The Anti-Armour Capability Gap

By Justin Petersen

Introduction

Australia currently possesses 59 M1A1 main battle tanks and ranks 88th in the world for number of main battle tanks owned [1]. Compare this to the top six nations, listed in descending order: Russia, China, United States, North Korea, Egypt, and Syria that respectively own 20,300, 7,716, 5,884, 5,243, 4,946, and 4,640 tanks [1]. Whether the next conflict is waged in urban, open, or naturally restricted terrain, history has shown that the tank will be the dominant method for force projection on the ground. This should raise questions in how our Army plans to defeat this potential future threat. At an average cost of $6.2 million per M1A2 Abrams Tank [2], it is neither fiscally possible nor prudent to increase the lethality of our force through the proliferation of a number of tanks comparable to even the top 50 tank owning nations. Fortunately, as an Army in the midst of modernisation and reorganisation, we are in a unique position to identify, refine, and employ improvements to our force that can defeat the modern tank without the costly option of acquiring more tanks.

In 2014, under the Forces Command (FORCOMD) Directive 115/14, FORCOMD directed a three phase campaign plan with the aim of modernising and generating a "relevant and sustainable Reinforced Combat Brigade that is able to operate and win across the spectrum of conflict as part of Defence's Maritime Strategy."[3] These phases consist of a preliminary phase (Plan Beersheba), Phase 1 (Consolidate and Modernise) and Phase 2 (Integrate and Realise) [3]. Plan Beersheba, implemented in 2014 and completed in 2017, has seen the restructure of the Army's three Combat Brigades into like multi-role formations comprised of a Headquarters, Mechanised Infantry Battalion, Motorised Infantry Battalion, Armoured Cavalry Regiment (ACR), Combat Engineer Regiment, Combat Signals Regiment, and a Combat Service Support Battalion [4]. We are currently in Phase 1 of the campaign, spearheaded by the appropriately named, Plan Keogh* [5].

Through Plan Keogh, "FORCOMD will implement directed and identified structural and capability change within the Combat Brigades (CBT BDE), using outcomes to guide other interdependent tasks. Synchronisation will ensure that personnel, training, in service equipment capability and future equipment capability components are considered in a comprehensive and coherent manner across multiple Lines of Effort (LOE)"[5]. Plan Keogh will also serve as a provisional solution to the Army's implementation of the Land 400 (L400) project by using antiquated equipment (and by proxy, tactics, techniques and procedures (TTPs)) to develop the "experience, procedures, training systems and doctrine that will support introduction of the L400 fleet from FY 23/24 onwards"[5]. For the uninitiated, L400 is the procurement project in current application that has the directed goal of modernising the Army's mounted fleet [6].

In so many words, we are now in the process of creating the foundational doctrine for our future modernised force, and we are doing so with outmoded equipment and TTPs combined with Army's interpretation of how to best implement newly acquired equipment. The focus of this paper will be on the identification of a deficiency pertaining to a vehicle mounted anti-armour (AA) capability as it relates to FORCOMD directed modernisation and a proposal to correct this deficiency. This will be achieved by exploring the evolution of the use of anti-tank (AT) and AA weapons, describing the current and future army organisation and capability, explaining the current and projected AA capability gap as it relates to the current and projected force, and presenting a proposal for ameliorating this gap.

* "COL EG Keogh (1899 – 1981)….reinforced that we cannot limit ourselves to matters of interest primarily within our own remit. Comprehensive force design decisions, informed by analysis and professional mastery, are critical if we are to have a force capable of winning in the next war." [2]

Genesis and Evolution of the Anti-Tank Weapon System

In 1916 during the throes of World War I, at the Battle of Flers–Courcelette, a new technology, the tank, introduced by the British Army, entered the battlefield equipped with heavy armour, 6lb guns and 8mm machine guns, forever changing the nature of modern war [7]. As warfare has never been an exception to the rules of causality, the Imperial German Army engaged in an arms race to develop a weapon against these tanks. So it was, in May through September 1918, German companies, Mauser and Rheinmetall, produced the Mauser 13mm AT rifle and the 37mm Tankabwehrkanone (TAK) Rheinmetall [7]. These weapons would see little action, as the war would end in November 1918.

