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Mechanised battalions employing the M113AS4 (APC) comprise fifty per cent of the Australian Army's infantry capability. The projected 2025 acquisition of an Infantry Fighting Vehicle (IFV) under Project LAND 400-3 will significantly enhance the lethality and survivability of infantry soldiers within these battalions. This paper will evaluate the reasons, examine operational examples, and offer a way forward to support evolution to a specialised structure and method of employment for infantry operating an IFV that goes beyond the present M113 mechanised battalion.

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MASTER OF MILITARY STUDIES

BEYOND M113: DEVELOPING AN ARMOURED INFANTRY CAPABILITY FOR THE AUSTRALIAN ARMY

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OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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Executive Summary

Title: Beyond M113: Developing an Armoured Infantry Capability for the Australian Army

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Thesis: The projected 2025 acquisition of an Infantry Fighting Vehicle (IFV) under Project LAND 400 Phase 3 (L400-3) is expected to significantly enhance the ability for infantry soldiers to engage in combined arms close combat. This research seeks to identify what lies beyond the present day mechanised infantry battalion whilst drawing lessons from other militaries that underwent a transition from APC to IFV to discern the best possible way for employing the IFV as a complete system.

Mechanised infantry employing the M113AS4 (APC) comprise approximately fifty per cent of the Australian Army's Combat Brigade infantry capability. This thesis will argue for implementing a new armoured infantry capability that the acquisition of an IFV should trigger; highlighting the benefit of effectively wedding technology to a cogent concept behind employment, and the opportunities it provides for Combat Brigades in the joint land campaign. To acquire an IFV without rethinking modes of employment and traditional structures for infantry units risks a failure to harness the capability in its entirety and underpins a greater failure to fully modernise. An infantry battalion that possesses an IFV requires a specialised structure, a new mode of employment, and a distinct identity that is different to the current M113-based mechanised capability.

Discussion: Armoured Infantry is a specialised type of infantry that employs the IFV as an organic asset whilst increasing the relative effectiveness of tank manoeuvre; thereby allowing for smaller combined arms organisations to have a greater battlefield effect. Offering a way to successfully inject technology into a complex fighting system is the core of this research. First, this thesis will frame the transition point Army will shortly undertake offering a design-driven method for understanding the conceptual approach to transition from APC to IFV. Second, it will review characteristics of both mechanised and armoured infantry to determine a working definition and a mode of employment before offering a place for it within the Army's Future Land Operating Concept and the joint land campaign. Third, it will analyse operational case studies in both medium and high-intensity conflict to offer a narrative on the nature of tasks IFV-equipped infantry could be required to undertake. Lastly, the thesis will review approaches to the generation of capability by select nation's militaries; observing two key transition points involving a move from APC-based infantry to IFV-based infantry centred on the US Army from 1982 and the Republic of Korea's Army (ROKA) from 2009.

Conclusion: From 2025, acquiring an IFV necessitates the establishment of armoured infantry to modernise the present mechanised battalion and sustain an advantage in armoured close combat for the future.

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THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

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Preface

'Infantry cannot achieve these skills and knowledge when they are merely itinerant passengers in strange vehicles, when commanders are hampered because they can't see and most important of all, don't command the vehicles or communications they are using.'[1]

These words from LTCOL K.E. Newman, Commanding Officer of the 5th Battalion, The Royal Australian Regiment, as part of input into an After-Action Review for the Vietnam War, reflect a frustration in a lack of organic armour to enhance manoeuvre whilst remaining at the mercy of inefficient C2 structures. It was this narrative that became part of the groundswell toward developing a mechanised infantry capability for the Australian Army. That the initial result was both a single infantry battalion and APC-based Cavalry Squadrons reflects the failure to embrace a single mode of combined manoeuvre in the decades following the Vietnam War.[2] In 2017, the Army's mechanised capability increased by 300%, equating to half of the total infantry capability in the Combat Brigades. Under Project LAND 400, the Army will undergo the most significant modernisation in decades to meet the demands of twenty-first century warfighting. The acquisition of an IFV by 2025 will reignite the debate over how best to fight and who it belongs to. The Australian Army is not the only military to face this. The U.S. Army, for instance, struggled with these same issues when they adopted the Bradley in the 1980s. The US challenge to define the optimum role and structure of the combined infantry and armour organisation is reflective of the journey the Australian Army will shortly undertake. This project seeks to offer a narrative on the advantages that specialised infantry with organic armour provides in the context of the joint land campaign; as well as offer a conceptual approach for the future generation of a capability beyond Australia's 53-year experience with the M113.

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[1] K.E. Newman, "APCs and Infantry". (Tobruk Lines: Holsworthy, 28 April 1972), 10.

[2] Ian Kuring. *Redcoats to Cams: A history of Australian Infantry 1788-2001*. (Canberra: Australian Military History Publications, 2004), 388 and David Horner. *Duty First: A history of the Royal Australian Regiment.* (Sydney: Allen and Unwin, 2008), 270.

"Technology works best when enabling or partnering human endeavour."

Lieutenant General Angus Campbell DSC, AM[3]

1. Introduction

Military institutions often struggle to wed forthcoming technology to a cogent concept for employment. The penalty for failure is the loss of life that ensues when the intended combination of technology, people, and doctrine results in an inadequate system for enabling warfare in the future operating environment. Acquiring new technology requires an Army to rethink concepts for employment that also necessitates restructuring and even reviewing its operational approach. The Australian Army's 2025 acquisition of an Infantry Fighting Vehicle (IFV) under Project LAND 400 Phase 3 (L400-3[4]) and Plan BEERSHEBA's recent generation of three mechanised battalions across the Combat Brigades represent a real opportunity to maximise the overall effectiveness of combined arms close combat.[5] The eternal debate as to the utility of different types of infantry and an argument toward the most effective manifestation is unlikely to be settled herein. The key component of the debate, however, addresses the persistent need to adapt, modernise, and implement new technology in the most effective fashion to maintain a competitive edge – this aspect will be addressed forthwith. The results of the following analysis will show that the Army's acquisition of an IFV has triggered the need for generating a specialised infantry capability, as part of modernising the mechanised battalion, that will more

[3] LTGEN Angus Campbell. "A turning tide? Australia's strategic Defence interests and the Australian Army." Chief of Army address to the Lowy Institute for International Policy, address to the Lowy Institute for International Policy, Sydney, Tuesday, 4 October 2016, https://www.army.gov.au/our-work/speeches-and-transcripts/chief-of-army-address-to-the-lowy-institute-4-october-2016.

[4] LAND 400 aims to "enhance the mounted close combat capability of the Land Force by providing armoured fighting vehicles with improved firepower, protection, mobility and communication characteristics to enable tactical success in the contemporary and future operational environment". Definition: https://www.army.gov.au/our-future/modernisation-projects/project-land-400

[5] Under Plan Beersheba the Australian Army continues to modernise in order to remain equipped and prepared for new and emerging threats. Source: https://www.army.gov.au/our-future/modernisation-projects/plan-beersheba/plan-beersheba.

effectively wed the new technology to a cogent design for employment. Doing so will provide Combat Brigades the opportunities for exploitation at the tactical and operational level in future combined arms warfare.[6] From 2025, acquiring an IFV necessitates the establishment of armoured infantry to modernise the present mechanised battalion and sustain an advantage in armoured close combat for the future.

The Australian Army has the advantage of learning from other nations' efforts to effectively incorporate IFVs into an operational approach after 53 years operating the M113. Therefore, it will be beneficial to evaluate case studies in both mid-intensity and high-intensity conflicts including the transition of select nations from APC to IFV. Doing so will demonstrate the utility that the IFV brings to a future Australian capability within the realms of what the Australian Combat Brigade may be called upon to do.[7] Ultimately, the historical evidence supports specific recommendations surrounding the transition away from mechanised infantry battalions equipped with organic armoured personnel carriers (APC) to generating an armoured infantry equipped with an IFV and a specialised mode of employment. Such a move will support a pathway to L400-3's successful implementation beyond 2025. If the Australian Army's Future Land Operating Concept (FLOC) requires forces with a technological edge to have a disproportionate effect harnessing all aspects of a single capability; the development of armoured infantry is the logical 'next step' when considering the future of mechanised infantry relative to the demands of twenty-first century combined arms close combat.

The capability of infantry equipped with organic fighting vehicles is the result of a complex set of human, organisational, and technological processes that is the subject of this

[6] The core capabilities of Plan BEERSHEBA will be "three similarly structured combat brigades, each able to deploy and sustain combined arms teams (consisting of armour, infantry, artillery and engineers) directly supported by specialised enabling functions (such as intelligence, logistics and aviation)", https://www.army.gov.au/our-future/modernisation-projects/project-land-400/land-400-seven-success-factors-underpinning-the. The 2017 extension to this came in the form of Plan Keogh to direct the establishment of mechanised battalions.
[7] Australian Combat Brigade will be referred to 'Combat Brigade' from here on.

study. Current literature identifies that both mechanised and armoured infantry formations are prevalent throughout developed armies of the world. Their origins in the interwar period of the 1920s and 1930s were reinforced through the Allied and German armoured divisions of the Second World War and revived by many Western armies after the Arab-Israeli war of 1973. It is a common capability to employ in recent decades, but has a difficult history sitting astride both infantry and armour branches of respective armies. Infantry equipped with IFVs have often been subject to institutional agendas and factional competition over resources leading to a history complicated by questions of branch or institutional affiliation.

Offering a way to successfully inject technology into a complex fighting system is the core of this research. First, this thesis will frame the transition point Army will shortly undertake offering a design-driven method for understanding the conceptual approach to the transition from APC to IFV. Second, it will review the unique characteristics of both mechanised and armoured infantry to determine a working definition and a mode of employment before offering a place for it within the joint land campaign. Third, it will analyse operational case studies in both medium and high-intensity conflict to offer a narrative on the likely nature of tasks for IFV-equipped infantry to be incorporated into an operational approach. Lastly, the thesis will review the generation of armoured infantry by select nations' militaries; observing two key transition points involving a move from APC to IFV centred on the US Army from 1982 and the Republic of Korea's Army (ROKA) from 2009. Accompanying this work are products relating to the transition beyond M113 including a possible unit structure, as well as recommendations to aid implementation of the conceptual approach put forth here.

1.1 Framing the Transition

"Nations will modernise their military for possible use against regional adversaries and develop adaptive technologies for possible use against extra-regional adversaries."

Colin Gray[8]

An effective problem frame will identify the crucial issues that may impede effective adaptation. Acknowledging that the IFV will not be employed by the Australian Army before 2025 allows for flexibility in determining a solution to the problem of modernising. In describing how the British generated mechanised forces during the interwar period, historian Dennis Showalter posits achieving a synergy of doctrine and materiel as the defining characteristic.[9] Moreover, early armour advocate, JFC Fuller described a similar problem of the 1920s interwar period in fusing emerging technology with appropriate concepts for employment in a similar fashion to Colin Gray's description of the modernisation imperative. Through his 2016 address to the Lowy Institute, the Chief of Army echoes the approach offered by Fuller and Showalter in emphasising the partnership with technology as a common theme for the future. Therefore, it is evident that accurately combining new technology with an effectively formulated concept for a relevant operational environment is the appropriate path to follow.

As an example, the United States Marine Corps addresses the challenge of modernising in the immediate future through a design-driven approach. They establish a central problem statement linked to a possible description of the solution – logic and counter-logic set in clear opposition. The example problem statement is: "The Marine Corps is not organised, trained, and equipped to meet the demands of a future operating environment characterised by complex

[8] Colin S. Gray. *War, Peace and International Relations: An Introduction to Strategic History* (New York: Routledge, 2007), 238.
[9] Dennis Showalter. "Military Innovation and the Whig Perspective of History" in Winton, Harold R. and David R. Mets, eds. *The Challenge of Change: Military Institutions and New Realities, 1918-1941*. (Lincoln: University of Nebraska Press, 2000), 232.

terrain, technology proliferation, information warfare, the need to shield and exploit signatures, and an increasingly non-permissive maritime domain."[10] It is from this problem statement that the future operating concept is articulated to best support explanation of the future drivers of change and the critical tasks required to meet them. The Harvard Business School demonstrates another approach to problem solving defined as a '*Theory of Action*' to establish an end-result descriptor of a solution. Similarly, H.A. Simon, in his discussion on solutions to ill-structured problems, suggests they are bounded by resource limitations and solutions expressed in varying degrees of acceptability.[11] Mike Pidd also addresses the complexities of problem-solving within systems describing key differences between 'puzzles' and 'wicked problems' in complex systems. He states that developing useful models of complex systems, especially those that involve human action and intent, is difficult but each have solutions derived from levels of acceptability to the relevant stakeholders.[12] Applying this methodology to the transition from APC and IFV to meet future threats allows the problem to be framed as follows:

> The transition of mechanised battalions away from M113AS4 and subsequent acquisition of an IFV risks disaggregation of the capability and limited adaptation if inappropriate concepts, structure, and culture are adopted.

With the problem framed in such a way, the proposed solution to modernising close combat is linked to the critical juncture of transition:

> Acquiring an IFV necessitates a conceptual and structural change upon transition to support cultural change and harness the advantages of protection, firepower, and mobility in the context of close combat. If the IFV is organic to the battalion for operational, structural, and cultural reasons the ability to modernise close combat can be realised more effectively.

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[10] *The Marine Corps Operating Concept* (Washington: HQ USMC, 2016) 8.
[11] Stacey Childress and Geoff Marietta. *A Problem-Solving Approach to Designing and Implementing a Strategy to Improve Performance*. (Boston, Harvard Business School Publishing, June 2008), 2. See figure A. See also H.A. Simon, "The structure of ill-structured problems". *Artificial Intelligence*, (4:1973), 181-201. Solutions to ill-defined problems are rarely correct or incorrect but fall on a range of acceptability; and cannot be judged on their own but require some implementation and evaluation to test. Solvers of ill-defined problems divide their work into "problem representation" and "problem solving" phases; and justify their solutions by means of argument.
[12] Mike Pidd (ed.) *Systems Modelling: Theory and Practice*. (Sussex: Wiley, 2004), 206.

