Tank: The Canadian Army's Four-Letter Word

by Major Lee J. Hammond, CD

INTRODUCTION

Since joining the Armed Forces in 1986, I have been confidently told, by many experienced army officers, that the day of the tank is over and that our current Leopard C2 is the last tank that will ever serve Canada. While I generally dismissed most of these officers as having a poor grasp on the true potential of tanks, unfortunately, in recent years, there have been many indicators that these officers may indeed be right. The most important of these indicators came in 1996, when the Army 2000 Campaign Plan stated that "the Leopard would not be replaced with a heavy tracked tank. Instead, the MBT (main battle tank) would be replaced with a 'modern, mobile, armoured direct fire support vehicle to complement the wheeled APC (armoured personnel carrier) and Coyote.'"[1] The result of this commitment was the evolutionary vehicle that came to be known as the armoured combat vehicle (ACV).

Another indicator that opponents of the tank are now using to justify their views is the recent American initiative of the interim brigade combat teams (IBCTs), which will be equipped with different versions of the LAV (light armoured vehicle) III, including a version armed with a 105 mm direct fire cannon. Although the Canadian Army has recently taken a pause in the ACV program, due to many of the limitations that will be outlined in this article, I fear that the new American initiative of the IBCT will again raise calls for the introduction of the ACV. In my opinion, should the Canadian Army follow this route, and we lose our MBT capabilities, we will be well on the way to becoming a constabulary, non-warfighting army. Moreover, I believe that the loss of MBT capability in the Canadian Army is largely based on misinformation, a lack of understanding of the technical shortcomings of its supposed replacement (the ACV) and an overall climate where the tank has been demonized as a Cold War relic that is no longer a suitable weapon on the modern battlefield.

As an artillery officer, it is my belief that I can address this issue in an unbiased fashion since my only interest is the overall fighting capability of the Canadian Army and not cap badge parochialism. In my experience, the only defenders of the MBT have been the Armoured Corps who are, quite predictably, dismissed on this issue as being biased.

AIM AND SCOPE

This paper will examine the utility of the tank as a crucial weapon system that is needed now and in the future. I will begin by summarizing the Canadian perception of the tank, a view that inspired the writing of this paper. I will follow with a brief examination of newly developed doctrine and where the tank fits into how we will fight. The technical aspects of the tank will then be examined along with a discussion of what the tank continues to offer the battlefield. Some of the arguments that have been presented on why the tank is no longer a relevant battlefield weapon will then be examined. The ACV, a one-time uniquely Canadian solution to the requirement for a tank-like vehicle, will also be discussed. The paper will then conclude with recommendations on where finite resources should be spent on maintaining a MBT capability.

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THE PERCEPTION OF THE TANK IN CANADA

The tank's place within Canada has been unique amongst all weapon systems deployed by the Canadian Armed Forces since the Trudeau era. Indeed, in a country where laser-guided bombs, Maverick missiles, and Harpoon anti-shipping missiles have been acquired with barely a whimper by anyone, the tank, in contrast, is seen as an offensive weapon good only during the Cold War era. It is described by many as a weapon totally out of context for the requirements of the modern world and is seen as an inappropriate tool for our primary task of peacekeeping.

In terms of its history in Canada, one does well to remember that our current Leopard 1 fleet was purchased reluctantly by the Trudeau government as the price to be paid for closer economic ties to Europe.[2] Moreover, in the curious economics of defence procurement, over 500 Centurion tanks were replaced by only 114 Leopard 1s for our forces in Germany. The rest of the Armoured Corps had to live with the Cougar. Thus, with the pullout of our forces from Germany, in 1992, the rationale for a peacekeeping-oriented army to employ tanks was lost on many so-called defence experts.

It is suggested that many of the perceptions of the tank in Canada outlined above are entirely incorrect. While the utility of the tank may be questioned here at home, the rest of the world's nations have no such doubts. Indeed, every major European army has continued to retain the tank as a central weapon system. Moreover, countries such as Sweden, Spain, England, Turkey, Greece, Cyprus, France, India, and Pakistan, to name but a few, have all

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Do we really need these? (Courtesy CFPU)

acquired new tanks in the last five years.[3] This leads to the question: Are we the only army in the western world who is right in surmising that the day of the tank is over?

Up until recently, even within the Canadian Army, the tank was officially recognized as a critically important warfighting tool. For example, until 1996, the ACV and tank projects were separate and had different requirements under two different project numbers.[4] Moreover, the requirement for a tank-like vehicle was not disputed then. Indeed, in the statement of requirement (SOR) for the ACV is stated that "a mobile, protected, direct fire capability, or armour, is an essential element, permitting the defeat of the enemy and security of our soldiers through aggressive use of firepower and battlefield mobility."[5] As well, in the realm of operations other than war (OOTW), the same SOR states that "the army must be able to deploy an armour capability that can detect and defeat current and proposed threat armoured vehicles so as to permit all-arms combat teams and battle groups to operate successfully and safely."[6]

Thus, it appears that unique perceptions of the tank have led us to adopt a vehicle that is more politically and socially acceptable in the form of the ACV. In my view, the Canadian Army is moving in the wrong direction. The following paragraphs of this paper will outline why the tank remains the better choice over the ACV for this "mobile, protected, direct fire"[7] weapon system.