Understanding the Mauser 13mm AT rifle was nothing more than a bolt action rifle that fired an extraordinarily large calibre bullet and the 37mm TAK resembled a cannon from the Napoleonic era, it is easy to imagine the evolution of the AT weapon system from WWI to WWII was drastic. At the onset of WWII in 1939, the 13mm AT rifle quickly found its way into obsolescence, while the 37mm TAK persevered until 1940. Britain and France had found themselves significantly unprepared for the German Blitzkrieg, spearheaded by the Panzer tank. In 1939, after the German invasion of Poland, Britain deployed a British Expeditionary Force (BEF), consisting of 10 infantry divisions, one tank brigade, and a Royal Air Force detachment consisting of approximately 500 aircraft, to the French-Belgian border. The BEF, Belgian, and French Armies, having failed to update their AT weaponry since WWI, quickly found themselves ill-equipped for the onslaught of Panzer tanks they faced during the German invasion of France in 1940. Conversely, the Soviet Army had learned valuable lessons from numerous tank losses suffered by AT weapons in battles against the Nationalists in the Spanish Civil War (1936-1939) and the Japanese Imperial Army in a border war engagement in 1937. Consequently, the Soviet Army would develop and employ the sloped armour T-34, a medium tank that shocked the unprepared German Army, who had anticipated a far inferior force, during their Soviet invasion in Operation Barbarossa (1941) [7][8].

The tank versus anti-tank weaponry arms race continued, producing ever greater calibre guns such as the German Panzerabwehrkanone (PAK) 38 50mm AT gun, and creative munitions such as the high-explosive anti-tank (HEAT) and armour-piercing discarding sabot (APDS) rounds. Eventually, AT guns grew to a calibre range between 50mm to 100mm. These guns were nothing more than facsimiles of the 37mm TAK, only much larger, much more cumbersome to transport or conceal, and they proved nearly impractical in their original purpose, which was to destroy or immobilise tanks and quickly withdraw. By 1944, man-portable AT weapons such as the American Bazooka and German Panzerfaust, and tank-destroyers (armoured fighting vehicles) such as the American turreted M10 and M38 tank destroyers, the turret-less casemate German Sturmgeschütz III, and the turret-less Soviet SU-100 were prolific in the anti-tank campaign of WWII. Following WWII, tank destroyers were largely phased out of most armies, with the exception of China, Italy, and Spain. Following WWII, anti-tank technology demonstrated improvements in the recoilless rifle, and the development of anti-tank guided missiles (ATGMs) [7][9][10].

Post WWII, recoilless rifles such as the M67 90mm, 84mm man-portable Carl Gustaf and M40 105mm emerged on the battlefields of the Korean War. While the M67 90mm discontinued service after the Korean War, the Carl Gustaf and M40 were used substantially by multiple nations and non-state actors in the Vietnam War (1955 -1975), South African Border War (1966 – 1989), Falklands War (1982), Salvadoran Civil War (1979 – 1992), War in Afghanistan (2001 – present) and conflict zones in Egypt (2013), Syria (2011 – present) and Libya (2011 – present) [11][12]. Major contributing factors to the longevity of service afforded to these recoilless rifles are the cheaper costs relative to ATGM and 120mm alternatives, reliability of projectile delivery in austere environments and through vegetation, faster firing rates compared to ATGM, versatility in munitions use, and depending on the sights used, can be impervious to electronic countermeasures [13].

Early ATGMs such as the Manual Command to Line of Sight (MCLOS) Australian/UK developed Malkara (in service 1958-1960s) proved too heavy to be man-portable and a difficult control unit contributed to poor accuracy. It was soon replaced by the similarly wire-guided, optically tracked, and manually guided Vickers Vigilant ATGM. This MCLOS ATGM and others of its generation were convenient in their versatility of dismounted or mounted employment and lethal with an average maximum range of approximately 1.3km within 12.5 seconds and warhead penetration of up to 576mm of armour. A significant vulnerability to these weapon systems and their operators was the necessity of the operator to maintain visibility of the target within the weapon's graticule whilst manually manoeuvring the missile onto the target until impact, thus greatly increasing the exposure of the operator. The second generation of ATGM developed and in current use are the Semi-Automatic Command to Line of Sight (SACLOS) and are deployed via wire-guidance, radio-guidance, or beam-riding. These SACLOS ATGMs no longer require the operator to manually guide the missile onto the target, however, the operator is still required to maintain the sighting device on the target until missile impact. Additionally, radio-linked ATGM are vulnerable to jamming, and wire-linked ATGM are fragile and prone to misfiring in any terrain that is not completely open. Examples of SACLOS ATGMs are the Milan, TOW, LAHAT, and Hellfire I [12].

Modern ATGMs are now laser-guided (utilising electro optics) and the missiles employed utilise thermographic cameras or W-band radar seekers located in the missile nose to stay locked onto its target. This technology allows the operator to fire the ATGM and immediately withdraw. The disadvantage to this technology is that it is more vulnerable to electronic countermeasures than the MCLOS and SACLOS ATGM. Some current ATGMs found on today's battlefield are the Spike LR2, Javelin, VIKHR, TOW2, and Swingfire [14].

