BULLETIN
OF "CAROL I" NATIONAL DEFENCE UNIVERSITY

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Doctrinal and Tactical Aspects of Deploying Anti-Tank Guided Missile Platoons in Defence

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Abstract

This paper explores the tactical employment of the Anti-Tank Guided Missile (ATGM) platoon in defensive operations, focusing on its effectiveness against armoured and mechanized threats in both conventional and hybrid warfare environments. Drawing on doctrinal frameworks such as FM 3-21.91, FM 71-1, and MCRP 3-30.7, the research evaluates key aspects including terrain-based siting, force distribution, survivability through mobility and camouflage, and synchronization with indirect fire and reconnaissance assets. Through simulated defensive scenarios, the study demonstrates that ATGM units deployed in decentralized, terrain-masked positions with overlapping fields of fire and ISR integration significantly improve engagement success and reduce vulnerability to counterattack. The findings suggest doctrinal and organizational refinements, such as the incorporation of hunter-killer tactics and loitering munitions at the platoon level, to meet the demands of multi-domain operations and support Force Design 2030 concepts. The paper concludes with practical recommendations for training, force structure adaptation, and integrated fires coordination.

Keywords:

Anti-Tank Guided Missile (ATGM) Platoon; Defensive Operations; Tactical Employment; Terrain Masking and Camouflage; Hunter-Killer Tactics; Combined Arms Integration.

Article info
Received: 30 May 2025; Revised: 27 June 2025; Accepted: 30 July 2025; Available online: 6 October 2025

Citation: Radovanovic, M., M. Zivkovic, A. Petrovski, and R. Mustafovski. 2025. "Doctrinal and Tactical Aspects of Deploying Anti-Tank Guided Missile Platoons in Defence." *Bulletin of "Carol I" National Defence University*, 14(3): 59-78. https://doi.org/10.53477/2284-9378-25-36

The tactical employment of the Anti-Tank Guided Missile (ATGM) (Radovanovic, et al. 2023b) platoon plays a vital role in modern defensive operations. As military engagements increasingly involve mechanized and armored threats supported by advanced mobility and firepower, the ability of defensive forces to neutralize such threats before they breach the defensive line is a mission-critical requirement. Recent armed conflicts, particularly the ongoing war in Ukraine, have demonstrated that Anti-Tank Guided Missile (ATGM) platoons achieve their greatest operational impact when deployed within a broader hybrid warfare framework. This approach integrates conventional maneuver elements with capabilities such as unmanned aerial reconnaissance, electronic warfare, precision artillery fire, and the use of camouflage and deception to disrupt enemy detection and targeting. Lessons from Ukraine have highlighted the importance of rapid relocation, effective concealment, and coordination between ATGM units and other combat assets to maintain both lethality and survivability. These developments confirm that the defensive role of ATGM platoons cannot be assessed in isolation but must be examined in relation to the multi-domain character of contemporary operations. ATGM platoons serve as the backbone of anti-armour resistance and are expected to deliver accurate, timely, and sustained fire support against enemy armour formations. Their success is not only a function of their weapons systems but also of their doctrinal positioning, coordination, and tactical flexibility. The correct deployment of these units can delay or stop an armoured advance, protect high-value defensive positions, and support infantry units holding the line.

According to Field Manual 71-1, ATGM platoons must be carefully positioned to take advantage of terrain, create overlapping fields of fire, and maintain concealment from enemy observation and targeting systems (Headquarters, Department of the Army 1998). Field Manual 3-98 reinforces this by outlining the importance of reconnaissance and early detection of enemy movement to allow ATGM units time to prepare engagements (Headquarters, Department of the Army 2009). Doctrinal publications such as MCRP 3-30.7 and MCWP 3-15.2 further support the idea that well-prepared indirect fire and long-range assets such as ATGM platoons must be embedded into a coordinated fire control plan (Headquarters, United States Marine Corps 2000; 2005). The Anti-Armour Company-Platoon Manual defines the deployment of combat crews and squads under various conditions of combat operations (Federal Secretariat for National Defense 1985). Field Manual FM 7-91 (Headquarters, Department of the Army 2002a) provides a detailed development of the engagement area for the anti-armour platoon and company.

Modern defensive doctrine increasingly incorporates multi-domain elements, including surveillance from unmanned aerial vehicles, communication with Tactical Operations Centres, and integration with mortar and artillery support. The FY2025 weapons strategy documents highlight that current investments are focused on enhancing the lethality and survivability of such units through encrypted battlefield communication, digital fire control, and real-time situational awareness

(United States Department of Defense 2023a; 2023b). However, even as technology advances, the core of ATGM employment remains rooted in tactics. The Hunter-Killer Platoon model introduces modern tactical concepts in which missile teams work in tandem with reconnaissance drones and loitering munitions to increase engagement success and reduce exposure time (Marine Corps Association 2022).

FM 3-21.71 outlines the operational readiness and placement of light infantry and support units, stating that ATGM platoons must not only deliver firepower but also maintain mobility and re-engagement capability in dynamic threat environments (Headquarters, Department of the Army 2002b). ATP 3-20.15 explains that in defensive operations, ATGM sections are most effective when placed at terrain chokepoints, reverse slopes, or concealed ambush zones to allow for first-strike advantage and survivability after firing (Headquarters, Department of the Army 2004). Tactical manuals such as the ROTC SOP and the Infantry Tactical SOP emphasize the importance of integrated planning, fire distribution, and command synchronization to achieve unit-level coherence during anti-armour engagements (United States Army ROTC n.d.; United States Army Infantry School n.d.a). The Anti-Armour Company–Platoon Manual emphasizes the specific conditions for employing ATGM platoons in manoeuvre terrain, including rugged terrain, mountainous areas, winter conditions, nighttime operations, and coastal defence (Federal Secretariat for National Defense 1985).