With an effective problem statement linked to a '*Theory of Action*', a definition of the capability and mode of employment can be explored. Importantly, this definition must reinforce the present doctrinal role of the Royal Australian Infantry in order to support a viable solution to modernising close combat. This research assumes that the present role of infantry is suitable to modern requirements and is unlikely to change in the near future. The ability to fulfil the present role, but with a more technologically advanced method, whilst avoiding the path dependence influenced by 53 years of familiarity between the current mechanised battalion and anachronistic APC Squadron structure, will be the key to realising the effectiveness of integrating the IFV.

2. Defining the Capability and Mode of Employment

2.1 A complicated history

"New arms are invented and introduced without a definite relationship to structure and control… proportions are not logically arrived at but are the outcome of ignorant opposition on one side and enthusiastic aggressiveness on the other."

JFC Fuller[13]

The salient prediction by JFC Fuller in the 1920s summed up the trouble with establishing a continuous historical evolution for a capability in constant conflict between two dominant combat arms. The complicated history of a hybrid infantry-armour capability is reflective of doctrinal confusion and branch, or corps, competition resident in the Western armies of the twentieth century. There are two individuals who sought to address the paucity of writing on what it means to be labelled 'mechanised' and to offer commentary on capabilities that straddle the difficult juncture between purist armour and traditionalist infantry. Writing in 1980, Brigadier Richard E. Simpkin sought to establish an effective definition of 'mechanised infantry' inside the larger narrative on the development of late twentieth century NATO armoured warfare as a way

[13] JFC Fuller, *The Foundations of the Science of War*. (London: Hutchinson, 1925), 147.

to defeat the Soviet Union's motor rifles.[14] His approach would later support the British development of the Warrior 'Mechanised Combat Vehicle' with associated infantry specialisation from 1987.[15] US historian W. Blair Haworth Jr. wrote extensively on the problematic evolution of the Bradley. He contrasted the fighting vehicle against the institutional issues with optimisation of tactical structures. Of note, are the definitions that Richard E. Simpkin and Huba Wass de Czege posited between 1980 and 1985 for determining specific roles for infantry in different aspects of the land campaign. They both describe a 'specialised infantry employing an infantry fighting vehicle' and both acknowledge that there is more than one type of infantry required in modern combined arms.[16] This, in itself, suggests that the recently shelved Australian 'Standard' Infantry Battalion may have been missing some of the more fundamental thinking in seeking both a standardised definition of role and ubiquitous design for employment.

Mechanised infantry leads a rather isolated existence amidst both combat history and the literature of military doctrine. It is a slightly obscure and difficult history of a capability caught between armour and infantry branches with impassioned advocacy on both sides. Both Simpkin and Haworth comment on the lack of sources and relative obscurity of the topic. Diane L. Urbina's 1999 work, *Lethal Beyond all Expectations: the Bradley Fighting Vehicle* describes longstanding confusion over what the Bradley was and was not designed to do. She states it was not an M113 APC, designed as a battlefield taxi, nor was it a tank.[17] Urbina further cites Haworth's work on the Bradley's evolution and the US Army's holistic problem with the role and

[14] Richard E. Simpkin. *Mechanized Infantry*. (London: Brassey's, 1980), 11.
[15] Simon Dunstan. *Warrior Company*. (Marlborough, UK: The Crowood Press, 1998), 8. The first Warrior vehicles were handed to 1st Battalion, Grenadier Guards in My 1987. This is approximately 5 years after the US fielded the Bradley Fighting Vehicle.
[16] Richard E. Simpkin. *Human Factors in Mechanized Warfare*. (London: Brassey's, 1983), 18 and Huba Wass de Czege. "Three Kinds of Infantry." *Infantry* (July-August, 1985), 11.
[17] Diane L. Urbina, "Lethal Beyond All Expectations: the Bradley Fighting Vehicle", in Hoffman, George F. and Donn A. Starry, eds, *From Camp Colt to Desert Storm: The History of U.S. Armored Forces*. (Kentucky: The University Press of Kentucky, 1999), 428.

structure of mechanised infantry amidst changes in technology of the Air-Land battle era.[18] This discussion encapsulates the conceptual problems facing the Australian Army with the IFV itself against the backdrop of technology, structure, and doctrine. What may be said of this history, however, is that the superimposition of the tank on Western warfare as a whole made the question of tactical mobility for infantry an urgent and perennial one.[19] Thus, it is important to consider the history around the evolution of the Bradley Fighting Vehicle throughout the 1980s and the subsequent fielding of US, ROK, and German IFV-equipped infantry through to 2015. These historical episodes mirror the journey the Australian Army will undertake; that is the transition from APC to IFV with the resultant requirement to undertake changes in structure, employment, and doctrine. The following will establish a definition for the reader, contrasting both 'mechanised' and 'armoured' infantry labels, before offering a definition of armoured infantry for the future Australian capability.

2.2 Establishing a useful definition

"Is the mechanised infantry force a body of infantrymen who happen to be issued armoured vehicles, or are they armoured vehicle crewmen who happen to dismount for some combat situations?"

W. Blair Haworth Jr.[20]

It is this exact question, defining mechanised infantry, that has plagued Western armies seeking to establish a mechanised capability or specialised armoured infantry since the introduction of the IFV after 1980. Instituting a new approach begins with an effective definition. The initial emphasis on definitions in this research is to highlight the subsequent effect they have on employment and placement in force design for the land campaign. Both parts of Haworth's

[18] Ibid.
[19] W. Blair Haworth Jr, *The Bradley and How it got That Way: Technology, Institutions, and the Problem of Mechanized Infantry in the United States Army*. (Wesport: Greenwood Press, 1999), 6.
[20] Ibid, 22.

question are the polar ends of the spectrum when it comes to infantry equipped with organic armour. Doctrine and tradition imply the former in generalist terms, but practice and technological developments have moved toward the latter in specialist terms; whilst any persistent effort to reconcile the duality within the same soldiery has been continually problematic.[21] In offering a definition for later use, this section will detail the difficult but common interchangeability between the terms 'mechanised' and 'armoured' including the institutional confusion it has wrought against a 'specialist versus generalist' backdrop. Implicit in the discussion is the tension between the type of vehicle platform, the dismounted section size, and the requirements of the role when describing either in definitive terms.

Distinctions between 'mechanised' and 'armoured' forms of infantry not only provide useful labels but also draw attention to the significant differences in capabilities, limitations, and complexity that characterises the different forms. Simpkin aptly describes the original challenge for a hybrid infantry-armoured force: "With mechanised infantry, the difficulty lies in arriving at a meaningful and lucid definition of the role of infantry in the armoured battle and the way it should fight… something at the grass roots level but broader than simply minor tactics."[22] In describing one view, Haworth observes the US model of mechanised infantry as a generalist force under the proponency of the infantry branch, using organic armoured vehicles under the training auspices of the armoured branch to carry out the whole spectrum of infantry missions.[23] There are two key issues worthy of discussion; first, the role of infantry in an armoured battle, and second, the relative difficulty to maintain the 'jack of all trades' approach to infantry training

[21] Ibid.
[22] Richard E. Simpkin, *Mechanized Infantry* (London: Brassey's, 1980), 49.
[23] Haworth, *The Bradley and How it got That Way: Technology, Institutions, and the Problem of Mechanized Infantry in the United States Army*, 152.

inside the ‘generalist’ capability burdened by the requirement to train with more and more technology.

Haworth’s description of a ‘generalist’ capability appears to have translated pervasively into the workings of the Australian Army. Specifically, in 2008, a former Commanding Officer of the only mechanised battalion observed that mechanised infantrymen have a key responsibility to provide the ‘mass’ element of the combined arms team.[24] This was the embodiment of the generalist view of the US Army M113-based mechanised infantry. It is the guiding principle by which the Australian mechanised mode of employment developed and suits both the APC and the battalion structure.[25] The most useful injection on the definition of different forms of infantry, however, was offered by Colonel Huba Wass de Czege in 1985 as he attempted to reconcile a number of different views on infantry with the introduction of the Bradley Fighting Vehicle.

Contributing to the debate on the dilemma of modern mechanised infantry in the generalist sense, De Czege described the utility of three basic kinds of infantry required for the land campaign; two of which will be discussed further in this thesis. He predicates this on the notion that infantry have a very broad responsibility in warfare that cannot be confined to the possession of one single type and suggests a requirement for ‘regular’ and ‘armoured’ infantry.[26] He states the need for “infantry whose primary mission is to support the advance of the tank.”[27] For the US in recent decades, both APC and IFV equipped infantry have been regularly task-organised alongside tank elements that largely supports this claim. Importantly, however, the terms ‘armoured’ and ‘mechanised’ have very different meanings depending on their context of fighting with, meaning integrated, or simply alongside tank formations. The meaning of these

[24] LTCOL S.L. Gabriel, Book 1: 7 RAR (Mech) SOPs (2008), 5.
[25] Kuring, *Redcoats to Cams*, 389.
[26] De Czege, “3 Kinds of Infantry”, 10.
[27] Ibid, 11.

terms has altered throughout the years not only through different eras but also through the polemical purpose of different authors and advocates. Lastly, de Czege defines armoured infantry as a 'specialised infantry employing an infantry fighting vehicle' to acknowledge that there is more than one type of infantry required in modern combined arms.[28] This definition is echoed by Simpkin and Haworth, and in both instances, the problem of discerning a well-defined 'mechanised' or 'armoured' infantry relates to more than semantics with mixed results in different militaries.

Specifically, a distinct contrast exists between the German, British, and US capabilities when it comes to infantry equipped with an IFV. In the first instance, it manifests in different dismounted section sizes and the possession of anti-tank guided missiles (ATGM) as a determinant. The British Army utilises infantry with an IFV labelled as 'armoured infantry', whereas the US employs an IFV within a mechanised 'combined arms battalion' based on a larger general-purpose infantry platoon.[29] The British Warrior IFV does not employ an ATGM, instead relying on the accompanying tanks for anti-tank fires and battalion-level ATGM platoon, although the US utilises an ATGM on each vehicle in an attempt to close the gap between tank and IFV offensive capability.[30] In both instances, the IFV-equipped infantry is designed in the first instance to fight with tanks with some variations on the need to conduct independent missions by the IFVs. The German *Panzergrenadier* offers a third approach as a model with a reduced section size and defined mission to enable armoured formations including the use of an ATGM.[31]

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[28] Ibid.
[29] The CAB is a 2:2 tank and infantry organization forming the core of the Armoured BCT. Doctrinally, see FM 3.90.1. *Armor and Mechanized Company Team* and 3.90.5 *Combined Arms Battalion*. There exists a potential to establish this interoperability as the standard for Australian IFV and tank doctrine because there is little offered beyond mounted minor tactics at present.
[30] Haworth, *The Bradley and How it got That Way*, 76.
[31] German Doctrine, *HDv 100/100 Truppenführung*. (London: Amber Books, 2007), 233.

Considering Haworth's definition and its present structure, the Australian Army's approach in the twenty-first century is reminiscent of the US M113-based mechanised infantry battalion of the late 1970s in the general-purpose sense.[32] It employs a marginally more capable version of the M113 but is better suited to fighting alongside tanks rather than integrated with them due to a lack of armour and anti-tank fires. The most common aspect of the UK and US capabilities is the abiding requirement for interoperability with tanks, although the role of Australian infantry remains no different to that in the UK.[33] The contrast between the German and US approach is of noteworthy consideration when it comes to defining 'mechanised infantry' and 'armoured infantry' in the context of employing an IFV due to similarly equipped platforms and significantly different approaches. Accurately defining different types of infantry has important implications for force structure, doctrine, and combined arms warfare. The role of infantry within the context of Australian Army doctrine is important in that it acknowledges the primacy of infantry in executing close combat. In considering how to define armoured infantry - the enduring role of the infantry should remain unchanged; however, the Army also needs to apply it in the context of a specialised force with organic IFVs engaging in close combat. For that purpose, an appropriate definition of close combat is:

> Actions that place force elements in varying terrain and in immediate contact with the threat; where direct fires, supported by indirect fires, are applied to strike, shape and/or shield to defeat or destroy enemy forces or seize and retain decisive points.[34]

[32] Kuring, *Redcoats to Cams*, 389 and Horner, *Duty First*, 271.
[33] *Role of the Royal Australian Infantry Corps*. This is only included in case there are some who are unaware: "The role of Royal Australian Infantry Corps is to seek out and close with the enemy, to kill or capture him, to seize and hold ground, and to repel attack by day or night, regardless of season, weather or terrain." (19 December, 2016) https://www.army.gov.au/our-people/corps/royal-australian-infantry-corps
[34] Dean K. Bowley et al. *Attrition and Suppression: Defining the Nature of Close Combat.* Defence Science and Technology Organisation, Department of Defence, Australian Government (DSTO – TR – 1638, 2004), 3. This study is used because it offers a more comprehensive definition for close combat than that offered in the ADFP-04.1.1.

Further, close combat's primary mechanisms are attrition and suppression for the stated purpose of the destruction of enemy forces or to seize and hold ground.[35] Regarding an IFV for infantry executing close combat then, this raises the question of whether infantry can do better with an IFV or an APC, and what will need to change? The present Australian Combat Brigade with two differently equipped infantry battalions at least structurally acknowledges that there are two possible types of infantry[36] – as also emphasised by De Czege in 1983. When it comes to the modes of employment there is one ultimate difference – there are those that utilise the APC and those that do not.[37] This should not be overly simplified to suggest that a battalion's utility is based solely on tactical mobility, but on something higher with greater depth of thinking surrounding its intended employment within the wider context of the land campaign. The inevitable extension to the rationale for future utility and to preserve the dichotomy within the Brigade is to say: those that employ the IFV and those that do not; a useful combination of a 'generalist' and 'specialist' infantry for applicable phases of war. The following diagram suggests a way to discern mechanised or armoured infantry capabilities based on vehicle type and dismounted section. It should be stated from the outset that a larger section size places it more toward the 'generalist' than the 'specialist'.[38] A dismounted element of six accompanying Germany's Puma IFV is an example of such specialisation resident in the *Panzergrenadiers*.

[35] Ibid.
[36] The intended design is one battalion employing wheeled protected mobility vehicles and a greater quantity of dismounted infantry (9) with the other battalion employing a tracked infantry fighting vehicle and a smaller quantity of dismounted infantry (6).
[37] De Czege, "3 Kinds of Infantry", 10.
[38] Bruce Held et al. *Understanding Why a Ground Combat Vehicle that Carries Nine Dismounts is Important to the Army*. (Santa Monica: RAND, 2013), 11.

