*ATP 3-09.70

PALADIN OPERATIONS

September 2015

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Paladin Operations

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Preface

Army Techniques Publication (ATP) 3-09.70 provides techniques for the Paladin units and staff with doctrine relevant to current and future operations. Publication ATP 3-09.70 is the principle reference for Paladin operations. Publication ATP 3-09.70 sets forth suggested duties and responsibilities of key personnel and addresses doctrine and techniques for Paladin operations and training.

This publication describes the Paladin units, to include:

•Doctrinal guidance for commanders, staffs, and subordinate commanders and leaders of the organizations responsible for conducting (planning, preparing, executing, and assessing) operations in the brigade combat team and field artillery brigade.

•Operations for the brigade combat team Paladin battalions and Paladin battalions assigned, attached, or under the operational control of field artillery brigades. The techniques described herein are guidelines, which remain flexible. Each situation in combat must be resolved by intelligent interpretation and application of the doctrine set forth in this publication.

•Army operations doctrine as stated in Army Doctrine Reference Publication (ADRP) 3-0 and ADRP 3-90. This is not intended as the sole reference for operations, rather it is used in conjunction with existing doctrine.

•Applicable North Atlantic Treaty Organization standardization agreements (see the references for a complete listing).

Publication ATP 3-09.70 is not intended as the sole reference for Paladin equipped cannon battery operations, rather it is used in conjunction with existing doctrine. This publication supplements doctrine and tactics, techniques, and procedures outlined in ATP 3-09.50. As applicable, those tactics, techniques, and procedures, which do not differ significantly from those described in the above publications, are not repeated in this publication.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate in accordance with the law of war and the rules of engagement. (See FM 27-10.)

Publication ATP 3-09.70 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which Publication ATP 3-09.70 is the proponent publication (the authority) are marked with an asterisk (*) in the glossary. Terms and definitions for which ATP 3-09.70 is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

Publication ATP 3-09.70 applies to the Active Army, Army National Guard and Army National Guard of the United States, and United States Army Reserve unless otherwise stated.

The proponent of Publication ATP 3-09.70 is the United States Army Training and Doctrine Command. The U.S. Army Field Artillery School is the preparing agency. Send comments and recommendations on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) to Directorate of Training and Doctrine, 700 McNair Avenue, Suite 128, ATTN: ATSF-DD, Fort Sill, OK 73503; by email to: usarmy.sill.fcoe.mbx.dotd-doctrine-inbox@mail.mil.

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Introduction

Army forces are employed with other Services as part of a joint force. Consequently, this ATP is grounded in joint doctrine as found in joint publications JP 3-09, JP 3-09.3, and JP 3-60. ATP 3-09.70 ties Army doctrine publications such as Army Doctrine Publication (ADP) 3-09, Fires, ADRP 3-09, Fires, and FM 3-09, Field Artillery Operations and Fire Support.

ATP 3-09.70 is organized into 8 chapters and 4 appendixes.

Chapter 1 provides the organizational framework for the Paladin-equipped cannon battery. Section I begins with a brief description of the mission and general organization. Section II closes with a discussion on cannon battery tactical duties of key personnel.

Chapter 2 discusses techniques for Paladin operations. Section I begins by discussing key considerations for operations. Section II briefly discusses the delivery of fires. Section III discusses movement considerations. Section IV discusses climate and terrain considerations for employment. Section V closes with a discussion on other tactical missions that may be assigned to the cannon battery.

Chapter 3 discusses the techniques necessary for a rapid and orderly movement to and occupation of a firing position. Section I begins with a discussion of the reconnaissance and the advance party. Section II discusses the selection of the new position. Section III discusses the organization of the new position. Section IV discusses considerations for movement. Section V discusses preparations for movement. Section VI closes with a discussion on the occupation of the position.

Chapter 4 discusses techniques for unit defense. Section I begins with an overview of threat capabilities and unit responsibilities for the defense. Section II discusses considerations for the defense. Section III closes with a discussion on defensive preparations.

Chapter 5 discusses considerations for firing in special situations. Chapter 6 discusses communications within the cannon battery.

Chapter 7 discusses firing safety and certification within the cannon battery. Chapter 8 discusses sustainment within the cannon battery.

Appendix A provides sample operations checklists for use by cannon battery personnel. This appendix is not all-inclusive, but instead provides a starting point for development of other checklists and unit tactical standard operating procedures.

Appendix B briefly discusses the common mistakes and malpractices that occur prior to and during firing. This list is not all-inclusive, but serves to highlight those that are most common to cannon artillery units conducting tactical operations.

Based on current doctrinal changes, no terms have been added, modified, or rescinded for purposes of this manual. The glossary contains acronyms and defined terms.

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Chapter 1

Mission, Organization, and Key Personnel

As Army operations and organizations continue to change, the techniques for future cannon batteries will continue to reflect technological advancements in weapons, munitions, and communications as well. The following chapters provide techniques for Paladin units. This chapter provides the organizational framework for the Paladin-equipped cannon battery. Section I begins with a brief description of the mission and general organization. Section II closes with a discussion on cannon battery tactical duties of key personnel.

SECTION I – MISSION AND GENERAL ORGANIZATION

1-1. This section briefly discusses the mission and general organization of the cannon battalion and cannon battery assigned to the armored brigade combat team or task-organized to a field artillery brigade.

CANNON BATTALION

1-2. The cannon battalion provides field artillery fires to the maneuver force and subordinate units in priority and for shaping missions assigned by the commander. The field artillery battalion also provides reactive counterfire against enemy mortar, cannon, and rocket elements in the supported higher headquarters area of operations. The cannon battalion has several limitations that are unique to the field artillery. The firing signature of howitzers makes the unit vulnerable to detection by enemy target acquisition assets. The battalion has limited self-defense capabilities against ground and air attacks. The battalion also has a limited ability in destroying armored moving targets.

1-3. The cannon battalion is organic to brigade combat teams or may be task-organized to a field artillery brigade. In the armor brigade combat team, the cannon battalion has three batteries of six M109A6 Paladin self-propelled 155-mm howitzers. All self-propelled cannon battalions are in the process of transitioning to three by six batteries. Self-propelled cannon battalions may be task-organized to a field artillery brigade and organized with three batteries of four M109A6 Paladin self-propelled 155-mm howitzers.

CANNON BATTERY

1-4. The cannon battery conducts operations through decentralized execution based upon mission orders. Battery leaders exercise initiative to accomplish the mission within the commander's guidance. The capability of the cannon battery is enhanced through the flexibility and survivability of the platoon-based organization. The platoon fire direction centers are equipped with the Advanced Field Artillery Tactical Data System (AFATDS) computer as the primary digital interface between the battalion command post and the howitzers.

1-5. The cannon battery consists of a battery headquarters, two firing platoons, a supply section, and two ammunition sections. Each firing platoon consists of howitzer sections, a platoon headquarters, and a fire direction center. The battery headquarters has personnel and equipment to perform administration, sustainment, and limited chemical, biological, radiological, and nuclear (CBRN) functions. Each firing platoon has personnel and equipment to determine firing data and conduct fire missions. The supply section provides limited sustainment support. Each ammunition section has personnel and equipment to provide limited ammunition support. Some units may consolidate ammunition sections at battalion level.

SECTION II – TACTICAL DUTIES OF KEY PERSONNEL

1-6. Paladin units exhibit the agility, initiative, and flexibility to provide timely and accurate fires in support of maneuver forces. Technological advances allow the Paladin howitzer to move and position within an assigned area, process technical firing data, and fire without relying on surveyed firing points, orienting equipment, or wire communications.

1-7. The following paragraphs represent the suggested tactical duties of key personnel in a cannon battery. Unit table of organization and equipment, commander's preference, personnel strength, and individual capabilities may require the commander to modify or reassign duties based on the six mission variables; mission, enemy, terrain and weather, troops and support available, time available, civil considerations (METT-TC), and tactical standard operating procedures.

Note. METT-TC is a memory aid that identifies mission variables. Army leaders use mission variables to synthesize operational variables and tactical-level information with local knowledge about conditions relevant to their mission. For more information on operational and mission variables, see ADRP 3-0. Mission variables will be used throughout the remainder of this document.

BATTERY COMMANDER

1-8. The battery commander is responsible for all aspects of battery operations. The battery commander will locate himself in a position to best command the battery, considering mission variables and the level of unit training. The battery commander has specific responsibilities, which include:

- Supervise the operations of the platoons.
- Conduct general reconnaissance of future positions.
- Determine the azimuth of fire, if not provided by higher headquarters.
- Plan unit marches and movements according to tactical plans established by higher headquarters.
- Determine operational employment (centralized or decentralized and consolidated or dispersed) and survivability movement criteria for his battery with the field artillery battalion commander and his operations staff officer (S-3).
- Coordinate survey control and navigation update points.
- Develop the overall battery defense plan.
- Coordinate with adjacent units for mutual support.
- Verify platoons maintain an effective security.
- Enforce communications and electronics security.
- Inform the battalion command post and battery personnel of changes in the situation.
- Supervise safety during battery operations.
- Ensures ammunition resupply is coordinated
- Perform risk management.
- Develop the battery tactical standard operating procedures.

FIRST SERGEANT

1-9. The first sergeant is the principle enlisted advisor to the battery commander. The first sergeant has specific responsibilities, which include:

- Advise the battery commander on matters pertaining to enlisted Soldiers.
- Supervise the platoon sergeant, gunnery sergeants, and section chiefs, whenever possible by maintaining a presence in the platoon positions.
- Assist the battery commander during reconnaissance.
- Assist the battery commander in the execution of the battery defense plan.
- Coordinate administrative and sustainment support (less ammunition), to include:

  - Water and food service.
  - Mail.
  - Laundry.
  - Showers.
  - Maintenance.
  - Personnel and equipment evacuation.
- Monitor battery personnel's morale, welfare, and hygiene.
- Direct evacuation of casualties to the battalion aid station, or other locations as directed by higher headquarters.

PLATOON LEADER

1-10. The platoon leader is responsible for all aspects of platoon operations. The platoon leader will locate in a position to best lead the platoon, considering mission variables and the level of unit training. The platoon leader will rely heavily on the platoon sergeant to supervise the platoon and the gunnery sergeant to supervise the detailed platoon reconnaissance, selection, occupation of a position (RSOP). The platoon leader has specific responsibilities, which include:

- Issue platoon operation and movement orders.
- Establish the platoon firing capability.
- Supervise the platoon displacement, movement and occupation.
- Supervise the maintenance of platoon equipment.
- Verify the platoon maintains continuous security, with emphasis during position displacement and occupation.
- Verify minimum quadrant elevation for each howitzer.
- Verify database for howitzer and fire direction center.
- Supervise hasty survey procedures.
- Supervise ammunition management within the platoon.
- Supervise safety during platoon operations.
- Confirm submission of reports to the battery commander and battalion command post.
- Update the platoon on the tactical situation and survivability movement criteria.

1-11. The platoon leader is responsible for determining the lowest quadrant elevation that can be safely fired from the platoon position that will ensure projectiles clear all visible crests. A minimum quadrant elevation for each howitzer is always determined. The maximum of these minimum quadrants is the minimum quadrant elevation.

1-12. For more information on methods and procedures for computing minimum quadrant elevation, see Training Circular (TC) 3-09.8 and applicable tabular firing tables.

FIRE DIRECTION OFFICER

1-13. The fire direction officer is responsible for fire direction center operations. He is responsible for the training of all fire direction center personnel. The fire direction officer should be familiar with the duties of the platoon leader. The fire direction officer can perform duties as platoon leader, as required. The fire direction officer has specific responsibilities, which include:

- Verify the AFATDS database.
- Verify target meet target selection standards and attack guidance.
- Ensure artillery precision munitions are correctly employed based on commander's guidance.
- Issue fire orders and fire commands.
- Verify safe, accurate, and timely firing data procedures.
- Verify that the tactical situation map is current.
- Verify dissemination and understanding of data for prearranged fires.

- Verify that the data from the other platoon is recorded and accessible.
- Supervise assumption of control of the fires from the other platoon.
- Perform independent safety computations.
- Control howitzer movement and positioning based on current situation and guidance from the battery commander and platoon leader.
- Recommend ammunition distribution plan to the platoon leader.
- Report sustainment and administrative requirements to the first sergeant.
- Exchange database information with the other platoon.
- Inform howitzer section chiefs on changes to the tactical situation and guidance on positioning.
- Compute minimum quadrant elevation for each howitzer.
- Verify dry fire verification after significant changes to the AFATDS database (registration or meteorological data).

PLATOON SERGEANT

1-14. The platoon sergeant is the primary enlisted assistant to the platoon leader. The platoon sergeant should be prepared to assume duties as platoon leader. The platoon sergeant has specific responsibilities, which include:

- Supervise firing platoon operations.
- Verify database in Paladin Digital Fire Control System (PDFCS) during initialization.
- Conduct independent secondary checks on survey data.
- Ensure howitzers maintain firing capability.
- Supervise platoon occupation and displacements.
- Supervise maintenance.
- Direct the platoon defense plan.
- Provide the first sergeant with the platoon defense diagram for integration into the overall battery defense plan.
- Confirm each section chief knows the location and route to alternate and supplementary positions.
- Verify ammunition-handling procedures.
- Supervise ammunition distribution plan.
- Verify safety procedures during firing.
- Enforce navigation updates, as required.

FIRE CONTROL SERGEANT

1-15. The fire control sergeant is the technical expert and trainer in the fire direction center. He ensures smooth performance of the fire direction center in 24-hour operations and functions as the fire direction officer in the fire direction officer's absence. The fire control sergeant has specific responsibilities, which include:

- Supervise creation and updates applied to the AFATDS database.
- Supervise safe, accurate, and timely computation of fire data.
- Ensure section crew drills are adhered to in accordance with appropriate FMs, standard operating procedures, and regulations.
- Ensure appropriate records are maintained.
- Verify preventive maintenance checks and services on section vehicles and equipment.
- Ensure required reports are accurate, and submitted in accordance with standard operating procedures.

GUNNERY SERGEANT

1-16. The gunnery sergeant supervises platoon advance party operations. The gunnery sergeant should be prepared to assume duties as platoon sergeant. The gunnery sergeant has specific responsibilities, which include:

- Perform in depth reconnaissance of routes and battery or platoon positions.

- Select howitzer firing areas based on commander's employment criteria.
- Select a tentative location for the fire direction center, complete with radio check to the battalion command post and confirm radio communications capability.
- Verify firing areas for radio communication with the fire direction center.
- Reconnoiter possible sustainment resupply points and report them to the battery commander.
- Coordinate with the battery commander and survey elements for emplacement of survey control points.
- Assist the platoon sergeant in verifying database in PDFCS during initialization.
- Perform hasty survey, as required.
- Initiate development of the platoon defense plan.
- Reconnoiter alternate and supplementary positions.
- Determine minimum quadrant elevation for the position.

Note. The gunnery sergeant is the battery's primary reconnaissance expert and spends a great deal of time away from the platoon. The gunnery sergeant selects howitzer locations based on employment criteria from the battery commander, which may range from very precise locations to simply the center of a firing area and a radius. The fire direction center uses this data to formulate movement orders fort the howitzers.

HOWITZER SECTION CHIEF

1-17. The howitzer section chief is responsible for all aspects of howitzer section operations. The howitzer section chief has specific responsibilities, which include:

- Initialize PDFCS.
- Verify digital and voice communications with the fire direction center.
- Monitor PDFCS during navigation.
- Select firing positions within assigned firing area.
- Observe potential emergency occupation firing positions during movement.
- Transmit emplacement data to the fire direction center.
- Record howitzer position data.
- Determine site to crest data.
- Submit Department of the Army (DA) Form 5969-R (*Section Chief`s Report*).
- Verify segregation of ammunition by type, lot, and weight.
- Ensure the howitzer is capable of receiving and processing Excalibur and Precision Guidance Kit fire missions.
- Maintain accountability of ammunition for howitzer and ammunition resupply vehicle.
- Verify safety during firing (firing data, ammunition, and sight picture, as required).
- Verify DA Form 4513 (*Record of Missions Fired*) is current, legible, and accurate.
- Verify range cards for the howitzer and crew served weapons.
- Supervise preventative maintenance checks and services on vehicles and equipment.

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Chapter 2

Paladin Operations

This chapter discusses techniques for Paladin operations. Section I begins by discussing key considerations for operations. Section II briefly discusses the delivery of fires. Section III discusses movement considerations. Section IV discusses climate and terrain considerations for employment. Section V closes with a discussion on other tactical missions that may be assigned to the cannon battery.

SECTION I – KEY CONSIDERATIONS

2-1. The cannon battalion is a principal means of fire support to the maneuver commander. The agility, flexibility, and employability of Paladin batteries enhance the cannon battalion's ability to deliver responsive and accurate fires throughout the depth of enemy formations.

CONTROL

2-2. The primary fire control facility for the cannon battery is the fire direction center. Methods of employment available to the cannon battery affect the control process. Positive and effective fire control depends on well-trained elements able to deliver fires in support of the mission. The battery commander and platoon leaders disperse in the battery position to increase redundancy and enhance fire control capabilities of the unit.

Note. The use of fire direction centers, platoon operations centers, or battery operation centers is dependent upon the organizational structure and positioning option utilized. Unless specified, fire direction center, platoon operations center, and battery operations center are used interchangeably in this document.

EMPOLYMENT

2-3. Paladin batteries during normal conditions are employed using platoon, paired, or single howitzer methods. Under normal conditions, the preferred unit of employment is the firing platoon. During degraded operations, such as the loss of a fire direction center (FDC), the remaining fire direction center may be tasked to control the howitzers as a battery element. The battery commander's guidance and mission variables will dictate the method of employment. This facilitates command, control, and sustainment, should the platoons operate as individual units. As the distance between elements increase, so does the difficulty of command, control, and sustainment.

