traffic Control in a Combat Zone

44-1 (HTF), US Army Air Defense Artillery Employment

(S) 44-1A, US Army Air Defense Artillery Materiel (U)

44-30 Visual Aircraft Recognition

100-5 (HTF), Operations

100-15 (TEST), Larger Unit Operations

100-42, US Army/Air Force Airspace Management in an Area of Operations

RELATED PUBLICATIONS

Related publications are sources of additional information. Users do not have to read them to understand FM 44-15.

JOINT CHIEFS OF STAFF PUBLICATIONS (JCS PUB)

JCS-1, Dictionary of Military and Associated Terms

JCS-2, Unified Action Armed Forces (UNAAF)

ARMY REGULATIONS (AR)

380-5, Department of the Army Information Security Program

(S) 530-4, Control of Compromising Emanations (U)

710-2, Supply Policy Below the Wholesale Level

FIELD MANUALS (FM)

3-87 (HTF), NBC Reconnaissance and Decontamination Operations

5-100 (HTF), Engineer Combat Operations

30-102, Opposing Forces: Europe

44-3 (HTF), Air Defense Artillery Employment, Chaparral/Vulcan

44-8, Small Unit Self-Defense Against Air Attack

44-18 (HTF), Air Defense Artillery Employment, Stinger

44-90 (HTF), US Army Air Defense Artillery Employment, Hawk

63-3, Combat Service Support Operations, Corps

71-100 (HTF), Armored and Mechanized Division Operations

71-101 (HFT), Infantry, Airborne, and Air Assault Division Operations

100-10, Combat Service Support

101-5-1 (HTF), Operational Terms and Graphics

TECHNICAL MANUALS (TM)

9-1425-600-10, Description, Patriot System

9-1430-600-10, Engagement Control Station, Guided Missile, Truck Mounted, AN/MSQ-104.

9-1430-601-10-1, Radar Set, Guided Missile, Semitrailer Mounted, AN/MPQ-53

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9-1440-600-10, Launching Station, Guided Missile, Semitrailer Mounted, M-901

TABLES OF ORGANIZATION AND EQUIPMENT (TOE)

44-635, ADA Battalion, Patriot

44-636, HHB, ADA Battalion, Patriot

44-637, ADA Battery, Patriot

TECHNICAL BULLETIN (TB)

380-6-8, Electronic Security (ELSEC) for Air Defense Artillery Weapon Systems

ARMY TRAINING AND EVALUATION PROGRAM (ARTEP)

44-635, ADA Battalion, Patriot

PROJECTED RELATED PUBLICATIONS

These related publications are scheduled for printing. Upon print, they will be distributed automatically via pinpoint distribution and will not be available for requisition from USA AG Publications Center, Baltimore, until indexed in DA Pam 310-1.

FIELD MANUALS (FM)

3-100 (TEST), NBC Operations

34-1 (HTF), Intelligence and Electronic Warfare Operations

(S) 44-1A, US Army Air Defense Artillery Operational Planning Data (U)

44-15-1, Operations and Training, Patriot

63-4, Combat Service Support Operations, Theater Army Area Command

100-16, Support Operations: Echelons Above Corps.

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