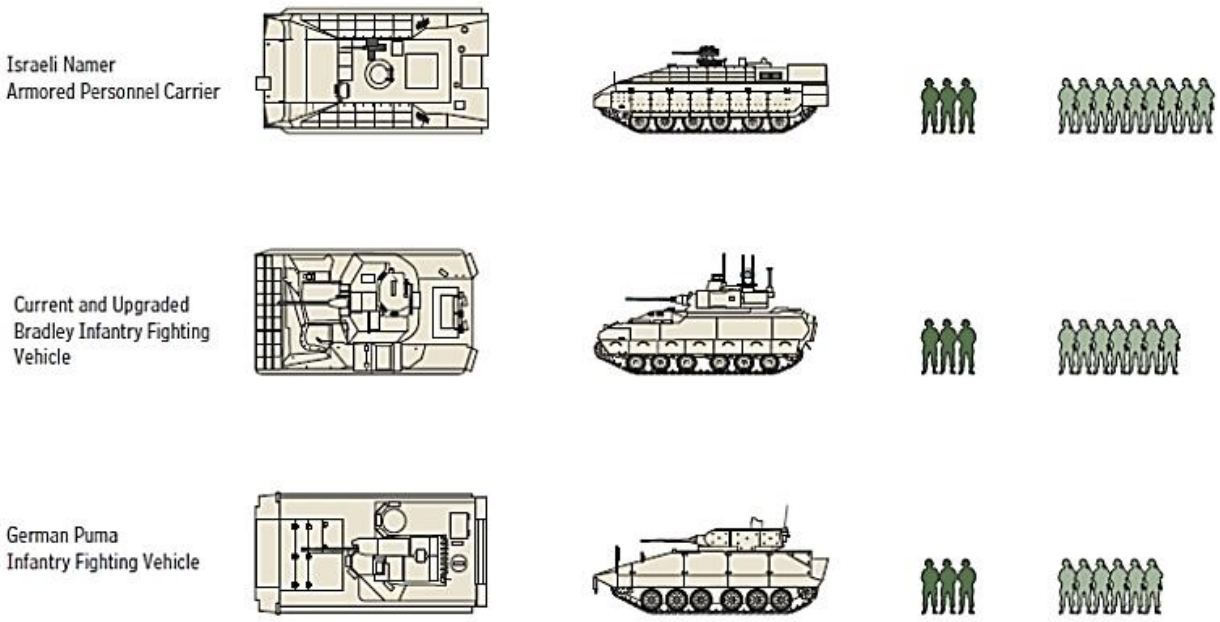


Figure 1: Vehicles and section sizes determining labels

Inherent to each type of infantry is the common observation that there exists a requirement for some type of specialised vehicle for battlefield mobility. Each comes with nuanced differences in the size of the dismounted infantry element employed with. In the *Journal on Military Operations*, William F. Owen states: "The roles of IFVs and APCs differ in one essential way. The IFV is designed to fight; that is, engage in direct-fire combat with the enemy… in support of a dismounted section. In contrast, the APC is and was designed to deliver the infantry to a point where they dismount and fight on foot."[39] The Israeli Defence Force (IDF) employs an APC-based infantry that serves as a useful example of a general purpose mechanised infantry.[40] After the 2006 Second Lebanon War, the IDF concluded that heavy units would play a critical role in hybrid conflict with utility of heavy armoured personnel carriers relating to

[39] William F. Owen. "Wrong technology for the wrong tactics: The Infantry Fighting Vehicle". *Military Operations*, Volume 1, Issue 3 (Winter 2012), 17.
[40] Ibid, 18.

protected mobility near front-line conflict.[41] The section of nine dismounted soldiers is of suitable size to conduct independent operations whilst the vehicle enables battlefield mobility as depicted in Figure 1. The US Bradley-based capability, on the other hand, offers a different 'mechanised' approach. A dismounted section of nine soldiers are equipped with a specialised vehicle that allows for both independent operations but is more capable when remaining with the IFV. The US model is unique because the section is split between vehicles meaning the section is not complete until it regroups after dismounting – the Bradley only carries seven in the troop compartment and cannot deliver a complete section into battle. This capability resides within the general-purpose infantry model also.

Meanwhile, the last type of infantry specified within Figure 1 is that of the German *Panzergrenadier*. With the associated Puma IFV, the dismounted section of six soldiers are intended to fight alongside the IFV and are considered an equal aspect of the capability overall. The Puma IFV becomes the 'suppression or fixing platform' (support group) with the requirement to enable the movement of the smaller dismounted *'gruppen'* (group). According to German doctrine *Truppenfuhrung* (2000), this type of specialised infantry, with a tailored design in structure and tasking is more closely associated with traditional armoured infantry, though the *Bundeswehr* demonstrates a significant commitment to the operational-level idea of *Panzergrenadiers* to be discussed later.[42] The key observation is that a smaller section size generates a greater requirement for integration with the IFV – the two become quite dependent on each other. There is a critical point surrounding survivability of the vehicle and survivability of the infantry where the capability could not be disaggregated because it ceases to achieve its intended purpose of supporting infantry in close combat.

[41] David E. Johnson. *Observations on Recent Trends in Armored Forces*. (Santa Monica: RAND, 2010), 5.
[42] German Doctrine, *HDv 100/100 Truppenführung*, 233. The doctrine describes the primary function in support of tanks with further emphasis on transition between mounted and dismounted combat.

Importantly, the enduring role of infantry is no different at the tactical level when it comes to the execution of close combat, but the mode of employment for the IFV and the place within the joint land campaign will be.[43] The extant doctrinal tension surrounds whether armoured infantry equipped with an IFV is a unique type of infantry, that is, infantry with a more unique set of tasks than more traditional mechanised infantry, or whether IFV-equipped infantry should be capable of the full set of traditional mechanised infantry tasks. Haworth describes the crucial issue that plagued the US Army in establishing a fundamental definition for infantry with an organic IFV; "The vision of a mechanised force wedded to armoured fighting vehicles yet preserving the general-purpose nature of the earlier force repeatedly led the Army to pursue unrealistic goals and forced it to make awkward trade-offs when they proved unattainable."[44] To propose a distinction between armored and mechanised infantry is to specify different sets of tasks and functions that are linked to intended employment. Forcing an IFV to do both the general-purpose whilst ostensibly configured for the specialist ensures that it will do neither well. The seemingly minor tactical aspect of dismounted section size is one determinant. By not making this distinction effectively, the US Army experienced issues with training and support, distorted force designs, and a doctrine that was incomprehensible to outsiders.[45] The most useful definition revolves around the speciality of fighting with an IFV, tactically structured to do so due to a smaller dismounted element, and with the ability to enable tanks though intimate support in both weapons and doctrine. The start point for transition away from M113-based battalions is to define the key differences between 'mechanised' and 'armoured' relative to close combat.

[43] The key difference between infantry attacking or defending at the tactical level versus when you would employ a specific type of infantry at the operational level or during a campaign. Armoured infantry may occupy a first echelon task as part of an advance and attack versus motorized infantry needed to seize an objective in complex terrain.
[44] Haworth, *The Bradley and how it got that way*, 153.
[45] Ibid.

2.2.1 Mechanised Infantry

"Confusion or misunderstanding in some circles regarding the role of an APC versus an IFV was a long-standing problem in the US Army."

Diane L. Urbina[46]

Establishing an effective definition for what mechanised infantry 'is' versus what it 'does' has been a persistent challenge for the Australian Army based on the dual mode of employment for the M113 manifest as both a mechanised battalion and APC 'lift' Squadrons for the past 53 years. The present 'mechanised battalion' is loosely defined by the possession of the M113AS4 and purported interoperability with the M1 Main Battle Tank (MBT). The most recently available definition for the M113-based capability is offered by the LWD 3-3-7 *Employment of Infantry* (2008) as: "A standing organisation of infantry that has organic armoured personnel carriers."[47] If the doctrine is explored further, a reader can also establish somewhat disjointedly: "Mechanised infantry has protected mobility and firepower that allows domination of a larger part of the battlespace and faster transition from one activity to the next… [and] even dismounting to achieve the mission."[48] What can be deduced from this is the mechanised battalion is a generalist force that is expected to conduct tactical actions with or without the APC. It also implies an element of operational reach and a description of rapidity in tactical transition. This is not a sophisticated description of an M113-based capability and is easily confused with that of an APC Squadron in the context of providing lift versus close combat.

The 2008 definition is one of the only references in published Australian doctrine and is symptomatic of a greater struggle with the mode of employment since the Army's first

[46] Urbina, "Lethal Beyond Expectations", 410.
[47] LWD 3-3-7 *Employment of Infantry*, (Canberra: Land Warfare Doctrine, 2008), 1.2.
[48] Ibid, 3.5. This connection was derived across two different sections of the publication.

'mechanised trial' and subsequent resource-constrained development throughout the 1980s.[49] Professor Michael Evans also observed the Australian institutional problem as: "Doctrinal fragmentation and a lack of corporate memory in doctrine development led to the predominance of corps doctrine over Army-wide doctrine and of task doctrine over conceptual doctrine."[50] This notion is worth highlighting as this thesis seeks to first conceptualise the development of armoured infantry as an evolutionary process from the present mechanised infantry. In the first instance, it may be achieved by establishing a comprehensive definition behind the basis for employment. By defining the capability effectively, it therefore becomes easy to draw out subsequent tasks against a mode of employment for the IFV itself. Moreover, the generalist definition offered by the M113-based mechanised infantry can be contrasted with that of a more specialised approach in determining a mode of employment for infantry equipped with an IFV.

2.2.2 Armoured Infantry

"History and common sense alike leave no doubt that tanks mostly need close-in support of a more intimate kind than other tanks can give. Whether they do it mounted or on their feet, the men who provide such support are going to have to live, move and fight with the tanks."

Richard E. Simpkin[51]

One key difference between mechanised and armoured infantry is the specialised nature that manifests in both the type of vehicle employed and the quantity of infantry resident within it. The second point of difference is the ability for the IFV to enable infantry in the conduct of close combat through different weapons like stabilised cannons and ATGM, increased armour, and

[49] Horner, *Duty First*, 271. The vision of a 'mechanised battalion' fielding only a single company on a rotational basis is a disturbing one, though not out of place in the context of the time and funding for the Army.
[50] Michael Evans, "Forward from the Past: the development of Australian Army Doctrine 1972-Present", *Study Paper No. 301*, (Canberra: Land Warfare Studies Centre, 1999), 68. Evans describes the departure from any armoured infantry circa 1975 whereby General Hassett articulated the requirement for armoured tactics absent infantry. The 1980s 'mechanised trial' would subsequently cement this doctrinal division despite enthusiasm at the battalion and brigade level.
[51] Simpkin, *Mechanized Infantry*, 43.

interoperability with tanks. In seeking a definition of an armoured infantry capability for the Australian Army, this thesis subscribes to that offered by both Simpkin and De Czege as the starting point; firstly, the utility of a specialised infantry employing an infantry fighting vehicle and, secondly, infantry who have a distinct role in supporting the tank. The US approach to the IFV is that: "The Bradley was designed to fight through to an objective, only dismounting its small number of infantry once it arrived. Infantry, however, is not the priority with the Bradley. This made it a good vehicle to fight alongside M1 Abrams Tanks."[52] Though conceptually useful, the US never fully embraced this concept, which only served to complicate dismounted manoeuvre.[53] Americans eventually adopted a middle-ground approach with the present-day role of the IFV after experiences in Iraq from 1991 and 2003 onward. The US Army describes: "The Bradley provides protected transport, overwatching fires for dismounted infantry, employed to suppress or defeat enemy tanks, fighting vehicles, bunkers, and dismounted infantry; and used to close with the enemy by fire and manoeuvre."[54] In understanding the requirements for infantry operating with tanks and how to employ a smaller dismounted element, Germany suggests a different definition for articulating the requirements of the *Panzergrenadier*.

In the example of *Panzergrenadier*, the IFV is an integral, even defining piece of section equipment, its members being expected to stay with it under normal operational conditions.[55] The *Bundeswehr* presently defines the capability as: "The *Panzergrenadiertruppe* (infantry platoon) is especially suited for swift changes between mounted and dismounted combat to maintain the momentum of armoured (tank) troops. The direct and close cooperation of the *Panzertruppe* [tanks or armour] and the *Panzergrenadiertruppe* is, mandatory to succeed. Their versatility and

[52] James King, "Never Bring a Stryker to a Tank Fight" Modern War Institute at West Point, https://mwi.usma.edu/never-bring-stryker-tank-fight/
[53] Haworth, *The Bradley and how it got that way*, 152.
[54] The Role of the M2 Bradley Fighting Vehicle (2016) www.army .mil/factfiles/Bradley.html
[55] Thiele, H.J "Panzergrenadier", *Infantry* 53 (November, 1963), 40.

reactivity enable them to gain and maintain the initiative and bring about the decision."[56] In this description, the German capability reflects the more traditional view of armoured infantry as described by Simpkin and De Czege. The original 1942 title *Panzergrenadier* itself suggests (mechanised) heavy infantry elements whose greater protection and mobility allowed them to keep pace with tank units and formations and strike or penetrate in depth. This designation reflects the traditional role of grenadiers as shock troops within the wider combined arms formation.[57] Is this something of future utility to Australia in requiring a greater relative effect from a smaller force? Central to the mode of employment is the inclusion of the IFV and interoperability with the Main Battle Tank (MBT). This mode of employment is important to the definition of armoured infantry equipped with an IFV relative to mechanised infantry equipped with an APC. These descriptions are the key changes triggered by the acquisition of an IFV. The conceptual understanding for employment of the *Bundeswehr* armoured infantry capability is a useful start point in describing a future Australian capability. When paired with the institutional understanding offered by both Simpkin and De Czege, there are a number of useful common characteristics. The characteristics offered for the Australian capability are:

1. The IFV is organic to the battalion structure with crews drawn from the infantry.
2. The primary reason for the capability is to enhance infantry close combat.
3. The secondary reason for the capability is to enhance the effectiveness of tanks at the tactical and operational level through attack in depth and penetration.
4. Employment of the capability emphasises rapid changes between mounted and dismounted combat that exist nowhere else in Army.