OUR MANOEUVRE WARFARE DOCTRINE AND THE TANK

Watching the Armoured and Infantry Corps' struggle to develop doctrine for the newly introduced Coyote demonstrates that not all Army equipment acquisition projects of the past have been measured against the doctrine litmus test. To be fair, the Army was going through a radical change in its doctrine during the introduction of the Coyote. However, this is no longer the case. We have been firmly established as a manoeuvre warfare army. Thus, in examining the utility of the tank versus the ACV, we now have an ability to compare the characteristics of these vehicles to the requirements of our doctrine.

While a detailed examination of manoeuvre warfare is beyond the scope of this paper, suffice it to say that under manoeuvre warfare we are trying to achieve some basic objectives. Concepts such as the exploitation of enemy surfaces and gaps, by attacking where the enemy is weak, are central to manoeuvre warfare. Preemption, dislocation, and disruption are also basic dynamic forces. Therefore, in order to achieve the above objectives, many things have to happen, the most basic of which is fixing the enemy and then striking them. Few officers would disagree that the tank is a central part of the strike function because of its inherent ability to strike while moving. Moreover, although there is a lot more to manoeuvre warfare than just moving, the physical movement of forces is a big part of it. In his book *Fighting by Minutes,* Robert R. Leonard states that a fighting force is always concerned about three inter-related activities, which include protect, move, and strike. The tank (and, to a significantly lesser degree, the ACV) possesses all three capabilities at any one time. Thus, doctrinally, the tank makes sense in an army that purports to be a combat capable force that uses manoeuvre warfare to defeat its enemies.

There are other aspects of manoeuvre warfare that must also be considered when examining the continuing utility of the tank. Once again, Leonard gives us two more important concepts. The first is that armies conduct fighting in two different ways: the protective fight and the dislocation fight. Protective fighting is characterized by like-system combat; in other words, tanks typically fight tanks. During the dislocation fight, unlike-system combat takes place. This is where one sees tanks destroying artillery and logistic units, which leads to the defeat and, hopefully, the rout of the enemy force. If we look back to many of the battles over our history, we will see evidence of these concepts during the battles in Normandy, the Soviet Union, and the Middle East Wars. Thus, the important conclusions from the above discussion are that, doctrinally, Canadian tanks (or whatever we have in place of them) are required to fight enemy tanks during the protective phase of combat.

Therefore, in examining our doctrine, it appears quite clear that a tank-like vehicle is very important to the conduct of land fighting within the context of manoeuvre warfare. The only questions that remain are what that vehicle should look like and are these arguments simply a wheeled versus tracked discussion? There is much more to this argument than

simply the suspension system being used. However, before getting into the specifics of comparing the two vehicles, the basic characteristics of the tank should be discussed first.

THE TANK AND ITS CHARACTERISTICS

The British first employed the tank in 1917 during the First World War. Since that time, the tank has embodied the three basic characteristics of firepower, mobility, and protection. The constant difficulty tank designers face is how to balance these three characteristics. Trade offs have always been necessary. For its entire history, the tank has continually striven for the perfect balance. For example, the German tanks employed by Rommel during the desert fighting in Africa had excellent mobility, adequate firepower, and reasonable protection. The Sherman tanks used by Canada had excellent mobility but poor firepower and abysmal protection when compared to their counterparts the Tigers and Panthers. What is most significant about getting the firepower, mobility, and protection factors right is that the designer will never achieve perfection in all three areas. From a manoeuvre warfare perspective, this is not critical. Armies still win, despite the individual shortcomings in the design of their tanks, through aggressive and bold leadership and by executing well-planned operations. Thus, the firepower requirements of a Canadian tank have to be close to its opponents but not necessarily a complete over match. The armour of a Canadian tank need not be as thick if our tanks have guns that can outrange enemy tanks. Moreover, if boldly and aggressively used, the superior mobility of Canadian tanks can make up for some of its shortcomings in armour. The important point is that technology is not the overriding factor in victory in land warfare (witness the German defeat of France in 1940, despite the French Army being a bigger and better armed force than the German Army).

Nevertheless, there are caveats about the impact of the quality of a tank and its contribution to combat. There is a point where bold action and excellent leadership will not matter if forces are too technologically apart. For example, Allied Shermans suffered grievously during the fighting in Normandy when they faced their German counterparts. The Germans suffered a similar shock the first time they faced the Soviet T-34. Moreover, no matter how well led, trained, or motivated the Iraqi Army might have been (and they were not!), their T-55 tanks had no chance against the far superior American M1s and British Challengers. Thus, there is a danger in falling too far behind in the technological capabilities of land combat systems.

The tanks in operation today throughout the world's armies embody all of the characteristics described above. Indeed, they have better mobility, protection, and firepower than at anytime in history. Because they are still an exceedingly difficult target to hit and kill, they continue to form the basic building block of all major armies. However, in Canada, there is a strong body of opinion that states we no longer require the capabilities embodied in the tank because we have a better way. This vision is based on many of the apparent shortcomings of the tank that are presented below.

ARGUMENTS AGAINST THE TANK

There are many arguments presented by the opponents of the tank. These arguments come from professional military officers and scholars, as well as the less informed. For the sake of completeness, all of the most common arguments will be addressed, even if they do seem rather obvious to some readers.