PLATOON OPERATIONS

2-4. Platoon operations are normally two firing platoons operating independently in separate platoon locations with a fire direction center controlling the howitzers. The numbers of howitzers in each platoon and employment method vary based on the tactical situation and mission requirements. Howitzers normally position individually and work together under the lead of the senior section chief. If the platoon divides into pairs, a designated senior section chief acts as team leader. Consider employment of pairs when the counterfire threat is high, and the threat from a dismounted ground attack is low. Control is critical to maintaining responsiveness and survivability of the platoons. Platoon leaders must understand and use troop leading procedures, which reinforce and expedite dissemination of information to the platoon.

2-5. In a platoon-based unit, the requirement for control exists at both platoon and battery levels. The platoon operations center achieves this requirement in the platoon. The platoon operations center is a fire direction center with added operational responsibilities. The platoon operations center is not a separate element and does not require a separate vehicle. The functions of the platoon operations center are technical and tactical fire direction, the traditional functions of the fire direction center. The fire direction center provides fire direction with an automated tactical fire control system. Additional functions of the platoon operations center are executing orders from higher headquarters, coordinating sustainment support, and all the other operational functions normally performed by a headquarters, based on guidance from the battery commander or platoon leader.

2-6. There are no major differences between the reconnaissance, selection, and occupation of a platoon position and a battery position. The platoon survives with a combination of movement and dispersion. The battery commander issues movement criteria to the platoon leader for displacement and survivability moves. Base platoon movement criteria on mission variables and tactical standard operating procedures. Some triggers for movement may include number of rounds fired in the current location, duration of firing, and time in position. Managing survivability moves requires teamwork between the howitzers and the fire direction center.

SECTION OPERATIONS

2-7. A howitzer section consists of a howitzer, ammunition carrier, and cannoneers. The howitzer section chief is responsible for section operations. Section operations are one howitzer section operating autonomously in an exclusive firing area. Section operations are the least preferred method of employment, because the section is isolated and must provide for its own defense. This method requires the highest degree of crew training and does not provide for mutual support against air or ground threats. Consider employment of single howitzers for special missions, as this the most difficult method for control. Communications with the fire direction center is also a major concern with increased distances.

2-8. There are three basic positioning options available for howitzer section operations. The mated option (ammunition carrier close to howitzer) allows the howitzer to utilize ammunition and external power from the ammunition carrier. The separated option (ammunition carrier at a short distance from the howitzer) is another option which forces the howitzer to use the on board power supply for electrical power. The overwatch option combines both the strengths and weaknesses of the mated and separated options. In the overwatch option, the ammunition carrier is stationed a greater distance away from the howitzer to provide early warning and covering fires, particularly during firing. The ammunition carrier positions on terrain to cover danger areas or high-speed avenues of approach. All three options have their advantages and disadvantages. Positioning options for howitzer section operations are based on commander's guidance and unit tactical standard operating procedures.

SECTION II – DELIVERY OF FIRES

2-9. With advent of automated PDFCS, the first priority for the fire direction center is no longer technical fire direction, but instead database management. Organization and training of the fire direction center is necessary to effectively manage database information. A system of charts, checklists, and overlays are effective tools for this effort.

FIRE DIRECTION CENTER

2-10. Automation systems, which can send, process, and receive technical firing data, have caused the fire direction center to assume a broader role, performing tactical and technical fire control, as well as managing movement. The capabilities of the PDFCS generate a substantial increase in information management requirements for the fire direction center. Accurate and timely information management is a necessity. The AFATDS provides an automated means to provide a recommendation on when to fire Excalibur. AFATDS software is designed to replicate the decision process that a leader would go through to determine whether a target is appropriate for engagement with Excalibur. However, the recommendation will only be appropriate if commander's guidance is properly input. The fire direction center has key responsibilities, which include:

- Perform AFATDS computer database management.
- Establish internal fire direction networks.
- Control movement of howitzers, to include survivability moves.
- Review fire missions for safety violations (for example; fire support coordination measures or intervening crests).
- Perform technical and tactical fire direction.

2-11. In addition to the functions listed above, each fire direction center must be prepared to control multiple howitzers simultaneously. The fire direction center must develop procedures that enable control of the entire battery.

TACTICAL AND TECHNICAL FIRE DIRECTION

2-12. The fire direction center performs tactical and technical fire direction for fire missions assigned by the battalion. Tactical fire direction includes howitzer selection for missions that do not require the entire platoon (for example; smoke, illumination, precision munitions, and precision registration). The fire direction center ensures that fire orders received from the battalion, are properly executed. Technical fire direction is normally accomplished at the individual howitzer. The fire direction center reviews each fire mission for maneuver boundaries, restrictive fire support coordination measures, and intervening crests, to ensure the mission is safe to fire. The fire direction center also reviews each request for precision munitions dependent based on commander's guidance. After these checks, the fire mission is transmitted to the howitzer for processing.

MISSION PROCESSING

2-13. The fire direction center is responsible for fire mission processing. Upon receipt of a call for fire, the fire direction center determines tactical and technical firing data. The fire direction center has specific responsibilities for fire mission processing, to include:

- Determine tactical fire controls necessary to meet mission requirements.
- Warrant the use of precision munitions bases on commander's guidance.
- Compute technical firing data.
- Transmit the fire order digitally to each howitzer.

Note. This is the normal method of processing calls for fire, adjust fire, and fire for effect missions. During degraded operations, the fire direction center may transmit fire commands to the howitzer via voice communication. Using fire command standards will reduce the transmission time required to issue voice fire commands. For more information on fire command standards, see FM 6-40.

SECTION III – MOVEMENT AND LAND MANAGEMENT

2-14. One of the key responsibilities of the fire direction center is to control movement of the battery, platoon, pairs, or individual howitzers. Uncontrolled movement within the position may result in howitzers occupying positions recently vacated by other howitzers. Survivability diminishes, since the enemy may have targeted these positions earlier. Survivability moves of 300-500 meters remove the platoon or howitzers from the target footprint of most threat artillery systems. Tracking the movement of one to four and possibly as many as eight howitzers is a major addition to fire direction center tasks.

MOVEMENT CONTROL

2-15. The fire direction center manages the movement of the howitzers based on the battery commander's movement criteria. The two methods of control available to manage this movement are centralized and decentralized. Under the centralized control method, the fire direction center directly controls the howitzers. The howitzers move to new locations only when directed by the fire direction center. The

centralized method of control is best suited for positions with limited terrain. The battery commander may choose the centralized method to exercise maximum control when one or more howitzers experience system failures.

2-16. The decentralized method of control takes full advantage of the Paladin howitzer capabilities. The howitzers move within their own assigned firing areas, based on movement criteria provided by the fire direction center, and at the discretion of the senior howitzer section chief. The howitzer section chiefs coordinate movement and move as a team. Battery commander's guidance, tactical standard operating procedures, or the threat (for example; counterfire, or ground attack) will dictate movement of the howitzers. There are disadvantages to the decentralized method of control. Tracking the location and status of the howitzers is difficult, as the fire direction center must wait for the howitzer to arrive in the new position and report. If there are problems with the new position (for example; proximity to another howitzer or other friendly element), the fire direction center must immediately notify the howitzer to move. An unforeseen mask may disrupt communications. Difficulty in coordinating platoon defense increases under decentralized control. The probability of two or more howitzers locating in close proximity, or occupying a position recently vacated by another section, increases without an effective reconnaissance and movement plan. Regardless of the method of control, the fire direction center must develop tools and procedures for controlling movement.

2-17. The fire direction center should be positioned outside of the firing area to reduce detection. Position the fire direction center to effectively communicate with higher headquarters and howitzers. Once positioned, the fire direction center does not routinely move within the platoon position, but instead relies on cover and concealment for survivability.

MOVEMENT TRACKING

2-18. The battery commander and tactical standard operating procedures provide the guidance necessary to track movement of the platoon personnel and equipment. Two methods of movement tracking are the development of a howitzer tracking chart and howitzer position chart. The howitzer-tracking chart may be prepared on a piece of preprinted chart paper. The howitzer-tracking chart will serve as a graphic representation of howitzer locations. A legend with color scheme will indicate that status of locations (for example; the color black could indicate a howitzer’s current location; red for a past location; and blue can represent a future planned location). The use of the howitzer-tracking chart is dependent on mission variables. For example; if the platoon were fighting a deliberate defense the howitzer tracking chart could be very useful, but during a movement to contact or hasty attack, it would be counterproductive.

Use the howitzer position chart in conjunction with the howitzer-tracking chart. While the howitzer tracking chart provides a quick visual reference for past, current, and future planned positions, the howitzer position chart records the actual grid locations reported by the howitzers and those issued in movement orders. When howitzers report emplacement data, the howitzer position chart provides a first line verification of information. If the reported grid and the recorded grid vary, the fire direction center should immediately plot the grid on the howitzer-tracking chart to determine the discrepancy. For information on the use of graphics and symbols, see ADRP 1-02.

RECONNAISSANCE, SELECTION, AND OCCUPATION OF A POSITION

2-19. The primary purpose of RSOP is to determine the suitability of a position in terms of maneuverability, defensibility, trafficability, and communications. The battery commander must issue clear guidance for an effective reconnaissance of battery or platoon positions. The battery commander assembles the reconnaissance elements from one or both platoons. The platoon reconnaissance element is normally the gunnery sergeant and his driver, augmented with additional personnel, as required. The primary function of the reconnaissance element is to determine the suitability of routes, and in what general areas the unit can operate. RSOP operations are discussed in Chapter 3 of this publication.

2-20. The battery commander issues guidance to the reconnaissance elements, to include:

- Reconnaissance method.
- Positioning options.
- Tentative Locations for support assets.
- Considerations for offensive and defensive operations.

SECTION IV – CLIMATE AND TERRAIN CONSIDERATIONS

2-21. Climate and terrain can vary widely between operational areas, and even within the same operational area. Cannon batteries frequently adjust their tactics, techniques, and procedures to account for these differences. This section briefly discusses some of the climate and terrain considerations unique to specific types of locations.

MOUNTAIN OPERATIONS

2-22. Rugged, compartmented terrain with steep slopes, treacherous mobility, and poor road networks characterize operations in mountainous terrain. Additional ammunition, including precision munitions, may be required to support the maneuver force in mountainous terrain because of reduced munitions effectiveness. Cross-country restrictions force the enemy to use roads and trails, which will enhance friendly interdiction fires. Movement control is more difficult on winding mountain roads. Because of the closeness of terrain masks, fewer suitable battery positions are available. Maximize use of terrain for cover and concealment to compensate for limited hardening potential. If possible position units in defilade. Position observation posts, listening posts, and crew-served weapons to provide early warning and defensive fires. Plan for defensive cannon direct fire missions. Displacement is limited to the use of available roads, which generally are narrow and twisting. Survey may not be as accurate in this terrain. Emplacing on hills increases the range of howitzer weapons systems. For more information on mountain operations, see FM 3-97.6.

JUNGLE OPERATIONS

2-23. High humidity and dense vegetation characterize operations in jungle terrain. Position units for mutual defense, especially when thick vegetation increases vulnerability to ground attack. Humidity may degrade the ability of the propellant to achieve desired ranges and may reduce equipment operability. Employ measures to keep powder increments dry. Dense vegetation degrades munitions effects. In thick canopy, variable time and improved conventional munitions are ineffective. Point detonating fuzes may be set on delay to penetrate to the ground and achieve the desired results. When employing Excalibur, the delay mode may not be the optimal method because it was designed to penetrate four inches of reinforced concrete, so it may penetrate the vegetation and then bury before detonation resulting with little or no effects on the target. Communications degrade because of high humidity, vegetation density, and electronic line of sight. Antennas may have to be elevated to overcome line of sight restrictions. Soft terrain and thick vegetation hamper selection of firing areas. The battery must be prepared to clear fields of fire. Firebase operations are a viable means of providing battery defense and 6,400 mil firing capability. Soft ground on the available roads reduces mobility and restricts the use of terrain march. Reduced mobility hampers unit resupply. Survey control is more difficult to establish, and survey personnel need more time to complete their tasks. Position howitzers closer together to provide security of the position. For more information on jungle operations, see FM 90-5.

COLD REGION OPERATIONS

2-24. Frozen earth, snow covered terrain, intense sunlight, and prolonged darkness characterize operations in cold regions. Smoke lasts longer and travels farther in cold weather; however, snow usually smothers the smoke canisters. White phosphorus particles remain active in the area longer and restrict use of that terrain. Utilize artillery fires to start snow slides or avalanches as a munitions effects multiplier. Radio communications can be unreliable in extreme cold, and equipment may become inoperative. Frozen, snow covered terrain may limit the number of available positions for emplacement. Tracked vehicles will experience increased travel times due to icy conditions on roadways. Wheeled vehicles and trailers are generally not suited for operations in cold region areas due to reduced mobility. Snowstorms and intense cold

adversely affect vehicles and equipment. Without the use of improved position azimuth determining system, survey may be more time consuming. For more information on cold region operations, see Army Tactics, Techniques, and Procedures (ATTP) 3-97.11.

URBAN OPERATIONS

2-25. Densely populated, movement restrictive, high traffic areas characterize operations in urban terrain. High angle fires and precision munitions are most effective in attacking defiladed areas between buildings. Control of a firing platoon operating in an urban area is demanding. The battery commander or gunnery sergeant reconnoiters individual howitzer positions, using existing structures (for example; barns, auto repair shops, and warehouses) as firing or hiding positions. This technique provides maximum protection and minimizes the camouflage effort. Additional time is necessary for the reconnaissance of suitable positions. The use of aerial imagery could aid in identifying potential locations. Depending on the density of buildings in the area, the reconnaissance party may need to use cordon and search techniques to clear and check buildings. Because of the expanded occupation required in the urban area, platoon displacement may be impossible. In this case, displacement may be by howitzer section. Battery personnel must be prepared to use hasty survey techniques to establish directional and positional control during degraded mode. Magnetic instruments are impaired when operating in a built up area and their accuracy is degraded. For more information on urban operations, see FM 3-06.

DESERT OPERATIONS

2-26. Rapid, highly mobile warfare conducted over great distances characterize operations in desert regions. Considerations vary according to the type of desert. However, considerations common to all include munitions effects due to the temperature extremes and a lack of identifiable terrain features. The mountain desert typically has barren, rocky ranges separated by flat basins studded by deep gullies created during flash floods. This terrain will support all types of artillery but is best suited for self-propelled units. The rocky plateau desert typically has slight relief with extended flat areas and good visibility. It has steep-walled eroded valleys (termed wadi). These areas are suitable for artillery positions, but are subject to flash flooding. The sandy or dune desert typically has extensive flat areas covered with dunes subject to wind erosion. The dune size, the texture of sand, and the leeward gradient may prohibit terrain movement entirely. For more information on desert operations, see FM 90-3.

SECTION V – OTHER TACTICAL OPERATIONS

2-27. This section briefly discusses considerations for cannon battery support of other tactical operations. This section highlights those principles generally common to all operations, and discusses considerations unique to specific types of other tactical operations.

ARTILLERY RAIDS

2-28. The artillery raid is a rapid air or ground movement of elements into a position to attack a high- payoff target currently beyond the maximum range of available field artillery weapons. This could involve operations across the forward edge of the battle area. Normally a raid is extremely short and does not involve sustained operations. A detailed plan, surprise, and speedy execution are key factors in a successful raid. Because the target dwell time is likely to be perishable, the planning phase must be very short. Effective tactical standard operating procedures are essential to mission success. Troop strength and level of training are key considerations for the conduct of an artillery raid. Firing units will move forward only the number of vehicles necessary to accomplish the mission. When the fire mission is complete, the howitzer crews prepare the howitzers for movement. Security for the area is most difficult at this time. Howitzer section members provide local security for the raid location. See Appendix A for a sample precombat checklist for artillery raids.

STABILITY OPERATIONS

2-29. Cannon batteries deploy to conduct stability operations when the need arises. The battery must be prepared to perform the full range of field artillery offensive and defensive tasks. Stability operations encompass activities in areas outside the United States. In stability operations, all personnel must fully understand the mission (military and political), cultural impacts, and rules of engagement. Tactical standard operating procedures must be developed, rehearsed, and coordinated to effectively deal with complex situations (for example; snipers, mortars, media, dislocated civilians, military or civilian emergency vehicle traffic, and refugees). For more information on stability operations, see FM 3-07.

DEFENSE SUPPORT OF CIVIL AUTHORITIES

2-30. Defense Support of Civil Authorities (DSCA) are conducted within the United States responding to crises and include actions to save or protect lives, reduce suffering, recover essential infrastructure, and improve quality of life. DSCA usually involve a greatly reduced potential for use of significant force. Normally, field artillery batteries conduct operations in nontraditional, noncombatant roles without their howitzers. Commanders must conduct detailed, comprehensive risk analysis to identify potential hazards and unique situations encountered during civil support operations. Anticipate dispersed operations and small unit positions. Terrain management may involve both military and civilian agencies. For more information on civil support operations, see ATP 3-28.1.

FIRE BASE, FORWARD OPERATING BASE AND HARDENED ARTILLERY POSITIONS

2-31. When the primary threat is infantry or irregular forces without heavy weapons, field artillery units may expect to support the maneuver forces from a fire base or forward operating base. Hardened or fortified positions are similar to a fire base and forward operating base, but they lack the combined arms support from maneuver units found in a fire base. The planning considerations for a fire base, forward operating base, and hardened or fortified position are the same.

2-32. A fire base is a deliberate defensive position, similar in many ways to a maneuver strong point. A carefully planned and coordinated defense against ground attack is the essential element for the battery or platoon to survive and continue to provide fires from a fire base. The mission and terrain dictate the positioning of the fire base. The position should allow for a 6,400 mil firing capability. Position individual fire bases on open, defensible terrain with clear fields of direct fire in all directions. The area beyond the perimeter must be clear of foliage or structures that block vision. A hilltop makes an ideal fire base location, as it provides clear kill zones and maximum grazing fires.