[56] German Doctrine, *HDv 100/100 Truppenführung*, 233.
[57] Robert Citino. *Quest for Decisive Victory: From Stalemate to Blitzkrieg in Europe, 1899-1940.* (Kansas: University Press, 2002), 200.

5. Employment of the IFV is predicated on suppression/attrition on behalf of the infantry within it.
6. The IFV and its infantry component cannot be effectively disaggregated without reducing the overall capability.

Refining this conceptual understanding through a concise definition is crucial. A possible definition based on combining Simpkin, De Czege, and the *Bundeswehr* approach is:

> Australian Armoured Infantry is the primary capability responsible for armoured close combat. It generally operates with and in close support of tanks, able to rapidly transition between mounted and dismounted combat as a versatile combination of infantry and integral armoured support.

Armed with an effective definition as a start point for the capability, it is now possible to articulate a possible mode of employment for the IFV within an organisation described as an 'armoured infantry' battalion.

2.3 Establishing a Mode of Employment

"The three physical elements of war are moving, guarding, and hitting. Like the mental and the moral, they are so closely related that to separate them is practically impossible."

JFC Fuller[58]

An effective definition supports the ability to discern the institutional approach employing the IFV. The differences in the German and US development of IFV-equipped infantry offer that the full potential of the IFV is only realised when an appropriate structure and tasks are incorporated into a system reflective of the mode of employment; that is, the primary way in which the capability is regarded by the institution. Fuller's description of the physical elements of war offer a way to basically understand the enduring characteristics of armoured infantry relative

[58]JFC Fuller, *The Science of the Foundations of War*, 148. These elements support both offensive and defensive phases of war. Guarding and moving may be extrapolated to cover stability operations as required.

to such employment. Of further utility in describing the various modes of employment for both mechanised and armoured infantry is Richard Simpkin's 'IFV Triangle' published in 1983.[59] Simpkin suggests that there are three options for utilising the IFV or APC with their own resultant complexities and risks that equate to the way in which they are regarded as a system. The absolute nature of each tasking resides in the apex in the corners of the triangle, manifest as a complete mode of employment defined by both the vehicle and structure of the dismounted element. The three options are:

1. *Conservative* – the vehicle is employed with the express aim of conserving it to be able to retrieve the infantry at a later point. In a tactical sense, this would equate to the common 'Zulu Muster' whereby vehicles are concentrated away from direct fires and infantry are left to manoeuvre unsupported. In an operational sense, this may be the existence of 'empty' vehicles for the purpose of moving units at specific points during a campaign or operation. This end describes Urbina's 'battle taxi' nature of the M113 relative to the employment of Haworth's 'generalist' mechanised infantry.
2. *Independent* – the vehicle is able to be employed independent to the infantry. This would equate to tactical tasks of reconnaissance or fire interdiction from a distance. This end really describes the armoured vehicle conducting fire and manoeuvre like a tank, but without the same level of survivability.
3. *Support* – this is the truest combination of infantry and armour and manifests through the ability of the vehicle to conduct close combat with the section as an integral element. The addition of an ATGM implies support to tank forces also.

[59] Richard E, Simpkin. "When the Squad Dismounts", *Infantry* 73[6], (Nov-Dec 1983), 15. The 'marketing model' style was also used as late as 2015 by Dr. John D. Salt of Cranfield University in the UK when describing the mode of employment available to IFV-equipped infantry in his presentation 'On the Wagons, Off the Wagons'. It has been modified in this thesis to include doctrinal tasks and placement of the studied forces within it for greater fidelity.

In determining the type of tasking required for the vehicle relative to that of the infantry, Simpkin posed the question: "Where do you place the pin?" For the mode of employment for mechanised and armoured infantry capabilities discussed so far, a position has been established within the triangle to best describe hybrid infantry-armour organisations pertaining to Australian, US, UK and German forces. Of note, are the polar differences between the definition offered for the M113-based Australian capability and that of the German IFV-based *Panzergrenadier* described earlier. The definitions for both mechanised and armoured infantry posited in this research are depicted in a comparative sense to illustrate the differences in support and the resultant structural manning requirements for the capability. The determinant for the US capability toward a more independent mode of employment is due to both the structure of the infantry platoon, and the integrated anti-tank missiles resident in the Bradley.

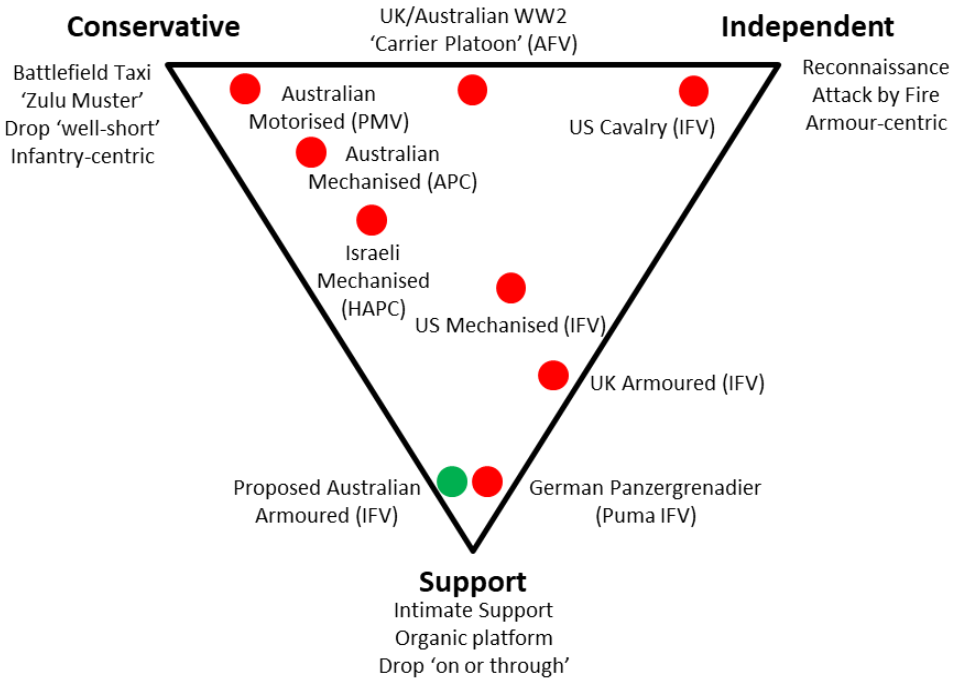


Figure 2: Simpkin's Triangle[60]

[60] The triangle has been expanded to offer indicative tasking between infantry-centric and armour-centric aspects of combined arms as articulated in LWP (CA) 3-3-16 *Mounted Minor Tactics*.

From Figure 2, it is possible to see how the IFV influences the mode of employment. Specifically, in the German model, a greater requirement for specialisation when it comes to a greater need for support, manifest in the requirement to accompany tanks, and transition between mounted and dismounted combat. The US Cavalry suggests a level of specialisation different to the infantry for IFV-centric operations. For the German and UK models, the section sizes are reduced to cater to the vehicle platform though the available mounted weapons are increased to cater for a reduced amount of infantry. A lone World War 2 example of 'infantry weapon carriers' offers a start point for a capability that tried to achieve every aspect of combined arms support to infantry but were not armoured enough to fight alongside tanks in close combat.[61]

An Australian capability with a dismounted element of six soldiers necessitates a position more toward 'Support' than any other part of the triangle. Further equipping it with an ATGM like the German capability generates a more self-reliant organisation that can better enable tank forces. An IFV without infantry is simply a weaker tank and employing it as an adjunct to infantry manoeuvre sees the placement of the capability mostly toward the independent point of the triangle similar to the US Cavalry approach. The APC-based infantry resides firmly along the conservative edge for the main purpose of delivering infantry that will ultimately fight on foot – the bias toward 'conservative' allows for the APC to return to remount the infantry for the next task. This is indicated by the Australian and Israeli approaches to a 'battlefield taxi', though the Israeli Heavy APC (HAPC) has tank-like survivability based on the availability of tank chassis for production. Achieving an approach that best supports close combat is clearly depicted by the capabilities at the base of the triangle. That the requirement to change the mode of employment

[61] Dr John D. Salt of Cranfield University suggests: "Doctrine at the time made it clear that these were not AFVs, but "firepower transports", so they would fight either by dismounting their organic weapons or (against the "light opposition" of hopeful doctrine writers) fight mounted but could not conduct anything like intimate support of their dismounted element."

upon acquisition of an IFV should now become quite apparent, particularly if the preceding capability is based on an APC – acquisition suggests a move on the triangle from 'Conservative' to 'Support' if the expressed aim is for close combat versus the requirement to fight solely as dismounted infantry. How the mode of employment may manifest across different militaries is the subject of the following discussion.

2.4 Comparative Systems

"The continued need of the tank for support from riflemen on the ground created an environment in which the tank and the armoured rifle squad are the primary and essential factors."

Virgil Ney[62]

This section will compare basic infantry 'systems' to best illustrate the key differences between a 'generalist' and 'specialist' capability. Those presented here are reflective of the specialist and generalist approaches to solving the problem of generating a hybrid infantry-armour organisation. Seemingly simple characteristics of each capability such as section sizes or possession of an ATGM have follow-on implications for the mode of employment. At the most basic level, reducing the APC dismounted section size to six does not equal the ability to maintain the same approach to employment – this problem was encountered by the US Army in 1982 and will be discussed later. The following table offers a comparison of different capabilities ranging from six to nine dismounts, with ATGM or without.

[62] Virgil Ney. *The Evolution of the Armored Infantry Rifle Squad*, (CORG Memorandum: United States Army Combat Developments Command, 1965), 2.

Nation	Description	Platform	Crew	Dismount	Armament	ATGM
Australia	Mechanised	M113AS4 (APC)	2	8	12.7mm	N
US	Mechanised	M2 Bradley (IFV)	3	9*	25mm	Y
UK	Armoured	Warrior (IFV)	3	7	30mm	N
Germany	Panzergrenadier	Puma (IFV)	3	6	30mm	Y
Norway	Mechanised	CV9030 (IFV)	3	8	30mm	Y
ROK	Mechanised	K21 (IFV)	3	9	40mm	Y

Table 1: Comparative capabilities of IFV-equipped infantry[63]

Table 1 identifies mechanised and armoured infantry capabilities defined by smaller section sizes, the inclusion of an ATGM, and mode of employment relative to the APC-based infantry of the Australian Army. Armies that intend for the infantry to accompany tanks are equipped with an ATGM – less the UK (a function of cost over requirement). In the case of both the UK and Germany, a smaller section size defines the capability as 'armoured' infantry designed to accompany tanks. The tasks of the German *Panzergrenadier* are limited to support the smaller section size, but the UK's doctrinal role of infantry still closely resembles that in Australia. The Australian APC-based infantry resembles both that of Norway and ROK, is as capable in the dismounted 'generalist' sense but cannot integrate with tanks as effectively due to a lack of both a stabilised cannon and ATGM. Both Norway and the ROKA retain 'generalist' infantry due to section sizes above 8. It should be noted that the US Bradley has both stabilised cannon and ATGM, but a single vehicle cannot deliver a whole section to battle. In observing the

[63] The table is comprised of open source information supplemented by responses from officers of each nationality in attendance at Marine Corps CSC through a combination of interviews and doctrine translation into English.

section size and weapons available between the US and German capabilities there is a clear difference in what the *Panzergrenadier* can achieve relative to its intended employment with the inclusion of a stabilised cannon, ATGM, and specialised set of tasks for the dismounted infantry.

These comparisons suggest that an IFV able to carry a section of 8 or more is still able to undertake infantry tasks in a 'generalist' sense of the definition and that it may be acceptable to separate the vehicles from the platoon if the requirement arose. Such an idea is further validated by the IFV possessing a stabilised cannon and ATGM. This sees both the mechanised infantry forces from ROK and Norway retain a larger section due to the troop compartment available in the platform and retain the IFV aligned with its infantry component. In the case of the Puma and Warrior IFV, the smaller section necessitated a structural change to the infantry, and again in the case of the *Panzergrenadier*, a narrower mode of employment relative to supporting tanks and rapid transition between mounted and dismounted combat. This is an inescapable aspect of reducing section sizes relative to the intended employment posited by Bruce Held of RAND in his 2013 study: *Understanding Why a Ground Combat Vehicle that Carries Nine Dismounts is Important to the Army.* In essence, dismounted combat power is irreducible below seven soldiers if the intended scope of tasks relates to that achievable by eight or nine.[64] Finally, in considering whether or not infantry soldiers are capable of wielding an IFV, it should be noted that all examples employ infantry as the crew as a way to ensure a level of cultural interoperability.

[64] Bruce Held et al. *Understanding Why a Ground Combat Vehicle that Carries Nine Dismounts is Important to the Army*. (Santa Monica: RAND, 2013), 16. Held offers a perspective across a number of decades designed to inform the US Army's acquisition of a larger IFV to overcome the inability of the Bradley to deliver a whole section.

2.4 Armoured Infantry and the Joint Land Campaign

"Only at the operational level could combat actions be forged into an ensemble and so provide the creative tactical material for extensive operations united by strategy."