Just as armour advanced to compete against AT weapons in WWII, so too has modern armour advanced to compete against ATGMs, HEAT missiles equipped with tandem warheads and Armour-Piercing Fin-Stabilised Discarding Sabot (APFSDS), successor to the APDS. Modern militaries around the world are using explosive reactive armour, non-explosive and non-energetic reactive armour, and directed energy reactive armour on tanks, Armoured Personnel Carriers (APCs), and Infantry Fighting Vehicles (IFVs). Explosive reactive armour consists of an explosive sheet sandwiched between two metallic face plates. Upon contact with a penetrating munition such as a tandem warhead, the explosive sheet detonates against the shape charge, sending the face plates forward, damaging the penetrating munition within the shape charge. Non-explosive and non-energetic armour operate similarly to explosive reactive armour, only the inner sheet consists of an inert layer such as rubber rather than an explosive layer. This inert layer, when contacted by a shape charge, creates a localised bending in the face plates, dissipating energy from the shape charge, and subsequently from the penetrating munition. Directed energy reactive armour is constructed of multiple counter-measure modules that react to incoming munitions according to their type and trajectory by fragmenting the munition or rendering it inert with a focused ballistic or energy beam. Active Protective Systems (APS) on tanks such as the Russian Armata T-14 and the Chinese ZTZ 99A are capable of detecting and intercepting MACLOS and SACLOS missiles.

Current Force Structure and Capability as of February 2019

As described in the introduction, the Regular Army's three combat Brigades are arrayed in three like multi-role formations. The ACR is organised into a Headquarters (comprised of ASLAVs), Tank Squadron (comprised of M1A1s and M113AS4s), 2x Cavalry Squadrons (comprised of ASLAVs), and a Support Squadron. The M1A1, at 63 tons, is equipped with a 120mm main gun, 12.7mm M2, and 7.62mm coax. The main gun has an effective firing range of 4km with sabot rounds and 8km with Laser Homing Anti-Tank (LAHAT) rounds. The ASLAV, at 13 tons, is equipped with a 25mm chain gun and 7.62 MAG58. It has no integral anti-armour armament. The M113AS4, at 19.8 tons, is equipped with a 12.7mm M2.

Mechanised Infantry Battalions are composed of a Headquarters, three Mechanised Infantry Companies, a Support Company, and a Combat Service and Support (CSS) company. The Mechanised Infantry Battalions are comprised of M113AS4s. Their only anti-armour capability is the man-portable Javelin and 84mm MDFSW M3 Carl Gustaf. The Javelin's range is between 65m to 2km and the flight time is 1km every 7 seconds. The M3 Carl Gustaf was designed in 1991, has a range of 100-500m, and is capable of firing anti-personnel and HEAT rounds [11].

The Motorised Infantry Battalions are composed of a Headquarters, three Motorised Infantry Companies, a Support Company, and CSS company. These battalions use Protected Mobility Vehicle (PMV) Bushmasters, and like the Mechanised Infantry Battalions, are equipped with Javelins and M3 Carl Gustafs. The Bushmasters are equipped with the 7.62 MAG58.

Future Force Structure and Capability [5][15]

At the completion of the final phase of FORCOMD Directive 115/14, between the year 2029 and 2030, the Australian Army's organisational structure will look very much like it does today. The capabilities, however, will be drastically different, as the Army will have become modernised through the procurement of contemporary equipment.

Between the years 2018 and 2021, the Army will have received 1100 PMV-Light (L) Hawkeis. The Hawkei, weighing 7 tons, will replace the outdated Land Rover and fulfil multiple roles as command, utility and combat vehicles within the Brigades [12][13]. It will be equipped with a Remote Weapon Station (RWS) or pintle with the option to mount the 12.7mm M2 or 40mm Automatic Grenade Launcher (AGL), or it may be equipped with a swing mount for 5.56mm Minimi and 7.72 MAG58 [12][13]. At only 7 tons, the Hawkei can be transported by the CH-47 Chinook.

Rheinmetall has secured a contract to produce 211 Boxer Combat Reconnaissance Vehicles (CRV) with anticipated delivery dates between 2022 and 2026 [18]. The Boxer will replace the ASLAV within the Cavalry Squadrons of the ACRs. At 38.5 tons, the Boxer will be equipped with a Mk30-2 30mm cannon and Spike LR2 ATGM. The range of the Spike is between 2km to 4km, has a ready to launch time of 30 seconds, and a reload time of 15 seconds.

A request for information to produce 450 tracked Infantry Fighting Vehicles (IFV) has been released and requires a delivery date between 2025 and 2029. While details of what armament will be included in the IFV are not yet known, it stands to reason that it will be equipped with a gun between 25mm to 35mm and will contain some kind of ATGM.