The first, and most common, argument against the tank is that it is heavy and difficult to transport. The most common variation on this theme is that Canada needs an air transportable vehicle that can be quickly sent to our peacekeeping missions abroad. This line of reasoning is perhaps the largest falsehood perpetuated in the Canadian Army in the 1980s and 1990s. To begin with, air transportability is neither the normal nor the preferred method of deploying armoured vehicles to the world's hot spots. Even the SOR for the ACV states that "Sea Transportation is the usual method for strategic movement of assets worldwide, [and] if rapid air deployment of the ACV to a theatre of operation is critical to the success of the mission, Canada will have to rely on coalition or civilian airlift."[8] The reasons are as follows: even the largest air forces are not big enough to move a significant number of armoured vehicles and their support vehicles into a theater of operation. For example, the new C-17 Globemaster III transport aircraft can only carry five LAV 25 Class armoured vehicles.[9] Thus, using a conservative figure of 150 vehicles for a battle group, it would take 30 chalks of C-17 lifts to get a battle group in theatre. Even then, this estimate does not include the supplies that the battle group would need to sustain itself. No Canadian battle group has ever had its vehicles airlifted into theatre, nor is this likely to happen since this capability is beyond even the biggest air forces. Moreover, if the normal mode of transport is sealift, then the difference in weight between a fully capable MBT and the ACV is not a factor at all. Indeed, the main lesson here is that our sealift capabilities should be improved, not that we need an air transportable vehicle.

One area where the weight of a tank is of interest is the tactical mobility limitations of the really large tanks in theatres such as the Former Republic of Yugoslavia and Somalia. This is a significant issue. For example, the latest versions of the M1A2 with depleted uranium armour weigh over 70 tons. They are clearly too heavy. This fact leads opponents of the tank to conclude that the only way tanks of the future can protect themselves is to get even heavier. This argument is not supported for the following reasons. First, it assumes that the only way to improve the armour is to use heavier materials. The history of composite armours, explosive reactive armour, and the history of the tank itself indicate that armour designers will always find new ways to defeat the anti-tank rounds of the day. In fact, this battle has been going on since the dawn of the tank. There is an old maxim in armoured vehicle design which states the following: First—don't be seen; if seen, don't be hit; if hit, minimize

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damage. At this stage in the development of tanks, we have only seen developments in the armour itself. In my view, technologies such as stealth, signature reduction (especially thermal and radar reduction), improved camouflage, electronic countermeasures, and active defence measures will ensure the ability of the tank to protect itself and keep its weight within accepted maximums. Moreover, as discussed above in the doctrine of manoeuvre warfare, tanks need not be designed to counter all possible threats.

In Canada, the next most common critique of the tank's capabilities is its vulnerability to many of the modern anti-tank weapons that now exist. It must be clearly stated at this point that these vulnerabilities are recognized. Of course, this has always been the case. In the Second World War, there were always certain weapons, such as the German 88, which could kill tanks. However, this did not lead to the abandonment of the tank as a platform. Moreover, despite advances in technology, tanks remain a difficult target to kill. Were this not the case, and if the tank was not a lethal threat, then it is doubtful that armies would spend so much time thinking about (and spending significant sums of money on) the problem of destroying tanks.

The most dangerous anti-tank weapon in all its forms (other than enemy tanks) is the anti-tank guided missile (ATGM). Easily able to kill a tank, these missiles may be launched by everything from dismounted soldiers, to armoured vehicles, to attack helicopters. However, it is my belief that ATGMs suffer from an enormous number of limitations that affect their efficiency in killing tanks. To begin with, most ATGMs take an inordinately long time to reach their targets, which, in the case of missiles like the TOW (tube-launched optically-tracked wire-guided missile), can take up to eighteen seconds. This means that the tank has to be exposed for a very long time for an effective engagement. Moreover, because of the long time of flight, most ATGM systems suffer from a very low rate of fire. Thus, in the time it takes one missile to fly to its target, the tanks could return four rounds of fire on the ATGM position. As well, many of the supposed advantages of the ATGM simply do not exist in practice. For example, for many years I was taught that the TOW, with its range of 3 750 metres, had a range advantage over tanks, which typically engaged targets at two kilometres. However, during the Gulf War, British Challenger tanks successfully engaged ATGM-equipped BMPs[10] at five kilometres! There are some ATGMs, like our own air defence anti-tank system (ADATS), which can fire at targets eight kilometres distant. Moreover, the latest versions of the Russian AT-16 Vikhr anti-tank (AT) missile have a maximum daylight range of up to 10 kilometres (five kilometres at night).[11] Nevertheless, how many places offer eight kilometre direct fire shots? I suggest that there are very few.