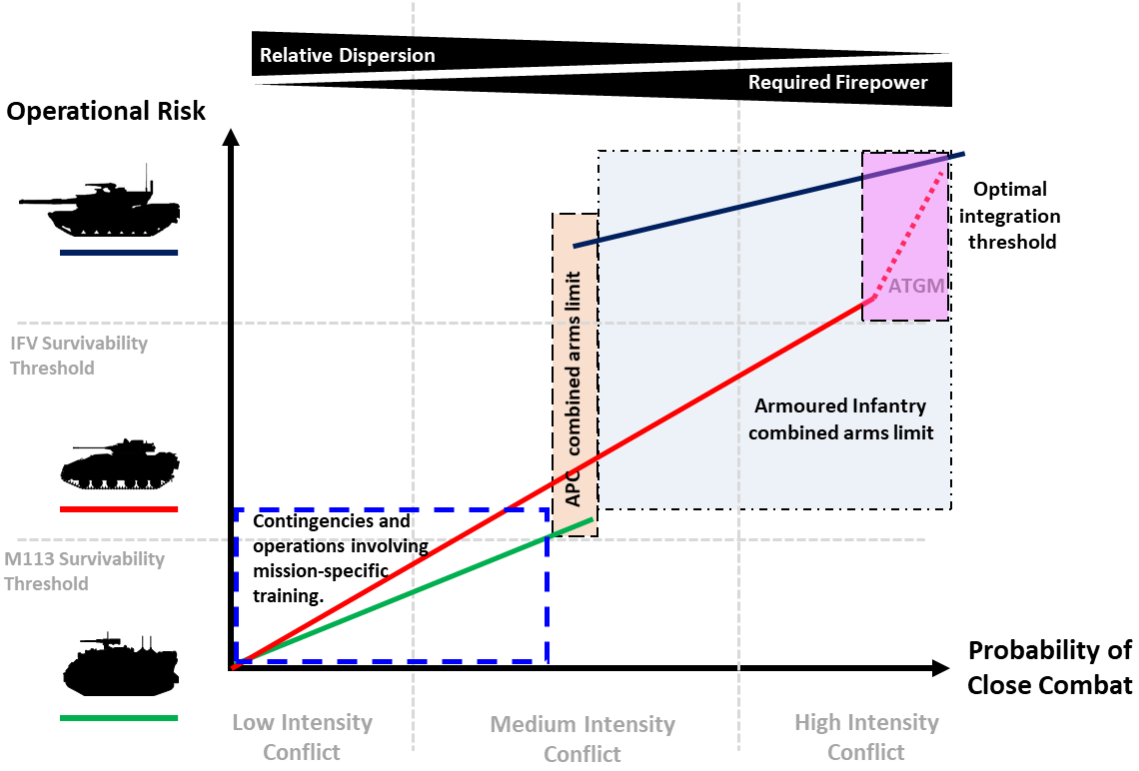
Dr. Michael Evans[65]

There are two assumptions that underpin the employment of armoured infantry: first, that there is a requirement to increase the relative effect of tanks at both the tactical and operational levels; and second, that there is a threat commensurate with the requirement to field an IFV. Thus, the optimal placement for the capability is in the high and mid-intensity conflict categories with the primary effect related to decisive actions in a land campaign. This section will offer a place for armoured infantry within the conduct of a joint land campaign for the Combat Brigade. Minor examples drawn from the Israeli experience in the opening decade of the twenty-first century are used to illustrate the utility of armour in hybrid conflict. For the IDF, hybrid threats including combinations of regular, irregular, and criminal elements combined to employ anti-tank missiles and unmanned systems to target armoured capabilities.[66] The 2006 and 2008 experiences of the Israeli Army in Lebanon and Gaza offer a narrative on the increasing utility of combined tank and IFV forces in hybrid warfare.

Commencing with an institutional lack of experience in combined arms due to prolonged employment in low intensity conflict, the IDF erroneously developed a belief that heavier forces were increasingly irrelevant. After the 2006 Second Lebanon War, the IDF concluded that a mix of tanks and IFVs would be critical in any hybrid conflict.[67] By December 2008, for Operation CAST LEAD, the IDF deployed two of the four ground manoeuvre brigades to Gaza based on

[65] Michael Evans. The Continental School of Strategy: The Past, Present, and Future of Land Power, *Study Paper 305*, (Canberra: Australian Army Land Warfare Studies Centre, June 2004), 50.
[66] Avi Kober, "The Israeli Defence Force in the Second Lebanon War: Why the Poor Performance", *Journal of Strategic Studies* (Feb 2008), 12.
[67] Johnson, *Observations on Trends in Armoured Forces*, 5. The Israeli example of a hybrid conflict can be extrapolated to any terrain or environment where a mix of combatants is designed to reduce conventional technological overmatch.

groupings with IFVs.[68] The brigades provided the IDF with the ability to conduct protected manoeuvre and direct fire support of infantry in an area riddled with mines, snipers, and RPGs. The final conclusion from the Israeli experience was that IFV-equipped infantry reduce operational risks and minimise friendly casualties.[69] The notion of risk reduction and IFVs as a force multiplier in hybrid warfare, offers armoured infantry as a logical choice. Graph 1 depicts the relative changes in grouping specialised armoured infantry in support of tanks versus the tank and generalist APC approach. The specific change relates to increased operational risk relative to close combat and the need for firepower. Further, the autonomy of armoured infantry and interoperability with tank forces is increased through the addition of an ATGM.

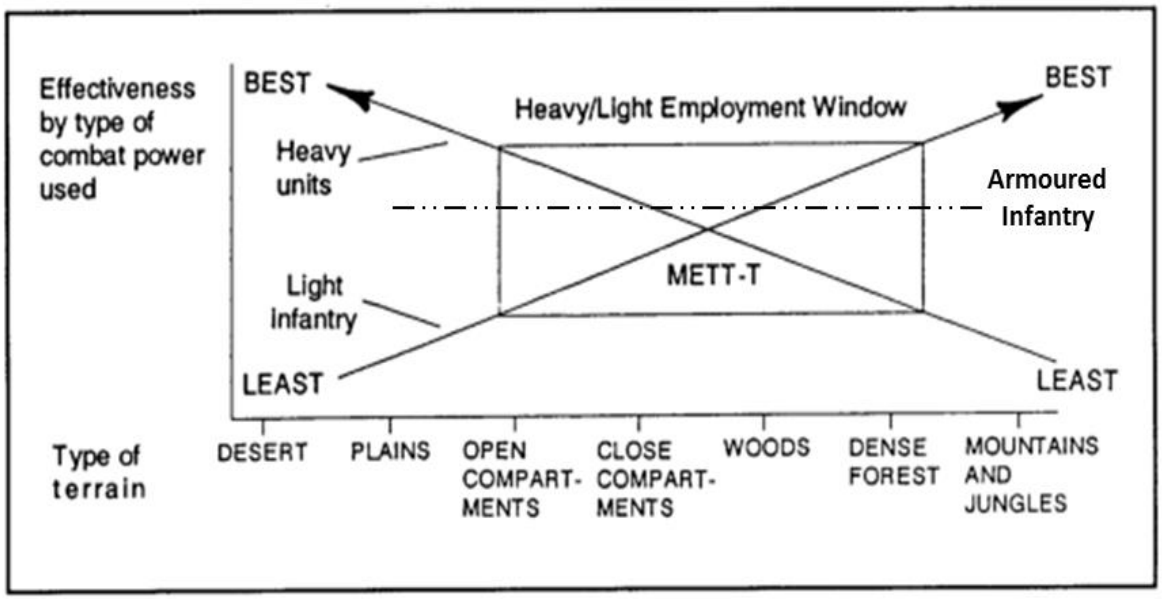


Graph 1: Comparative combined arms limits[70]

[68] Ibid, 6.
[69] Ibid.
[70] The limit for combined arms is determined by interoperability with tank forces, survivability of the infantry platform, and probability of engaging in close combat. Survivability is a combination of armament and armour when paired with tanks. The lower quadrant suggests a place for contingencies that require a level of mission-specific training in a low risk environment.

The paucity of tanks in the Combat Brigade necessitates a way to enhance close combat, increase the relative effect of the tank, and conduct distributed manoeuvre as part of FLOC.[71] Simpkin also suggests a place for armoured infantry in the land campaign as: The tactical or operational offensive is the type of combat in which tanks most need infantry support and need it on the largest scale; and to restore or maintain the momentum of the advance.[72] In essence, infantry can increase the relative effect of the tank by augmenting what Simpkin describes and is articulated in Graph 1. German doctrine at the battalion level, *HDv 231/100 The Panzergrenadier Battalion*, also states (translated): "The fighting of the battalion is characterised by the combination of fire and movement, attacking in conjunction with main battle tanks, swift changes between mounted and dismounted combat, close cooperation between mounted and dismounted forces, and particularly mobile combat."[73] An Australian capability can be illustrated effectively by combining Simpkin's notion of facilitating tank manoeuvre with that of the German approach to rapid transition with close cooperation between mounted and dismounted forces. Armoured infantry can therefore be considered in the context of generating small manoeuvre elements with a technological edge providing an enhanced effect for the heavy armour within a Combat Brigade and then transitioning to limited dismounted combat as part of distributed manoeuvre and decisive action.[74] The following graph suggests an interpretation of combat power applied to different operational environments for the optimal employment of a Brigade Combat Team (BCT) equipped with armoured infantry.

[71] Head of Modernisation and Strategic Planning – Army. *Future Land Operating Concept.* (Canberra: Australian Army, 2012), 45.
[72] Simpkin, *Mechanized Infantry*, 48.
[73] German Doctrine, HDv 231/100, *Das Panzergrenadierbataillon*,2001 (Amber books, 2007), 1003.
[74] *Future Land Operating Concept*, 33.



Graph 2: Armoured infantry force employment scale[75]

The utility of armoured infantry across a range of environs relative to the effectiveness of the type of combat power employed is depicted on Graph 2. The 'employment window' is the best use of a particular force as described by US doctrine relating to the employment of the BCT.[76] This force is of relative size to that which Australia may field as part of a coalition formation with a unit structure offered in appendix A. The overall lack of 'heavy' units in the Australian Army requires another aspect of the combined arms team to increase the relative effect of the tank. This would place armoured infantry in the top third of the employment window with significant utility across the majority of terrain types. Armoured infantry fills the gap where tank forces are too encumbered, but light forces do not have the requisite combat power or mobility. It is not as useful below this threshold due to structural differences in lighter forces, that is, the greater quantity of infantry and other factors such as air-portability of different vehicles, density of terrain, or force projection through Australia's relatively small amount of strategic mobility.

The US Army employs the 'Combined Arms Battalion' (CAB) based on balanced tank and

[75] The threshold for armoured infantry resides between where light infantry may not be effective and where tanks alone are unable to be protected. One of the key limitations is terrain which resides outside the employment window.
[76] US Army, FM 71-123 *Brigade Combat Team* (1992).

IFV groupings that may also offer utility for re-examining the Australian operational approach. In this sense, armoured capabilities are combined to form a core fighting structure within the US Armoured BCT (ABCT).[77] If an Australian armoured infantry battalion had four rifle companies to combine with up to two tank squadrons of the present Armoured Cavalry Regiment, two CABs could be formed within the Combat Brigade at any one time to generate an additional fighting echelon or another heavy force grouping for scheduled deployment.[78] As the following operational case studies will describe, a high IFV to tank ratio equates to generating greater relative effect of the tanks. This provides the Combat Brigade with a better armoured option than the singular mechanised infantry battlegroup supported by a small number of tanks. With a definition and characteristics of the capability established, and a broad position in the land campaign identified, recent operational case studies will illustrate the effect that infantry equipped with an organic IFV can achieve in both medium and high intensity conflict.

3. Operational Case Studies

"The danger of air attack, the aim of mystification, and the need of drawing full value from mechanised mobility, suggest that advancing forces should not only be distributed as widely as is compatible with combined action, but be dispersed as much as is compatible with cohesion."

BH Liddell Hart[79]

The fielding of the IFV in the 1980s engendered a fundamental shift in the way infantry could conduct close combat whilst increasing the ability to engage other fighting vehicles, and even tanks. Additionally, infantry forces, for the first time, had mobility that was truly commensurate with the MBT they were tasked to accompany and protect. The IFV allowed for

[77] US Army, FM 3-90.5 *Combined Arms Battalion* (2016).
[78] The expectation is that there would be a 2:1 infantry to armour inside a triangular battlegroup. A discussion on the utility of a four-company battalion will seek to reduce Support Company elements in favour of manoeuvre elements that would generate integration across a brigade as opposed to within a battalion to meet requirements of the FLOC.
[79] B.H. Liddell Hart, *Strategy*, second revised edition (New York: Meridian, 1967), 332.

operational reach and combined action with a requisite level of cohesion greater than that envisaged by Liddell Hart during the interwar period, and likely even more than Guderian experienced in the *Wehrmacht* Panzer formations entering the Soviet Union in 1942.[80] For the US, infantry underwent a quantum leap in technology available for the conduct of combined arms commencing with the introduction of the Bradley Fighting vehicle in 1982. The following short studies are included for the purpose of demonstrating the utility of infantry with organic IFV capabilities in both high and mid-intensity conflict. The US Army history is particularly useful because it shows the arrival and subsequent evolution of employment from testing, to operations involving large-scale manoeuvre, through to the complexity of the urban environment during stability operations.

3.1 The United States Army in Iraq

"With the arrival of the Bradley Fighting Vehicle, we have a new situation… Bradley infantry is designed to support the M1 tank, and Bradley infantry is significantly different from M113 infantry."

Colonel Huba Wass de Czege[81]

For the US Army, the recognition of the requirement for a different type of infantry was an important one both in the context of the acquisition of an IFV and the operational requirement to enable tank formations. This would become apparent in the first conflict the US would employ the new capability thereby validating the oft argued requirement for more than one type of infantry.

[80] James S. Corum. *The Roots of Blitzkrieg: Hans Von Seeckt and Military Reform.* (Kansas: University Press, 1992).
[81] Huba Wass de Czege, "More on Infantry", *Infantry* 76 (September-October, 1986): 13.

3.1.1 Operation DESERT STORM (1991)

> *D Company, TF 4-7th Infantry, had moved out that morning … The Company reached Medina Ridge after only a 5km march, and Staff Sergeant Peters, the company master gunner, spotted several BMPs and T-72s dug in on the slope below his Bradley. Peters destroyed one BMP with only three quick rounds of 25mm armour-piercing ammunition, then adroitly switched his ammunition selector to high explosive to engage the Iraqis as they ran from the vehicle toward some nearby trenches. He switched back to kill a second and then a third BMP. This particular vehicle did not explode like the others, it was a T-72… Peters raised the TOW and switched sighting systems a third time. He held his cross hairs steady on the tank until missile impact and destruction. He finished this remarkable one-man gunnery demonstration by switching back to the 25mm a fourth time to kill a third BMP as his amazed company commander watched.*[82]

This description of an infantry company's experience as part of the US 1st Armoured Division during Operation DESERT STORM relates an infantry unit historically trained to do something extremely different to what would transpire on the third day of the campaign. The notion of fighting mounted would appear counterintuitive to what the infantryman is fundamentally trained to do.[83] This new approach was so successful during DESERT STORM, though, that it is worthy of replication as an approach to combined arms. Ultimately, infantry increased their tactical and operational effectiveness through the addition of an IFV and a significant change in training. A similar story played out for the 24th Mechanised Infantry Division Combat Team (24DCT) in its attack to free Kuwait in March of 1991. 24 DCT comprised 249 M1 tanks and 218 M2 Bradleys.[84] This was an almost 1:1 ratio of tank to IFV for employment against an enemy comprising approximately seven Iraqi divisions. The ability to augment tanks and support the destruction of tanks in this fashion established a role for IFV-equipped infantry in high-intensity conflict.