In its current and projected structure, the Motorised Infantry Battalion has one Anti-Armour (AA) Platoon within Support Company. This AA Platoon will consist of a Platoon HQ and 3 sections, each equipped with 2 PMVs [15]. These Platoons will have the option to draw 84mm M4s and Javelins from the Support Company. There is not, nor is there projected to be, a mounted ATGM on the AA Platoon PMVs. Within Support Company is the Reconnaissance Sniper Surveillance (RSS) Platoon. This platoon is comprised of a HQ and 5 sections with each section containing 2 Hawkeis [15]. With what armament these Hawkeis will be equipped is unknown. See Figure 1 for the PMV Battalion force structure.

The IFV Battalion will have IFVs presumably equipped with ATGM. As with the Motorised Infantry Battalion, the IFV Battalion Support Company contains one AA PL, comprised of 3 sections (containing 1 IFV each), and one RSS PL, comprised of 5 sections (containing 1 IFV each) [15]. See Figure 2 for the projected IFV force structure.

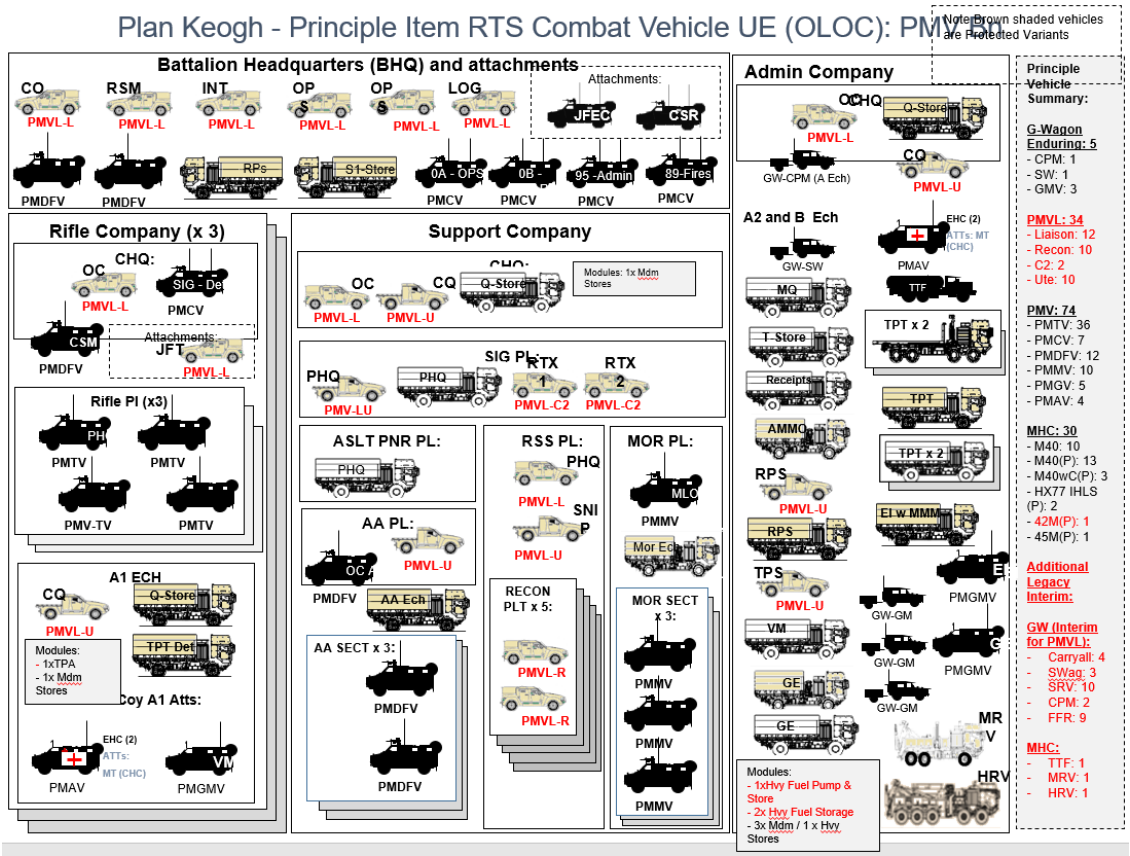

Figure 1. Current and projected force structure of the PMV Battalion IAW Plan Keogh. [5][15]