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2-34. The defense planner (normally the first sergeant) must carefully survey the area outside the perimeter and identify likely enemy avenues of approach. Concertina, barbed wire, mines, trip flares, remote sensors, and observation or listening posts are used to prevent entry into the battery or platoon position. As time and resources permit, the defenses are expanded and improved. Begin hardening the position with whatever means are available immediately after establishing a firing capability. At a minimum, the battery must carry basic Class IV materials (for example; sandbags, concertina, pickets, 4x4s, and plywood) and use these and other readily available materials (for example; powder canisters and soil filled containers) to secure and harden the position. Position howitzers and crew-served weapons to provide interlocking fires throughout the position. Determine a primary and alternate means of communications and provide redundancy. Unit tactical standard operating procedures and plans for the defense must be detailed enough to ensure that all battery

personnel know their individual responsibilities once an enemy attack begins. The plan must be rehearsed, critiqued, and improved on a continuing basis.

2-35. The defenses must be constantly checked for evidence of tampering. For the final defense of the position, an internal perimeter is established around each howitzer position, support section, fire direction center, and the command post. If the outer perimeter is penetrated, sections should stay in place and defend the battery or platoon from their assigned positions. Once the situation stabilizes, the battery or platoon leadership executes a counterattack to reestablish the perimeter followed by a security sweep of each defensive position inside the perimeter. Priorities of work must be established to efficiently occupy and defend a fire base, forward operating base, or hardened position. Leaders must ensure that everyone understands the priorities of work and allocate resources to complete high priority tasks first. For more information on occupation and preparation of defensive positions, see FM 3-21.8 or ATTP 3-21.71.

2-36. The information discussed in this chapter provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures.

Chapter 3

Reconnaissance, Selection, and Occupation of a Position

This chapter discusses the techniques necessary for a rapid and orderly movement to and occupation of a firing position. Section I begins with a discussion of the reconnaissance and the advance party. Section II discusses the selection of the new position. Section III discusses the organization of the new position. Section IV discusses considerations for movement. Section V discusses preparations for movement. Section VI closes with a discussion on the occupation of the position.

SECTION I – RECONNAISSANCE AND THE ADVANCE PARTY

3-1. Reconnaissance entails examining terrain by visual observation or other detection methods, to determine its suitability for accomplishing the mission. A continuous and aggressive reconnaissance is essential to providing timely and accurate fire support. Cannon battery commanders or their designated representatives must continually perform reconnaissance and plan ahead to meet any contingency. The key to a successful RSOP is discipline and team effort.

CONSIDERATIONS

3-2. On the battlefield, a sophisticated enemy can locate and engage field artillery in various ways. To survive, field artillery units move often. An artillery unit is most vulnerable to enemy action while moving into or out of a position. To minimize movement time, key personnel must be able to perform reconnaissance, selection, occupation, and movement tasks quickly and efficiently. The battery commander must clearly understand the tactical situation of both friendly and enemy forces while planning and executing movement. The basic considerations for RSOP are when to move, where to move, and how to move. Field artillery units usually conduct moves in response to either tactical or survivability considerations. The three factors driving most unit movements are fire support to maneuver forces, timing, and survival. A unit must be able to move to provide fire support to the supported force. Some tasks require the unit to reach a certain position or phase line to range the target. A unit may also be forced to move when a position becomes untenable due to enemy counterfire, attack, or natural disturbances (for example; flooding).

RECONNAISSANCE

3-3. The battery commander will conduct a reconnaissance of the proposed location as time allows. Ideally, the reconnaissance will consist of a ground reconnaissance with identification of proposed routes, obstacles, ambush sites, survey locations, and platoon positions. Reconnaissance allows the battery commander to traverse the terrain that the battery or platoons will cover en-route to the position. Reconnaissance can accomplish survey coordination, engineer support, route security, adjacent unit coordination, and fire support.

3-4. The three methods of reconnaissance available to the battery commander are map, air, and ground. All reconnaissance methods should begin with a map inspection, supplemented by photomaps, aerial photographs, and aerial video if available. The best reconnaissance is one that utilizes a combination of all three methods. The map reconnaissance method is very fast, but there are disadvantages. For example; terrain and other features may have been altered, as surface conditions of the route and position cannot be determined. Aerial photographs should be used to supplement maps, as they are usually more recent and present a clearer picture of the terrain. If time and resources are available, an air reconnaissance may be beneficial, but true surface conditions may still be indistinguishable.

3-5. Traditional cannon artillery batteries had little or no access to aerial photographs or video. With the advent of technology, this has changed. A reconnaissance tool now available to the cannon battery commander is the RQ-11B Raven. The Raven is a man-portable class of unmanned aircraft systems. The Raven is small, self-contained, and portable with a weight of only four pounds and a wingspan over four feet. Raven missions include reconnaissance, security, and surveillance during both day and night. The Raven conducts hasty route reconnaissance forward of the ground reconnaissance element. Raven operators receive airborne video images and compass headings, which can be recorded for later analysis. The employment of the Raven small unmanned aircraft system is based on unit authorizations, commander's guidance, and tactical standard operating procedures. For more information on Raven employment and mission planning considerations, see FM 3-04.155.

3-6. The best single reconnaissance method is the ground reconnaissance. For this reason, the primary focus for the remainder of this chapter will be ground.

PLANNING THE RECONNAISSANCE

3-7. The battery commander must analyze mission variables when planning the reconnaissance. The unit must be able to perform its mission with minimal degradation from tactical or survivability moves. A thorough understanding of the current enemy situation is essential. The battery commander must analyze the terrain and weather along routes and the time and distance required to conduct movement. The battery commander must consider the current troop strength and level of training when planning the reconnaissance. The amount of time available will affect the detail of the reconnaissance. Civilian considerations related to population centers, culture, organizations, and leaders within the area of operations could directly or indirectly affect the current operation.

3-8. The reconnaissance party is commonly referred to as the advance party. The advance party is a group of unit representatives dispatched to a planned new position in advance of the main body to prepare the position for the arrival of the unit and equipment. The advance party should consist of enough personnel to accomplish the reconnaissance successfully. An advance party may consist of the battery commander, gunnery sergeant(s), and representatives from fire direction center(s) and support sections. Since there is no need to establish individual howitzer positions or determine initial deflections, the advance party usually consists of only the gunnery sergeant and his driver. The battery commander or unit tactical standard operating procedure establish the composition of the advance party. The battery commander chooses positions for the battery or platoons, to include firing areas. The unit tactical standard operating procedure will dictate when and where the advance party assembles and what equipment is necessary for the reconnaissance. The advance party should always bring the minimum equipment necessary for security and survival.

ROUTE RECONNAISSANCE

3-9. The primary purpose for a route reconnaissance is to determine the suitability of the route. A route reconnaissance is conducted from the current position to the new location. The battery commander may direct a howitzer section to accompany the advance party depending on the mission and tactical situation. The battery commander should select primary and alternate routes. Availability of cover and concealment are important for terrain marches. The route must support the weight of the howitzers and other vehicles. Obstacles and contaminated areas must be identified and clearly marked. Place survey control points along the route to perform navigation updates, as required. The time and distance required to travel to the new location must be carefully calculated. Any information discovered during the reconnaissance is transmitted to the battery or platoon. For more information on reconnaissance techniques, see FM 3-21.8 and ATTP 3-21.71.

SECTION II – SELECTING THE NEW POSITION

3-10. Based on the reconnaissance conducted earlier, the battery commander selects the battery or platoon positions and battery trains area. Once the general locations are determined, the gunnery sergeant(s) begin preparations of their respective positions.

PLATOON POSITION

3-11. The Paladin adds flexibility to the planning and coordination process at battalion level. Because the traditional line of metal no longer exists, the Paladin platoon can occupy places unsuitable for conventional artillery. A Paladin unit can occupy wooded areas, urban areas, or areas with dense undergrowth. If an area is open enough for individual howitzers to establish an azimuth of fire, with consideration to site to crest, and the ground is firm enough to allow one or more howitzers to maneuver, the area is suitable for operations. Since there is no need to lay with an aiming circle, intervisibility between howitzers is not required. However, it should be a consideration, as it allows for mutual defense and facilitates reciprocal lay during degraded operations.

3-12. The Paladin platoon position may require an area approximately 1,500 by 3,000 meters. A platoon position of this size is capable of providing two firing areas with multiple locations for howitzer emplacement (Figure 3-1). This is approximately the same amount of space used by traditional cannon platoons in establishing primary and alternate positions. The key difference between Paladin units and traditional cannon units are there is no need for prepared alternate positions, because survivability moves are made within the same firing area. These moves are normally 300-500 meters in length. The greater the threat of counterfire, the more the howitzers conduct survivability moves within a given firing area. However, Paladin units do not require exclusive use of this terrain. With proper coordination, maneuver units can pass through a platoon position without disrupting operations. Maneuver commanders may resist sharing space with Paladin units because of the potential for enemy counterfire. However, wide dispersion of howitzers across a brigade front minimizes the effectiveness of enemy counterfire. Coordination of terrain with the supported maneuver unit commander is continuous.

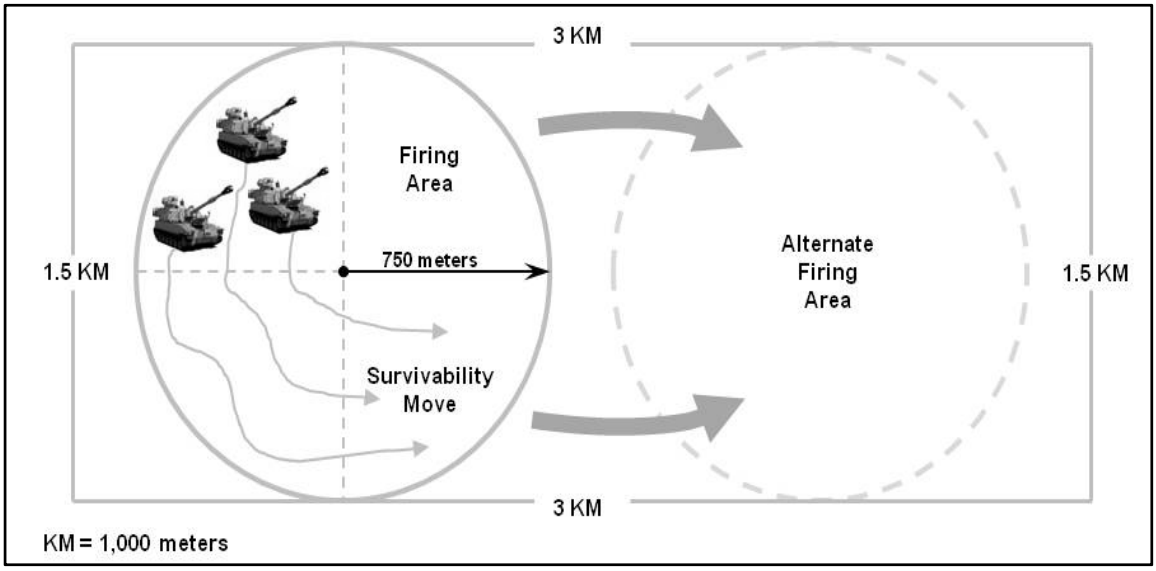


Figure 3-1. Example platoon position with firing areas

3-13. During mission analysis, the need may arise for a supplementary position. A supplementary position is used to conduct a specific mission (for example; offset registration, or primary defense). A supplementary position for offset registration should be far enough away that counterfire will not affect the primary position. A supplementary position could be designated for defense of the primary position to cover likely enemy avenues of approach. These positions may be inside or outside of the platoon position.

POSITION SELECTION CONSIDERATIONS

3-14. The mission is the most important consideration for selection of the position. The position must facilitate fires throughout the maximum area of the supported maneuver force. The azimuth of fire for the platoons is determined with this in mind. Communications is a key consideration for position selection. The

position must enable communications with higher headquarters. Defensibility is another key consideration for position selection. The position should use existing terrain features to prevent the enemy from targeting the unit. A position that provides protection against the effects of counterfire is very desirable. The position should offer effective cover and concealment, with emphasis on concealment. The position should also avoid high-speed avenues of approach and have more than one entrance and exit. Consider personnel and weapon systems when selecting positions to maximize capabilities in responding to and defeating a physical attack. Trafficability and maneuverability are other key considerations for position selection. The terrain should facilitate movement within the position. An established track plan specifies the routes vehicles take within the position. The vehicles and weapon systems that will occupy the position dictate the position requirements. For example; tracked vehicles require a larger area with stable soil to support the increased weight over wheeled vehicles.

SECTION III – ORGANIZING THE NEW POSITION

3-15. Based on the reconnaissance and selection of the new position conducted earlier, the battery commander issues guidance on the general locations for the howitzer platoons, fire direction center, and support sections. The battery commander also issues guidance to the gunnery sergeant for the track plan and scheme of defense. The advance party then organizes the position for occupation.

ADVANCE PARTY PREPARATIONS

3-16. Upon arrival at the new location, the advance party conducts a security sweep of the position. The sweep will identify the presence of the enemy; mines; improvised explosive devices; CBRN hazards; and other threats to the unit. If these threats are present, the advance party will break contact with enemy forces or mark hazards and relocate to another location. The intent is to move stealthily, avoid enemy contact, and accomplish the tasks without engaging in close combat. The security sweep should be well trained and rehearsed. Security is continuous throughout advance party operations. For more information on formations and movement techniques, see FM 3-21.8 or ATTP 3-21.71.

POSITIONING BATTERY AND PLATOON ASSETS

3-17. The enemy poses a general threat from counterfire, air attack, ground attack, and electronic warfare. To counter this threat, the battery commander must consider techniques of dispersion, movement, hardening, and concealment when selecting battery or platoon positions and firing areas. The battery commander selects firing areas for howitzers, and tentative locations for battery or platoon assets (wheeled vehicles and fire direction centers). Consider the use of natural cover and concealment to disperse battery or platoon assets over a large area when the threat is from enemy counterfire or air attack. This reduces vulnerability to indirect fire and increases survivability during air attack. Consider the use of a tight and defensible position when the threat is from enemy ground attack, guerilla, and Special Forces. This provides excellent firing and unit defense capabilities. The type of positioning utilized will depend on mission variables. The main factors to consider are the mission and enemy.

SURVEY CONTROL POINTS

3-18. Limited survey assets, dispersed firing elements, and greater survey requirements demand enhanced coordination. The gunnery sergeant coordinates with the battery commander and survey personnel, if available for emplacement of survey control points. These navigation update points will allow the howitzer to update its location (easting, northing, and altitude) in the PDFCS. Select suitable locations for survey control points, and perform hasty survey if necessary. Verify survey control points are properly marked and survey data is accurate.

Note. If the howitzer navigation subsystem is global positioning aided, there is no requirement for navigation updates. If the vehicle experiences a navigation system or subsystem failure, a visual and audible alert from PDFCS will notify the howitzer section chief to perform a navigation update.

3-19. Unit tactical standard operating procedures will dictate when, where, and how survey control points are constructed and emplaced. One option is to place survey control points at the battalion rearm, refuel, and resupply point. A survey control point can be placed at each fuel tanker, permitting the howitzer to perform a navigation update while refueling. This will save time and eliminate the need to establish survey control points along the route. At a minimum, at least one survey control point should be established in each battery or platoon position.

3-20. Publication ATP 3-09.70 sets forth suggested duties and responsibilities of key personnel and addresses doctrine and techniques for Paladin operations and training. It is based on current tables of organization and equipment and provides a starting point from which commanders can adjust their battery operations and training based on local training scenarios and mission variables.

TRACK PLAN

3-21. The gunnery sergeant with guidance from the battery commander establishes the unit track plan. A well-established track plan will minimize the signs of unit activity (tracks, disrupted soil, and debris) associated with tracked vehicles. The track plan includes specific routes for traffic flow within the position, entrance points, support vehicle pickup points for ground guides (periods of darkness), and exit points. Report problem areas to the battery commander or platoon leader immediately.

FINAL PREPARATIONS

3-22. The gunnery sergeant transmits pertinent information to the fire direction center, to include:

- Platoon firing areas (easting, northing, and altitude).
- Survey control points.
- Fire direction center location.
- Initial site to crest data.

3-23. The gunnery sergeant initiates the defense diagram, complete with a terrain sketch, including the above information, potential target reference points, likely enemy avenues of approach, locations of friendly and enemy elements, and suitable locations for observation or listening posts. This information will serve as a starting point for completion of the final defense diagram by the platoon sergeant. The defense diagram will be discussed later in Chapter 4 of this publication.

3-24. To assist in the organization of the new position, the gunnery sergeant may use a notebook, note card, or similar tool designed to capture pertinent information. Figure 3-2 on page 3-6 is one example.

Task	Planned	Actual
Center grid (only refine if necessary)	Easting: 45990 Northing: 68730 Altitude: 350	Easting: 45987 Northing: 68732 Altitude: 350
Radius (meters)	750	750
Minimum quadrant elevation of immediate crest: Range: Sight: Object:	 1000 meters 120 Hilltop	 1100 meters 130 Hilltop
Radio check with battalion FDC	Yes or No	
Entry point grid	Easting: 45910 Northing: 68750 Altitude: 350	Easting: 45913 Northing: 68757 Altitude: 340
Entry point description	Gravel road cutting through tree line from Hill Road	
FDC location	Easting: 45060 Northing: 69450 Altitude: 320	Easting: 45058 Northing: 69441 Altitude: 320
Terrain restrictions	Dense brush at the northeast edge of firing point	
Route restrictions	None	
Firing area restrictions	Intervening crest (hilltop) to the northwest of firing point	
Visible DAP	Yes or No and description Antenna tower on hilltop to the south (3300 mils)	
Travel time	45 minutes	50 minutes
Rally point	45910 68750	45913 68757
Additional information	Rally point is road intersection at entry point grid (see above)	
Note. Send ready to fire information as soon as possible. Send as much of the report, as it is completed, before the platoon departs from start point.		
FDC—fire direction center DAP—distant aiming point		

Figure 3-2. Sample gunnery sergeant's card

Note. The example above is for illustration purposes only. Other techniques or designs developed can be included in unit tactical standard operating procedures.