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The biggest disadvantage faced by ATGMs (even those, like line-of-site anti-tank [LOSAT], which fire hyper-velocity missiles) is the vulnerability of the firing platforms. The dismounted infantry, the light armoured vehicle, and the attack helicopter are all extremely vulnerable to indirect fire and the fire of tanks themselves. This vulnerability stems either from a lack of armour or a lack of tactical mobility, which are less than those of a tank. Moreover, in the case of the attack helicopter, this weapon system is very vulnerable to any kind of air defence system (witness the lack of deployment of the Apaches into Kosovo until ground forces were in place). As well, tank designers have not attempted to kill the launch system itself when providing a countermeasure to the attack helicopter. Instead, tank designers have begun work on defeating the weapon of the helicopter—the ATGM—through the use of active and passive defensive aid suites. Within this area of endeavour, armies are just beginning to address the issue of hostile missiles, which our colleagues in the Navy and Airforce have been addressing for decades. Thus, the ATGM is not the panacea that many of its proponents make it out to be. While it can kill tanks, its launch platforms are very vulnerable to the tank itself and to combined arms tactics. Finally, the advent of defensive aid suites and other passive measures further threatens to erode the effectiveness of the ATGM.

Another class of weapons that many people believe will defeat the tank are top attack munitions. These weapons come in different forms: they include top-attack missiles such as the BILL (Bofors Infantry Light and Lethal), TOW IIA, and Hellfire as well as self-forging-fragment-type weapons such as SADARM (Sense and Destroy Armour Munition), BONUS (Bofors Nutating Shell), and the Sensor Fused Weapon, which are delivered by artillery and aircraft, respectively. Defeating these types of weapons, on a simplistic level, would mean adding further weight to the tank by increasing the armour on the top. While this is certainly an option, there are also technical countermeasures, the most obvious of which is electronic spoofing of the fuzes using a system such as SHORTSTOP[12] and, even more simply, by using combined arms tactics. The answer to artillery deep attack and air delivered weapons is a good air defence, shooting down the artillery drones (in effect blinding the enemy artillery) and preventing the attack by enemy aircraft on friendly armoured units. The answers to the top attack BILL ATGM are indirect fire, tank suppressive fire, and speed of movement and supporting infantry. Thus, none of the technologies for destroying the tank have made it fundamentally obsolete on the modern battlefield. Moreover, it must also be emphasized that if the tank is vulnerable to any of the technologies outlined above, then the ACV is even more so.

There are also political arguments that many opponents of the tank often present. Those arguments tend to

revolve around the notion that Canada will not likely be involved in serious ground combat. A related thesis is that should we be involved, we should choose a support role where we will not be up front slugging it out with the enemy. As a counter argument, it is submitted that the Canadian Army until now has stated that it is a combat capable army. This means that we must be capable of fighting. Assuming that we will not have to fight is a very dangerous proposition to take from a planning point of view. To illustrate, what would Canada have done if the Serbian Army had not left Kosovo voluntarily, and instead, ground forces had been required to kick them out? Do people honestly believe that the Americans, British, and other nations would not have expected us to do our part in a war that nobody wanted to fight? Canada has already come under criticism, on numerous occasions, from the NATO Secretary General and the United States for inadequate defence spending. Pressure from our allies to participate in combat operations would be intense during a conflict.

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As well, a related issue to the above arguments is that all of the world's armies have been significantly reduced in capability, including the Americans. This means that our allies are even more likely to expect Canada to contribute. Thus, it is highly unlikely that Canada would be able to avoid major combat in a future war. What is more likely is that we will use what we have, as we did in Bosnia with the Cougar. Even the Army admits that "the Cougar [was] not required to perform any firepower tasks against medium or large calibre weapons systems, where the potential for mission failure and casualties [would have been] very high."[13] Therefore, if the Canadian Army does give up its tanks and moves towards low risk warfighting roles and plays a secondary role, then one would have to conclude that we have made the move to being a constabulary force.

Yet another interesting argument against the tank, which was recently made, is that the increasing urbanization of the world's potential battlefields is making true tank "country" an increasingly rare commodity. There are no arguments against this fact. It is true that tanks often do not have the advantages of the Russian Steppe nor the open deserts of the Middle East. However, in my view, the fact that the world is increasingly urbanized makes a stronger case for the tank over the ACV, rather than the reverse. To begin with, let there be no doubt that urban fighting is the *forté* of the infantry. However, from time to time, the infantry does need the intimate support of a direct fire asset such as the tank. While it is true that the ACV, or even M109 howitzers, could theoretically carry out this function, both vehicles are many times more vulnerable to the close range anti-armour weapons found in urban fighting, than is the tank. Anyone who has seen the burned and charred BMPs and BTRs in Grozny knows this to be true. Thus, with urbanization, the tank is clearly the better tool for supporting the infantry.

With the advent of the Coyote and the LAV III, a new argument against the tank is that Canada needs a wheeled fire support vehicle to keep up with these two vehicles. The fact that the LAV III does not have comparable tactical mobility to a tank means that the clear choice is to go all wheeled. It is submitted that this is a ludicrous argument unique to Canada. For decades, the Russian Army has had BTR 60/70/80 equipped motor rifle regiments that have had no apparent difficulty in working with tanks. Moreover, the French Army does not consider this argument to have any merit. Indeed, current plans within the French Army include the replacement of their AMX (10P full-tracked infantry combat vehicle with an 8x8 wheeled infantry fighting vehicle, which is being bought to specifically work with their new Leclerc MBTs.[14] Lastly, although the LAV III and Coyote are capable of travelling 100 kilometres per hour, this fact cannot be used as an argument that they will advance in hostile country at that speed. Travelling at such high speeds in the face of the enemy would be suicidal since all caution would have to be abandoned.