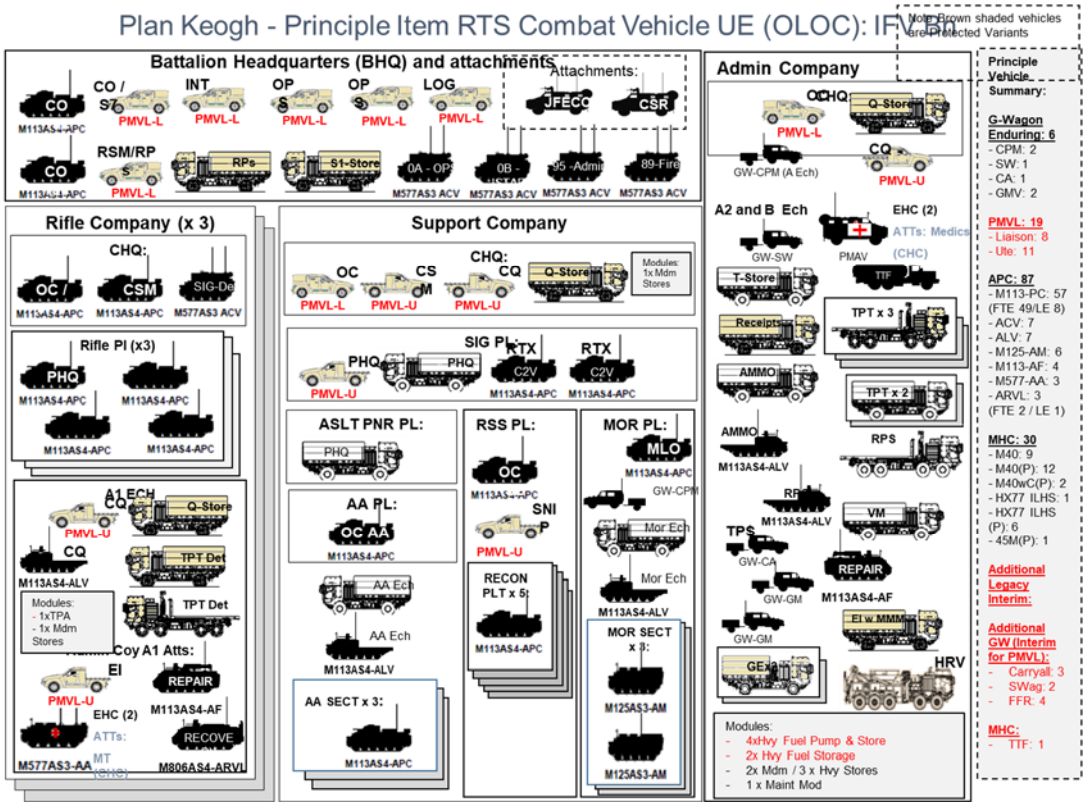

Figure 2. The current force structure of the Mechanised Infantry Battalion. Under Plan Keogh, the M113AS4s will be replaced with IFVs, transforming the Mechanised Infantry Battalion into the IFV Battalion. Aside from the replacement of the M113AS3s, the organisation will remain the same. [5][15]

Where's the Gap?

According to the 2017 Concept for Employment of Army's Combat Brigade,

> "Army must possess a force able to deploy rapidly to austere areas whereupon they are capable of immediately commencing decisive land combat operations….Army's ability to effectively operate in an urban, littoral and highly-lethal land environment is an absolute imperative for successful close combat. Army must be adequately protected, armed and mobile to function against these threats."

In its current state, with the exception of the Mexeflote barge, the Royal Australian Navy (RAN) lacks an appropriate ship to shore connector for the M1A1 tank due to the failed LCM1E and LCM2000 project. The antiquated LCM8 will remain in service until 2027. With a carrying capacity of 54 tons, the LCM8 is able to transport 2 ASLAVs or 2 PMVs per launch. When the Army's vehicle fleet is replaced, the LCM8 will be restricted to transporting 1 Boxer at a time. With 15 LCM8s in the ADF, this will give our force the ability to launch up to 15 armoured platforms with anti-armour capability within an initial beach landing. Given these ship to shore issues, I would submit that the ADF will not be prepared for rapid deployment into urban, littoral or highly-lethal environments with a force capable of immediate decisive combat operations, especially against an armoured threat in the close fight.

In its projected force structure, the Motorised Infantry Battalion will not have an organic mounted AT capability. Motorised Infantry Battalions will maintain the Javelin and 84mm M3 Carl Gustaf [14], but will have no ability to rapidly mobilise armoured AT to support the infantry in the near and medium fight (100m to 2km). Additionally, the dismounted arsenal of ATGM requires upgrading, as the Javelins and M3 Carl Gustafs within our arsenal will not be able to support the incoming updated ATGM rounds capable of defeating modern armour.

There is no intermediary AA weapon system between the M1A1 120mm cannon and the Spike LR2. From the perspective of a combined arms approach, and with limited tanks within our Army and relatively slow reload for the Spike, this creates a potential capability gap in the near and mid-range AA battle. It is not always prudent to engage infrastructure or lightly armoured vehicles with 120mm or ATGM.