[82] Robert H. Scales Jr, cited in Haworth, *The Bradley and how it got that way*, 2.
[83] Ibid.
[84] Jason Kamiya, *A History of the 24th Mechanized Infantry Division Combat Team during Operation Desert Storm: The Attack to Free Kuwait*. (Michigan: University of Michigan, 2017), 7.

In an example of operational reach characterising the success of infantry in increasing the relative effect of tank forces, 24 DCT advanced 370 kilometres as part of the attack. The operational effects were to sever Iraqi lines of communication through the Euphrates River Valley and destroy up to four Republican Guard Divisions; equating to approximately 363 tanks and other armoured vehicles.[85] Tank forces assigned achieved a high destruction ratio for enemy tanks due in part to the balanced nature of combined arms undertaken by 24 DCT – the IFV equipped with an ATGM and the balanced ratio with tanks. In advancing 370 kilometres in 100 hours of combat, 24 DCT ('Victory Division') moved farther and faster than any mechanised force in history.[86] Key tasks allocated to the infantry as part of 24 DCT were not far beyond that of traditional infantry requirements, though temporally compressed. The important difference related to the tempo and speed by which these tasks would occur, and then abruptly change. From the 24 DCT record of DESERT STORM describing the attacks on Rumaylah, into the Euphrates, toward Basrah, and the counterattack to Talill Air base, there were consistent tasks that came to characterise the employment of IFV-equipped infantry at company and above grouped with and without tanks. These were:

1. Seizure of identified battle positions.
2. Establishment of blocking positions.
3. Attacking with tanks to clear enemy strong points.
4. Support to tank forces in conducting penetration or bypass.
5. Defend in Zone as part of mobile defensive activities.[87]

The relative parity in numbers between tanks and IFV-equipped infantry demonstrated the need for balanced forces, or as a minimum, tanks enabled by appropriately-equipped infantry that

[85] Ibid, 40.
[86] Ibid.
[87] Ibid, 42-56.

could keep pace and deal with commensurate threats. The level of operational reach and the 1:1 tank to IFV ratio resident in the formations are two key aspects of this operation worth exploring further when considering the development of an Australian armoured infantry battalion task-organised with tanks.

3.1.2 Operation IRAQI FREEDOM (2003 onward)

'A mech infantry company is only half-complete with just the dismounts. We fight as an integrated team with our tracks. We complement each other. They are our heavy support. We are their eyes and ears. It is a perfect balance, and to be most effective, we have to work together.'

David Bellavia, *House to House*, (2007)[88]

In stark contrast to 1991, the requirements for IFV-equipped infantry expanded with the 2003 conflict in Iraq – a high IFV to tank ratio was replaced by a focus on employment of the IFV alongside dismounted infantry in urban terrain. In addition to a stunning armoured advance to achieve strategic defeat of Saddam Hussein, the challenges of combined arms in the urban environment were reinforced. Iraq in 2003 involved urban areas at the margin of highways and stretches of wide-open cross-country highway.[89] For a mechanised infantry force equipped with IFVs, the US Army had to contend with close combat in urban terrain and the complexities of stability operations within the lethality of high-intensity conflict. On the 6th of April 2003, an armoured BCT comprising 30 M1 tanks and 13 M2 Bradleys to seize the city of Baghdad with roughly 5 million inhabitants; by the 7th of April, the 3rd Infantry Division had seized Saddam Hussein's Presidential palace and achieved the initial strategic aims of the war.[90] This is but one example of significant operational reach. The following campaign included the significantly populated and religious areas of Fallujah and Sadr City.

[88] David Bellavia. *House to House: An Epic of Urban Warfare*. (New York: Free Press, 2007), 117.
[89] Zucchino, David. *Thunder Run: The Armored Strike to Capture Baghdad.* (New York: Atlantic Press, 2004), 15.
[90] Donnelly and Kagan, *Ground Truth: The future of US Land Power*, 52.

Echoing Bellavia's tactical summation for the Bradley during urban fighting, Michael Green observed the standard engagement by US mechanised infantry in Al Tharwa was less than 200 metres.[91] The short engagement distance reinforced the need for an IFV to support the infantry it carried as well as aid them in the protection of the attached tanks. In many ways, the IFV resembles the infantry section's automatic weapon – more so when describing the close combat mechanism of suppression. Bellavia relates his personal experience of this as: "Bradley gunners rake the buildings around us, prepping the area with high-explosive rounds fired into windows and doors."[92] In this sense, intimate support to infantry is beyond the capability of a tank in terms of casualty evacuation and discern targets for infantry. In describing the utility of the IFV in Fallujah in 2004, Kendall Gott emphasised the protected mobility and subsequent use of supporting and covering fires for infantry from the on-board weapons.[93] Conflict in Iraq from 2003 to 2005 offers the following insights on the employment of IFV-equipped infantry in an urban environment:

1. Cooperation between the infantry section and on-board infantry crews for attacking enemy positions detailed by those dismounted (fix and suppress)
2. An understanding of weapon effects from vehicle-mounted systems at distances under 300 metres.
3. Close combat operation between tanks and IFVs in a 2:1 tank to IFV ratio.

The close nature of cooperation and the intimate support requirements between the infantry and the dismounting section demonstrated the utility of an organic capability that could only be refined through habitual proximity between infantry and the associated fighting vehicle. The IFV was considered an integral part of the infantry organisation and was employed both

[91] Michael Green and James D. Brown. *M2/M3 Bradley at War*. (Saint Paul: Zenith Press, 2007), 51.
[92] Bellavia, *House to House*, 166.
[93] Kendall D. Gott. *Breaking the Mold: Tanks in the Cities*. (Fort Leavenworth: Combat Studies Institute, 2006), 97.

operationally and tactically in tandem with tanks. In the Australian context, development of urban terrain procedures for IFVs with tanks will be different for that employed by the present mechanised battalion. Reduced engagement distances and the increase of IFV to tank ratio in urban terrain are useful start point illustrated by the US experience in this case study.

3.2 The German *Bundeswehr* in Afghanistan (2009 – 2015)

"The Marder Armoured Infantry Combat Vehicles (IFV) saw their first frontline use in July 2009 when extricating Belgian and Afghan security forces from an ambush. This first combat experience alone demonstrated the enormous effect the AICVs had on enemy forces."[94]

The *Bundeswehr* sent German *Panzergrenadiers* to Afghanistan with the Marder AICV in early 2009 as a response to a deteriorating security situation. As previously described, German IFV-equipped infantry is of a slightly different capability to that of the US variety. This is an important distinction because this particular case portrays the utility of a specialised armoured infantry conducting stability operations in mid-intensity conflict. The German approach was established amidst concerns over the size of the German military commitment, a perception as to escalation with the arrival of the IFV, and concerns over the condition of roads and bridge capacity.[95] The resultant deployment of company-sized elements was Germany's solution to both the fragile security situation and the perception of the role of its forces. The deployment was most timely and overshadowed all concerns when, in 2010, German *Panzergrenadiers* were involved in the heaviest fighting since the establishment of the *Bundeswehr*.[96] The following company-level case offers important lessons on armoured infantry in stability operations. This conveys utility to the Australian approach to contemporary stability operations and to give a broader view of IFV-equipped infantry beyond high-intensity conflict.

[94] Marcel Bohnert, Marcel and Andy Neumann. *German Mechanized Infantry on Combat Operations in Afghanistan*. (Berlin: Miles-Verlag, 2017), 22.
[95] Ibid, 20.
[96] Ibid, 27.

The *Panzergrenadier* capability was primarily employed as a Quick Reaction Force (QRF) as part of a larger security force training mission in Regional Command – North (RC-N). Specifically, members of a paratroop (light) force conducting the training were reinforced by the AICV-equipped infantry. Of note, is the fact that this particular task force was built around the 92nd Mechanised battalion in the first instance. TF Kunduz III had the aim of stabilizing the southern part of the district of Chahar Darreh in Kunduz Province whilst overseeing the expansion of the security bubble further north. In real terms, this organisation was 250-strong and equipped with 25 Marder IFVs.[97] The success of the mission appears to surround the use of the IFV as a deterrent, in the first instance "through its weaponry and martial appearance," and then the ability to rapidly escalate as the security situation dictated. For example, the QRF was involved in over fifty engagements in 2010.[98] One distinct advantage observed by the author of this study was the ability of the *Panzergrenadiers* to transition between mounted and dismounted skills. The key lessons drawn for the employment of German armoured infantry in stability operations were as follows:

1. Coordination between mounted and dismounted capability
2. The enduring nature of tracked vehicles in all terrain
3. The utility of the IFV as a deterrent through its 'martial appearance'.[99]
4. The ability to employ the IFV as a 'mobile fortress' due to weapon and sensor capabilities, but still remain below the threshold of tank forces.

The *Bundeswehr* in Afghanistan offers an example of a relatively small amount of armoured infantry paired with an advisor organisation to support indigenous capacity-building

[97] Ibid, 32.
[98] Ibid, 22.
[99] Dr. John D. Salt of Cranfield University in the UK offers an interpretation of the IFV that resembles this notion – he describes it as the 'battlefield bully' in that it can fill a gap where a tank would be considered overkill. Correspondence with Dr Salt – 26 February 2018.

that resolves questions of both force protection and operational risk reduction. Essentially, the Germans had an IFV to support normal advisor operations as well as provide a deterrent and a primarily offensive capability to use against local insurgents. The force ratio of one armoured infantry company amidst a lighter battalion organisation of three other sub-units is noteworthy. With an understanding as to the employment of IFV-equipped infantry in both high and mid-intensity conflict, an approach to training and transitioning a hybrid infantry-armour organisation can be explored.

4. Transition and Training

"For a Bradley infantry battalion to have the same gunnery requirement as a tank battalion is, bluntly, expecting the infantry to do more than its fair share in the combined arms fight."

Major E. Gibbons (1995)[100]

The conceptual approach to fighting with an IFV should lead the implementation of the technology. From an infantry perspective, IFVs are designed around infantry use for close combat, and the context of this research is to support developing infantry units that possess organic vehicles with infantry crews. In grappling with the requirement to train infantry on a more technologically sophisticated platform whilst retaining the 'generalist' infantry approach, a common journey is observed in the US Army in transitioning infantry from M113 APC to Bradley IFV in the early 1980s. There remains an important narrative surrounding the dismounted component of an armoured infantry capability and a universal sense of frustration at its general decay when competing for time and resources in IFV units. Writing in the late 1980s and early 1990s, US Army officers provide primary source examples on these principal training

[100] Edward Gibbons. "Why Johnny Can't Dismount: The decline of America's Mechanized Infantry Force", Master's Thesis, School of Advanced Military Studies, US Army Command and General Staff College, (Fort Leavenworth: Kansas, 1995), 44.

challenges in Bradley-based units from the section to battalion-level. Haworth cites the same challenges in his study that reflect the tension between being proficient at both mounted and dismounted combat without reducing either requirements.[101] The Bradley IFV offers a unique perspective with an associated technological training component when the infantry training burden appears to be unnecessarily separate to the infantry-armour system itself. The ROK Army appeared to undertake the 2009 transition from APC to IFV based almost directly on the US model, hence its inclusion into this research. These perspectives have been included so that the Australian Army may capture the lessons and avoid the same mistakes during a similar transition.

4.1 The Bradley Fighting Vehicle Transition

"The Army proposed to change the role of the infantry armoured vehicle from transport to combat while expanding the role of the troops they carried; at the same time, it proposed to do so by evolving the new [vehicle] from the old, although the characteristics of the two diverged sharply."

W. Blair Haworth Jr.[102]

When striving to find a path forward for transitioning and training the Australian Army for the IFV, it is important to revisit the same struggles the U.S. Army had with the Bradley. The challenges surrounding the US Army transition from M113-based infantry to IFV-based infantry from 1982 are relevant to the transition that the Australian Army will undertake upon acquisition of the IFV. The fielding of the Bradley caused the US Army to think and rethink mechanised infantry doctrine. Ultimately, the US could never accept a specialised mode of employment. This had implications for the infantry section and sought to break up the individuals across the vehicles in the platoon to maintain a 'generalist' capability. The decision to focus on the vehicular capabilities in mounted operations necessarily reduced the role and function of the

[101] Haworth cites both Theodore Severn and Edward Gibbons as critics of the US Army's inability to conduct tactical training amidst the institutional problem of fielding a new vehicle with significant increases in technological sophistication.
[102] Haworth, *The Bradley and how it got that way*, 151.

infantry section in the conduct of dismounted operations.[103] This was never adopted by the infantry branch. The risk in forcing the platoon to regroup upon dismounting in order to maintain a more generalist mode of employment was deemed acceptable by the institution despite influential theorists like De Czege identifying otherwise. Haworth describes the doctrinal tension between intended roles, equipment capability, and required training relative to mode of employment in the context of the Air-Land Battle period. His study, completed in 1999 offers useful insight into the requirement to generate a specialised structure and well-defined mode of employment ahead of the acquisition of the IFV. Ultimately, Haworth observes that the US Army had difficulty acquiring and accommodating an infantry fighting vehicle because it insisted on effecting a radical doctrinal change by incremental means.[104] It should be noted that the infantry as a whole welcomed the overall capability but struggled to reconcile the difficulties in placing the IFV-equipped infantry into a traditional infantry mission.

[103] Gibbons. "Why Johnny Can't Dismount: The decline of America's Mechanized Infantry Force", 24.
[104] Haworth, *The Bradley and how it got that way*, 3.