The final argument against the tank that is presented is that of cost. Many might believe that this factor is the most important of all in our cash strapped army. To summarize this argument, many officers within the Army, and opponents of the tank in general, argue that the Canadian Army cannot afford tanks. In addressing this issue, my arguments are based on the following two fundamental assumptions:

- As a G-8 nation, Canada, which is one of the richest nations on the planet, can afford an army with three armoured regiments fully equipped with MBTs; and

- The above can be achieved with our current defence budget.

In examining the above two assumptions, the views presented are based on the fact that many nations have stretched their defence dollars far further than Canada has. The most obvious recent example, which has been mentioned in the press, has been the Australian Armed Forces. The fundamental factor in achieving the second objective is the elimination of waste and the focusing of our fiscal resources on priorities, which should include tanks. As an example, there is seldom a shortage of money for new desks, new computers, and the landscaping requirements of bases. Buildings have been built with beautiful wood panelling and elaborate glass brick construction. Thus, in my view, we are far from the limits of our resources in trying to achieve the fiscal resources to acquire major combat systems. Some will argue that these funds come from different pots of money and that a hundred thousand dollars here and a hundred thousand there is trump change. It all adds up! Moreover, if acquiring a critical combat capability like the MBT became the Army's *Schwerpunkt*, then our bean counters (in and out of uniform) could make it happen. However, in order to achieve

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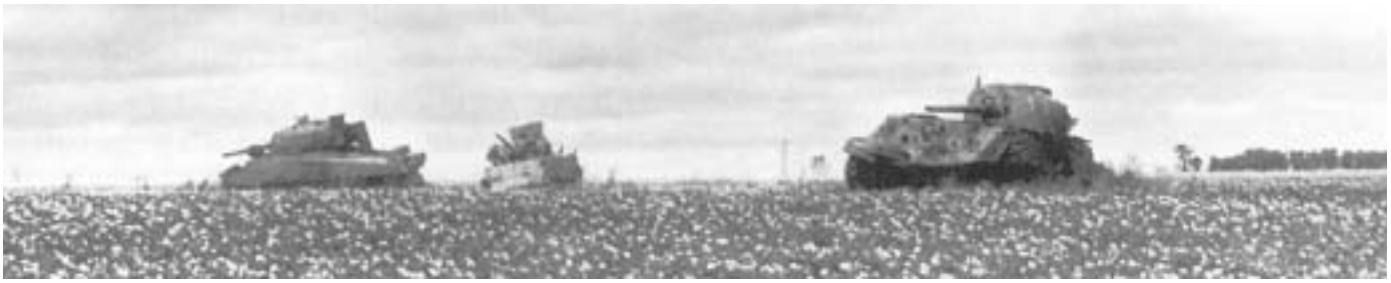

What is good tank country? (Courtesy National Archives of Canada)

success, everyone in the Army needs to be on side and agree that this is our main effort until the objective is taken. Thus, the cap badge parochialism that often exists as various branches of the Army compete against each other must be set aside. The best illustration of this is our own navy, which continuously manages to acquire new and very expensive equipment, while the Army argues with itself over priorities. (The latest example being the $500 million Evolved Sea Sparrow Project for our practically brand new frigates.) Thus, the Army, as an institution, needs to recognize the importance of a MBT capability, and everyone needs to get on board.

On the more technical level of comparing the cost of the ACV against the tank, there will likely not be significant savings. While it is true that the operation and maintenance of a wheeled vehicle fleet is generally less than that of tracked vehicle, the ACV will have a sophisticated turret system incorporating stealth, defensive aid suites, day-night fire control, and an ATGM. Thus, in terms of expensive and complex components, the ACV would have at least 80% in common with many of the most complex MBTs. Moreover, as far as unit costs go, the ACV is not likely to be cheap. Project staff have indicated that the vehicles could cost as much as $5 million each, which does not sound impractical given the in-service date of 2006.[15] Thus, in terms of up-front costs, the ACV is not the cheapest option available to the Canadian Army. Moreover, operating costs may in fact be higher in some instances than for a MBT. For example, the ACV is projected to have an ATGM. No doubt, this will come with a training bill for the crews that will operate the ACV. Thus, instead of a MBT firing $1,500 training rounds, the ACV will have to fire the same training rounds PLUS $100,000 missiles from time to time. Finally, the ACV, when compared with the MBT, will demonstrate some definite false economies if it ever goes into action against MBT equipped forces. After all, how much money is saved if a vehicle is eliminated the first time it encounters its opponents? As the following paragraphs will demonstrate, this is a very likely outcome if the ACV ever goes into combat against tanks.

THE ARMOURED COMBAT VEHICLE- CANADA'S SOLUTION

In reviewing the draft SOR of the ACV, it should be stated categorically that this vehicle was not envisioned to replace the tank; however, with the decision to not replace the Leopard with another tank, the ACV could become the de facto tank in the Canadian Army at some point in the future. Thus, in this section of the paper I intend to review the results of operational research conducted by the Canadian Army into the effectiveness of the ACV as a tank replacement. In these studies, the ACV was compared to the American M1A2 tank in offensive and defensive warfighting scenarios (in a flank security context) against a GENFORCE enemy equipped with T-80s and BMPs. Fifteen different tasks under an operations other than war (OOTW) scenario were also run.