Proposal

Arming the Hawkei with a mounted Spike LR or Spike Enhanced Range (ER) is a solution for resolving the issue of rapid employment against an armoured threat in the littoral environment. Hawkeis designated as reconnaissance or screening platforms can be outfitted with the Spike ER, which has a range of 8km. Due to its light weight, the Hawkei can be transported via Chinook from the Landing Helicopter Dock (LHD) to reconnaissance objectives beyond the Beach Landing Site (BLS). Simultaneously, Hawkeis mounted with Spike LR and pintle mounted M2 and MK47 AGL will provide immediate armour, firepower and mobility for the assaulting force at the BLS.

To provide integral AA firepower to the Motorised Infantry Battalion, the AA PL should be grown to an AA Company consisting of 3 AA Platoons. Under plan Keogh, the AA PL is equipped with PMVs and the RSS Platoon is equipped with Hawkeis. As reconnaissance and sniper tasks within a Motorised Infantry Battalion would likely entail transportation to a release point, followed by a dismounted infiltration to a Lying Up Place (LUP), I would propose that the AA Platoons should be outfitted with Hawkeis and the RSS Platoon be outfitted with PMVs. Additionally, the AA Company's primary role will be organic AA support to the Battalion, and will require a highly mobile vehicle with a lower profile than the PMV offers. Furthermore, the personnel transporting ability of the PMV is not necessary in the AA Company, as the main function of the AA Section will be to crew the ATGM. The AA Company can be modelled after the US Infantry Weapons Company, a task organisation that has proven effective in combat theatres from Vietnam to Afghanistan (see Figure 4 for the US

Infantry Weapons Company task organisation). The AA Company would consist of a Company HQ and 3 Platoons. Within each Platoon, there should be two sections, each with their own specialised armament. One section would be equipped with 2 Hawkeis, MK47 AGL, and a Spike LR for close and intermediate AA support. The second section would be equipped with 2 Hawkeis, a Spike ER and M2 for intermediate and long-range support and overwatch. The ATGM turrets should have a pintle option to equip a MAG58 in the case an ATGM is deemed unnecessary. See Figure 3 for the proposed task organisation. This AA Company would have the ability to execute tasks to include screening, cover, support by fire, assault, and assumption of the Battalion reserve. In addition to the creation of the AA company, the M3 Carl Gustaf should be replaced with the M4 Carl Gustaf [11] and it should be issued to every Motorised Rifle Platoon. This will enable the quick acquisition and employment of modern ATGM munitions as they arrive.