The historical foundation for these practices is not new. The 1943 British Army training document on anti-tank platoons highlights many of the same principles still relevant today, including field placement, lateral dispersion, and coordinated fire from multiple angles (War Office, British Army 1943). These concepts have evolved with new technology but remain consistent in their tactical value. Modern SOPs such as the ROTC-AC-TACSOP provide procedural detail on how platoon leaders should control fire missions, maintain secure communication with higher command, and coordinate with supporting assets (United States Army Cadet Command n.d.). These efforts are amplified when supported by secure signal and fire coordination measures as outlined in the Infantry Training SOP and Field Manual 7-90 (Headquarters, Department of the Army 1990; United States Army Infantry School n.d.b). Field Manual 3-21.91 (FM 7-91) (Headquarters, Department of the Army 2002a) defines the deployment model of combat positions for the anti-armour company and anti-armour platoons depending on the type of operation and mission.

Despite technological advancements, tactical fundamentals continue to determine the effectiveness of ATGM platoons. Whether operating in static defence, ambush configuration, or mobile blocking positions, their ability to achieve fire dominance over armoured threats depends on doctrine-driven decision-making, knowledge of terrain, and effective coordination with other elements. This paper focuses on evaluating the tactical deployment of the ATGM platoon in defensive scenarios by comparing several doctrinally supported configurations under simulated battlefield

conditions. These include linear forward-facing defence, flanking ambush positions, and layered depth-based defences. Each model will be assessed for its effectiveness in engagement success, survivability, and support coordination. By grounding the analysis in existing doctrine and validating it through simulation, this research aims to contribute practical insights for optimizing ATGM platoon employment in defensive operations.

Research Objectives and Hypotheses

The main objective of this study is to evaluate the effectiveness of three doctrinally recognized ATGM platoon deployment procedures in defensive operations, considering both conventional and hybrid warfare contexts. Specific objectives include:

1. To compare the operational performance of linear, echeloned, and dispersed defensive procedures using defined tactical indicators.
2. To identify the operational conditions under which each procedure provides maximum coverage, survivability, and adaptability.

Based on doctrinal understanding and observed field practices, the following hypotheses are formulated:

H1: The echeloned defense procedure provides superior coverage and survivability compared to linear and dispersed deployments under hybrid warfare conditions.

H2: The integration of reconnaissance data and coordinated fires significantly improves the overall effectiveness of ATGM platoon defense, regardless of the specific deployment procedure.

Literature Review

The tactical employment of Anti-Tank Guided Missile (ATGM) platoons in defensive operations is a critical element of modern combined arms doctrine. Over the decades, military field manuals and training documents have established a robust framework for understanding how these specialized units should be positioned, supported, and coordinated during operations involving enemy armoured formations. This section reviews seventeen doctrinal and strategic sources that collectively shape the theoretical and practical knowledge surrounding the deployment of ATGM platoons.

Doctrinal Foundations of ATGM Platoon Defence

Field Manual 71-1 provides one of the clearest tactical overviews of how company-level units, including ATGM platoons, should be deployed during mechanized defence operations. It emphasizes the importance of force protection, standoff range, concealment, and synchronized fields of fire that ensure early engagement and reduced risk of detection (Headquarters, Department of the Army 1998). Field Manual 3-98 complements this by offering detailed doctrine on reconnaissance integration and the role of early warning in anti-armour tactics. The document highlights how ATGM platoons should not operate in isolation but must work in coordination with surveillance elements and command structures (Headquarters, Department of the Army 2009).

ATP 3-20.15 is the most specialized reference focusing directly on anti-armour and ATGM platoon tactics. It explains how commanders should position these units using natural cover, concealment, reverse slope defence, and engagement from unexpected angles. It introduces the concept of mutual support between sections and emphasizes the value of terrain analysis in maximizing effectiveness (Headquarters, Department of the Army 2004). Field Manual 3-21.71 builds on this by describing defensive strongpoints and light infantry configurations, in which ATGM assets are layered within defensive belts to create depth and flexibility in response to enemy movement (Headquarters, Department of the Army 2002).
The British Army's 1943 Infantry Training Part VI on anti-tank platoons remains historically significant. Although the equipment described is outdated, the manual reinforces many tactical principles still applicable today. It discusses ambush from defilade, pre-registration of firing points, lateral dispersion, and the importance of interlocking fire zones, all of which are doctrinally echoed in modern NATO practices (War Office, British Army 1943).

Tactical Positioning and Defensive Configurations
MCRP 3-30.7 and MCWP 3-15.2, both developed by the United States Marine Corps, address the integration of ATGM platoons with infantry and indirect fire elements. These manuals discuss positioning options, the use of observation points, and fire planning in coordination with company and battalion-level headquarters (Headquarters, United States Marine Corps 2000; 2005). They highlight that terrain masking, line of sight control, and mobility are essential not only for successful engagement but also for post-shot survivability.

The Hunter-Killer Platoon concept introduces a more modern interpretation of ATGM operations. It proposes a hybrid model that combines traditional missile teams with mobile reconnaissance and loitering munitions. While this concept is still evolving, it supports the idea that ATGM platoons benefit greatly from real-time intelligence and dispersed ambush strategies. The platoon is no longer a static element but rather part of a dynamic targeting team that shifts position based on enemy movement and terrain advantage (Marine Corps Association 2022).

Modern tactics emphasize the importance of decentralization and flexibility. This is evident in the ROTC Tactical SOP and Infantry-TACSOP documents. These training guides instruct junior officers and non-commissioned leaders on how to organize ATGM units within patrol bases, fire teams, and ambush groups during field operations. They reinforce that anti-armour operations must be adaptable, with multiple fallback positions and communication lines to coordinate with supporting elements (United States Army ROTC n.d.; United States Army Infantry School n.d.a).

Supporting Elements: ISR, Mortars, and Command Coordination
While the core focus of defensive ATGM tactics is on fire and manoeuvre, modern doctrine recognizes that support from other elements can significantly enhance

performance. ATP 3-21.90 and MCWP 3-15.2 describe how mortars and indirect fire teams are used to suppress or channel enemy armour into the kill zones of ATGM platoons. Mortar units can also provide screening fire during ATGM platoon relocation, enhancing survivability (Headquarters, United States Marine Corps 2005; Headquarters, Department of the Army 1990).