SECTION IV – MOVEMENT CONSIDERATIONS

3-25. Based on the reconnaissance, selection, and organization of the new position conducted earlier, the battery commander or platoon leader determines considerations for an orderly movement of the main body to the new location. The primary consideration for the tactical road march is rapid movement. Successful movement places Soldiers and equipment at their appointed destination at the proper time, ready for combat. The advance party continues with ongoing preparations, until the main body arrives.

METHODS OF MOVEMENT

3-26. There are several methods for moving the platoon in a tactical configuration. Each method has specific advantages and disadvantages. The open column method is used primarily for daylight movements, when adequate road networks exist and enemy contact is unlikely. The closed column method is best suited for

situations where maximum control is required (for example; limited visibility, built up or congested areas, or periods of darkness). The infiltration method involves movement individually, or in small groups to reduce vulnerability to hostile observation. The terrain march method is conducted off road using the terrain for cover and concealment when enemy observation, interdiction by fires, or air attack is likely. Time available is a determining factor when significant distances are involved. The battery commander or platoon leader decides which movement method, or combinations of methods to use based on mission variables. For more information on tactical road marches, see FM 3-90-1.

MOVEMENT TECHNIQUES

3-27. Convoy control measures will assist in unit movements. Control measures typically include primary and alternate routes, start points, release points, checkpoints, and phase lines. Movement at night poses a greater challenge for leaders and Soldiers due to reduced visibility, fatigue, increased need for control measures, and the enemy's ability to use darkness to its advantage. The platoon maintains security against enemy attack throughout the movement. The platoon organizes to take immediate action against an attack. Unit tactical standard operating procedures should identity procedures for immediate action, to include incoming artillery, ambush blocked or unblocked, air attack, ground attack, improvised explosive device, CBRN attacks, and associated signal procedures. Units should rehearse movement techniques and associated actions at the halt. During mission analysis, the battery commander or platoon leader identifies those tasks necessary for movement, based on mission variables. These planning considerations may include actions in response to improvised explosive devices. For more information on planning considerations for improvised explosive devices, see ATP 4-32.

MARCH DISCIPLINE

3-28. The objective of march discipline is to maintain movement techniques and standards prescribed in the unit tactical standard operating procedures and movement order. March discipline can only be maintained when the plan matches conditions and the unit's ability to move. Unit leaders position themselves in optimum positions to control movement and ensure march discipline. Unit leaders monitor unit response to actions, which include:

- Maintain correct speed, interval, and positioning.
- Recognize route markings.
- Respond to signals (visual or verbal).
- Observe roadway for hazards, to include hostile activity, danger areas, and improvised explosive devices.
- Initiate protective measures against air, ground, improved explosive device, and CBRN attack.

3-29. For more information on convoy operations, see ATP 4-01.45.

SECTION V – PREPARING FOR MOVEMENT

3-30. Based on the mission analysis conducted earlier, the battery commander or platoon leader issues orders, to include preparations for movement. Security is continuous during movement preparations.

ORDERS

3-31. The battery commander or platoon leader will disseminate information (operation or movement order) to key leaders in preparation for movement. Traditional movement briefings included representatives from each howitzer section, fire direction center, ammunition section, supply, and battery or platoon headquarters, as required. The unit tactical standard operating procedure and commander's guidance will dictate the method of delivery (digital and voice) and personnel participation in movement briefings. The briefing format should include information contained in the five-paragraph operation order, as applicable. Information critical to the movement are the grid location of the next position, azimuth of fire, no earlier or later than time to move, route, and column or formation composition. The amount and level of detail in the briefing depend on time available, tactical situation, and experience level of participants. Maps, sketches, and aerial photography may supplement the briefing.

Note. The fire direction center transmits digital movement orders to the PDFCS. This message includes the proposed location grid coordinates, center sector azimuth of fire, left and right sector limits (if necessary), start point time, and firing area radius. Other instructions should be sent to the howitzer using plain text messaging or voice communications.

LOAD PLANS

3-32. Vehicles will be loaded according to the vehicle load plan in preparation for movement. Vehicle load plans provide storage and transportation guidelines for movement of personnel and associated equipment. Mission essential equipment should remain stowed while not in use. Each vehicle should have a load plan and every Soldier should be familiar with the load plan. Load plans may be recorded and graphically portrayed in the vehicle. Examples of load plans are included in applicable technical manuals for each vehicle. Unit tactical standard operating procedure provides for standardization and display of vehicle load plans between like sections (for example; howitzers and ammunition) within a unit. Battery and platoon leaders should verify vehicle load plans as part of precombat checks and inspections.

MOVEMENT PREPARATIONS

3-33. Based on information received from the battery commander, the platoon leader prepares the main body of the platoon for movement. The platoon continues to provide fire support in the current position throughout displacement. Certain preparatory tasks can be completed prior to movement. The command to initiate these tasks is PREPARE TO MARCH ORDER. This command will place the platoon in an increased readiness posture. Once the platoon leader or platoon sergeant announce this command, sections make preparations, which include:

- Store section equipment not in use, according to load plan.
- Start vehicles to charge batteries.
- Recover camouflage netting.
- Recover wire communications.
- Recover observation and listening posts.
- Report readiness status to the fire direction center and platoon leader.

3-34. The command to initiate movement is MARCH ORDER. This command will place the platoon in the highest readiness condition. Once the platoon leader or platoon sergeant announce this command, sections make final preparations for departure, which include:

- Load and secure remaining section equipment.
- Mount vehicles.
- Move to start point.

Note. The unit tactical standard operating procedure will dictate the delivery method (digital or verbal), command to initiate movement preparations, and tasks to be completed.

SECTION VI – OCCUPYING THE POSITION

3-35. Based on the mission orders issued by the battery commander or platoon leader, the unit occupies the position. Regardless of the employment method, local security must be maintained throughout the occupation.

TYPES OF OCCUPATION

3-36. A deliberate occupation is one that is planned. During a deliberate occupation, the advance party normally precedes the main body and prepares the position for occupation. The deliberate occupation may occur during hours of daylight or after darkness falls. Preparations for the occupation (day and night) depend on mission variables. The primary considerations are the tactical situation, time available, and time of day

for preparation of the position. The preferred method for a deliberate occupation at night would be to prepare the position during daylight hours. A nighttime reconnaissance and subsequent movement are often necessary and can be time consuming. Additional planning and preparation time are required for movements conducted at night.

Note. Minimize the number and composition of the advance party to preclude observation by the enemy and risk detection.

3-37. An emergency occupation is one that results from a call for fire received during a tactical movement. The call for fire requires immediate action from the fire direction center and the howitzer(s). An emergency occupation requires a modification to the normal occupation techniques. Emergency occupation techniques apply to all cannon artillery units, both self-propelled and towed. The battery commander should consider suitable locations for emergency missions along the route during reconnaissance. This information is issued to platoons during the movement briefing. The key to a successful emergency occupation is well-rehearsed tactical standard operating procedures.

Note. Because the Paladin howitzer makes frequent tactical and survivability moves, receiving a fire mission while moving becomes a routing event. For more information on emergency occupations and fire missions see Technical Manual (TM) 9-2350-314-10-1 & -2 and TM 9-1290-210-12&P.

TECHNIQUES

3-38. The employment of the Paladin howitzer is divided into four phases: initialization, tactical movement, occupation, and firing. Tactical movement was discussed earlier in this chapter. For more information on initialization, preparations for, and firing procedures, see TM 9-2350-314-10-1 & -2.

Note. Initialization of the howitzer database and verification checks normally occurs in the motor pool, or when the PDFCS powers down. The fire direction center transmits the subscriber table, map modification, meteorological and other pertinent ballistics data to the howitzer. Unit tactical standard operating procedures should list explicitly those settings input at the howitzer. Upon completion of initialization, the howitzer conducts a verification mission with the fire direction center to verify accuracy of the ballistic solution. The platoon leader or sergeant verifies each howitzer initialization database. They will verify the initialization grid (easting, northing, and altitude), at a minimum.

OCCUPATION

3-39. The platoon occupies the position in accordance with instructions in the movement order. Sections perform occupation procedures in accordance with tactical standard operating procedures or vehicle technical manual. All sections will occupy individual positions observing the track plan and instructions from ground guides, as required. The priority tasks are to establish a firing capability and communications with higher headquarters. The platoon leader or sergeant supervises platoon occupation. The platoon leader or sergeant will report status to the battery commander and higher headquarters, as required. For more information on howitzer emplacement of a firing point and firing area, see TM 9-2350-314-10-1 & -2.

Note. The unit tactical standard operating procedures will dictate the use of and procedures for ground guides during occupation (day and night).

WARNING

Failure to comply with nighttime ground guide procedures could result in personal injury or damage to equipment.

SURVIVABILITY MOVES

3-40. The platoon howitzers conduct survivability moves based on movement criteria. These criteria may include time in position, number of rounds fired, or duration of firing. Survivability moves require teamwork between the howitzers and the fire direction center. During survivability moves, other sections remain in individual locations utilizing techniques of cover and concealment to reduce the chance of enemy observation. Based on the employment method and method of control, platoon howitzers will conduct survivability moves.

Note. The unit tactical standard operating procedures and battery commander's guidance establish movement criteria.

SUSTAINING ACTIONS

3-41. Once the occupation is complete and the unit is ready to answer calls for fire, sustaining actions begin. These actions are commonly referred to as position improvement. Position improvement is continuous throughout the duration in position. The battery commander or platoon leader determines sustaining actions in priority, to include:

- Improve position defenses (for example; camouflage, concealment, and fighting positions).
- Harden critical elements (for example; ground mounted generators or palletized ammunition).
- Perform maintenance.
- Rehearse immediate action drills (incoming artillery, ground, air and CBRN attacks).
- Rehearse reaction forces.
- Conduct resupply.
- Conduct training.

3-42. The information discussed in this chapter provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures.

Chapter 4
Unit Defense

This chapter discusses techniques for unit defense. Section I begins with an overview of threat capabilities and unit responsibilities for the defense. Section II discusses considerations for the defense. Section III closes with a discussion on defensive preparations.

SECTION I – OVERVIEW

4-1. The cannon battery must prepare an adequate defense in order to survive and provide continuous fire support to the maneuver commander. A defense is more effective when there is adequate time to thoroughly plan and prepare defensive positions. For more information on defense or security operations, see FM 3-90-1, FM 3-21.8, or ATTP 3-21.71, respectively.

THREAT CAPABILITIES

4-2. The enemy directs actions against the field artillery to affect its ability to deliver fires. The enemy will try to detect field artillery elements through the study of doctrine and the processing of intelligence. The enemy collects information using long-range patrols, spies, and partisans as sources of information. Personal communication devices, such as cellular phones, permit untrained observers or irregular forces to report unit positions for targeting. In addition to visual observation and signals intercept, predicted activities, vehicle markings, and leftover rubbish add to the collection of information supporting the targeting effort. The enemy collects signals intelligence, using signal intercept and radio direction-finding equipment to locate and jam friendly communications. Other targeting means are radars, sound, and visual target detection teams (for example unmanned aircraft system). The greatest threats to the cannon battery come from counterfire, air attack, and ground attack. The battery commander must analyze the intelligence staff officer's (S-2) intelligence preparation of the battlefield and develop an overall defensive plan to mitigate these threats. Due to an increased unmanned aircraft system threat the defensive plan developed should emphasize the need for the use of dispersion, displacement, and concealment as mitigation efforts.

UNIT RESPONSIBILITIES

4-3. The battery commander is responsible for general planning, coordination, and execution of the battery defense. By thoroughly analyzing mission variables, the battery commander gains an understanding of the tactical situation and identifies potential friendly and threat weaknesses. The battery commander must graphically portray to his subordinate leaders, exactly how he intends to defend the battery position. This information will aid the platoon leaders in developing a plan to defend the platoon positions. The first sergeant assist with the overall execution of the battery defense. The first sergeant integrates the platoon defense plans into an overall battery defense. This may not be feasible if the platoons disperse over a significant distance. A unit defense checklist may aid in defense preparations. A sample unit defense checklist is provided in Appendix A of this publication.

SECTION II – CONSIDERATIONS FOR THE DEFENSE

4-4. The battery commander will undertake actions to provide for early and accurate warning of enemy operations. This will protect the cannon battery from surprise and reduce the unknowns in any situation. This section briefly discusses considerations for defensive operations.

USE OF TERRAIN

4-5. A concealed or unrecognizable unit has greater odds of survival. Occupying positions that offer cover and concealment will aid the unit in avoiding detection. Use any terrain and natural concealment available to blend into the surroundings. Utilize available camouflage (for example; trees, shrubs, buildings, and lightweight screening systems) to break up the outline and hide equipment. Maintain noise and light discipline throughout operations. Develop a track plan, because the most common signs of military activity in an otherwise well camouflaged area are tracks, disrupted soil, and debris associated with vehicle movement. Utilize the terrain by occupying positions that have natural advantages for the defense (for example; interior tree lines and ravines). Consider hardening positions and dig in whenever possible. If time and resources permit, construct obstacles to delay, stop, divert, or canalize an attack force. Once emplaced, these obstacles should be covered by fires. In fast moving situations, or when emergency displacement is anticipated, hardening might be limited to preparing fighting positions on the perimeter, placing sandbags around sensitive equipment (for example; collimators and tires), and constructing survivability positions throughout.

PROVIDE EARLY WARNING

4-6. Plan defensive operations laterally and in depth, so the unit is warned of an impending attack soon enough to displace or defend the position. Coordinate with adjacent units to provide early warning of enemy attacks. Observation posts and listening posts are key elements for providing early warning. Position observation posts and listening posts based on mission variables. When determining the location for observation posts and listening posts, consider terrain, visibility, likely threats, and the time required by the battery or platoon to displace or occupy prepared fighting positions. Observation posts should allow observation of likely avenues of approach, so personnel can engage the enemy at maximum ranges. Observation posts must allow for quick identification of target reference points in avenues of approach and communication with higher headquarters.

4-7. Plan defensive operations laterally and in depth, so the unit is warned of an impending attack soon enough to displace or defend the position. Coordinate with adjacent units to provide early warning of enemy attacks. Observation posts and listening posts are key elements for providing early warning. Position observation posts and listening posts based on mission variables. When determining the location for observation posts and listening posts, consider terrain, visibility, likely threats, and the time required by the battery or platoon to displace or occupy prepared fighting positions. Observation posts should allow observation of likely avenues of approach, so personnel can engage the enemy at maximum ranges. Observation posts must allow for quick identification of target reference points in avenues of approach and communication with higher headquarters.

DEFENSE IN DEPTH

4-8. The cannon battery and platoons are most vulnerable to attack during occupation and displacement from a position. The first consideration for either is establishing security. Each section will have a predetermined sector of responsibility on the perimeter. This sector of fire must maximize the use of primary weapons and ensure there is a coordinated, 6,400-mil defense with interlocking fires. A defense diagram, to be discussed later in this section, visually depicts the defense plan. The defense diagram includes the fields of fire for the cannon, antitank, and crew served weapons. If howitzer sections disperse over great distances, these sections may become responsible for their own defense. This requires the howitzer section to defend itself until help arrives. If enemy forces attack the unit, or penetrate the perimeter, a reaction force may be required. This reactionary force responds by assembling at a predetermined location to assess the situation and deploys to augment the existing perimeter. The reaction force deploys using fire and maneuver to expel or destroy the enemy and reestablish the perimeter. Composition of the reaction force is dependent on mission variables and unit tactical standard operating procedure. Based on personnel strength levels, the unit may not be able to fully man an effective defensive perimeter and provide continuous fires. Cannon battery personnel should be trained on basic and advanced warfighting skills that were formally exclusive to the infantry. For more information on warfighting skills, see Soldier Training Publication (STP) 21-1-SMCT or STP 21-24-SMCT.

DISPERSION

4-9. Dispersion laterally and in depth minimizes the effects of an air attack or counterfire, but the unit becomes more susceptible to dismounts and individual enemy combatants. The battery commander will determine the method of employment and formation for howitzers and support vehicles, based on mission variables. Consider positioning howitzer sections at least 100 meters apart, with the fire direction center an even greater distance to the rear or either flank of the formation. Position support section vehicles in a similar manner throughout the position. Considerations for dispersion over great distances include personnel strength, experience level, and training. Defensibility is a greater concern with increased dispersion. For more information on positioning and traditional formations, see ATP 3-09.50.

CONTROL

4-10. A battle will never go exactly as planned, so the battery commander and platoon leaders must remain flexible and respond quickly to the unexpected. They must continuously evaluate mission variables and be prepared to deal with changing situations. Battery and platoon tactical standard operating procedures should be developed and followed to maintain control during the defense. The battery commander or platoon leader should consider the amount of time required to prepare for the defense and issue priorities of work to the Soldiers. The tasks assigned and their priority will depend on requirements to defend or displace the position in the event of an attack. Unit tactical standard operating procedures should dictate actual work priorities involved in position improvement. Position improvement is a continuous process throughout the duration in position. The platoon leader will command the defense in the event of an attack.

DEFENSE DIAGRAM

4-11. The defense plan provides for 6,400-mil coverage of the battery and platoon positions through the use of a defense diagram. The defense diagram is completed based on guidance from the battery commander or first sergeant and unit tactical standard operating procedures. The defense diagram graphically portrays the battery and platoon positions with respect to the azimuth of fire. The defense diagram identifies key terrain, vehicles, weapon systems, defensive positions, and adjacent units, which include:

- Dominant terrain features.
- Dead space.
- Target reference points.
- Range markers.
- Observation and listening posts.
- Howitzer assigned direct fire sectors.
- Crew served weapons assigned sectors of fire.
- Fire direction center.

4-12. The gunnery sergeant initiates the defense diagram during advance party operations, to include a terrain sketch, complete with howitzer firing areas and initial defensive positions. Once the main body occupies the new position, the gunnery sergeant submits the defense diagram to the platoon sergeant for completion and verification. The platoon sergeant establishes the sectors of fire for the platoon. When these sectors have been identified and assigned, each section will construct a range card for each weapon system position (for example; howitzer, machine gun, grenade launcher, or antitank team). The sections will continually update and revise range cards throughout the occupation of a position. Battery leaders should verify that range cards are properly constructed and maintained. For more information on the procedures for completing a standard range card, see Soldier Training Publications (STP) 21-1-SMCT. For more information on the procedures and instructions for completing a howitzer range card, see ATP 3-09.50.