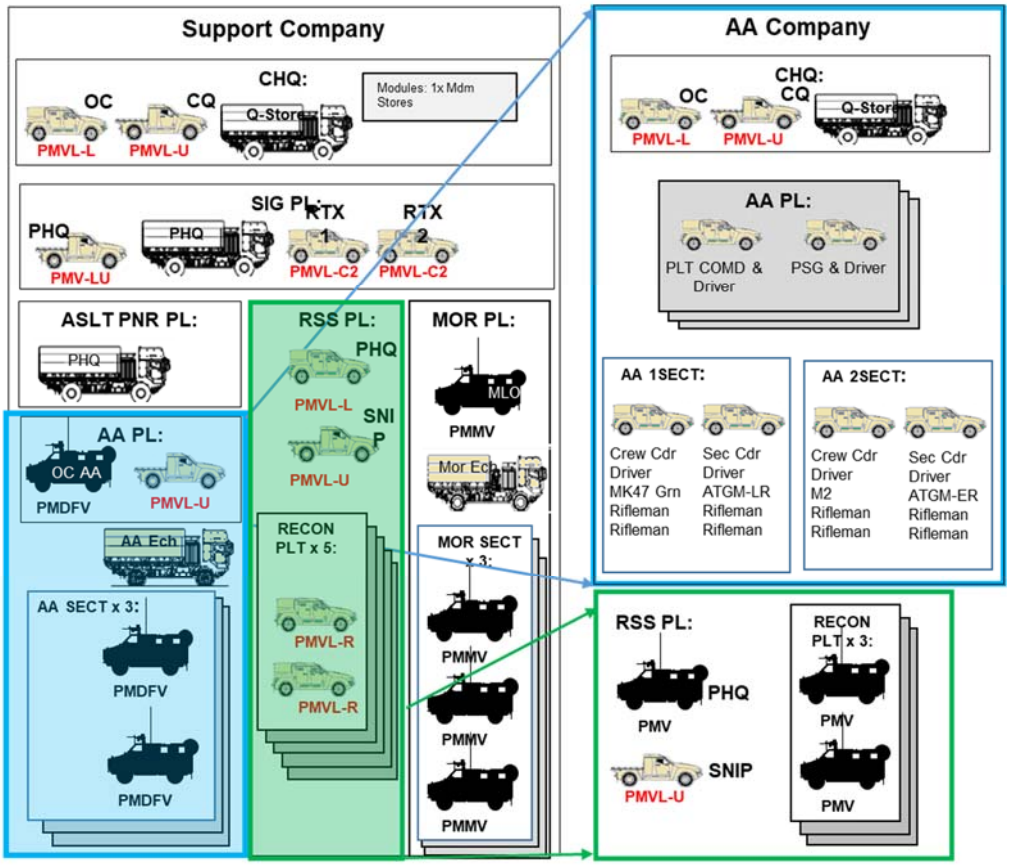

Figure 3. Illustration proposing the PMV Battalion AA PL be grown to an AA Company. Additionally, the AA Company would trade PMVs for Hawkeis with the Recon PL. Hawkeis would be outfit IAW the illustration. The Recon PL would have to reduce from 5 sections to 3 sections.

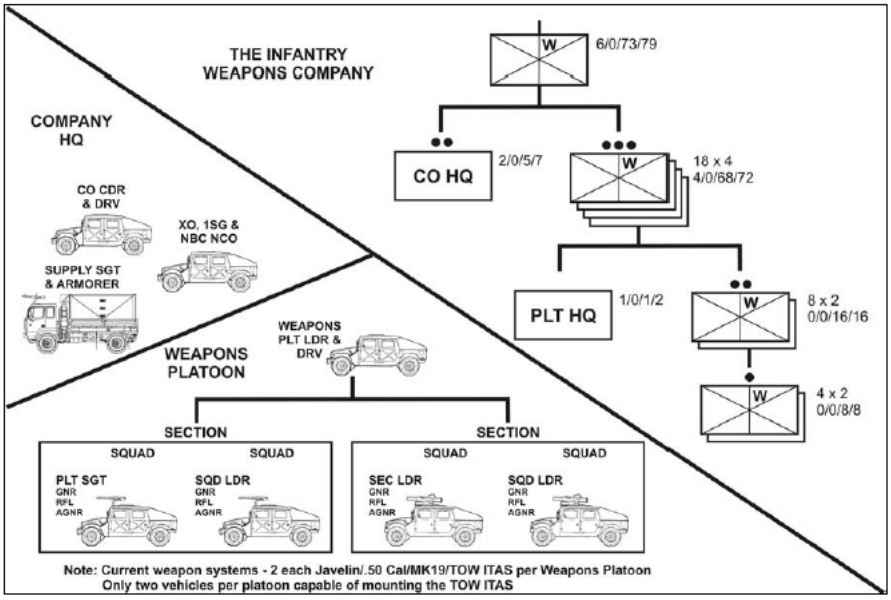

Figure 4. The above illustration depicts the task organisation of a US Infantry Weapons Company [19].

There is not an intermediary between the M1A1 120mm gun and the Spike LR2. Both weapons fire for an effective range of 4km. The M1A1 has a rate of fire of 15-20 rounds per minute whereas the Spike LR2 has a ready to launch time of 30 seconds with a 15 second reload time. If we acquire an IFV comparable to that of other modern armies, we can assume that every IFV in our IFV Battalion will be armed with a 30mm-35mm cannon and an ATGM of some kind. With every IFV outfitted with an ATGM, the AA Platoon within the IFV battalion would be irrelevant. The AA Platoon may then be transformed into a Tank Destroyer Platoon and be equipped with M40 105mm recoilless rifles. This Tank Destroyer Platoon could act as local AA support in the close fight to support infantry against technical and light armoured vehicles or for infrastructure reduction. It may also be used in support of a tank assault in which it would destroy or suppress light and medium armour, allowing tanks to freely engage other MBTs. While it may seem radical to re-introduce a gun that is over 50 years old, the effectiveness of its application in Vietnam, Syria, and Libya cannot be denied [12].