FM 3-98 and the ROTC-AC-TACSOP highlight the importance of communication and command integration during anti-armour engagements. Real-time updates from reconnaissance units or unmanned aerial vehicles allow ATGM platoons to adjust their firing positions and time their engagement to exploit the enemy's vulnerability. These documents stress that while technology assists with targeting and synchronization, the tactical decision of when and where to strike remains a human command function (Headquarters, Department of the Army 2009; United States Army Cadet Command n.d.).

Strategic sources such as the FY2025 Defence Acquisition Reports identify ongoing investment in secure communication networks, battlefield sensors, and improved missile systems. These reports support the doctrinal shift toward precision engagement using integrated command and control, which directly impacts how ATGM platoons are expected to operate in future conflicts (United States Department of Defense 2023a; 2023b).

TABLE NO. 1

Summary of Key Contributions from Reviewed Literature

Ref	Title	Main Contribution
Headquarters, Department of the Army, 1998	FM 71-1	Explains ATGM roles in mechanized defensive operations
Headquarters, Department of the Army, 2009	FM 3-98	Outlines the integration of reconnaissance and ATGM employment
Headquarters, United States Marine Corps, 2000	MCRP 3-30.7	Tactical coordination of missile teams with maneuver and observation units
Headquarters, United States Marine Corps, 2005	MCWP 3-15.2	Describes supporting fire integration and battlefield positioning
United States Department of Defense, 2023a	FY2025 Weapons Report (1)	Strategic funding for missile, communication, and ISR systems
United States Department of Defense, 2023b,	FY2025 Weapons Report (2)	Focus on satellite and secure network support for tactical operations
United States Marine Corps, 2022	Hunter-Killer Platoon	Introduces modern flexible deployment and ISR-based targeting
Headquarters, Department of the Army, 2002	FM 3-21.71	Light infantry and ATGM integration in defensive strongpoints
Headquarters, Department of the Army, 2004	ATP 3-20.15	Specific doctrinal guidance on ATGM section placement and tactics
United States Army ROTC (n.d.)	ROTC SOP	Describes field-level ATGM fire control and team organization
United States Army Infantry School (n.d.)	Infantry-TACSOP	Tactical leadership procedures for ambush and fire distribution planning
War Office, British Army, 1943	1943 Anti-Tank Platoon Manual	Historical basis for ambush, flanking, and interlocking fire planning
United States Army Cadet Command (n.d.)	ROTC-AC-TACSOP	Coordination of ATGM platoons with command and signal planning
Headquarters, Department of the Army, 1990	ATP 3-21.90	Indirect fire coordination and support of anti-armor elements
Headquarters, Department of the Army, 2002	FM 3-21.91 (FM 7-91)	Tactical Employment of Antiarmor Platoons and Companies
United States Army Infantry School (n.d.)b	Infantry Training SOP	Fire control, defensive positioning, and coordination between platoon-level units
Federal Secretariat for National Defense, 1985	*Anti-Armour Company–Platoon Manual*	Conduct of anti-armor operations under varying weather and terrain conditions

The table summarizes the central contributions of all fifteen references reviewed in this study. Each document supports a different aspect of the doctrinal, operational, or strategic understanding of how ATGM platoons are employed in defensive engagements. These sources collectively serve as the foundation for the simulated scenarios, tactical analysis, and doctrinal comparisons presented in the following sections of this paper.

Methodology

This study uses a multi-phase methodology to evaluate the tactical effectiveness of the Anti-Tank Guided Missile (ATGM) platoon in defensive operations. The approach integrates doctrinal analysis, simulation modelling, and comparative evaluation of battlefield performance under varying tactical conditions. All tactical models are grounded in military doctrinal publications and reflect realistic field scenarios extracted from seventeen validated sources.

Doctrinal Analysis of ATGM Platoon Employment

The first phase involved a comprehensive review of U.S. Army and Marine Corps field manuals and training publications related to the organization, capabilities, and employment of anti-tank platoons. Manuals such as FM 3-21.71, FM 3-21.91, and ATP 3-20.15 provide detailed guidelines on platoon composition, firing post selection, ambush planning, terrain exploitation, and integration with infantry and reconnaissance units (Headquarters, Department of the Army 2002; 2004). FM 71-1 and the 1943 British Anti-Tank Platoon manual were reviewed for insights on historical and mechanized deployment of anti-armour teams in layered defence strategies (Headquarters, Department of the Army 1998; War Office, British Army 1943).

From these documents, key doctrinal factors were extracted:

- Preferred firing range and standoff distances;
- Use of enfilade and defilade positioning;
- Mobility and shoot-and-scoot doctrine;
- Force distribution across linear, flanking, and depth-based layouts;
- Integration with indirect fire support and ISR platforms (Radovanovic, et. al. 2023a).

This doctrinal foundation guided the design of simulation scenarios and the performance metrics selected for analysis.

Tactical Scenario and Threat Definition

In the second phase, a reference battlefield scenario was constructed to model a defensive engagement between a friendly ATGM platoon and an enemy mechanized company. The environment is set in a semi-open, hilly terrain with intermittent vegetation and two key approach avenues. The enemy force consists of ten main battle tanks and supporting infantry fighting vehicles approaching from multiple angles.

The friendly force consists of a fully equipped ATGM platoon with six launchers organized into two firing sections. The platoon has access to UAV-generated ISR data, mortar support, and real-time position tracking via secured communication with the Tactical Operations Centre. However, the communication layer is treated as a supporting element, not the primary research focus.

Three tactical configurations are tested:

1. Linear frontal deployment across a ridge with overlapping fields of fire;
2. Ambush flanking setup with split sections covering separate engagement zones;
3. Depth-based echelon defence using fallback positions and mobility.

Each configuration is evaluated for engagement success, platoon survivability, and tactical delay imposed on enemy advancement.

Anti-Tank Guided Missile (ATGM) Platoon Deployment Model

Based on the analysis of various military manuals, several models for the deployment of an anti-armour platoon in defensive operations have been developed. These models are closely aligned with the disposition and strength of enemy forces and allow for further adaptation and refinement depending on the specifics of the tactical situation. The flexibility of these deployment frameworks enables commanders to optimize the positioning of anti-armour assets to effectively counter anticipated threats and terrain conditions, thus enhancing the unit's overall operational effectiveness in the defence.