Note. A reproducible copy of DA Form 5699-R (Howitzer Range Card) with instructions is available in ATP 3-09.50. Examples of complete standard range cards (DA Form 5517-R (Standard Range Card) and sector sketches are available in FM 3-21.8 and ATTP 3-21.71.

4-13. Once the range cards are complete, this information is used to sketch the sectors of fire on the defense diagram. The objective is a completed defense diagram with pertinent data displaying the overall platoon defense. The methods of constructing a map matrix on which to draw the diagram vary. The key is to pick a scale suitable for plotting the grid locations for the unit. The matrix may be a commercially produced item, or one developed by the user. The most important thing to remember is that the matrix should accurately reflect conditions on the ground.

4-14. The first sergeant collects completed platoon diagrams and integrates them into a battery defense diagram. The defense diagrams are updated as the battery improves the defenses. The completed battery defense diagram and updates are forwarded to the battalion command post for use in development of a battalion defense plan. For more information on constructing a defense diagram, see ATP 3-09.50.

SECTION III – DEFENSIVE PREPARATIONS

4-15. This section briefly discusses defensive preparations and considerations unique to specific threats. Those actions unique to a specific type of threat are addressed in the appropriate paragraph below. The battery commander and subordinate leaders must understand the differences in these threats and the associated implications for the cannon battery. Any action or response to a threat will be based on mission variables and unit tactical standard operating procedures. For more information on defensive control measures or planning considerations, see FM 3-90-1.

DEFENSE AGAINST INDIRECT FIRE

4-16. Indirect fire is the greatest threat to the field artillery. The preferred defense against indirect fire is a combination of dispersion, hardening, and survivability movements. Dispersion requires the least effort and time. If the ground threat or terrain makes dispersion impractical, then hardening the position will increase survivability. Defilade is another option, but this option is time consuming and requires engineer support. Survivability moves decrease vulnerability to counterfire, through rapid displacement and occupation. The Paladin howitzer provides an enhanced firing capability whether moving or stationary, compared to traditional cannon systems. The unit tactical standard operating procedures should address the method of control and criteria for movement within the position. Actions to defend against indirect fire should be exercised to maintain proficiency.

DEFENSE AGAINST AIR ATTACK

4-17. The preferred defense against air attack is for the battery or platoon to remain undetected. If detected and attacked, the key to survival is dispersing and engaging the attacking aircraft with a large volume of fire. Accuracy is not as important as mass during the attack. When attack is imminent, direct all sections to prepare for air attack. The unit tactical standard operating procedures should address the alarm and method of control for air engagements. Consider the use of air target reference points (for example; dominant terrain features, or identifiable objects [buildings or manmade structures]) to mass crew served weapons and provide a wall of fire against the threat. Actions to defend against air attack should be exercised to maintain proficiency. For more information on aircraft recognition and identification, see FM 3-01.80.

DEFENSE AGAINST DISMOUNTED ATTACK

4-18. The preferred defense against a dismounted attack is for the battery or platoon to engage the enemy outside the position. When attack is imminent, direct all howitzer crews to prepare for ground attack. The unit tactical standard operating procedures should address the alarm and method of control for engagements. Consider the use of illumination during periods of limited visibility. The perimeter security must be alert to defend against dismounted infantry and guerilla type attacks, usually preceded by a diversionary attack, and

then followed by the main attack. The use of mines, barbed and concertina wire, and other obstacles will aid in the defensive effort. Plan for "killer junior" missions (see Chapter 5) on dismounted avenues of approach. Verify fighting positions provide interlocking sectors of fire. Actions to defend against dismounted attacks should be exercised to maintain proficiency.

DEFENSE AGAINST ARMOR AND MECHANIZED FORCE

4-19. The preferred defense against an armored or mechanized ground attack is for the battery or platoon to displace to an alternate position and continue the mission. Direct confrontation with this type of force is not recommended. In some circumstances, this may be unavoidable. When attack is imminent, direct all howitzer crews to prepare for direct fire (see Chapter 5). The unit tactical standard operating procedures should address the alarm and method of control for direct fire engagements. Consider the use of illumination during periods of limited visibility. The perimeter security must be alert to defend against lightly armored vehicles (for example; light trucks with armed enemy personnel) with crew served weapons. Tank killer teams should be utilized in pairs for increased lethality against heavier armored vehicles. Actions to defend against enemy armor and mechanized forces should be exercised to maintain proficiency. For more information on vehicle recognition and identification, see FM 3-20.21.

DEFENSE AGAINST CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ATTACK

4-20. The preferred defense against a CBRN attack is to practice avoidance. The battery or platoon should exercise survey teams, protective measures, immediate action, decontamination, and reporting procedures to maintain proficiency. The unit tactical standard operating procedures should address CBRN operations. Actions to defend against CBRN attack should be exercised to maintain proficiency. For more information on CBRN defense operations, avoidance, protection, or decontamination, see FM 3-11, FM 3-11.3, FM 3-11.4, or FM 3-11.5 respectively. The information discussed in this chapter provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures.

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Chapter 5

Special Situations

This chapter briefly discusses considerations for firing in special situations. These special situations may include operating in degraded operations, direct fire, and killer junior techniques.

DEGRADED OPERATIONS

5-1. Conditions at the howitzer or fire direction center that restrict or prohibit normal operations, characterize degraded operations. For example; if the AFATDS becomes inoperative, the fire direction center can no longer control the fires of the platoon. In this example, control may be shifted to another fire direction center. If the digital communications system fails, the PDFCS cannot receive and compute fire missions. In this example, firing data must be externally supplied. Sample degraded operations checklists are available in Appendix A of this publication. For the remainder of this discussion, the emphasis will be on degraded howitzer operations.

5-2. A degraded condition indicates a subsystem is not 100% functional. Though a degraded condition exists, certain degraded subsystems will not interfere with howitzer operation or impede mission effectiveness. However, it is important to know which subsystem is degraded. Knowing which failure to compensate for or correct will allow the howitzer section to continue the mission.

5-3. Various line replaceable units communicate and send messages periodically within the PDFCS. The howitzer prognostic and diagnostic interface unit is the central collection point for information concerning the condition of the Paladin system. This unit gathers, stores, and communicates information concerning failures or impending failures to the crew. Based on that information, the crew can either proceed in a degraded mode or enter a maintenance mode and begin performing fault detection and fault isolation for a line replaceable unit. The howitzer section chief takes actions to correct or compensate for the failure and notifies maintenance personnel. The howitzer technical manual list tables for system warning messages with cause and reconfiguration advisories.

5-4. Degraded operations at the platoon and section level are perishable skills. It is imperative that unit leaders institute training programs to exercise operations in degraded mode in order to maintain proficiency. Some of these traditional methods of operation include—

- Hasty survey techniques (platoon leader, sergeant and gunnery sergeant).
- Manual computation of technical firing solution (fire direction center).
- Laying, measuring, and reporting (platoon leader, sergeant and gunnery sergeant).
- Establishing aiming points (howitzer section).
- Fire commands (voice) (fire direction center and howitzer section).
- Laying for deflection and quadrant elevation (manual) (howitzer section).

5-5. For more information on the above methods of operation, see ATP 3-09.50 and FM 6-40. For more information on operating the howitzer in degraded mode, see TM 9-2350-314-10-1 & -2.

DIRECT FIRE

5-6. Direct fire is a special technique that demands a high level of training and requires the howitzer section to operate as an independent unit. Direct fire should be used only as a last resort. Considerations for the use of direct fire include target type, ammunition, trajectory, and crew experience level.

5-7. The most likely direct fire targets are vehicles and dismounted personnel. Howitzer sections engage vehicles as point targets and personnel as area targets. Direct fire targets should be engaged in priority, for example:

- Any target that is the greatest threat to the position.
- Vehicles at short ranges threatening to overrun the position.
- Stationary vehicles covering the advance of other vehicles.
- Command and control vehicles.
- Dismounts.

5-8. The ammunition (shell and fuze combination and propellant charge) for direct fire engagements may be standardized in the unit tactical standard operating procedures to save time. If other than standard is desired, commands for shell, charge and fuze are given after the direction to target.

5-9. Trajectory characteristics change with respect to range to target and charge fired. To produce the highest muzzle velocity and a flat trajectory, always use the maximum charge available. Shorter ranges are the most accurate to engage a target, because the trajectory is flattest. Intermediate ranges provide a trajectory flat enough to allow direct estimation of range without actually bracketing the target. At longer ranges, hits are only reasonably possible and bracketing will probably be required to obtain a hit.

WARNING

Engage targets closer than 800 meters from the howitzer during combat situations only. Lethal fragments can travel up to 600 meters from point of burst.

5-10. The howitzer section chief commands the howitzer during direct fire engagements. The commands for direct fire and methods available for sighting and laying during a direct fire engagement are covered in the howitzer technical manual. Direct fire drills should be exercised to maintain proficiency. For more information on loading and firing during direct fire missions, see TM 9-2350-314-10-1 & -2.

KILLER JUNIOR

5-11. Killer junior is a special technique developed during the Vietnam War. Killer junior was designed to defend positions against enemy ground attack. Much like direct fire, killer junior demands a high level of training and requires the section to operate as an independent unit. Killer junior uses time fuzed, high explosive projectiles set to burst seconds after firing. Considerations for the use of killer junior include target type, ammunition, and crew experience level.

5-12. The most likely target for killer junior is dismounted infantry. Careful consideration given to howitzer positioning, maximizes interlocking fields of fire with other organic or attached systems. The minimum authorized charge should be fired to facilitate engagement of targets at close range, because maximum charges serve only to increase the range to fuze function. The fire direction center can compute firing data, to include quadrant elevation, fuze setting, and 10R (10 divided by range in thousands) for the minimum authorized charges. This will produce an airburst of ten meters above and before the listed range.

WARNING

Firing a fuze with a time setting of less than minimum safe time or distance could result in injury to personnel and damage to equipment from lethal fragments.

5-13. The commands, methods available for sighting, laying, and procedures for loading and firing during killer junior engagements are similar to those described above for direct fire. Killer junior drills should be exercised to maintain proficiency. For more information on minimum fuze settings and ammunition safety, see TM 9-2350-314-10-1 & -2 and TM 43-0001-28.

5-14. The information discussed in this chapter provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures.

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Chapter 6

Communications

This chapter briefly discusses communications within the Paladin battery. Section I provides and overview of the chapter. Section II discusses information systems available at the battery and platoon level. Section III discusses the communication between the fire direction center and howitzer sections along with planning considerations.

SECTION I – OVERVIEW

6-1. Mission command is a process that begins and ends with the commander. Communications and equipment are essential elements for planning, directing, and controlling operations. The commander must develop techniques and procedures that promote an expeditious flow of information throughout the unit. These techniques and procedures should be included in the unit tactical standard operating procedures.

6-2. Operators at every level should be trained and certified on assigned communications equipment. For specific information on operation and troubleshooting communications equipment, see applicable technical manual. The battery commander must plan and coordinate with the battalion signal staff officer for external support. For more information on information systems and communications within the cannon battalion, see FM 3-09.21.

Note. A communications section is no longer authorized at battery level. The communications representatives at battalion level provide battery personnel with advanced technical assistance in installing, operating, and maintaining the battery communications system. Battery personnel share responsibility for the installation, operation, and maintenance of the system.

SECTION II – INFORMATION SYSTEMS

6-3. Information systems available to the battery and platoon are based on unit authorizations and configuration. Units equipped with the Force XXI battle command-brigade and below (FBCB2) have instant access to up to date information on battlefield conditions. The FBCB2 system allows commanders to issue guidance to subordinate units, enabling them to prepare for upcoming events. The battery commander uses tools to rapidly and efficiently create and deliver user-friendly lower level orders in both graphical and matrix format. The battery commander tracks the maneuver forces to maintain correct interval during movements to contact and dedicated element operations. The battery commander achieves real time or near real time situational awareness by establishing filters based on mission variables, and unit tactical standard operating procedures.

Note. All FBCB2 systems users can add battlefield geometry. This allows personnel to input obstacles, minefields, and other hazards into the system as they are encountered, thus making all users on the battlefield immediately aware of the current situation.

6-4. The first sergeant uses the FBCB2 system to process and relay sustainment information within the unit and higher headquarters. The various formats allow users to prepare and submit timely and accurate information to the battalion personnel staff officer (S-1) or logistics staff officer (S-4). Maintenance requests generated digitally enable the administration and sustainment operations center, battalion maintenance officer, and executive officer to quickly assess the situation and dispatch appropriate maintenance assets.

Threat analysis ensures adequate security measures are implemented according to the threat portrayed and as directed by the battalion intelligence officer (S-2).

6-5. The gunnery sergeant uses the FBCB2 system to perform map reconnaissance for selected routes and positions. The FBCB2 allows users to modify the scale or zoom magnification and appearance of the map display on the screen. This feature allows users to perform map reconnaissance using current real time situational awareness of friendly and enemy forces. The gunnery sergeant can use the line of sight function to confirm that position selection does not hinder firing capability due to site to crest limitations.

Note. The FBCB2 system can aid in battlefield navigation. The navigation function allows the user to create a new route of march; select and edit a previously created rout of march; reverse the direction of march on a selected route; set route attributes; analyze a route; center the situational awareness map on the selected route of march; and transmit the land route report.

6-6. The platoon leader or sergeant uses the FBCB2 system to process and disseminate guidance received from higher headquarters. The platoon leader or sergeant uses the FBCB2 system to quickly receive and transmit guidance to sections, enabling them to prepare for upcoming events. When the platoon leader or sergeant transmits guidance quickly to their platoons, sections have maximum planning time to accomplish the assigned mission. The platoon leader or sergeant utilizes the threat analysis and map reconnaissance capabilities of the FBCB2 system, as described above. For more information on the capabilities and operation of the FBCB2, see TM 11-7010-326-10.

RADIO NETWORK STRUCTURE

6-7. Radio communication is essential to the unit and its ability to provide effective fires. The network structure should rely heavily on frequency modulation radio communications that monitor multiple radio networks while maintaining continuity of operations during displacement. The network must communicate effectively over long distances to many diverse elements, including the field artillery battalion, fire support cells, fire support teams, or a field artillery brigade. The radio network structure will rely increasingly upon data communications, which have shorter range capabilities than voice communications. The battery radio network structure will be based on mission variables and unit tactical standard operating procedures.

6-8. The battery normally operates on various external and internal radio networks. The external networks include the battalion command and fire direction networks. The battalion command is a secure network used for control and for intelligence information. The battery commander, first sergeant, platoon leaders, platoon sergeants, fire direction centers, and ammunition sections normally operate on this network. The battalion fire direction networks are for tactical fire direction. Each platoon fire direction center operates on this network and communicates digitally with the battalion fire direction center. The internal networks are used for battery and platoon command (voice), and technical and tactical fire mission processing between the howitzers and the fire direction center (digital).

WIRE SYSTEM

6-9. The battery or platoon may use both radio and wire equipment based on unit authorizations, configuration, and mission variables. One system will be designated primary and the other will become secondary. There are advantages and disadvantages associated with each. A radio permits mobility and speed, but is susceptible to enemy electronic warfare. Wire lines are immune to enemy electronic warfare, but inhibit rapid movement and speedy installation. Hence, the strength of one is the weakness of the other. Units must always strive to have system redundancy. It may be preferable to rely on radio during displacements and initial occupations; then install and operate internally on wire lines, as required. If radios are unavailable or unusable, a wire system is necessary. Determine diagrams and system configurations that provide practical and realistic alternatives for establishing battery communications. Established methods, procedures, and configurations should be included in the unit tactical standard operating procedures.

Note. The availability of wire communications and equipment is based on unit tables of organization and equipment and unit task organization.

SECTION III – FIRE DIRECTION CENTER TO HOWITZER COMMUNICATION

6-10. The communication between the fire direction center and howitzer sections is established by voice and digital using frequency modulation radios and wire. The digital link between the fire direction center and the howitzer is established via the PDFCS. The voice link between the fire direction center and the howitzer is established via frequency modulation radio. Priorities for establishing digital and voice communications are based on mission variables and unit tactical standard operating procedures.

6-11. Before communicating digitally, howitzer section and fire direction center personnel must make various communicating software setting and communication inputs. These items should become part of the unit tactical standard operating procedures. The communications parameters are found in TM 9-2350-314-10-1 & -2.

COMMUNICATIONS PARAMETERS CARD

6-12. The communications parameter card (see Figure 6-1) is used to establish both voice and digital communications between the fire direction center and the howitzers during initialization, as well as provide them with backup information in the event that the primary fire direction computer becomes inoperable. This information is included in the unit tactical standard operating procedures and is given to the howitzer section chief prior to initialization of the system and start of operations. For more information on initializing the PDFCS, see TM 9-2350-314-10-1 & -2.

NETWORK ACCESS		NETWORK ADDRESS	
NETWORK TYPE: *14* NETWORK ACCESS DELAY TIME: *1.0* GUN KEY TIME: *1.4* BLOCK MODE SELECTION: *SINGLE* NET BUST SENSE OVERRIDE: *OFF*		HOWITZER PLATOON / SECTION: PRIMARY AFATDS URN: BACKUP AFATDS URN: PRIMARY AFATDS IP: BACKUP AFATDS IP:	*1/1* *8123215* *8125216* *127.0.2.20* *127.0.3.30*
NETWORK PROTOCOL: BAUD RATE: MODULATION: WIRE RADIO LINK:	*188-220A* *1200* *1200-2400* *RADIO*	CONTROLLING AFATDS:	*PRIMARY*
HOWITZER CALL SIGN: FDC CALL SIGN: BACKUP FDC CALL SIGN:	*PAPA 10* *PAPA 13* *PAPA 20*	DIGITAL NETWORK: VOICE NETWORK: BACKUP DIGITAL NETWORK: BACKUP VOICE NETWORK:	*45400* *58500* *45800* *58200*
AFATDS – Advanced Field Artillery Tactical Data system FCS - fire control system FDC - fire direction center IP—internet protocol URN—unit reference number			

Figure 6-1. Sample communications parameter card

Note. The example above is for illustration purposes only. Other techniques and designs developed can be included in unit tactical standard operating procedures.