Prior to discussing the results of these tests, a little history on the development of the ACV is in order. The ACV is in fact meant to be a replacement for the Cougar, which was bought as a tank trainer in 1978. It should be noted that the Cougar was a vehicle with more limitations than capabilities. Suffering from poor tactical mobility, very little protection, a primitive fire control system, and an inadequate gun, the Cougar was never meant for deployment outside of Canada. However, "because there was no other vehicle available, it has seen operational service in Oka, Somalia, and the Former Republic of Yugoslavia."[16] Because of these shortcomings, project L2636 was initiated in 1992 to replace the Cougar with a new and more capable vehicle for tasks in OOTW with an in-service date of 2006, which has now been delayed.[17] In warfighting, the ACV is supposed to be suitable for "a more restricted number of armour tasks such as flank protection, rear area security, and economy of force"[18] operations. As well, the SOR for the ACV stated that it would be a light armoured vehicle armed with a 105 mm gun and that it was designed to handle, as its most dangerous opponent, the T-72M1 Russian Tank.[19] The T-72M1 was chosen because it is the most "representative of the upper limits of armoured vehicles found in Third World countries where the army might be deployed in OOTW."[20]

Now that the ACV's history and scope, and what it is supposed to accomplish for the Canadian Army, has been presented, the limitations of the ACV will be explored by examining the three categories of firepower, mobility, and protection. In doing so, the differences between the ACV and a modern MBT will become more than apparent. First of all, in terms of firepower, the ACV is to be equipped with a 105-mm gun and a long range ATGM. Its principal target capability is supposed to be the T-72M1, which is indeed a curious choice. While it is argued that the T-72M1 is likely to be

the most common tank found in developing countries, a pessimist might believe that this requirement has more to do with the fact that no wheeled vehicle has ever mounted a 120 mm gun, and, thus, the target is in fact the maximum that can be handled by the main gun of the ACV. Moreover, with a planned in-service date of 2006, the ACV was designed to handle a target that will be 35 years old the day the ACV comes into service, and a target which, in fact, out-guns the ACV. Likewise, by the time the ACV goes out of service in 2030, the target it was designed to handle will be 65 years old! Proponents of the ACV argue that the ATGM will handle the more modern tanks, like the T-80s used in operational research. However, this too is an inadequate solution since those same tanks mount a through-the-barrel ATGM. Thus, in the firepower category, the ACV is very much outclassed, not only by its anticipated target, the T-72M1, but also by the current leader in Russian tank sales, the T-80. As an example, in one operational research scenario, four up-armoured ACVs engaged two T-80Us in a head-on engagement. All four of the ACVs were lost without any casualties to the T-80Us. This outcome was due to the fact that, even with extra armour, the ACV was outgunned by the 125mm sabot and the ATGMs of the T-80U.

Secondly, in terms of mobility, the ACV is outclassed by all MBTs, in every sense, at the tactical level. As well, with a vehicle cone index (VCI) of approximately 45, the ACV will have significantly less tactical mobility than the LAV III with a VCI of only 32.[21] In order to improve its tactical mobility, the ACV will feature a central tire inflation system that will have a run-flat tire capability. This feature is often touted as the reason why wheeled AFVs are just as good as tracked vehicles. However, what proponents of the wheeled AFV seldom mention is that any bullet, mortar, or artillery fragment can pierce the tires, and, if this happens, the vehicle can only continue for a maximum distance of 40 kilometres before the tires have to replaced. Thus, the smallest projectile can turn the ACV into a vehicle casualty. The same is not true of tanks.

Finally, despite the above shortcomings, it is in its armour protection where the ACV falls far short of the acceptable minimums to replace the tank. Indeed, European commentators describe wheeled LAVs as an acceptable warfighting tool "as long as they keep out of the direct fire zone."[22] However, since the ACV is a direct fire support weapon, Canada clearly intends to employ it in just such an environment. Moreover, experts also generally agree that a practical weight limit of 32 tons exists before any wheeled vehicle becomes so heavy that it loses its tactical mobility.[23] Thus, the ACV will always have less potential for armour protection than its tracked opponents will. And, indeed, our own operational research indicated that the ACV "could not carry the amount of armour needed to protect it from [T-80 and BMP 2 Class] weapons."[24] As well, the 105-mm kinetic energy service ammunition was unable to successfully deal with the frontal armour of the T-80 class of tanks.[25] Thus, the ATGM was used as the preferable option. However, the addition of a guided missile was also not considered to have been enough "to overcome the ACV's general vulnerability on the battlefield."[26] Therefore, "as a consequence of higher losses [in both the defence and offense], ACV battle group[s] [were] considered combat ineffective"[27] after only one engagement during operational research testing.

... it is highly questionable that the ACV is a good choice for the Canadian Army ...