The organizational structure of an ATGM platoon varies based on national military doctrine, the specific ATGM system employed, and whether the unit operates as part of a mechanized, motorized, or dismounted infantry force. Despite these variations, an ATGM platoon typically comprises 2 to 3 ATGM sections, each containing 2 to 3 firing teams. This analysis focuses on the tactical employment of an ATGM platoon organized into three sections, a configuration that enhances tactical flexibility and enables more effective allocation of anti-armor fires in defensive operations.

The tactical formation of an anti-armour platoon in a column (Figure 1) configuration involves the sequential placement of vehicles or squads, where each element maintains a distance of approximately 100 to 200 meters from the next. This formation is frequently employed in urban environments and mountainous terrain, particularly in areas with significant elevation differences. Under such conditions, where visibility is limited, ambushes are likely, and manoeuvrability is constrained, the increased spacing between elements reduces the risk of a single enemy attack affecting the entire unit. In urban settings, this formation enables improved coverage of intersections and street approaches, as well as a more rapid and flexible response to threats emerging from multiple directions, including ambushes. In mountainous or high-relief environments, where terrain restricts both movement and line of sight, the spacing enhances control over elevation-dominant routes and enables

manoeuvrings from protected positions. Additionally, this configuration facilitates the use of natural cover and concealment and supports the effective organization of fire support. Moreover, the column formation contributes to improved flank and rear security, as it allows for enhanced observation and more agile repositioning in the event of enemy contact. This setup supports sustained situational awareness and increases the survivability of anti-armour elements in complex operational environments.

The line formation of an anti-armour platoon (Figure 2) entails the lateral deployment of squads in a linear array along the forward line of own troops (FLOT), with intervals of 100 to 150 meters between elements. This configuration is typically employed in wide-area coverage scenarios, particularly on manoeuvrable terrain, in prepared defensive positions, or during delaying (elastic) defence involving multiple successive primary, alternate, and supplementary positions in depth.

This tactical disposition provides several doctrinally recognized advantages:

- Overlapping fields of fire, ensuring maximum coverage and mutual support between weapon systems in accordance with direct fire planning principles;
- Improved early target acquisition and engagement capabilities against armoured threats;
- Flexible fire planning, especially when employing mixed anti-armour assets;
- Reduced vulnerability to enemy indirect fire or air-delivered munitions, due to increased dispersion and decentralized target signature.

The 100–150 meter interval is optimized to maintain C3 (command, control, and communication) effectiveness, ensure line-of-sight (LOS) where feasible, and facilitate fire and manoeuvre while preserving the tactical autonomy of each squad under degraded conditions. In anticipation of an enemy armoured counterattack or breakthrough, the line formation enables saturated direct fire coverage across the axis of approach, while preserving the ability to conduct manoeuvre in depth — including fighting withdrawal, lateral repositioning, or flanking engagement.

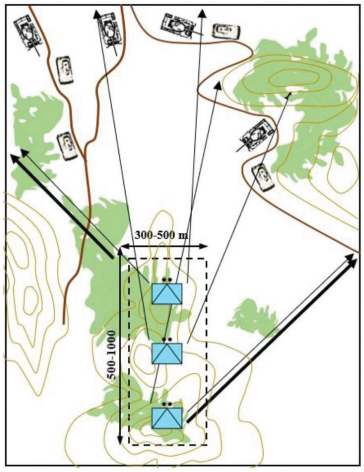

Figure 1 ATGM Platoon in Column

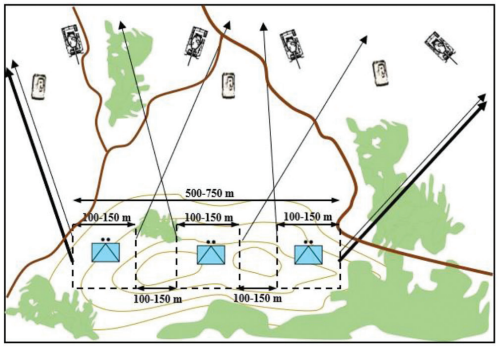

Figure 2 ATGM Platoon in Line

The anti-armour platoon formation in a reverse wedge (also known as a "backward wedge") (Figure 3) is employed to achieve enhanced flexibility and protection in combat situations against armoured threats. In this formation, individual anti-armour missile launchers or firing units are arranged to form an angle oriented backward, with the apex of the wedge facing the platoon's rear.

Advantages and Reasons for Employment:

- This formation enables control of the space behind the leading combat elements, which is critical for defence against surprise armoured or infantry attacks from the rear.
- The reverse wedge allows rapid reaction by anti-armour units to potential threats approaching from lateral or rear sectors, thereby reducing the risk of unexpected flanking attacks.
- Thanks to the angular arrangement, units can easily reposition and redeploy without complex realignments. This is particularly beneficial in dynamic and unpredictable combat environments.
- Anti-armour systems deployed in this formation can cover a wider area with fires from multiple directions, increasing the probability of detecting and neutralizing enemy armoured targets.

Limitations:

- Potentially reduced forward concentrated firepower compared to a traditional forward wedge formation.
- Requires effective communication and coordination among individual anti-armour assets to maintain formation integrity and operational effectiveness.

The anti-armour platoon formation in a forward wedge is employed to maximize offensive firepower concentration and direct engagement of armoured targets (Figure 4). In this formation, individual anti-armour missile launchers or firing units are arranged to form an angle oriented forward, with the apex of the wedge facing the enemy.

Advantages and Reasons for Employment:

- This formation allows the platoon to deliver a highly focused and coordinated volume of fire directly towards the enemy's front, increasing the effectiveness of anti-armour engagements.
- The forward wedge facilitates rapid target acquisition and engagement, enabling swift suppression or destruction of approaching armoured threats.
- The arrangement supports clear lines of sight and communication between units, facilitating synchronized manoeuvres and fire coordination.
- The forward wedge can be easily adapted to terrain features, allowing the platoon to exploit natural cover and concealment while maintaining an offensive posture.