PLANNING CONSIDERATIONS

6-13. The increased number of radios, along with elimination of communications personnel authorizations and equipment available to install and service wire, requires changes in the traditional way the battery as a whole, approaches the mission. To meet specific requirements, the battery commanders may modify the communications system to account for mission variables. The battery commander communications planning considerations, include:

- Develop a mixture of voice and data networks based on operational status of assigned equipment.
- Develop a backup plan for each network.
- Avoid over reliance on any one system.

- Utilize secure equipment whenever possible.
- Practice communications discipline (for example; limit transmissions duration and frequency of use).
- Enforce communications security.
- Utilize only authorized call signs from the automated network control device.

6-14. The information discussed in this chapter provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures.

Chapter 7

Safety

This chapter briefly discusses safety. Section I discusses the duties and responsibilities for firing safety and certification within the Paladin battery. Section II discusses the safety computations necessary for firing safety.

SECTION I – DUTIES AND RESPONSIBILITIES

7-1. The cannon battalion commander establishes and maintains a firing safety training and certification program for the personnel in the cannon battalion. The purpose of this program is to select, train, and safety certify personnel within the unit on firing safety procedures for their specific area of responsibility. The safety personnel in the cannon battery include, but are not limited to the battery commander, platoon leader, platoon sergeant, fire direction officer, gunnery sergeant, fire control sergeant, and howitzer section chief. The tactical duties for these key personnel are discussed in chapter one of this publication.

7-2. For more information on field artillery safety and sample artillery skills proficiency tests, see Training Circular (TC) 3-09.8 and the unit combined arms training strategy.

RESPONSIBILITIES OF SAFETY PERSONNEL

7-3. All key safety personnel must be thoroughly familiar with other safety references, to include:

- TM 43-0001-28.
- FM 6-40.
- Local range regulations.
- Department of the Army Pamphlet (DA PAM) 385-63.
- Army Regulation (AR) 385-63.
- DA PAM 385-64.
- Howitzer technical manual.

Note. These references are guidelines that may be used in developing unit tactical standard operating procedures.

7-4. The cannon battery chain of command is responsible for safety during firing, both in training and in combat. This chapter contains recommended procedures and precautions required to fire cannon artillery. However, if local range regulations are more restrictive than the material in this chapter, local range regulations will take precedence.

7-5. The officer in charge is the battery commander or a safety certified direct representative. The officer in charge is responsible for all aspects of safety in the firing unit. The officer in charge verifies the unit is in the proper location prior to firing. The officer in charge has specific responsibilities during firing, which include:

- Supervise the conversion of the safety data into safety diagram.

Note. The safety diagram provides authorized projectile, propellant, charge, fuze, left and right deflection limits, minimum and maximum quadrants elevations, and minimum safe fuze times.

- Distribute safety diagram information to appropriate members of the firing unit.

- Determine locations of friendly personnel in danger areas who may inadvertently be exposed to artillery fires.
- Disseminate information on friendly personnel in danger areas to subordinate leaders.

Note. This information increases awareness of potential situations that could result in injury and fratricide.

7-6. The officer in charge receives safety data from the range control officer, which include:

- Grid coordinates of the firing position.
- Lateral safety limits.
- Minimum and maximum ranges.
- Authorized ammunition to be fired (for example; fuze, projectile, and charge).
- Maximum ordinate (for example; high or low angle).
- Hours during which firing may be conducted.

7-7. The platoon leader is responsible for the safety practices of the platoon. The platoon leader determines the lowest quadrant elevation that can be safely fired from the firing position to ensure projectiles clear all visible crests (minimum quadrant elevation, see Appendix D). The platoon leader is responsible for verification of all safety data computations, to include the safety diagram and safety T. The fire direction officer, platoon sergeant, gunnery sergeant, and fire control sergeant assist the platoon leader, as required.

7-8. The fire direction officer has primary responsibility for computing safety. The fire direction officer is responsible for plotting the impact area on a map or chart in the fire direction center with the assistance of the fire control sergeant. The fire direction officer ensures all firing data is within prescribed safety limits before transmitting it to the howitzer section(s).

7-9. The platoon sergeant assists the platoon leader with his duties. The platoon sergeant performs many of the platoon leader's duties in the platoon leader's absence. The platoon sergeant has the main responsibilities of occupation, performing duties as platoon leader, and working in shifts with the platoon leader.

7-10. The howitzer section chief supervises all actions that take place at or near the howitzer. These include verifying that announced safe data are applied to the howitzer and the proper charge, fuze, and projectile are fired. The howitzer section chief has the final responsibility for firing the howitzer.

DUTIES OF SAFETY PERSONNEL

7-11. Before firing, safety personnel have specific duties, which include:

- Verify the data provided by the range control officer (officer in charge).
- Compute the safety diagram (fire direction officer).
- Verify the safety diagram (platoon leader).
- Ensure that all personnel and equipment are clear from surface danger areas before firing (see DA PAM 385-63).
- Verify range safety card to ensure that only authorized ammunition is fired (platoon leader or sergeant).
- Observe firing for safety violations that occur at or near the howitzer(s) (all members of the firing unit).
- Verify boresight (degraded mode) (howitzer section chief).
- Verify the lay of the firing unit (platoon leader or sergeant).
- Compute minimum quadrant elevation (platoon leader or fire direction officer).
- Verify minimum quadrant elevation (fire direction officer or platoon leader).
- Verify the howitzer section chief has safety data (safety T) (platoon leader or sergeant).
- Obtain range clearance (platoon leader or fire direction officer).

7-12. During firing, safety personnel have specific duties, which include:

- Verify the serviceability of ammunition (howitzer section chief).
- Supervise key safety personnel in the performance of their duties (officer in charge).
- Compare announced charge, projectile, and fuze against safety T (howitzer section chief, platoon leader or sergeant, fire direction officer, and fire control sergeant).
- Compare announced fuze time against safety T (howitzer section chief, platoon leader or sergeant).
- Verify the shell-fuze combination, time (if required), and charge for each round fired (howitzer section chief).
- Compare announced quadrant elevation against safety T (howitzer section chief, platoon leader or sergeant).
- Compare announced deflection against safety T (howitzer section chief, platoon leader or sergeant).
- Direct misfire procedures during a failure to fire situation (for example; misfire, hangfire, or sticker) (howitzer section chief).
- Compute safety when conditions change, which include (fire direction center):
  - Registration is complete.
  - Meteorological conditions change.
  - Restrictions change.
- Issue updated safety Ts (fire direction center).
- Command CHECK FIRING on any command that is unsafe to fire, with the reason(s) why the command is unsafe (all members of the firing unit).
- Suspend firing when unsafe conditions exist, or when any person witnesses an unsafe act, for example:
  - Power increments or modular artillery charge system charges exposed to fire.
  - Personnel smoking near ammunition.
  - Improper handling of ammunition.
  - Time fuze previously set and not reset to shipping and storage, safety.
  - Personnel or aircraft directly in front of the howitzer.
  - Primer inserted into the firing assembly before the breech is closed.
  - Failure to inspect the powder chamber and bore after each round fired.
  - Failure to swab the powder chamber after each found fired.

7-13. After firing, safety personnel have specific duties, which include:

- Verify that unused powder increments are stored or disposed of properly at an approved location (howitzer section chief, platoon leader or sergeant).
- Verify that unfired ammunition is properly accounted for, repackaged, and returned to the ammunition resupply point (howitzer section chief, platoon leader or sergeant).
- Verify that all safety Ts are collected and disposed of properly (fire direction center).

SECTION II – SAFETY COMPUTATIONS

7-14. Safety computations for surface danger zones can be performed by computer using automated software if the software has been thoroughly tested and validated by survey and manual computations; approved for use by the artillery commander who trains the unit; and reviewed and verified by the installation range control officer. For more information on manual safety computations for surface danger zones, see FM 6-40.

7-15. Paladin firing safety is paramount. Secondary independent verification checks ensure that each round fired impacts and detonates on the desired target. Failure to conduct secondary independent checks is the primary contributing factor to Paladin firing incidents. Conducting procedurally correct crew drills can help prevent firing incidents from occurring. The most frequent types of firing incidents during Paladin live fire operations that can be prevented by secondary independent checks, include:

- Firing at loading elevation.
- Firing an incorrect propellant charge.

- Operating in degraded mode (see Chapter 5).

7-16. For more information on loading and firing of the howitzer, to include degraded mode, see TM 9-2350-314-10.

7-17. Target location and verification of target location are critical factors in fire mission processing as well. The fire direction center verifies target location at all levels. Targets must be physically plotted and checked to ensure that they plot safely and do not violate fire support coordination measures. Safety is computed in accordance with established standards, and can be derived from automated range safety. For more information on safety standards, see FM 6-40.

7-18. The information discussed in this chapter provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures.

Chapter 8

Sustainment

This chapter discusses techniques for Paladin sustainment operations. Section I begins by giving an overview for sustainment of operations. Section II briefly discusses the execution of sustainment operations.

SECTION I – OVERVIEW

8-1. Sustainment is the warfighting function that deals with arming, fueling, supplying, and sustaining the cannon battery. The battery has limited resources for sustainment. Therefore, the battery must rely on the cannon battalion, forward support company, brigade support battalion, or sustainment brigade for the support necessary to sustain operations until mission accomplishment. The burden of sustainment tasks is removed from the battery commander and instead placed under the control of the field artillery battalion, as much as possible.

SECTION II – EXECUTION OF SUSTAINMENT OPERATIONS

8-2. The decentralized nature of Paladin operations demands development of coordinated and standardized procedures. Detailed coordination and planning are required to obtain supplies and services for the cannon battery. Sustainment responsibilities at battery level are primarily to report status, supervise operator level maintenance, request support, and ensure that sustainment operations are properly executed within the battery position. The first sergeant is the primary executor of the sustainment function within the battery. The first sergeant coordinates administrative and sustainment support, less ammunition. For detailed information on sustainment, see ADRP 4-0.

Note. Supply and ammunition assets may be consolidated at battalion level by design or tack organization.

8-3. For more information on sustainment within the brigade combat team or field artillery brigade, see ATP 4-90. For more information on sustainment within the cannon battalion, see FM 3-09.21.

BATTALION TRAINS

8-4. Trains are a unit grouping of personnel, vehicles, and equipment that provide sustainment support to subordinate units. Trains are the basic sustainment tactical organization. Battalions use trains to array their subordinate sustainment elements. The battalion trains can be employed in two basic configurations, as unit trains or as echeloned trains. The unit trains configuration positions resources in a centralized location. The echeloned trains' configuration is decentralized and may consist of battery trains, battalion combat trains, and battalion field trains. Battalion trains usually are under the control of the S-4, and assisted by the S-1. The battalion trains may collocate with a cannon battery for increased security. The use of, type, composition, and location of battalion trains are based on mission variables and unit tactical standard operating procedures. For more information on battalion trains within the cannon battalion, see FM 3-09.21.

BATTERY INTERFACE WITH SUSTAINMENT OPERATIONS

8-5. The focal point for sustainment support is the battalion trains. The battalion trains, under the supervision of the S-4, anticipate, request, coordinate, and supervise execution of sustainment. They monitor the tactical situation to forecast sustainment support requirements; process requests, reports, and requirements from subordinate elements; and focus on major concerns, to include at a minimum:

- Ammunition.
- Petroleum, oil and lubricants.
- Priority equipment repair and salvage.
- Health service support.

8-6. The supply section can remain with the battery or operate from the battalion trains. The supply section acts as the primary logistics executor for the battery in the absence of the first sergeant. The supply section coordinates resupply requirements and executes sustainment packages.

SUSTAINMENT PACKAGES

8-7. Normally, sustainment support is provided by the automatic push of supplies and equipment to the battery at specific times. These sustainment packages include most classes of supply (less Class V), mail, replacement personnel, and weapons systems. The primary means of receiving a sustainment package is through a sustainment release point. The sustainment release point is an identifiable location where the battery representative can link up with the support package and move it forward to the battery or platoon location. The sustainment release point is usually located alongside a main supply route near the trains. The trains' personnel assist in the coordination and movement of sustainment packages by ensuring that packages are organized and configured per the unit's requests and make it forward to the release points.

MAINTENANCE, RECOVERY, AND REPAIR

8-8. Success on the battlefield is directly related to the unit's ability to maintain equipment and material in effective operating condition. When breakdowns occur, the lowest echelon possible must repair equipment as far forward as possible. Operators should be familiar with technical manuals for their specific equipment. Technical manuals provide repair procedures and guidelines for battlefield repairs. When equipment must be moved, move it only as far as necessary for repair. The battery must recover extensively damaged equipment to the nearest maintenance collection point or request assistance from the battalion.

Note. A maintenance section is not currently authorized at battalion or battery level.

8-9. Due to the Army's change to two levels of maintenance (field and sustainment), field and sustainment maintainers are concentrated in the brigade support battalion or sustainment brigade. Field maintenance is on system maintenance and is mainly preventive maintenance and replacement of defective parts. Sustainment maintenance typically involves repair of components off system (for example; inside-the-box repair of line replaceable units or rebuild of power trains [engines and transmissions]).

Note. Forward support companies assigned to brigade support battalions of brigade combat teams or field artillery brigades can be in direct support, operational control, or tactical control to supported maneuver or field artillery battalions of the brigade.

8-10. The field artillery battalion executive officer, S-3, S-4, and forward support company commander or brigade sustainment officer analyze current and anticipated support requirements to determine recommendations for the commander, which include:

- Maintenance concept.
- Trains configuration.
- Appropriate level of support for-
  - Batteries.
  - Maintenance collection points.
  - Command post.
  - Trains locations.

REFUEL, REARM, AND RESUPPLY POINT

8-11. When the tactical situation permits, a battalion refuel, rearm, and resupply point may be established to provide critical supplies to the battery. This site is a location where the battery can pass through and take on needed ammunition and Class III products. Units are vulnerable during daylight hours, unless operations are conducted quickly. Therefore, night operation of the refuel, rearm, and resupply point is the optimum tactical solution.

8-12. The battery must determine considerations for the refuel, rearm, and resupply point, which include:

- Conduct reconnaissance of the point, to determine-
  - Location relative to the route of march.
  - Trafficability.
  - Cover and concealment.
  - Overwatch positions for security.
- Determine organization of the column to minimize time within the point.
- Prioritize activities required within the site, for example:
  - Resupply of petroleum, oils, and lubricants.
  - Resupply of ammunition.
  - Repair parts.
  - Rations.
  - Local security.

8-13. The distribution platoon in the forward support company has Class V, Class III, and general supply sections. The Class III section is responsible for supporting retail fuel operations in the field artillery battalion. The Class V section is responsible for supporting Class V operations in the field artillery battalion. Resupply is managed from the forward support company holding area to the battalion trains area, and then forward to the battery. The methods and techniques for refuel, rearm, and resupply should be tailored to meet the unit's needs and covered in the unit tactical standard operating procedures.

8-14. The information discussed in this chapter provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures.

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Appendix A

Sample Operations Checklist

This appendix provides sample operations checklists for use by cannon battery personnel. This appendix is not all-inclusive, but instead provides a starting point for development of other checklists and unit tactical standard operating procedures.

MISSION CHECKLIST

A-1. The information discussed in this appendix provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures. To make a tentative plan, the battery commander must gather information by focusing on battery level mission variables. Table A-1 provides sample topics and questions that may assist the commander in this effort.

Table A-1. Sample mission checklist

From the intelligence staff officer (S-2)
1. Position (terrain and weather)
What are the slope, soil conditions, and trafficability?
Where can I best position observation or listening posts?
Are there site to crest or intervening crest problems?
What are the percent illumination, moonrise, moonset, and night vision device window?
What are the precipitation, wind, and temperature?
2. Enemy
What is the enemy's mission?
What is the primary threat to the battery?
What is the composition of the forces?
What are the number and type of weapons?
What are the likely avenues of approach?
How will the enemy locate me (direction-finding radar or observation)?
How will the enemy react?
When and where will the enemy become a threat?
When will I be a priority target?
Will the enemy use chemical, biological, radiological, and nuclear (CBRN) weapons?
If so, when and where will they use them, to include type, effects, and best defense?
From the operations staff officer (S-3)
What battalion fire support task is my responsibility?
Whom am I supporting?
How much ammunition do I need?
When and where will I get this ammunition?
When will tasks be executed?
What are the trigger points and frequency?
Where are the positions I must fire from and are they clear?
What are the adjacent unit's call sign, frequency, and actions?

Table A-1. Sample mission checklist (continued)

From the operations staff officer (S-3)
What are my approved routes and movement priority?
What event triggers my movement?
What are the grids to - Brigade support area? Battalion aid station? Ambulance exchange points?

PRECOMBAT CHECKLIST

A-2. Mission success depends as much on preparation as it does on planning. Preparation requires leader and Soldier actions. The tables below provide sample checklists for precombat checks and inspections. Some version of these checklists can be incorporated into the unit tactical standard operating procedures.

Table A-2. Sample precombat checklist for ground threat (mounted)

Sections
Complete range cards for crew-served weapons (all sections).
Complete range cards for howitzer (howitzer sections).
Compute data to target reference points (fire direction center).
Rehearse killer junior engagements to cover dead space (howitzer sections). See Chapter 5.
Rehearse direct fire crew drill (howitzer sections). See Chapter 5.
Identify tank killer teams and reaction force personnel.
Perform preventative maintenance checks and services, to include: Vehicles. Individual and crew-served weapons. Night vision devices (sights and goggles).
Inventory ammunition on hand for all weapons.
Complete individual fighting positions with overhead cover and sector stakes.
Complete survivability positions.
Review threat vehicle identification.
Verify boresight (howitzer sections). See howitzer technical manual.
Review unit tactical standard operating procedures.
Report completion of preparations to the platoon leader or sergeant.
Platoon
Position weapons to cover enemy avenues of approach.
Establish platoon engagement areas with triggers.
Position weapons to maximize fires in engagement areas.
Identify dead space.
Plan killer junior engagements to cover dead space (fire direction center). See Chapter 5.
Identify natural target reference points, or emplace target reference points with global positioning system device.
Compute range and azimuth to each target reference point (fire direction center).
Compute self-illumination targets (fire direction center).
Rehearse tank killer teams and reaction force.
Rehearse medical evacuation. See medical evacuation checklist.
Establish observation or listening posts.
Review unit tactical standard operating procedures.