Even more disturbing, in terms of its *raison d'être*—OOTW—the ACV was considered superior to the M1A1 in only four of fifteen tasks that were tested, while the M1A2 was considered the superior tool in nine of fifteen tasks.[28] Thus, it is highly questionable that the ACV is a good choice for the Canadian Army, even if it is only used in its intended role of OOTW. One of the warfighting tasks was a flank defence, something the ACV should be able to handle. In terms of our doctrine of manoeuvre warfare, the ACV was also a failure. In short, "the ACV was unable to manoeuvre in the face of the enemy. When it did so, it was destroyed."[29] Moreover, the ACV suffered 1.7 to 3.1 times the casualties during operational research scenarios when compared with a modern MBT, such as the American M1A2.[30] Once detected, "the lack of armour protection made the ACV extremely vulnerable to both direct and indirect fire from any range and aspect. It could not manoeuvre in the presence of the enemy, and therefore it had little capacity to counter attack or perform a blocking manoeuvre."[31]

... we are in dire straits in an area that is critical to our ability to implement our own manoeuvre warfare doctrine.

Therefore, in reviewing the performance of the ACV during operational testing, it is quite clear that a modern MBT is clearly superior to the ACV in both warfighting and OOTW. The ACV could kill the enemy; however, Canadian casualties were up to three times higher than for an M1-equipped force. As well, the bold and aggressive use of the ACV was found to be totally impractical and perhaps even suicidal. The only engagements that were successful were short-range ambush tactics that increased our own casualties. Thus, the ACV must be seen as a totally unsuitable tool for our own doctrine in which movement plays a critical part.

To be fair, despite the above critical shortcomings, the ACV does have some advantages over the MBT. These include greater operational mobility than that of MBTs and lower operating costs.[32] Moreover, the ACV will be air portable, although the SOR only states that it is desirable that it fit into a C-130 aircraft, whereas it is essential that it fits onto the

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C-141 and C-5 aircraft.[33] Nevertheless, these few advantages of the ACV over the MBT clearly do not outweigh the fact that the MBT is the superior tool in virtually all categories, not the least of which is that more Canadians will survive in a tank than in the ACV.

... all major armies of the world continue to invest in the tank.

Given the above arguments, the reader may question why the Americans have gone down the route of LAVs in their IBCTs. Indeed, a recent Jane's Defence Weekly article on the subject featured a vehicle which looks very much like the ACV. Yet, in reviewing what the Americans are doing, the whole context must be taken into account. For example, while the Americans are forming up to three IBCTs, they will continue to have heavy divisions capable of high intensity fighting. As well, the IBCTs help to bridge a significant gap in American capabilities. Until the formation of the IBCTs, American commanders could only choose between heavy divisions equipped with mechanized tracked vehicles and light/airmobile/airborne divisions, which were not in themselves easy to move overseas quickly due to their reliance on a large number of helicopters (with their huge administrative tail) and their lack of low level (section and platoon) firepower. Thus, the IBCTs form a bridge between these capabilities.

Moreover, the very name of the new formations INTERIM Brigade Combat Teams gives a hint that the Americans have much bigger plans. Many of these plans centre on a concept known as the Future Combat System (FCS). At the current time, this system is touted as a replacement for the heavy capabilities of heavy divisions, while being light enough to quickly deploy overseas. The key units that will test these concepts are the IBCTs, and, thus, these formations can be seen as somewhat of an experimental force. Moreover, the FCS concept, at the present time, is very all encompassing and broad ranging. The FCS is not, in itself, a replacement for the tank as a single platform but offers instead a whole host of capabilities, such as drones, direct and indirect fire missiles, and other sensors all brought together as a system. The point is, at the present time, the FCS is a concept and an experiment, and not something that will be fielded for many years to come.

THE CURRENT SITUATION

With the decision to slow down the ACV project, possibly with a view to watching the developments of the FCS, the Canadian Army is now facing a critical lack of direct fire power capability. The negligible increases in capability that even the ACV would have offered would only come into service in 2006. With this delay, a real replacement for the Cougar, and possibly the Leopard, is even further off. While the Armoured Corps works to maintain its relevance with its skillful handling of the Leopard Upgrade Project, it must be recognized that we are in dire straits in an area that is critical to our ability to implement our own manoeuvre warfare doctrine. Although the Airforce and the Navy have their own problems, in my view, neither is so far from achieving its minimum essential capabilities than the Army.

RECOMMENDATIONS

Canada must, at the very least, maintain its current minimum level of MBT capability. Indeed, it has been argued above, there are even strong reasons to forgo the ACV altogether and increase the MBT fleet at the expense of the ACV. Thus, it is recommended that the following courses of action be adopted:

- Continue with the upgrading of the Leopard C1 fleet to the C2 standard. For relatively little cost, these tanks can continue to be used, not only for training, but also in wartime as excellent tools for pursuit and exploitation tasks and during the dislocation phase of fighting;
- Scrap the ACV concept altogether. Take the $500 million to $1 billion that would be spent on that project and purchase an additional minimum of three squadrons of modern MBTs. In accomplishing this goal, the following options should be explored:
  - Buy used Leopard IIs or M1s and upgrade over time as the funds become available. There are many of these tanks on the market that can be purchased for less money than the cost of a new ACV; or
  - Purchase the French Leclerc tank. Its lightweight and modular armour system seems particularly suitable both for Canadian doctrine and its likely employment in theatres where tactical weight restrictions are very important. Moreover, the modular armour concept means that strategic and operational transport can be facilitated by mission specific armour options as well as new armour technologies that will be developed in the future;
  - Re-assign the convoy escort task during OOTW to LAV III and Coyote equipped sub-units;
  - Dispose of the Cougar altogether since its capabilities are so limited that they outweigh any training advantages it might offer to the reserves.