Limitations:

- Reduced coverage of rear and flanking sectors, potentially exposing the platoon to attacks from the sides or rear.
- Less flexibility in repositioning without breaking the formation, which can be disadvantageous in rapidly changing combat situations.

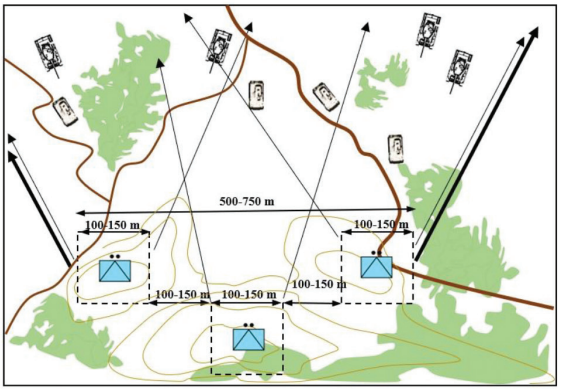

Figure 3 ATGM Platoon backward wedge

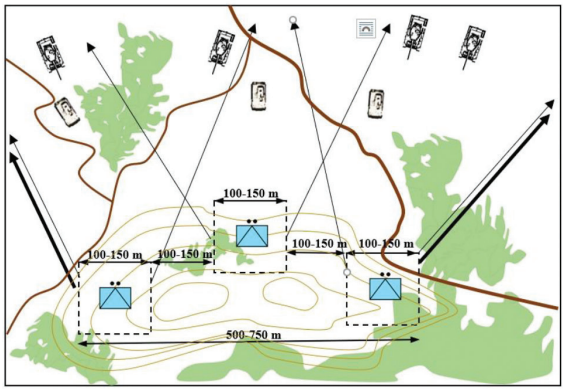

Figure 4 ATGM Platoon forward wedge

In the "Echelon Left I" formation, two squads on the left flank are positioned behind the right-flank squad at a distance of approximately 150 to 200 meters (Figure 5). This deployment provides combined depth protection and enhanced tactical flexibility during combat operations.

Detailed Tactical Advantages:

- Positioning the left-flank squads rearward of the right-flank unit ensures effective control of the area behind the primary forward line. This arrangement is critical for countering enemy flanking manoeuvres and surprise attacks originating from the rear sector. The left flank elements maintain surveillance over enemy movements and enable a timely response to any bypass attempts.
- The 150 to 200 meter lateral and rearward spacing provides sufficient room for rapid repositioning and adjustment of unit positions without compromising the integrity of the overall formation. This flexibility is especially advantageous in complex operational environments such as urban or wooded terrain.
- Maintaining this spacing preserves line-of-sight and communication links between units, reducing the risk of physical interference or movement path conflicts. This facilitates effective command and control throughout the formation.
- The rearward placement of left flank squads acts as a force multiplier by providing a protective anchor and enabling rapid reaction to flanking threats, thus increasing the overall resilience of the formation.

Potential Limitations:

- Due to the positional offset, left flank squads may experience a marginal delay in responding to immediate threats directed at the right flank or main battle line.
- Successful employment of this formation necessitates clear command directives and robust communications systems to maintain situational

awareness and formation cohesion.

- In high-tempo combat scenarios, the physical separation between squads may contribute to delayed transmission and reception of critical tactical information.

The **"Echelon Left II" formation** of an anti-tank squad represents a tactical deployment in which each successive squad is positioned to the left and to the rear of the preceding one. In Figure 6, it is clearly shown that the right-flank squad is deployed forward and acts as the lead element, while the remaining two squads on the left flank are echeloned in depth, with an approximate interval of 150 to 200 meters diagonally to the left and rear.

This type of formation is particularly suitable when it is anticipated that the main thrust of enemy armoured and mechanized forces will occur frontally or from the right. The "Echelon Left" formation enhances both survivability and manoeuvrability of the unit. Echeloning the squads in depth reduces the probability of multiple elements being simultaneously affected by enemy artillery or air strikes. At the same time, such a disposition facilitates better utilization of terrain and available cover, and enables easier execution of redeployment, counterattack manoeuvres, or withdrawal in case of an unfavourable tactical situation. Command and control are simplified, as all elements remain within visual and radio communication range, allowing effective coordination and timely transmission of orders.

Essentially, the "Echelon Left II" formation is employed when it is necessary to establish a flexible anti-tank defence, provide flanking fire from the left, and reduce the risk of concentrated combat losses due to a frontal assault. Its implementation requires well-trained crews, efficient communication, and clearly defined positions for each squad relative to the unit's main axis of engagement.

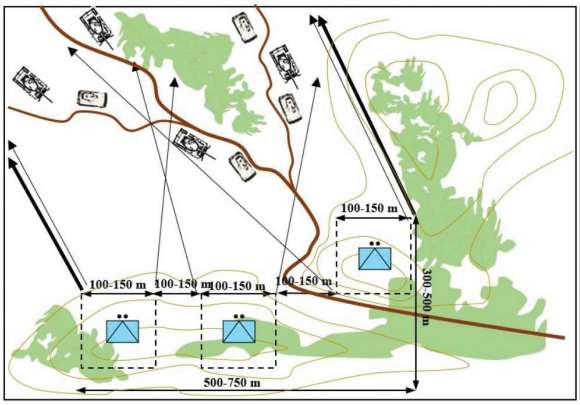

Figure 5 ATGM Platoon Echelon Left I

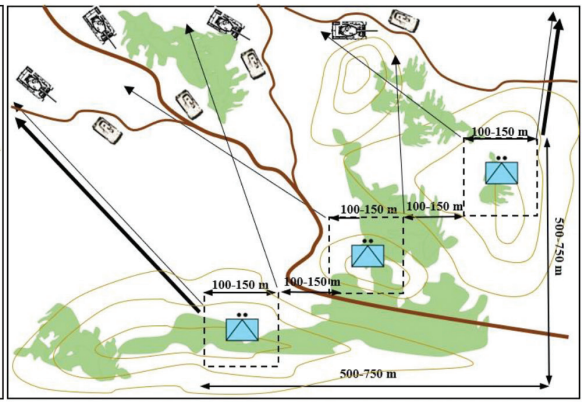

Figure 6 ATGM Platoon Echelon Left II

The **"Echelon Left III" formation** of the anti-tank platoon, shown in *Figure 7*, features a tactical layout in which the right-flank and centre squads are deployed on the same line, while the left-flank squad is echeloned to the rear and left at a distance of approximately 150–200 meters. The entire formation covers a frontage of approximately 500 to 750 meters.