Table A-3. Sample precombat checklist for ground threat (dismounted)

Note. Same information as Table A-2 above, but with additional precombat checks, which include:
Platoon
Utilize platoon formations (star or wedge) to maximize perimeter security.
Use defensive wire, if available (concertina or barbed).
Focus on 6400-mil security.
Utilize patrolling. (See FM 3-21.8 or ATTP 3-21.71)
Review unit tactical standard operating procedures.

Table A-4. Sample precombat checklist for air threat

Sections
Clean crew-served weapons.
Perform a function check.
Rehearse stoppage and immediate action drills.
Rehearse changing machine gun barrels, as applicable.
Check camouflage, to include:
Ensure camouflage netting is serviceable and covers the vehicle.
Remove camouflage netting from crew-served weapons.
Cover windshields, headlights, and other reflective surfaces.
Test fire crew-served weapons, if possible.
Identify firing teams.
Review aircraft threat identification cards, if available.
Review battery air attack signals (visual [signal flag] and audible).
Verify air defense warning and weapon control status.
Rehearse engagement of fast moving aircraft.
Review unit tactical standard operating procedures.
Report completion of preparations to the platoon leader or sergeant.
Platoon
Assign air sectors of fire.
Establish air target reference points.
Verify coverage on defense diagram.
Disseminate air defense warning and weapon control status.
Rehearse air attack.
Conduct medical evacuation precombat checks. See Table A-7.
Assign air avenues of approach.
Utilize platoon formations (line or lazy W) to maximize dispersion.
Coordinate small arms ammunition authorization.
Review unit tactical standard operating procedures.

Table A-5. Sample precombat checklist for counterfire

Sections
Complete survivability positions for all personnel.
Harden the position (sandbag generators and bury wire).
Rehearse hasty displacement of the position.
Rehearse hasty occupation of a position.
Check camouflage, to include:
Ensure camouflage netting is serviceable and covers the vehicle(s).
Cover the windshields, lights, and other reflective surfaces.
Inventory first aid kits, combat lifesaver bags, and field litters.
Stow non-essential equipment (pioneer tools or load-bearing equipment) according to load plan.
Report completion and status to platoon leader or sergeant.
Platoon
Utilize platoon formations (line or lazy W) to maximize dispersion.
Position in defilade, if possible.
Request engineer support, as required.
Avoid use of high angle fire missions.
Determine movement criteria.
Reconnoiter alternate positions and routes.
Prepare alternate positions.
Rehearse medical evacuation. See Table A-7.
Rehearse hasty displacement of the position.
Rehearse hasty occupation of a position.
Identify Class IV material on hand.
Requisition Class IV material, as required.
Brief sections chiefs on the route and alternate position information.
Review unit tactical standard operating procedures.

Table A-6. Sample precombat checklist for CBRN threats and hazards

Sections
Inventory decontamination kits, if available.
Inventory chemical detection kits, if available.
Inventory decontamination apparatus, if available.
Rehearse donning of protective mask and hood (fit and seal).
Inventory individual protective gear.
Stow non-essential equipment according to load plan.
Inventory nerve agent antidote auto injectors, if available.
Identify detection teams.
Identify survey teams.
Rehearse buddy-aid procedures.
Review operational decontamination procedures.
Inventory chemical detection paper, if available.
Perform map reconnaissance of operational and thorough decontamination sites.
Brief drivers and assistant drivers on dirty routes to decontamination sites.
Report completion and status to platoon leader or sergeant.
Platoon
Perform preventative maintenance checks and services, to include: Vehicles. Chemical alarms. Decontamination equipment.
Rehearse detection teams.
Rehearse survey teams.
Rehearse chemical, biological, radiological, nuclear (CBRN) reaction drills.
Coordinate thorough decontamination plan with battery headquarters.
Request extra mask filters and expendable supplies, as required.
Identify the operational decontamination team.
Review unit tactical standard operating procedures.

Table A-7. Sample precombat checklist for medical evacuation

Sections
Identify casualty collection point.
Inventory combat lifesaver bags.
Inventory field litters.
Position straps and tie downs with the litters.
Verify communications with fire direction center or battery or platoon operations center, if applicable.
Verify numbers for all personnel.
Rehearse buddy-aid procedures.
Account for section personnel in and out of position.
Load medical evacuation frequency into radios.
Report completion and status to platoon leader or sergeant.
Platoon
Determine casualty collection point.
Rehearse medical evacuation in each position, to include loading and unloading of casualties.
Rehearse actions at casualty collection point, to include triage and segregating casualties according to injury.
Identify a representative to collect numbers at casualty collection point.
Conduct communications checks with battalion command post and medical evacuation vehicle(s).
Disseminate locations for all active aid stations to unit leaders.
Reconnoiter the route and time to aid station locations.
Inventory the medic bag.
Confirm the medic has consolidated Class VIII requirements from the sections.
Disseminate the medical evacuation frequency to all sections.
Review unit tactical standard operating procedures.

Table A-8. Sample precombat checklist for artillery raid

Sections
Load ammunition per commander's guidance and mission instructions.
Conduct a map reconnaissance of route(s) and position(s).
Brief the route(s) to all personnel.
Brief the recovery plan.
Rehearse targets with the fire direction center according to battery commanders or platoon leader's timeline.
Top off all vehicle fuel tanks.
Conduct preventative maintenance checks and services on vehicles and howitzers.
Rehearse movement formations.
Conduct precombat checks for likely threat.
Inspect night vision goggles and night sights.
Verify Counter-Radio Controlled Improvised Explosive Device Electronic Warfare system or other counter-improvised explosive device equipment is operational.
Report completion and status to platoon leader or sergeant.
Platoon
Conduct intelligence preparation of the position with the intelligence staff officer (S-2).
Reconnoiter the route and firing position, if time available.
Brief the order in detail.
Verify the recovery plan.
Rehearse the medical evacuation plan.
Identify mission essential vehicles only.
Verify the survey plan for the unit.
Determine required sustainment support.
Coordinate sustainment support, as required.
Rehearse security plan.
Rehearse action on the objective.
Review unit tactical standard operating procedures.

Table A-9. Sample precombat checklist for scatterable mines

Howitzer Section
Inspect fuzes, propellants, and projectiles.
Position ammunition prior to firing according to unit tactical standard operating procedures (ground, ammunition vehicle, or howitzer).
Rehearse dry fire missions according to platoon leader's time line.
Report completion and status to platoon leader or sergeant.
Fire Direction Center
Distribute guidance on use of scatterable mines (number and combination of remote anti-armor mine system and area denial artillery munition projectiles).
Receive and compute aiming points.
Verify aiming points on the chart.
Direct ammunition breakdown by howitzer.
Verify ammunition breakdown.
Conduct technical rehearsal.
Report technical rehearsal time line to the operations staff officer (S-3) or battalion fire direction officer.
Cancel terrain gun position corrections, if applied.
Report completion and status to platoon leader or sergeant.
Platoon
Prepare alternate position, as required.
Brief immediate action status.
Coordinate ammunition resupply, as required.
Determine ammunition resupply triggers.
Review unit tactical standard operating procedures.

Table A-10. Sample precombat checklist for massing fire

Howitzer Sections
Distribute ammunition per fire direction center guidance.
Report ammunition by type and lot.
Rehearse dry fire missions according to platoon leader's time line.
Report the powder temperature according to fire mission parameters (for example; every 30 minutes).
Rehearse changing aiming reference points (degraded).
Position ammunition uniformly.
Verify boresight (degraded).
Report completion and status to platoon leader or sergeant.
Fire Direction Center
Determine ammunition requirements.
Direct ammunition breakdown by howitzer.
Conduct technical rehearsal.
Report technical rehearsal time line to the S-3 or battalion fire direction officer.
Compensate for all nonstandard conditions.
Satisfy the five requirements for accurate predicted fires.
Conduct dry fire missions.
Report completion and status to platoon leader or sergeant.
Platoon and Battery
Brief immediate action status.
Verify positioning of ammunition.
Review unit tactical standard operating procedures.

BATTERY STATUS INVENTORY

A-3. Table A-11 is a sample battery status inventory checklist that may be completed before the battalion orders brief. The battery commander may use this information to determine if additional resources are required to support assigned tasks.

Table A-11. Sample inventory of assets

Asset	Authorized	Operational	Status or Remarks
Howitzer			
Ammunition Carrier			
Fire Direction Center			
Generator			
Wheeled Vehicle			
Voice Communication			
Digital communication			
Crew-served weapon			
Unmanned Aircraft System			
Personnel			
Class I			
Class II			
Class III			
Class IV			
Class V			
Class IX			

CRITICAL EVENTS TIME LINE

A-4. Table A-12 is a sample checklist of critical events used to determine how much time is available and to schedule the battery's preparation for combat. Remember to schedule those events that are difficult to conduct at night during daylight hours, if possible.

Table A-12. Sample critical events time line

Critical Event
Battalion Orders Brief
Rehearsal
Reconnaissance
Survey Linkup
Advance Party Departs
Battery Warning Order
Precombat Checks and Inspections Complete
In Position Ready to Fire (no later than)
Move (no earlier than)
Move (no later than)
Refuel, Rearm, and Resupply
Logistics Package

UNIT DEFENSE CHECKLIST

A-5. Table A-13 is a sample checklist for leaders to review the level of battery or platoon defensive preparation.

Table A-13. Sample unit defense checklist

Entrance Point
Note. The entrance point serves as a means to control the flow of traffic into and out of the firing position. It does not necessarily serve the same function as an observation or listening post.
Is the sentry properly posted with orders and special instructions?
Does the sentry know the current challenge and password?
Does the entrance point have communications with the fire direction center or battery or platoon operations center?
Is movement into and out of the battery or platoon entrance point restricted?
Who is responsible for transportation of the sentry in an emergency displacement?
Passive Defensive Tasks
Note. Passive defense measures are those actions taken in anticipation of an enemy attack, and usually characterized by the use of cover, concealment, camouflage, and deception.
Are passive measures being employed by the battery or platoon?
Consider mission variables, to include:
What type of target acquisition assets does the enemy possess (radar, sound, or flash)? This may influence the selection of charge(s) to fire.
What is the expected air threat?
What is the expected ground threat?
What is the expected counterfire threat?
Is battery or platoon equipment dispersed to minimize detection?
Are antennas remote?
Are directional antennas used?
Does the unit display good camouflage discipline?
Has natural camouflage been enhanced and manmade camouflage been constructed?
Is the unit using all available cover and concealment?
Is noise and light discipline being enforced during periods of limited visibility?
Is track plan discipline being enforced to limit identifiable vehicle tracks within the position?
Chemical, Biological, Radiological, Nuclear (CBRN)
Are chemical agent detectors situated upwind of the position?
Are detectors placed far enough away from the unit to provide adequate early warning?
Have detectors been relocated as wind direction changes?
Have detector alarms been tested?
Has a mission-oriented protective posture level been established?
Do sections have complete individual protective over garments readily available?
Does the unit have access to replacement expendable items (filter replacements, decontamination kits, and detection kits)?
Does the battery have survey and monitoring teams established?
Have the teams been exercised?
Are trained teams using detection kits?
Are individual Soldiers using chemical detection paper?

Table A-13. Sample unit defense checklist (continued)

Chemical, Biological, Radiological, Nuclear (CBRN)
Is the unit prepared to conduct personal decontamination?
Is the unit prepared to conduct limited equipment decontamination?
Have personnel been designated for operational decontamination?
Does the unit have all authorized decontamination apparatus' on hand?
Have unmasking procedures been rehearsed?
Active Defensive Tasks
Note. Active defense measures seek to interdict and neutralize the enemy's actions.
Are active measures being employed by the battery or platoon?
Observation or Listening Posts
Are observation or listening posts positioned to afford early warning?
Are observation or listening post locations prepared?
Do observation or listening posts have binoculars?
Have observation or listening posts been briefed on their responsibilities and the enemy situation?
Have two means of communications been established with the observation or listening posts?
Has a system been established to operate the observation or listening posts on a continuous basis?
Has a prearranged signal been established to recall the observation or listening posts?
Hardening
Is key battery equipment (for example; generators) hardened?
Are available manmade structures and natural terrain being used to the maximum extent possible?
Can howitzers be positioned in defilade?
Is engineer support available for excavation?
Are available cover and concealment being used?
Have individual fighting positions been prepared for every section?
Are the individual fighting positions properly camouflaged?
Have survivability positions been prepared for each section?
Are the individual fighting positions integrated into the overall defensive plan?
Are sufficient crew-served weapons (M2, M240, M249, and MK-19) positioned to provide security for key battery elements?
Fighting Position
Have range cards been constructed for crew-served weapons?
Are firing stakes being used to identify the primary and alternate sectors of fire?
Are firing stakes marked for day and night?
Have traverse and elevation mechanism settings been recorded on range cards?
Has a final protective line been established?
Has a signal been identified for firing on the final protective line?
Do fields of fire interlock?
Have fields of fire been cleared?
Reaction Force
Has a reaction force been established?
Have reaction force personnel been designated?
Has a primary and alternate signal for reaction forces been designated?

Table A-13. Sample unit defense checklist (continued)

Reaction Force
Has a rally point been designated?
Have alternate members been identified for the reaction force?
Has the reaction force been exercised?
Does the reaction force have a means of communication?
Has the reaction force been briefed on the tactical situation?
Review unit tactical standard operating procedures.
Perimeter Communications
Have communications been established within the battery or platoon perimeter?
Does the entrance point have communications?
Does the battery or platoon have alarm signals for attack, to include:
Ground?
Air?
Counterfire?
Chemical, Biological, Radiological, Nuclear (CBRN)?
Anti-armor Assets
Have tank-killer teams been designated?
Have likely engagement areas and hide positions been selected?
Have supplementary positions been reconnoitered and prepared?
Have the tank-killer teams been briefed on the tactical situation?
Have the tank-killer teams been exercised?
Movement
Has the battery commander or platoon leader coordinated for mutually supporting fires in support of the movement plan?
If so, has this information been provided to higher headquarters?
Has the battery commander or gunnery sergeant reconnoitered an alternate position?
Has the alternate position been prepared?
Have rally points been established?
If so, have the rally points location and route of egress been disseminated?
Have convoy signals been established, to include:
Blocked ambush?
Unblocked ambush?
Air attack?
Artillery attack?
Are vehicles prepared for the tactical situation (for example; ground attack likely)?
Is security available?
Is Counter-Radio Controlled Improvised Explosive Device Electronic Warfare system or other counter-improvised explosive device equipment operational?
Local Security
Have local patrols been employed, if necessary? (See FM 3-21.8 or ATTP 3-21.71)
Have obstacles been integrated into the defensive plan, if available?
Has a defensive diagram been prepared?
Have mines and barriers been annotated?

Table A-13. Sample unit defense checklist (continued)

Local Security
Are primary and supplementary positions marked?
Are direct fire sectors marked for day and night?
Are interlocking fields of fire and the final protective line marked?
Are observation or listening posts included in the defensive diagram?
Is dead space annotated and covered?
Have target reference points been established and marked for day and night?
Have avenues of approach been identified?
Have killer junior targets been identified (for example; dead space)?
If so, has data been computed and disseminated?
Has the battery commander or platoon leader planned indirect fires in support of the defensive plan?
Has the challenge and password been issued to all personnel?
Have friendly unit locations been identified and disseminated to avoid fratricide?
Do all personnel know the threat?
Have RQ-11B Raven missions been planned?
Air Defense Coverage
Has the air defense warning and weapon control status been disseminated?
What percentages of available crew-served weapons are deployed in a ground mount versus a ring mount configuration?
How does the battery or platoon plan to defend against fast moving aircraft?
Has the battery or platoon plan been rehearsed?
What are the primary and alternate signals for air attack?
Medical
What is the plan for evacuating casualties to the battalion aid station?
Has a casualty collection point been identified?
Are combat lifesavers properly trained and positioned throughout the unit?
Have litter teams been identified?
Are medical evacuation vehicles on call and prepositioned?
Note. In addition to ground ambulances, unit organic vehicles should also be identified in the event of mass casualties.
Has the route and time to the battalion aid station been reconnoitered?
Have ambulance exchange points been identified?
Has a landing zone been identified and marked for medical evacuation aircraft?
Enemy Prisoners of War
Are enemy prisoner of war collection points established?
Is there a plan for evacuation and treatment of enemy prisoners of war?
Has the plan been rehearsed?
Who has primary responsibility for the enemy prisoners of war?

BATTERY WARNING ORDER

A-6. The battery warning order is used to focus the battery commander's initial mission preparation before completing the plan. The warning order alerts subordinates of an upcoming mission and directs preparation activities, such as reconnaissance, sustainment, task-organization, and troop movement. A good warning

order directs actions rather than simply passing information. Leaders optimize the use of time with warning orders, fragmentary orders, and verbal updates.

A-7. For more information on the use and format of warning orders, see ADP 5-0.

BATTERY ORDER

A-8. Once the battery commander has completed the operation order, he arranges potential actions in time, space, and purpose to guide the battery during execution. One successful technique is a fill in the blank order format. Section chiefs and other key leaders can use a blank laminated order to fill in during the battery commander's orders brief. This technique will assist the section chief in briefing their subordinates. This suggestion provides another option for development of unit tactical standard operating procedures.

A-9. For more information on formats, examples, and procedures for creating operation orders and annexes, see ADP 5-0.

DEGRADED MODE

A-10. The tables below provide sample checklists for fire direction center and howitzer operations in degraded mode. Some version of these checklists can be incorporated into the battery tactical standard operating procedures.