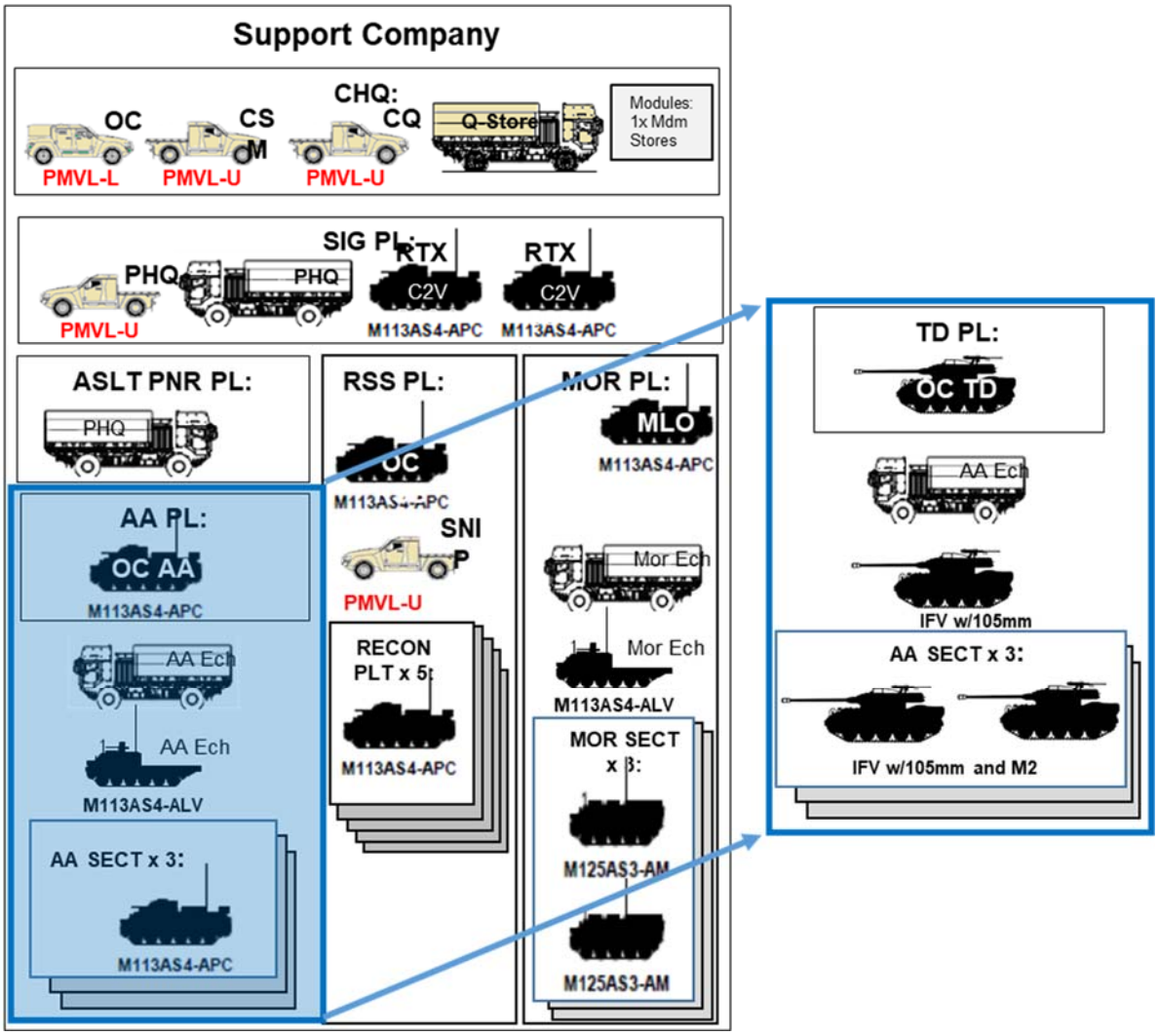

Figure 5. Illustration proposing the IFV Battalion AA PL be transformed into a Tank Destroyer PL equipped with 105mm recoilless rifles.

Conclusion

If we are to be the rapidly deployable, lethal force capable of destroying our adversaries within any terrain, we must revisit the organisational structure of our formation and its equipment. At a minimum, an immediate solution must be presented to resolve our lack of ability to deploy a large force capable of defeating infantry and armour within the littoral environment. With our given and projected capability, Hawkeis are the perfect answer to this problem. The lack of true AA support within the Motorised Infantry Battalion must also be addressed. Understanding one solution is to merely reorganise and integrate IFVs from the Mechanised Infantry Battalion, this does not

ameliorate the lack of autonomous AA support to the light infantry fighter after dismounting from the PMV. Again, ATGM mounted Hawkeis provide a solution. Within our budget-constrained environment, we must also consider an intermediate AA weapon system than can be used in lieu of the tank or ATGM. Incorporation of the M40 105mm recoilless rifle is one method for bridging this gap. Finally, our 30 year old M3 84mm Carl Gustaf is due for an upgrade in order to maintain relevancy with modern munitions. The M4 84mm Carl Gustaf is the perfect candidate. While our Army's modernisation overhaul is taking us in the right direction, it is every soldier's responsibility to stay abreast of these changes and identify potential weaknesses or gaps in capability. At a minimum, this will generate discussion, and at best, it may even contribute to a change leading to a more lethal Army.

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