This configuration allows for flanking fire from the left, while maintaining the forward firepower of the main elements along the likely enemy axis of advance. The centre and right-flank squads provide direct frontal engagement, while the rear-positioned left squad offers flexibility for engaging targets from oblique angles, executing manoeuvres, or forming a secondary line of fire.

The depth and dispersion of the formation enhance the platoon's survivability against concentrated enemy fires (e.g., artillery, air strikes), while still enabling effective command and control through both line-of-sight and radio communications. The formation is particularly suited for scenarios involving expected frontal or right-flank enemy movement, offering improved fire distribution and tactical adaptability.

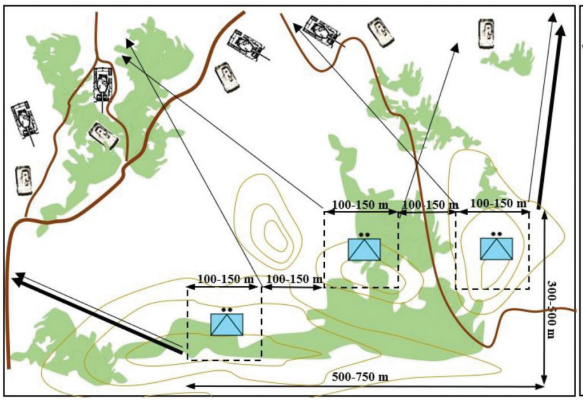

Figure 7 ATGM Platoon Echelon Left III

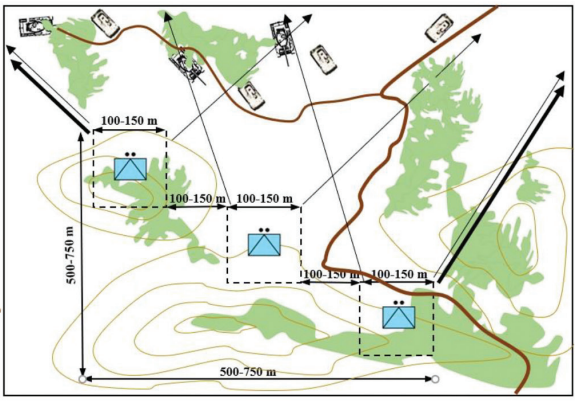

Figure 8 ATGM Platoon Echelon Right I

The **"Echelon Right"** formation (I, II, and III) possesses the same tactical and technical characteristics as the left echelon formation, with the difference that the unit arrangement is mirrored to the right side (Figures 8, 9, and 10). In other words, the layout of elements and their positions remain identical but are symmetrically positioned relative to the formation's central axis.

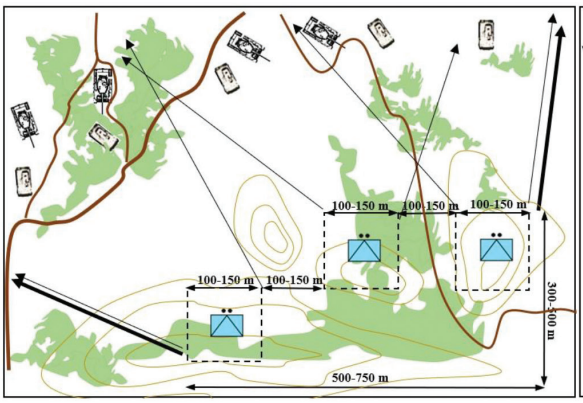

Figure 9 ATGM Platoon Echelon Right II

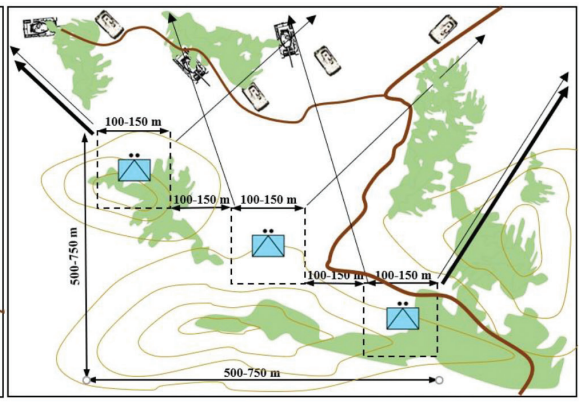

Figure 10 ATGM Platoon Echelon Right III

Simulation Environment and Execution

To evaluate the ATGM platoon's performance under each configuration, a series of simulations was conducted using a MATLAB-based modelling environment. The terrain was modelled using elevation data and vegetation density layers. Enemy

movement was randomized within doctrinally accurate approach routes. Sensor detection, engagement delay, and missile hit probability were calibrated based on doctrinal specifications outlined in ATP 3-20.15 and FM 3-21.91 (Headquarters, Department of the Army 2002; 2004).

Each scenario ran ten times to account for variability in detection time, targeting delay, and enemy manoeuvres. Metrics recorded include:

- Number of enemy vehicles destroyed;
- Time to first engagement;
- Average missile-to-hit delay;
- Platoon survival rate at mission end;
- Total mission time until enemy breakthrough or halt.

Data from these simulations is used to compare which configuration offers the most favourable trade-off between firepower, concealment, and survivability.

Integration of ISR and Supporting Assets

Although the ATGM platoon is the primary focus of this study, integration with supporting elements such as UAVs, mortars, and TOC coordination is considered in simulation modelling. UAVs are modelled as ISR assets that reduce detection time and enhance firing readiness. Mortar support is used to simulate enemy suppression and area denial during platoon relocation. Communication systems are assumed to function as described in MCRP 3-30.7 and FM 3-98, ensuring situational awareness between the platoon and command elements (Headquarters, Department of the Army 2009; Headquarters, United States Marine Corps 2000).