Note. If the platoon is operating in a fully degraded mode, the platoon leader can use conventional tactics outlined in ATP 3-09.50.

A-11. For more information on equipment and associated options for degraded mode, see applicable equipment technical manual. Consider restrictions in the howitzer technical manual.

FIRE DIRECTION CENTER

A-12. Table A-14 (on page A-16) is a sample checklist for the fire direction center to use in the event of a computer or communications failure. Some version of this checklist can be incorporated into the battery tactical standard operating procedures.

Table A-14. Sample degraded fire direction center operations checklist

Failure	Crew Drills
Advanced Field Artillery Tactical Data System (AFATDS)	Degraded fire direction center: Notify adjacent platoon to assume control of howitzers. Notify howitzers to go to backup fire direction center and backup frequency on the network address screen. Inform the battalion command post and fire direction center of the situation. Inform battery commander of nature of equipment failure and request external support, as required. Repair or replace faulty equipment.
	Immediate Actions
	Adjacent fire direction center: Establish communications (voice and digital) with degraded howitzers. Request howitzer update from each howitzer. Request ammunition update from each howitzer. Request minimum quadrant from each howitzer. Request muzzle velocity variances from each howitzer. Request registration data from each howitzer. Conduct verification mission with howitzers (after this step, the platoon is ready to fire). Request targets stored in the Paladin Digital Fire Control System of each howitzer. Update and transmit information to battalion command post and fire direction center.
Digital Communications	Degraded fire direction center: Keep howitzers in current position or move them into a platoon formation. Establish an internal wire system, if feasible. Use Advanced Field Artillery Tactical Data System (AFATDS) to compute technical fire commands. Verify azimuth of fire.

HOWITZER

A-13. Table A-15 (on page A-17) is a sample checklist for the howitzer section chief to use in the event of a howitzer subsystem failure. Some version of this checklist can be incorporated into the battery tactical standard operating procedures.

Table A-15. Sample degraded howitzer subsystem operations checklist

Failure	Crew Drills
Electrical Power	If ammunition carrier is available— Notify fire direction center. Use limited electrical power available from ammunition carrier auxiliary power unit. Manually ram projectile. Manually elevate and traverse.
	Note. The auxiliary power unit provides enough power for Paladin Digital Fire Control System operations only. Auxiliary power unit output is not sufficient for operating the hydraulic system.
	If ammunition carrier is not available— Notify fire direction center. Operate travel lock manually. Use spades. Use alternate methods of lay. Receive firing data from adjacent howitzer. Use aiming reference points (distant aiming point, collimator, or aiming posts). Manually elevate and traverse. Manually ram projectile.
Digital Communications	Notify fire direction center. Collocate within 30-50 meters of an operational howitzer and use the howitzers firing data, or use firing data from the fire direction center. This method is slower than collocating with an operational gun, but is more accurate. Use voice network for fire direction. Manually input data into the Paladin Digital Fire Control System. Verify azimuth of fire (voice) with fire direction center. Report rounds complete.
Navigation System	Notify fire direction center. If in position— Use distant aiming method (preferred) or collimator and continue mission using manual or optical fire control. Move an operational howitzer within 30-50 meters and use the howitzers firing data. If moving— Manually navigate to destination. Collocate within 30-50 meters of an operational howitzer. Use traditional methods of lay. Use the operational howitzers firing data, or use firing data from the fire direction center. Use spades.
Vehicle Motion Sensor	Zero velocity update required more often, but howitzer is still operational.
Hydraulic Power	Notify fire direction center. Load, traverse, and elevate manually.
Gun Drive Servos	Notify fire direction center. Manually elevate and traverse.

Table A-15. Sample degraded howitzer subsystem operations checklist (continued)

Failure	Crew Drills
Paladin Digital Fire Control System	Notify fire direction center. Collocate within 30-50 meters of an operational howitzer and use the howitzers firing data, or use firing data from the fire direction center. Use distant aiming method (preferred) or collimator and continue mission using manual or optical fire control. Use spades. If moving— Manually navigate to destination. Collocate within 30-50 meters of an operational howitzer. Use traditional methods of lay.
Voice Communications	Notify fire direction center. Remove radio from ammunition carrier and place in howitzer, or install wire to an adjacent howitzer.
Intercom	Notify fire direction center. Remove combat vehicle crewman helmets and replace with Kevlar helmet. If firing M119 or M203 series charges, the combat vehicle crewman helmet must still be worn with earplugs to ensure overpressure does not damage hearing. Do not move howitzer until communications are restored between the howitzer section chief and driver.
Transmission or Final Drive	Notify fire direction center. Tow to subsequent position using the ammunition carrier. Use auxiliary power unit to power the Paladin Digital Fire Control System.
Engine Power Plant	Notify fire direction center. Use limited electrical power available from ammunition carrier and auxiliary power unit. Continue firing until engine is repaired or replaced. Tow to subsequent position.

Appendix B

Common Mistakes and Malpractices

This appendix briefly discusses the common mistakes and malpractices that occur prior to or during firing. This list is not all-inclusive, but serves to highlight those that are most common to cannon artillery units conducting tactical operations.

PROBLEM AREAS

B-1. Problems arise during firing primarily due to lack of training or sacrificing established procedure for speed. Bypassing established procedures can lead to inaccuracies in fires, wasted rounds, loss of precision munitions capability, and a decrease in the effectiveness of fire support. Many of these inaccuracies are attributed to carelessness or improper procedures at the howitzer or orienting station. Proper training is the key to minimizing human error and careless gunnery procedures. The problem areas discussed below give the commander a starting point for evaluating the unit's training proficiency and development of unit tactical standard operating procedures. For more information on firing safety, see TC 3-09.8. For more information on special segments, containing cautions, warnings and danger notices during loading or firing, see TM 9-2350-314-10-1 & -2.

LOSS OF OR FAILURE TO ACHIEVE PRECISION MUNITION CAPABILITY

B-2. One problem of concern is loading the encryption keys (Black Keys) into the Platform Integration Kit (PIK). Problems stem from a lack of training, to failure in loading current segments of the keys. Errors can result from improper procedures or lack of attention to detail, for example:

- Failure to power up the PIK.
- Failure to verify PERFOFM SETTER CHECK is YES in the PDFCS.
- Failure to power up the Enhanced Portable Inductive Artillery Fuze Setter.
- Failure to inspect PIK battery.
- Failure to provide sufficient power from host

Note. Once Black Keys are loaded into the PIK, it may take 10 to 15 minutes for the PIK to load and verify the global positioning system device keys.

CAUTION

Do not remove or install the PIK if host system power to the PIK is ON. Damage to the PIK will occur. Always ensure host system power to the PIK is OFF before removing or installing the PIK.

PRECUTTING CHARGES

B-3. One problem area of concern is the preparation of propelling charges. Improper preparation of propelling charges can lead to the firing of an incorrect charge. Firing an incorrect charge is the single most common reason that a cannon artillery unit fires outside of safety limits, and can result in fratricide.

B-4. Older series of propellants (for example; M67, M3A1, or M4A2) have adjustable propelling charges. These propellants are manufactured with an adjustable propelling charge divided into increment charges. When the propellant is fired full charge, the charge is used as issued. When other than full charge is to be fired, the propelling charge is adjusted as indicated in the instructions for adjustable propelling charges.

B-5. Propelling charges are prepared, commonly referred to as "cut," when directed as part of a fire command. The charge is cut ONLY after the command CHARGE is announced as part of the initial fire command, or if CHARGE is not announced, after a subsequent element of the fire command (for example; fuze, deflection, and quadrant) is announced. The procedures and commands for preparation and firing of propelling charges must be strictly enforced. For information on preparation of propelling charges, see howitzer technical manual. For more information on sequence and types of fire commands, see ATP 3-09.50 and FM 6-40.

IMPROPER EMPLACEMENT OF AIMING REFERENCE (DEGRADED MODE)

B-6. Another potential problem area of concern is the improper emplacement of aiming references. Aiming references are emplaced or established at certain distances from the howitzer to ensure a proper sight picture. This is especially important when considering displacement. Displacement is the undesired movement of the sight caused by traversing the tube or by the shock of firing. If the sight is not centered over the pivot point of the weapon, or if the weapon shifts backward during firing, the sight is then oriented toward the aiming point from a different angle. Left uncorrected, this could result in rounds that impact outside of safety limits, which can result in fratricide. Correcting for displacement is made using the two close-in aiming references (collimator and aiming posts).

B-7. The collimator is the primary aiming reference for the howitzer used during degraded mode. The emplacement distance for the collimator will vary because of terrain encountered, but is normally between 4 and 15 meters from the howitzer. Displacement is corrected by matching the numbers in the panoramic telescope with the corresponding numbers in the collimator. If the collimator is not emplaced within the distances stated above, the graduations visible in the collimator will not align properly and the sight picture will be out of focus. Therefore, it will be impossible to correct for displacement. If displacement is not corrected, the howitzer will not be oriented in the direction of the target.

B-8. The aiming posts are an alternate aiming reference for the howitzer used during degraded mode. The emplacement distance for the aiming posts are approximately 50 and 100 meters from the howitzer. This is very important for two reasons. First, the distance to the aiming post is in direct relationship to the angular measurement taken when displacement occurs. The farther the aiming post is from the sight, the smaller the angular measurement. This is the reason for using the near-far-line rule when correcting for displacement to the aiming posts. To correct for displacement to the aiming posts, the number of mils between the near aiming post and the far aiming post must equal the number of mils between the far aiming post and the vertical line in the panoramic telescope.

B-9. The distant aiming point is another alternate aiming reference used during degraded mode and though not emplaced, must be properly selected. It is not possible to correct for displacement when using a single aiming reference, other than the collimator. Therefore, the distant aiming point must be far enough from the panoramic telescope to eliminate the need to correct for displacement. The principle is very similar to that involving the aiming posts, where the greater the distance between the sight and the aiming point, the smaller the angular measurement will be when displacement occurs. Howitzers do not normally lay for deflections of less than one mil. Therefore, the angular measurement caused by displacement must be less than one mil when using a distant aiming point. The greatest amount of displacement possible with any one howitzer system is 1.5 meter. Therefore, using mil relation, the minimum distance for a distant aiming point is 1,500 meters.

B-10. The use, type, and selection of aiming references depend on unit authorizations and tactical standard operating procedures. For more information on establishing aiming references (degraded mode), refer to TM 9-2350-314-10-1 & -2.

LAYING ON THE WRONG AIMING POSTS (DEGRADED MODE)

B-11. Another potential problem area of concern is the inadvertent laying of the howitzer on the wrong aiming posts. A situation may arise where the gunner needs to switch aiming points from primary to alternate during firing. For example; the primary aiming point (collimator) is no longer available, requiring the gunner to switch to an alternate aiming point (aiming posts). There are established procedures for establishing, or switching between aiming points. If these procedures are performed incorrectly or out of sequence, the

probability of laying on the wrong aiming point will increase substantially. Left uncorrected, this could result in rounds that impact outside of safety limits, which can result in fratricide. For more information on establishing, or switching between aiming points, see TM 9-2350-314-10-1 & -2.

Note. Laying on the wrong aiming posts is a mistake that is possible, especially at night. Unit tactical standard operating procedures may be developed to include color-coding for howitzer sections (for example; red, blue, green, and amber). Color-coding is an extremely important consideration if the unit is occupying a firebase**.**

USING THE ALIGNMENT DEVISE TO VERIFY BORESIGHT (DEGRADED MODE)

B-12. Another potential problem area of concern is the failure to boresight the howitzer properly. Boresighting is the process where the optical axis of the howitzer sights (panoramic telescope) are aligned parallel to the axis of the howitzer tube. When this condition exists, the tube can be oriented parallel to the azimuth of fire upon occupation of a position. Thus, a target can be engaged with both indirect and direct fires.

B-13. Alignment devices were originally developed for boresighting, because distant aiming points were not always available and transporting testing targets into a tactical environment was not practical. However, potential conditions exist that invalidated their use for boresighting. Because of these conditions, the M140A1 alignment device should be used only to verify boresight performed by other methods (distant aiming point or standard angle). Left unchecked an error in boresight could result in rounds that impact outside of safety limits, which can result in fratricide. For more information on boresighting, verifying boresight, or fire control alignment tests, see TM 9-2350-314-10-1 and TM 9-2350-314-10-2.

Note. Comparison test must be done with the alignment devices to verify their accuracy when performing fire control alignment tests.

IMPROPER EMPLACEMENT OF ORIENTING EQUIPMENT (DEGRADED MODE)

B-14. Another problem area of concern is the improper emplacement of orienting equipment. Errors can result from improper procedures or lack of attention to detail, for example:

- Failure to level the tripod, which affects orientation and accuracy.
- Failure to setup the tripod do that one leg is oriented in the general direction of sighting, to preclude the likelihood of the instrument operator disturbing the device.
- Failure to tighten the instrument securely to the tripod, this could allow the head to move resulting in incorrect measurements.
- Failure to verify the azimuth to the end of the orienting line.
- Failure to cleat the area of magnetic attractions when the magnetic needle is used.
- Failure to read number on the azimuth scale in a clockwise direction.
- Inadvertently reading red numbers rather than black numbers on the azimuth scale.
- Failure to use a proper base length to measure subtense (for example; using a rifle when the distance is greater than values listed in the appropriate table),
- Failure to update howitzer location in the fire direction center (final lay deflection).
- Failure to follow occupation procedures (for example; verifying lay before the primary aiming point is emplaced, or boresight is verified).

B-15. The result of an error has a direct effect on direction and the accuracy of the fired round. Left uncorrected, this could result in rounds that impact outside of safety limits, which can result in fratricide. For more information on orienting equipment, see TM 9-6675-262-10.

FAILURE TO COMPUTE TERRAIN GUN POSITION CORRECTIONS (DEGRADED MODE)

B-16. Another potential problem area of concern is the failure to compute terrain gun position corrections. The digital link between the fire direction center and the howitzer will at some point fail to function. When this failure occurs, voice fire commands may be issued to one or more howitzers. Therefore, it is important to compute terrain gun positioning corrections as part of occupation procedures at the fire direction center. Without terrain gun position corrections, the firing unit will not be able to manipulate the sheaf.

B-17. Terrain gun position corrections are individual howitzer corrections applied to the gunner's aid on the panoramic telescope, the correction counter on the range quadrant, and the fuze setting. Once terrain gun position corrections are computed, the fire direction center will issue special corrections to individual howitzers for use, as directed. These corrections are applied to fuze settings, deflection, and quadrant elevation to place the fire for effect bursts in a precise pattern on the target. The goal of terrain gun position corrections is to compute corrections to obtain an acceptable sheaf in the target area. The goal of special corrections is to compute aimpoints tailored to fit the target size, shape, and attitude. For more information on terrain gun position corrections, see FM 6-40.

MALPRACTICES

B-18. Another problem area of concern is malpractice. Malpractice includes blatant violations of standard procedures set forth in field manuals, technical manuals, and other publications. In order to reduce or eliminate the occurrence of firing incidents, leaders must be observant for conditions not mentioned previously, which include:

- Failure to have a second safety certified person orient the verification circle and verify the lay of the howitzer (degrade mode).
- Failure to adhere to maximum or sustained rates of fire.
- Failure to properly seat the projectile during ramming, which may result in the projectile falling back on the propellant when the tube is elevated, or a blow by condition.
- Failure to properly test the gunner's quadrant (degrade mode).
- Failure to properly or consistently place the propellant in the powder chamber.
- Failure to complete or improperly performing fire control alignment test.
- Failure to protect projectile or propellants from exposure to direct sunlight for extended periods.
- Failure to protect the fuze during handling, when mated to the projectile.
- Failure to use a fuze wrench when tightening fuzes.
- Failure to follow firing procedures in the howitzer (for example; attaching the lanyard before the proper command is given).
- Failure to clear the path of recoil when priming or performing misfire procedures.
- Failure to segregate ammunition by lot.
- Failure to perform pre-fire checks during occupation of each position.
- Failure to fire at the commanded quadrant elevation (for example; firing at loading elevation).
- Failure to update powder temperature.
- Failure to lay for correct deflection or quadrant elevation (for example; transposing numbers announced in fire commands) (degraded mode).
- Failure to zero the gunner's aid counters when special corrections are canceled (degraded mode).
- Failure to center bubbles in the pitch and cross level vials (degraded mode).
- Failure to verify fire commands against the safety T.
- Failure to review firing data before transmitting to howitzers (fire direction center).
- Failure to apply proper misfire procedures.

INCIDENTS

B-19. Lack of attention to detail, improper supervision, and failure to make safety checks lead to incidents that result in equipment failure, and can lead to physical injury or death to personnel. Leaders at every level should be diligent in enforcement of safety practices and procedures.

B-20. The information discussed in this appendix provides the battery commander a starting point for evaluating unit training proficiency and development of unit tactical standard operating procedures.

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Glossary

SECTION I – ACRONYMS AND ABBREVIATIONS

AFATDS	Advanced Field Artillery Tactical Data System
ADP	Army Doctrine Publication
ADRP	Army Doctrine Reference Publication
ATP	Army Techniques Publication
ATTP	Army Tactics, Techniques, and Procedures
CBRN	chemical, biological, radiological, and nuclear
DA	Department of the Army
DA PAM	Department of the Army Pamphlet
DSCA	Defense Support of Civil Authorities
EOD	explosive ordnance disposal
FBCB2	Force XXI Battle Command-Brigade and below
FDC	fire direction center
FM	field manual
METT-TC	Mission, Enemy, Terrain and weather, Troops and support available, Time available, Civil considerations
NBC	nuclear, biological, and chemical
PDFCS	Paladin Digital Fire Control System
PIK	Platform Intergration Kit
RSOP	reconnaissance, selection, and occupation of a position
S-1	personnel staff officer
S-2	intelligence staff officer
S-3	operations staff officer
S-4	logistics staff officer
STP	Soldier Training Publications
TC	Training Circular
TM	Technical Manual

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By Order of the Secretary of the Army

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