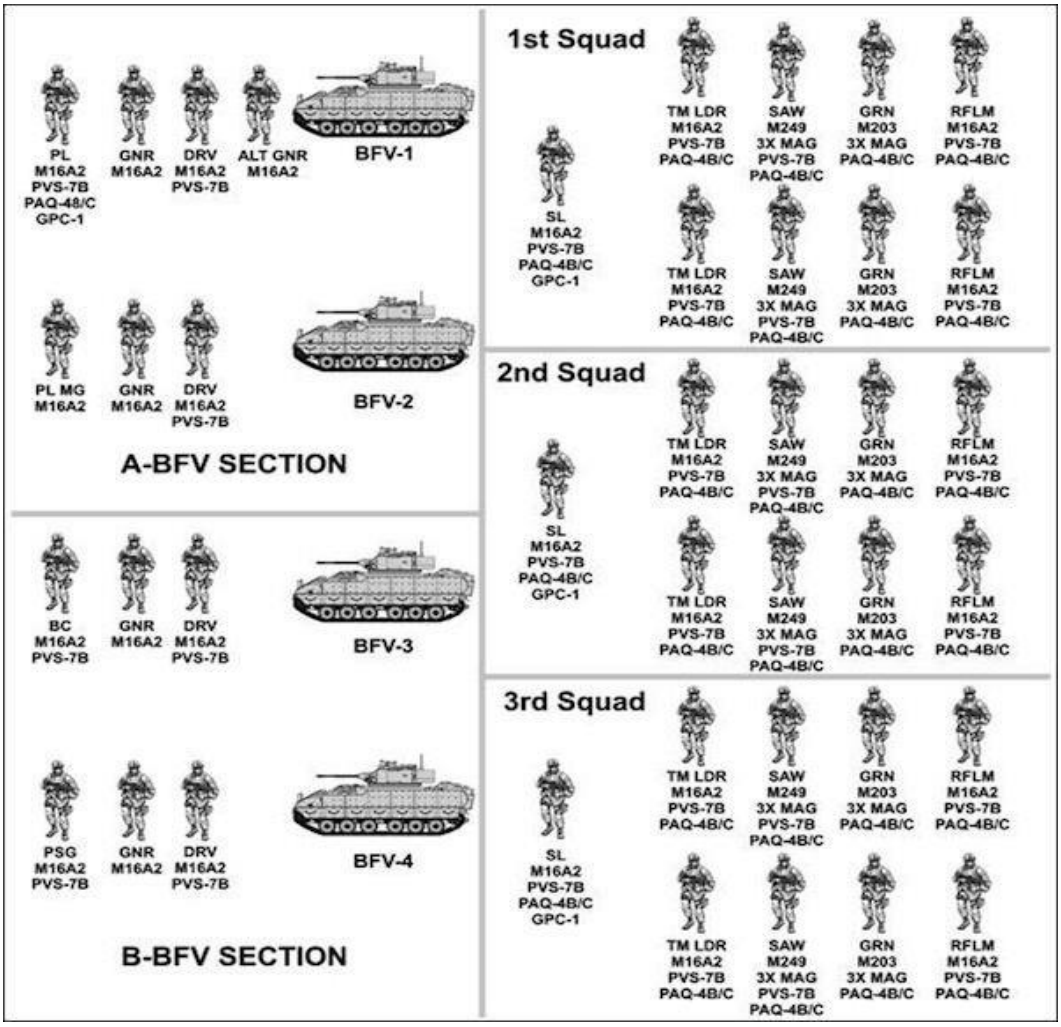


Figure 4: US Bradley platoon[105]

The 1988 reorganisation of the Bradley platoon sought to remedy the problems associated with having a reduced section size in each Bradley against the requirement to generate a nine-man section.[106] This led to forming two 9-man sections or one large section per Bradley pairing. The restoration of the large section was at the expense of the platoon because the mounted and dismounted elements were considered separable when required. A further 1998 reorganisation gain led to changes in the quantity of sections relative to the infantry platoon. Figure 4 depicts the

[105] US Army. FM 3-21.71 (2010). This was the F-series platoon that sought to combine the mounted and dismounted capabilities by assuming risk in splitting the dismounted elements between vehicles. It is the present model (less equipment) for the US Army and not recommended as a way to approach structuring infantry with an IFV.

[106] Haworth describes a period in the early 1980s whereby Bradley dismounts were reduced to five due to a requirement to maintain a 'loader' for the TOW and the problem of low recruiting in mechanised infantry units.

present model of Bradley platoon.[107] The platoon structure demonstrates both a dismounted capability and a separate IFV capability by splitting dismounted sections between the vehicles. Overall, the platoon has three sections of nine and a vehicle element of four that can be split into pairs. When the vehicular element splits, however, the dismounted element is unnecessarily split also. This structure reflects the ability of the Bradley platoon to operate toward the 'independent' sector of Simpkin's Triangle due to a large dismounted element beyond that carried in a single vehicle.

There are a number of tactical problems observed with the US structure that are worth exploring to avoid similar problems with an Australian model whereby the IFV may not have the requisite seating to house the current model of an M113-based mechanised section. The first issue relates to the fact that a single vehicle is unable to deliver a single section to an objective. This would lead to friction at the lowest level at what would be the most crucial point in close combat. For the section commander, face-to-face communication would not be possible until the fire teams have assembled after leaving the different vehicles.[108] To remedy the requirement to be in close proximity for the purpose of regrouping to conduct dismounted combat, either of two things must occur. First, the IFV must manoeuvre to close proximity with the other to affect link-up thereby exposing itself to greater risk of destruction. Second, the soldiers from another IFV must move away from it to regroup with their parent section – likely under fire or in close contact with an enemy. It all suggests that the ability to conduct close combat immediately upon dismount is likely to be more difficult simply because sections need to reconsolidate from different vehicles on different parts of an objective.[109]That these two aspects would be in-built into the platoon on

[107] US Army. FM 3-21.71, (2010) 1-17, Figure 1-4. The Bradley Platoon Structure.
[108] Bruce Held et al. *Understanding Why a Ground Combat Vehicle that Carries Nine Dismounts is Important to the Army*. (Santa Monica: RAND, 2013), 29. This would be the least ideal model for a section commander to deal with.
[109] Ibid.

the basis of maintaining a 'generalist' capability seems to be an unacceptable risk when considering the implications of confusion during manoeuvre under fire on an objective.

The US evolution of section sizes and platoon structures from the inception of the IFV in 1982 reflects a struggle to align doctrine with technology and maintain the M113-style of 'generalist' infantry. In this case, technology was implemented before there was a conceptual understanding behind a reduced section or platoon size. The acquisition of an IFV in the Australian context necessitates that Army addresses the requirements for a reduced section before the arrival of the new technology. If the IFV dictates a reduction in section size, therefore a case can be made for a reduction in the scope of tasks for the dismounted element. The reduction in scope could amount to a specialisation for the purpose of increasing the relative effect of the tank and maneuvering as first echelon forces as part of armoured close combat.

Another issue in transition was coordinating the two different training models for the new IFV and the full suite of dismounted infantry tasks. US doctrine at the time demanded that the Bradley-equipped section be treated as a complete entity, yet the time demands on training the entire capability exerted pressure to split training into infantry, gunnery, and tracks.[110] Haworth describes how the challenge could be overcome through an examination of doctrine and specialisation that would inform training. "On the doctrinal front, some of the conflicts inherent in trying to operate armoured vehicles within the framework of the infantry ethos and mission might have been avoided by seeing the dismounted element as a specialist subset of an armoured force rather than seeing armoured vehicles as a piece of equipment within a general purpose infantry force."[111] This conflict appears to be outwardly resolved by the German model of *Panzergrenadier*, specifically, that a specialised structure and role was adopted with the

[110] Haworth, *The Bradley and how it got that way*, 102.
[111] Ibid. 153.

introduction of an IFV and the reduced section size was treated according to a narrower mode of employment. A number of useful observations are found in the US transition from M113 to IFV:

1. Development of new doctrine to support the employment of the IFV prior to fielding the capability including tactical structure from section-level up.
2. Implementation of new doctrine as quickly as possible to enable training.
3. Instituting a specialised section structure to suit employment of the vehicle and avoid keeping large sections distributed between vehicles (avoid a regroup on dismount).
4. Development of a stream of senior non-commissioned officers to ensure technical aspects of the vehicle such as gunnery can be trained to the required level in-unit.
5. Reduction in the training requirements for the dismounted infantry relative to the scope of employment to fit within a defined mode of infantry.
6. Issues with the requirement to train an IFV crew like a tank crew eg. gunnery

Haworth's final observation regarding the fielding of the Bradley relates to proponency and questions of ownership in training, management, and culture in hybrid organisations[112] – whenever the path of least resistance was taken institutionally, the Army ended up taking the path of greatest resistance doctrinally. The divided opinions between the armour and infantry branches over the infantry fighting vehicle was one of the most difficult aspects of fielding the capability.

[112] Ibid, 157.

4.2 The South Korean Transition

The K21 IFV was fielded as a successor to the K200 APC in 2009 after a ten-year development period. This was a deliberate intention to increase the lethality of the armoured vehicles available to the infantry who were previously equipped with a domestically produced M113-equivalent – the K200.[113] The Republic of Korea Army (ROKA) fielded the relatively new capability in the context of fighting against the BMP and BTR-equipped units of North Korea on the DMZ. Depicted in Figure 5 is the standard ROKA Mechanised infantry company. Of note is the integral indirect fire support provided by IFV mortar variants.[114] This section will detail the training challenges and recommendations based upon the transition from K200 to K21.

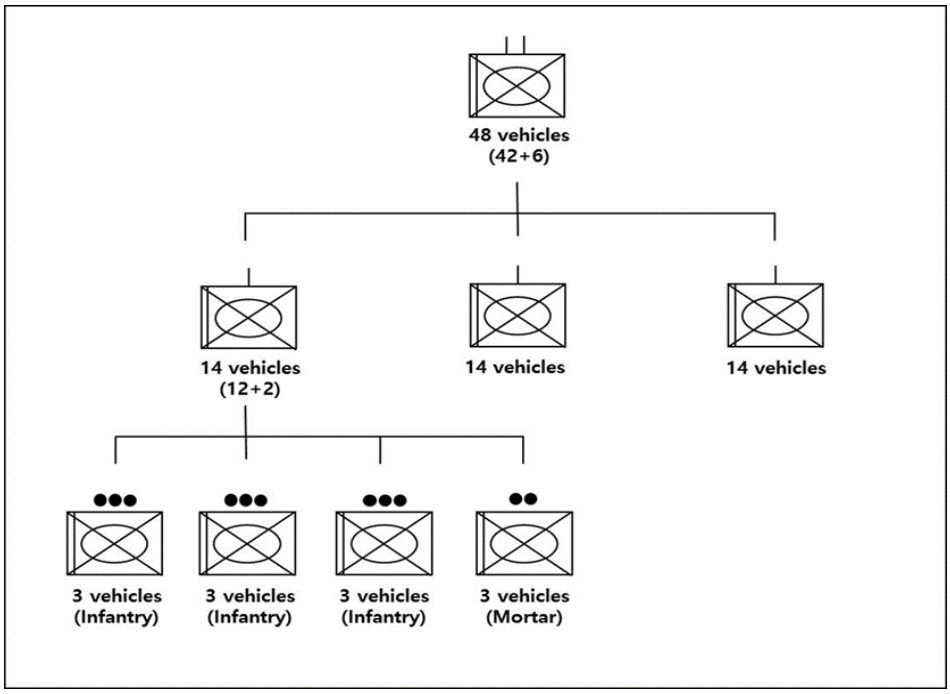


Figure 5: The ROKA Mechanised Company

The premise for the development of the K21 was to combine the best of the available IFV technology with an amphibious battlefield taxi akin to an M113 with the result manifesting as the

[113] Press release related to ROKA unveiling of the latest version of the K21. http://nationalinterest.org/blog/the-buzz/south-koreas-deadly-infantry-fighting-vehicle-terror-the-15751

[114] This diagram translated from ROKA 2nd Mech Division doctrine attributed to Major Hankook Cho, ROKA, 21 Jan 2018. Issues with translation form Korean to English prevent a more through exploration of ROKA doctrine.

structure depicted in Figure 5. The challenge for the employment of the K21 was then to identify the optimum employment for the hybrid vehicle. The K21 adopted the German concepts of chain gun and anti-tank missiles while maintaining the ability to transport the large infantry section around the battlefield.[115] This allowed the IFV to have multiple roles: transporting personnel, supporting infantry, supporting tanks, and killing enemy tanks. It is for these reasons that the ROKA struggled to define its main role on the battlefield. Due to the radically upgraded capability of the K21, the value of the mounted element came to compete with that of the dismounted element and it remained unclear which was more valuable.[116] A clear solution in this case was to produce new doctrine to consider the intended roles and the relative importance between the dismounted riflemen and the IFV. In developing doctrine, the ROKA identified sub-challenges to include: defining the IFV's role, developing procedures for the crew, tactical employment, and optimum organisation for the section and platoon. The last aspect was given relatively little weight in comparison to the first three as the structure had not changed.

Despite retaining the same sized section as used in the previous K200 battalion, the ROKA identified different concepts for employment, and therefore, different requirements to train IFV units. The first of which was mounted gunnery training. ROKA identified that gunnery training should be integrated with tactical training to prevent the isolation from tactical training and the technicalities of gunnery becoming an end in itself.[117] The perceived technical burden of an advanced vehicle with the associated turret was related to the second problem of fielding an IFV unit – dismounted infantry training. This problematic aspect was itself mirrored in the US

[115] Changho Lee. "The Challenges in Training the Mechanized Units of the Republic of Korea in transitioning from the APC (K200) to the IFV (K21)." Master's Thesis, US Army Command and General Staff College, (Fort Leavenworth, Kansas, 2012), 55.
[116] Ibid, 56.
[117] Ibid, 59.

transition and identified in 1995 though seemingly not addressed in the ROKA example.[118] Structurally, it could be a result of the 'generalist' and 'specialist' argument related to the mode of employment for infantry. If the IFV has an increased technical burden with the resultant requirement for more hours of training by the same people, what is the expected compromise?

The answer offered here is to reduce the scope of dismounted tasks to create a specialised mode of employment for infantry with IFVs. The ROKA approach was to refine infantry tasks to working more with tanks such as breaching obstacles, securing objectives, and employing anti-tank missile systems.[119] Like the US of the 1980s and 1990s, the ROKA also struggled to reconcile the requirement to train one aspect of the capability at the expense of the other. The ROKA identified the requirement to revise dismounted tactics due to the change from APC to IFV. The key tension was: "the competing need between dismounting infantrymen to close with an objective and maintaining sufficient stand-off range for employing chain gun and anti-tank missiles."[120] The solution was to train leaders in defined conditions requiring the infantry to dismount. Though seemingly a tactical issue, the unnecessary slowing of the formation could have operational issues for momentum and tempo when it came to enabling tanks. The ROKA example identified the problems of training a hybrid organisation when the level of technical expertise was increased without relative changes to any other requirements. The recommendations from the ROKA experience are offered for Australia's transition from APC to IFV. A short summary of recommendations for transition from APC to IFV are as follows[121]:

[118] Gibbons, "Why Johnny can't dismount", 34.
[119] Changho Lee. "The Challenges in Training the Mechanized Units of the Republic of Korea in transitioning from the APC (K200) to the IFV (K21)", 75.
[120] Ibid, 68.
[121] Ibid, 78.