These support tools are evaluated for their tactical impact on decision-making speed and platoon repositioning efficiency, not for their technical performance.

Results and Tactical Effectiveness Analysis

This section presents the simulation results evaluating the tactical performance of the Anti-Tank Guided Missile (ATGM) platoon in three doctrinally informed defensive configurations: Linear Deployment, Flanking Ambush, and Depth-based Defence. The analysis draws from multiple scenarios runs and performance metrics that reflect key tactical outcomes, including engagement success, platoon survivability, and overall delay imposed on the enemy advance. Each configuration was tested ten times under consistent battlefield conditions, and averages were calculated for comparative evaluation.

Engagement Effectiveness: Enemy Vehicles Destroyed

As shown in Figure 11, the Flanking Ambush configuration resulted in the highest number of enemy armoured vehicles neutralized, with an average of 8 kills per scenario. This configuration allowed ATGM teams to engage from lateral or rearward positions, exploiting side and rear armour vulnerabilities of advancing enemy tanks. The ability to remain undetected until the first engagement provided a critical advantage in achieving high-impact first strikes.

The Depth-based Defence achieved 6 vehicle kills, demonstrating effective use of echeloned firing positions that allowed the platoon to conduct successive engagements while maintaining cover and manoeuvre options. The Linear Deployment, while doctrinally simpler to organize, resulted in only 5 kills, as its frontal exposure made ATGM positions more susceptible to early detection and return fire.

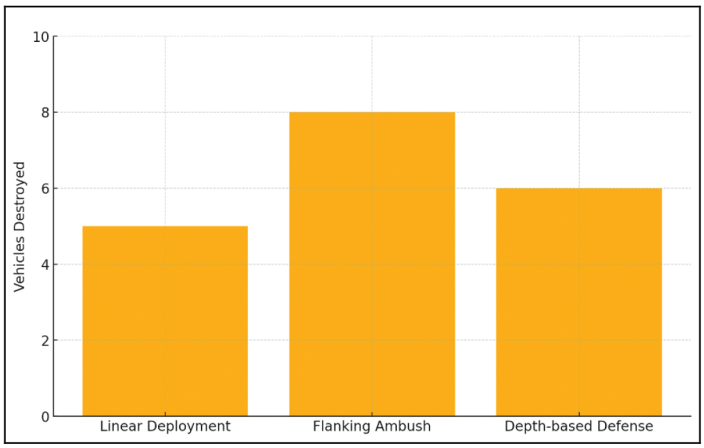

Figure 11 Number of Enemy Vehicles Destroyed by Configuration

The Flanking Ambush configuration achieved the highest success, destroying an average of 8 enemy vehicles per scenario. The Depth-based Defence model achieved 6 kills, benefiting from delayed engagement and tactical repositioning. The Linear Deployment was least effective, with 5 vehicles destroyed, likely due to early detection and higher vulnerability. This metric confirms doctrinal principles found in ATP 3-20.15 and FM 3-21.91, which emphasize ambush and terrain exploitation as key to effective anti-armour tactics (Headquarters, Department of the Army 2002; 2004).

Platoon Survivability under Fire

Platoon survival rate is a critical indicator of tactical success. As seen in Figure 12, the Flanking Ambush achieved the highest survivability at 70%, benefiting from concealment, terrain masking, and minimal early exposure. This model allowed firing teams to displace rapidly after launching missiles, in line with the shoot-and-move doctrine.

The Depth-based Defence maintained a respectable 60% survival rate, as the fallback structure gave each section time to fire and relocate without concentrated return fire. The Linear Deployment, by contrast, experienced heavy attrition with a survival rate of just 40%. In this configuration, multiple positions were exposed simultaneously, increasing the platoon's vulnerability to suppression or direct hits from enemy support elements.

The Flanking Ambush again performed best, with a 70% survival rate, attributed to concealed positions and limited exposure. The Depth-based Defence provided

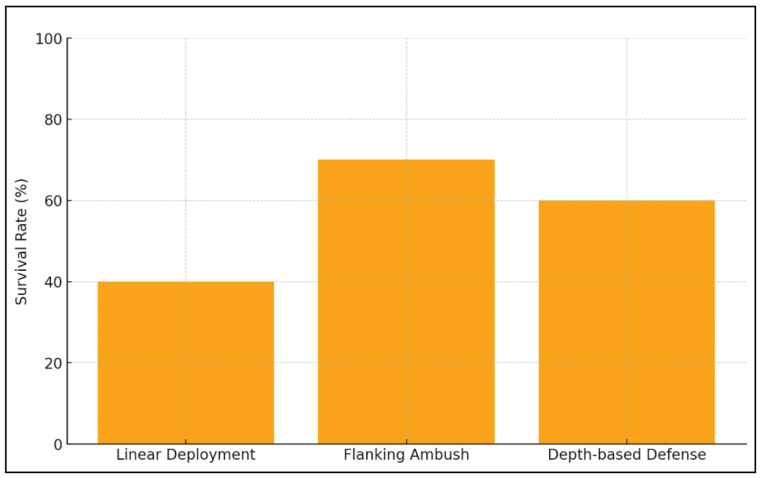

Figure 12 ATGM Platoon Survival Rate by Configuration

moderate survivability at 60%, leveraging mobility and terrain for fallback. The Linear Deployment saw the lowest survival rate at 40%, with units often exposed early and receiving return fire. These results reinforce the importance of distributed positioning and delayed detection emphasized in FM 71-1 and MCRP 3-30.7 (Headquarters, Department of the Army 1998; Headquarters, United States Marine Corps 2000).

Delay of Enemy Advance: Time to Halt

The ability of an ATGM platoon to delay enemy manoeuvre provides critical time for repositioning, reinforcement, and coordination with higher command. Figure 13 illustrates that Flanking Ambush created the longest delay, halting enemy movement for an average of 18 minutes. This delay was the result of sudden, coordinated fire from unexpected angles that forced the enemy into disorganized manoeuvre and regrouping.