CONCLUSION

This paper has covered the many reasons why opponents of the tank believe it is no longer a suitable or relevant weapon system. In refuting these arguments, many of the opinions expressed against the tank's future are uniquely Canadian and are in fact based on highly fallacious arguments. India has recently bought 255 T90S MBTs while Pakistan has purchased 320 T-80UDs.[34] Clearly these countries, and many others, believe that the future of land warfare includes the tank as a central component of their armies. The Canadian idea (the ACV) is clearly a

failure based on poor arguments to justify its existence. Similar vehicles being adopted by the US Army are filling a niche and experimental role while the FCS continues to be developed. While the Canadian Army may feel that its contribution to coalition operations would be best served by an IBCT-like organization, it is important that each weapon system within this concept be able to really accomplish the missions assigned to it. In my view, the ACV fails in this regard. Moreover, all major armies of the world continue to invest in the tank. The development of the ACV has more to do with political considerations than military effectiveness. As well, from a doctrinal point of view, the ACV makes no sense. The ACV is "unable to generate the mass and shock action of an MBT-equipped armoured regiment [and] is not considered an appropriate replacement for a Main Battle Tank."[35] Indeed, the ACV "(can)not be used boldly and aggressively in warfighting situations."[36] Finally, "being deliberately aware of the ACV's limitations and deliberately purchasing it as an alternative to the MBT in warfighting would be morally and ethically wrong and courts defeat."[27]

ABOUT THE AUTHOR

Major Lee Hammond is a graduate of the University of Manitoba with a BA in Political Studies. He has served as an instructor in gunnery, adjutant, and training officer in the Artillery School and as the Regimental Command Post Officer in 2nd Regiment Royal Canadian Horse Artillery. A graduate of the US Army Ranger Course, Major Hammond has served as an Airborne Gunner in E Battery (Para) with the Canadian Airborne Centre in Edmonton and overseas as a missile inspector in Iraq. Major Hammond is currently the Battery Commander of E Battery, 2nd Regiment Royal Canadian Horse Artillery.

ENDNOTES

1. 3552-22243 (DGOR/DOR [J&L]) Operational Research Division (ORD) Project Report 9817, 23 February 1999, Executive Summary, p. ii.
2. In an effort to decrease the increasing reliance of Canadian exporters on the United States, Prime Minister Trudeau pursued his so-called "Third Option." Under this plan, the Canadian Government tried to increase trade ties with the European Economic Union. The price Canada had to pay for this increase in trade was increased commitment to NATO through the tangible purchase of West German Leopard 1 tanks.
3. Over the last two years, the periodical *Jane's Defence Weekly* has been filled with announcements of the purchase of new MBTs by the countries concerned.
4. ORD, p. 1.
5. Draft 4.0 (13 April 99) Statement of Requirement (SOR) DSP 00002636, NO PSD 00002636, Armoured Combat Vehicle, p. 1.
6. SOR, p. 1.
7. Draft 4.0 (13 April 99) Statement of Requirement DSP 00002636, NO PSD 00002636 Armoured Combat Vehicle, p. 1.
8. SOR, footnotes 47 and 49.
9. *Jane's International Defense Review*, Vol. 32, April 1999.
10. Russian infantry fighting vehicle. Jane's Defence Glossary (online) Available from fttp://www.janes.com/defence/glossary/.
11. *Jane's Defence Weekly*, Vol. 31, 14 April 1999.
12. SHORTSTOP is a system that absorbs the radar emissions of a variable time air burst, fuzes and retransmits them to the projectile at an amplified strength, which causes the rounds to burst prematurely above the optimum height of burst.
13. SOR, p. 1.
14. *Jane's Defence Weekly*, Vol. 31, 31 March 1999.
15. A very rough estimate by PMO LAV LCol Carruthers during a discussion following a presentation in Gagetown in 1999.
16. SOR, p. 1.
17. ORD, p. 1.
18. SOR, p. 1.
19. ORD p. 1 and SOR p. 6.
20. SOR, footnote 12, p. A-2.
21. SOR, p. 21 and p. A-4.
22. *Jane's International Defense Review*, Vol. 32, March 1999.
23. *Jane's International Defense Review*, Vol. 32, March 1999.
24. ORD, Executive Summary, p. iii.
25. ORD, Executive Summary, p. iv.
26. ORD, Executive Summary, p. iv.
27. ORD, p. 40.
28. ORD, p. 39. The tasks for which the ACV was considered to be the preferrable system were: conduct convoy escort, provide mounted and dismounted OPs, provide mounted patrol, and contribute to a rapid reaction force. The M1A2 was considered to be superior in the following: demonstrate resolve, defend with other troops, conduct hasty defence, provide fire support to a checkpoint, establish a road block, conduct a hasty attack, provide direct fire support to the infantry in an attack, reduce strong points, bunkers, trenches, and secure a route.
29. ORD, Executive Summary, p. ii.
30. ORD, Executive Summary, p. iii.
31. ORD, p. 19.
32. SOR, p. 12.
33. SOR, p. 23.
34. *Jane's Defence Weekly*, Vol. 31, 14 April 1999.
35. ORD, p. 41.
36. ORD, Executive Summary, p. iv.
37. ORD, Executive Summary, p. iv