1. A clear statement that the IFV is a new tool to support armour in the offence and to take and hold ground.
2. The Infantry School should play a central role in providing the integration of doctrine for IFV training and employment.
3. The mounted and dismounted elements are almost equally supported and supporting.[122]
4. Articulate the conditions which require infantry to dismount and refine the responsibility of the dismounted leader.
5. Refine the essential training tasks for dismounted infantry in IFV units.
6. Develop institutional training programs for IFV infantry leaders.
7. Exclude the section leader from the vehicular leadership position to prevent overtasking.
8. Generate a cadre of NCO gunnery instructors to ensure efficiency in turret training.
9. Adopt a second SNCO to support the dismounted element in addition to that required for the IFV grouping. (A dual SNCO system at platoon and company level[123])

4.3 Dealing with the Dismounts

The US experienced significant doctrinal tension associated with generating and maintaining the dismounted aspect of the capability, acknowledging from the outset that it was comprised of competing training objectives within the finite bounds of time and resources. The impost of a more technologically capable vehicle compounded the requirement to continue to train to the full scope of dismounted infantry tasks. One way to mitigate against this systemic

[122] There would appear to be a similarity between ROKA and *Panzergrenadier* modes of employment despite differing section sizes and IFV numbers per platoon. The basis for this has been hard to discern due to English translation limitations.
[123] This would not be unlike the present 'Mechanised Sergeant' resident in the Australian approach.

competition is to reduce the scope of tasks required by the infantry. This can be done by creating a specialised structure complete with defined tasks and establishing a system whereby the mounted and dismounted aspects of the unit can be trained by two sets of instructors to best generate concurrency in training.

Writing in 1988, Severn observed the US Army attempting to integrate the IFV into normal tactical training and live-fire scenarios in Europe. He identified the need to train the mounted and dismounted 'elements' as opposed to single sections and platoons to prevent the additional requirements for gunnery taking primacy at section and platoon level.[124] He posited that: "Training as separate elements offers a practical solution to the existing dichotomy and builds trust, confidence and teamwork."[125] Collective tactical training needed to be focused on reaching element proficiency before conducting culminating training as a complete IFV platoon – essentially training dismounted teams and vehicle crews separately at platoon level. Severn notes that NCOs in each element can more easily achieve proficiency since the number of tasks required by each of them is reduced significantly.[126] This aspect of the US transition from APC to IFV combined with the similar approach by the ROKA may offer a conceptual way to design combined in-unit training for the Australian Army commencing at platoon and above. Additionally, a defined collection of armoured infantry tasks at the section level may support the ability to meet the baseline of training relative to the technical complexity of the IFV.

Earlier in the thesis, a definition for Australian armoured infantry was offered as one which is primarily responsible for armoured close combat with integral support from an IFV. The placement of the Australian capability on Simpkin's Triangle wholly in the 'Support' realm is the

[124] Severn, Theodore R. *Air-Land Battle Preparation: Have We Forgotten to Train the Mechanized (Dismounted) Infantrymen?* (US Army War College. Carlisle Barracks, Philadelphia, 1988), 29.
[125] Ibid, 30.
[126] Ibid, 31.

preferred mode of employment. When considering the operational level tasks to support tanks and undertake combat actions in the mid and high intensity levels of conflict, the exact scope of for the accompanying infantry can be narrowed to best effect. They could take their origins from both *Panzergrenadiers* and previous manifestations of armoured infantry.[127] The basic tasks for dismounted infantry are likened to:

1. Breaching or removing hasty obstacles in attack and advance
2. Neutralising or destruction of antitank weapons
3. Designating targets for tanks
4. Protecting tanks against individual antitank measures (identifying/marking lanes)
5. Leading the attack when necessary (through complex terrain)
6. Providing security for tanks (at the halt, harbour, or in battle positions)
7. Breaking into a fortified objective through intimate support with armour
8. Mopping up and consolidating the objective through reduction of strong points
9. Employment of anti-tank weapons against enemy vehicles (in complex terrain)
10. Supporting the delay and defence through occupation of prepared positions

This is by no means an exhaustive list but seeks to identify the basis by which individuals can be trained relative to the definition and conceptual mode of employment for armoured infantry offered in this research. The unit structure and recommendations to refine and implement the conceptual ideas behind armoured infantry are included as appendices A and B.

[127] Ney, 69.

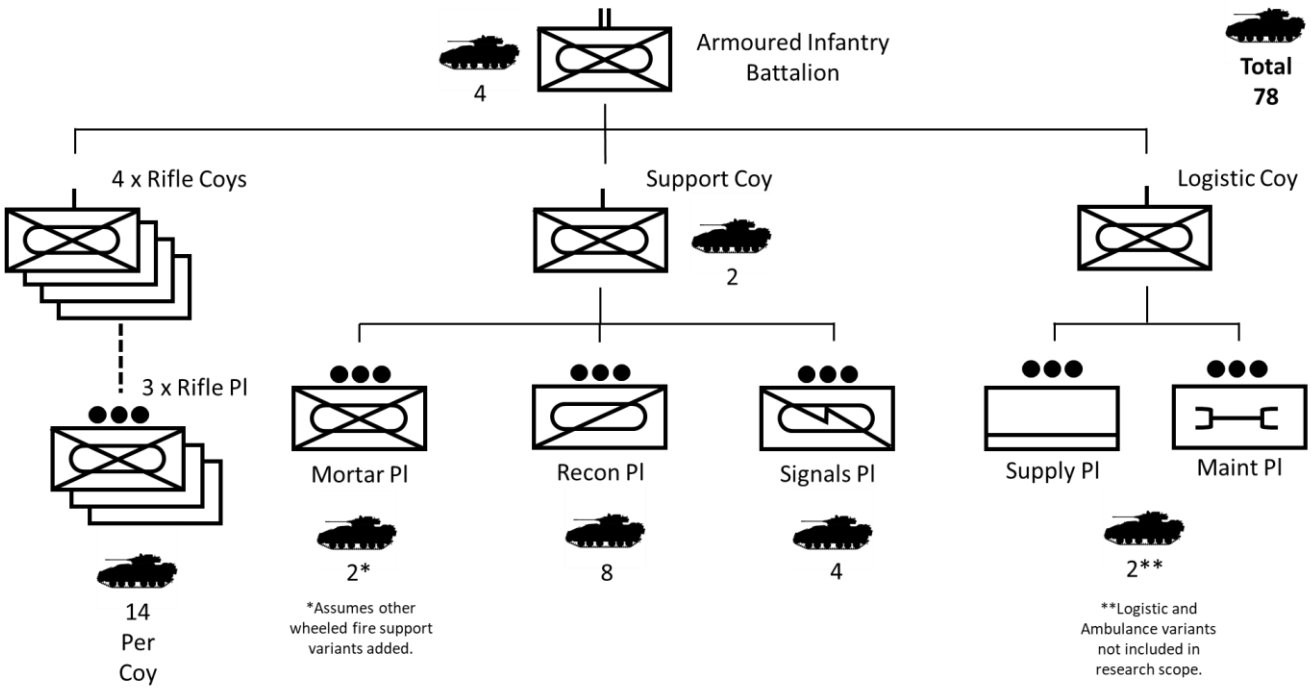
5. Conclusion

Australia's 53-year history with the M113 has embedded an approach to infantry equipped with APC's that requires a rethink in the lead up to the acquisition of the IFV. There is no question that the armoured infantry soldier requires a different mindset to understand the scope of tasks and the significant increase in technology resident within the IFV capability. To see infantry navigating at high speed, fighting a stabilised system with anti-tank missiles, executing tank-killing missions, conducting hasty clearances, breaching obstacles, and engaging in stability operations before transitioning to attack a fortified urban objective all demonstrate a capability beyond that of the present mechanised battalion. Such a vision really encapsulates an infantry specialist whose bias is toward armoured close combat and combined arms in the truest sense. It is also offered as one example of the partnership between human endeavour and technology envisaged by LTGEN Campbell in 2016. When planning the future of infantry and the transition away from M113, it is worth considering the examples of the 1991 and 2003 Gulf Wars, the 2006 and 2008 experiences of Israel in Lebanon and Gaza, and the German experience in Afghanistan up until 2015 as indicative examples of modern hybrid conflict. These are all instances whereby infantry equipped with an IFV, often closely aligned with tank forces, provide a significant capability in both mid and high-intensity conflict that proved the defining difference in the campaign. The use of high IFV to tank ratios, development of close and far engagement techniques with all onboard weapons within close proximity to the dismounted infantry are all important aspects to consider.

To best meet FLOC's requirement for decisive action and distributed manoeuvre, the acquisition of the IFV under L400-3 should drive thinking toward a specialised infantry; particularly if the IFV cannot accommodate the same sized section of the present APC and the

future operating environment requires more from its close combatants than that offered by the present mechanised battalion. Such thinking should emphasise the design-driven approach and articulation of the resultant issues in applying an inappropriate system of doctrine, people, and technology. This thesis sought to articulate the conceptual and structural change imperative based on the acquisition of the IFV and future transition from M113 which must ostensibly start with a useful definition leading to an effective mode of employment. The German model for the *Panzergrenadier* offers an extremely useful start point for a hybrid infantry-armour organisation in determining that which Australia could adopt by 2025. In identifying these things first, Army should then look to the transition undertaken by the US and ROK to best identify the pitfalls of increasing technology and training requirements, but not altering the mode of employment or modifying doctrine effectively beforehand. In the case of the US alone, the resultant structural and doctrinal tension suggests it is still not optimal. Additionally, further review of US and German doctrine detailing a place for the armoured infantry battalion within the Combat Brigade will establish a start point for developing doctrine ahead of the transition. A clear approach to understanding the interaction between the IFV and tank forces, a clear definition of the intended capability, and a mode of employment supported by adequate doctrine will prove decisive in generating an effective combat system. When the advantages of technology in partnering human endeavour are considered, it ultimately suggests that the acquisition of an infantry fighting vehicle requires a systemic change to best enable infantry to conduct combined arms close combat beyond M113 and certainly well beyond 2025.

Appendix A: Armoured Infantry Unit Structure



Armoured Infantry Battalion (ArInf)

Characteristics. The IFV is central to shoot, move, communicate, and task-organise effectively within the brigade. The structure is based on the definition offered for the Australian capability.

Divisible. The battalion is designed as a 'first echelon' force built around four rifle companies. The battalion can detach two rifle companies to form a 2:1 battlegroup with the Armoured Cavalry Regiment (ACR) whilst retaining a similar weight of combat power in the remaining elements. Equally, the addition of tanks allows for a sub-unit to be replaced within the ACR. The structure is designed to be more adaptable to forming battlegroups within the Combat Brigade as a whole.

Integral firepower. Removing the 'heavy weapons platoon' acknowledges that the battalion is able to support manoeuvre primarily through the IFV and associated ATGM (including handheld section-level anti-tank weapons). The second assumption is that the habitually grouped tanks are also able to provide a better effect than man-portable systems either as a reserve or main effort force. The question of a battlegroup reserve is answered through the addition of a fourth rifle company perceived to be of more utility than a single platoon.

Integral recon. The recon platoon provides Army's only integrated mounted and dismounted capability. A total of four patrols and a sniper section would be the baseline requirement.

Appendix B: Recommendations to aid implementation

Recommendation	Comments
Endorse Problem statement for transition planning: "The transition of mechanised battalions away from M113AS4 and subsequent acquisition of an IFV risks disaggregation of the capability and limited adaptation if inappropriate concepts, structure, and culture are adopted."	This 'problem statement' would be the start state for further investigation by FORCOMD planners when it came to understanding how to transition from APC to IFV. It is intended to generate thinking across the range of doctrine and training requirements to achieve integration. Transition will be likely as important as acquisition because the resultant issues may persist for years.
Adopt Definition: "Australian Armoured Infantry is the primary capability responsible for armoured close combat. It generally operates with and in close support of tanks, able to rapidly transition between mounted and dismounted combat as a versatile combination of infantry and integral armoured support."	Defining the capability has utility in the development of doctrine at both tactical and operational levels of war. From the definition, all other aspects of the conceptual thinking could be derived.
Adopt Mode of Employment characterised by: 1. Support to small numbers of tanks. 2. Intimate support to infantry. 3. Rapid transition between mounted and dismounted combat. 4. Employment of the IFV ATGM	These four key tasks would be behind the development of tactical doctrine and individual training at the schoolhouses.
Examine specialised scope of tasks for IFV dismounted infantry section of 6. Review German doctrine in bibliography as a start point and an overview of Virgil Ney's work would also be useful.	The development of new TTPs behind smaller squad sizes reconciled with tasks to support armoured close combat needs to be the focus. It may equate to doing one third less of regular infantry DMETL but offer new tasks to breach or attack by fire with anti-tank systems.
Endorse Armoured Infantry battalion structure: 1. Conduct simulation testing. 2. Provide alternative models to that proposed. 3. Establish best practice based on the above.	This structure really focuses on 4 rifle companies as a trade-off to making it more interoperable with the rest of the brigade.
Establish an approach for integrating the battalion structure into the Combat Brigade's manoeuvre. 1. Review US doctrine: US Army doctrine. FM 3-90.1 *Armor and Mechanised Infantry Company Team*, 2016. 2. Review US doctrine: FM 3-90.5 *Combined Arms Battalion*, 2016. 3. Review German doctrine: *HDv 231/100, Das Panzergrenadierbatallion*, 2001. 4. Develop doctrine for grouping and employing the ArInf Battalion including ATGM employment.	An ideal scenario would see the CAB integrated as a Panzergrenadier battalion that supports armoured offensive action at the operational level. This type of manoeuvre enables further operational reach with a bias for offensive action not previously available to infantry battalions in the Australian Army. It will remain a function of mindset enhanced by equipment and doctrine.

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