The Depth-based Defence caused a 15-minute delay, effectively staggering the engagement timeline and forcing enemy units into incremental exposure. Linear Deployment achieved only a 12-minute delay, as the predictable engagement zone allowed the enemy to rapidly suppress and bypass ATGM firing positions.

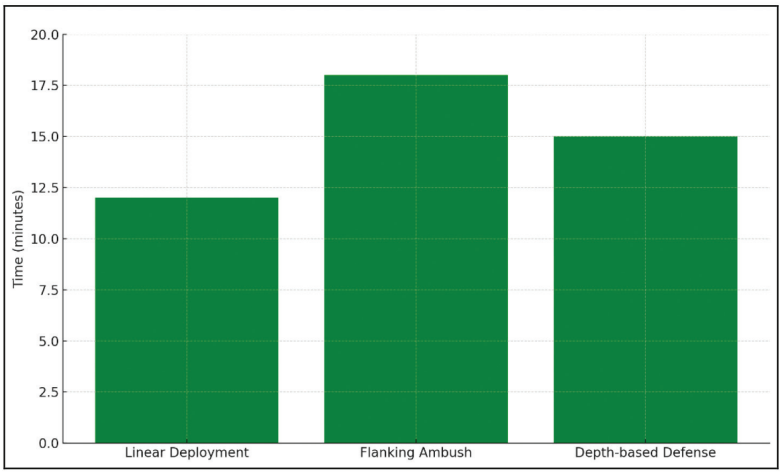

Figure 13 Time to Enemy Halt by Configuration

The Flanking Ambush configuration delayed the enemy advance by an average of 18 minutes, allowing more time for support to reposition. The Depth-based Defence caused a 15-minute delay, effective in layered attrition. The Linear Deployment achieved a shorter delay of 12 minutes, as the enemy was able to identify and suppress ATGM positions earlier. This outcome highlights the tactical advantage of surprise and channelling enemy movement into constrained kill zones, consistent with the principles outlined in FM 3-98 and the Infantry-TACSOP (Headquarters, Department of the Army 2009; United States Army Infantry School n.d.a).

The simulation results clearly show that Flanking Ambush tactics provide the most effective balance between firepower and survivability in defensive operations. These results align with doctrinal guidance from ATP 3-20.15 and FM 3-21.91, which recommend enfilade fire, terrain masking, and decentralized positioning for anti-armour units. The Depth-based Defence also performed well and offers value in complex terrain where manoeuvre space allows fallback. In contrast, Linear Deployment should be avoided in open terrain unless heavily reinforced or concealed. These results validate the importance of terrain exploitation, lateral dispersion, and integrated ISR support when tactically employing ATGM platoons.

Doctrinal Implications and Tactical Insights

The results of the simulation clearly validate that the Flanking Ambush configuration offers the most favourable trade-off between lethality and survivability. The performance gains are attributed to its alignment with classical ambush doctrine, tactical concealment, and enfilade fire geometry. This configuration also leverages ISR integration most effectively, as UAV reconnaissance feeds were used to coordinate positioning and timing without direct visual contact.

The Depth-based Defence performed well in scenarios where fallback and terrain manoeuvre were available, making it suitable for delaying actions and rear-guard operations. While not as lethal as flanking ambushes, it provides sustained fire capacity with greater survivability than linear setups.

The Linear Deployment remains the least effective in open or semi-open terrain without support from suppressive fire or concealment measures. Its frontal geometry often exposed multiple sections at once, increasing vulnerability and limiting tactical flexibility. However, it may still be appropriate in static defence of critical chokepoints where terrain prohibits flanking movement.

Conclusion

The tactical employment of the Anti-Tank Guided Missile (ATGM) platoon in defensive operations remains a decisive element in modern warfare, particularly when confronting armoured and mechanized threats. This research evaluated doctrinal principles, historical guidance, and simulation-based performance across three distinct

deployment configurations: linear frontal defence, flanking ambush, and depth-based echelon defence. The results clearly indicate that flanking ambush tactics offer the most favourable balance of lethality, survivability, and operational impact.

The simulation results demonstrated that the flanking ambush configuration not only achieved the highest number of enemy vehicle kills but also maintained the highest platoon survival rate and imposed the longest delay on enemy advancement. These outcomes validate key doctrinal concepts outlined in FM 3-21.91 and ATP 3-20.15, particularly regarding the importance of terrain exploitation, concealment, and fire from unexpected angles. The depth-based defence configuration also performed well and may serve effectively in situations requiring flexible repositioning and sustained attrition. Conversely, linear deployment proved to be the least effective model in open terrain, exposing ATGM teams to early detection and concentrated enemy fire.

While supporting elements such as unmanned aerial vehicles, indirect fire support, and secure communications contributed to operational awareness and coordination, the core determinant of ATGM effectiveness remained the tactical configuration and its alignment with battlefield terrain and enemy movement. These findings reinforce the importance of doctrinally informed planning, continuous terrain analysis, and decentralized decision-making at the platoon level.

While the comparative results of the three evaluated procedures show consistent patterns, the study is limited by the scope of scenarios considered and the selected simulation parameters. The procedures were tested under controlled conditions that may not fully reflect the complexity and variability of real combat environments. Future research should expand the analysis by including additional tactical procedures, more diverse terrain types, and variable threat profiles to capture a broader operational spectrum. This extended approach would enable a more conclusive assessment and provide deeper insights for operational planning and doctrinal refinement.

For commanders and planners, this study offers actionable insights. ATGM platoons should be employed in dispersed, terrain-masked positions with ISR-enabled targeting and fallback maneuver capability. Training programs should emphasize rapid position transitions, fire discipline under concealment, and coordination with reconnaissance assets. Future doctrinal updates should consider integrating modern hunter-killer concepts and loitering munitions to expand the role of ATGM platoons in multi-domain operations.

This paper confirms that when tactically employed with doctrinal precision and strategic foresight, the ATGM platoon is a force multiplier capable of decisively shaping the outcome of defensive engagements against armoured threats.

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