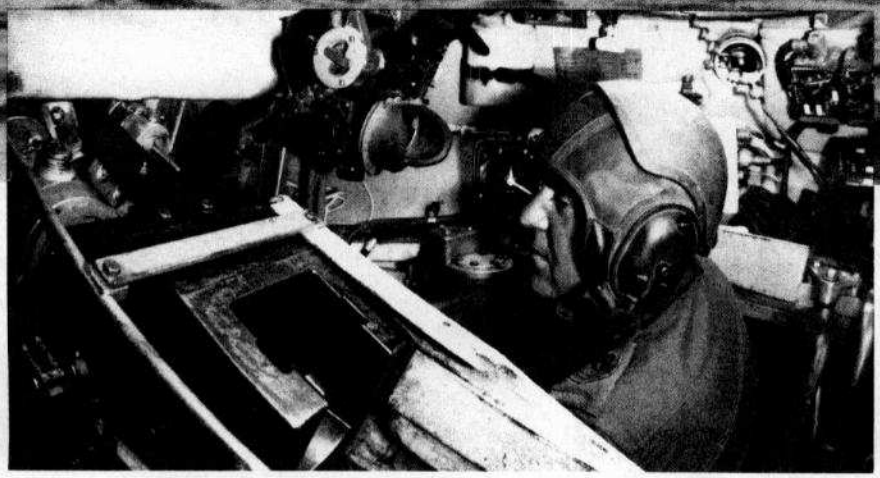
National Defence / Défense nationale

Armour Bulletin

WINTER 1991



Canada

Armour Bulletin
WINTER 1991

Table of contents

The Armour Bulletin

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The Armour Bulletin is published under the authority of the Vice Chief of Defence Staff. The Armour Bulletin is the journal of the Royal Canadian Armoured Corps. It is published twice a year to provided information of professional interest and as a forum for the exchange of ideas and opinions. Views and opinions expressed are those of the authors and do not necessarily reflect official DND policy. Contributions, suggestions, and comments on articles in the form of letters to the editor are most welcome. In this regard, the editor reserves the right to edit or reject any submission. Unless previously arranged all submissions will be considered copyright of Her Majesty. Correspondence should be addressed to:

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Armour Bulletin Writer's Guide

Subjects

We are interested in all subjects relating to Armour affairs that would be of interest to Armour personnel. This would include articles on R&D, personnel, equipment, training, tactics, and history.

Style

In that a readable article is preferred, fit the style to the subject matter. Articles should be double spaced, typed on one side of the paper. Articles should normally not exceed 2,000 words. Only material of an unclassified nature should be submitted. Articles will be published in both official languages.

Illustrations

Art work-sketches, black and white or colour photographs, maps, line drawings, diagrams, etc. enhance the attractiveness and understanding of an article. They must be sharp and of high contrast. Washed out, grey, fuzzy and greatly enlarged photos reproduce poorly. Do not submit photocopies.

Next Issue submission deadline
Prochain numéro date limite de soumission

Summer 2 March	**Été 2 mars**
Winter 31 Oct	**Hiver 31 oct**

Cover photo
Sgt Métivier (12e RBC) and Tpr Burger (LDSH(RC) during the AVGP swim camp conducted by DTM squadron of the Armour School.

Inside the AVGP
Sgt Gaétan Tessier (12e RBC)

A-JS-050-004/JD-001

Director of Armour's Message

Most of you are well aware that, since the White Paper of 1987, we have been following an uncertain course, brought on by a changing world situation and a precarious economy here at home. These and other issues have given rise to the need to reconsider the orientation of Canada's defence policy. It is this policy review in which many of us at NDHQ and FMC HQ have been involved over the past two years. At this stage, the policy is still under development and the Government has not yet approved any change to its previous objectives. For this reason, I am unable to provide definitive answers to the questions which I know you are all asking. However, I can provide a general SITREP on where we stand today, which will enable you to draw your own conclusions.

In the early stages of the review, a structuring concept was developed by the Army. This concept includes three themes that underpin the Army's approach to the policy review and the restructuring which will follow. They will set the character of the future Army.

The first of these themes is a General Purpose Combat Capability. This recognizes that the most efficient use of resources will be to generate forces with the inherent flexibility to be able to react to the widest possible range of tasks. Such forces must include all combat functions and the ability to combine them on the battlefield in combat teams and battle groups.

The second is Total Force. There will not be sufficient resources to permit commitments to be met with full-time soldiers only. The ability of the Army to fulfil its commitments will be dependent on the successful application of a total force: a balance of Regulars and Reserves.

The third theme is a regional organization for command. With the formation of LFCA and LFWA this is already partially implemented, and the three other military areas (including Northern Area) will be formed in the near future. This reorganization is essential to the future of the Army. It will eliminate flaws in our present structure and it will enhance every aspect of the way in which forces are generated, deployed and supported.

Keeping the above themes in mind, I will turn to the field force which will be composed of two parts: manoeuvre troops and deployment troops. In general, the manoeuvre troops will consist of balanced general purpose brigade groups. They will be equipped and trained to ensure they can move anywhere quickly, as the need arises. Although they will be manned predominantly by the regular force, reserve soldiers will be a part of these troops when they are available for full-time employment.

Deployment troops will be formed primarily from the Reserves. In times of emergencies or on operations, they will form composite forces to meet tasks such as Military Vital Point Protection (MVP), replacement or reinforcement of manoeuvre troops, sustainment and the provision of a mobilization base.

Now, what about the Armour Branch? This is where it becomes a bit more difficult to provide hard answers. Indeed, there are not many. However, I can assure all of you that there will continue to be an Army and, within it, we will continue to provide essential elements of the Close Combat Function, specifically the battlefield functions of armour and armoured reconnaissance. These principal functions of the Branch have been reaffirmed as being critical to the Army's overall capability. In effect, there will be no fundamental change in the way we train and fight.

Of course, there are a number of options concerning organizations, establishments and equipment being considered. Because there have been no policy decisions, there is still some uncertainty in all of these areas. Therefore, I have chosen not to address them at this time. I will say, however, that these options, as they pertain to the Armour Branch, are favourable and they provide ample scope for all of us to be optimistic.

To conclude, let me assure all of you that there are many experienced and competent people planning the future of the Army, which will include in it a healthy Armour Branch. I am confident that our future is bright. Do not be too concerned with the review process, but continue to prepare yourselves professionally, with the resources available to you, to meet our current commitments. This is your challenge and I am sure you will measure up to it. Also, have fun in the process.

Col. N.B. Jeffries, CD
Director of Armour

CORPS UPDATE

The Lake Superior answered the call to duty

Last Fall during the weekend of 7, 8 and 9 September 1990, the Lake Superior Regiment (Motor) celebrated their 50th Anniversary of Mobilization for WW II and held a memorial dedication for their fallen comrades. The Lake Superior Regiment (Motor) was the Motorized Infantry Regiment for the 4th Canadian Armoured Brigade of the 4th Canadian Armoured Division and for this reason the Armour Bulletin would like to salute this fine unit and wish them the best for the future.

On September 10, 1939, the Government of Canada declared war on Germany. The Lake Superior Regiment, although not immediately mobilized, sent many reinforcements to the Princess Patricia's Canadian Light Infantry, stationed in Winnipeg.

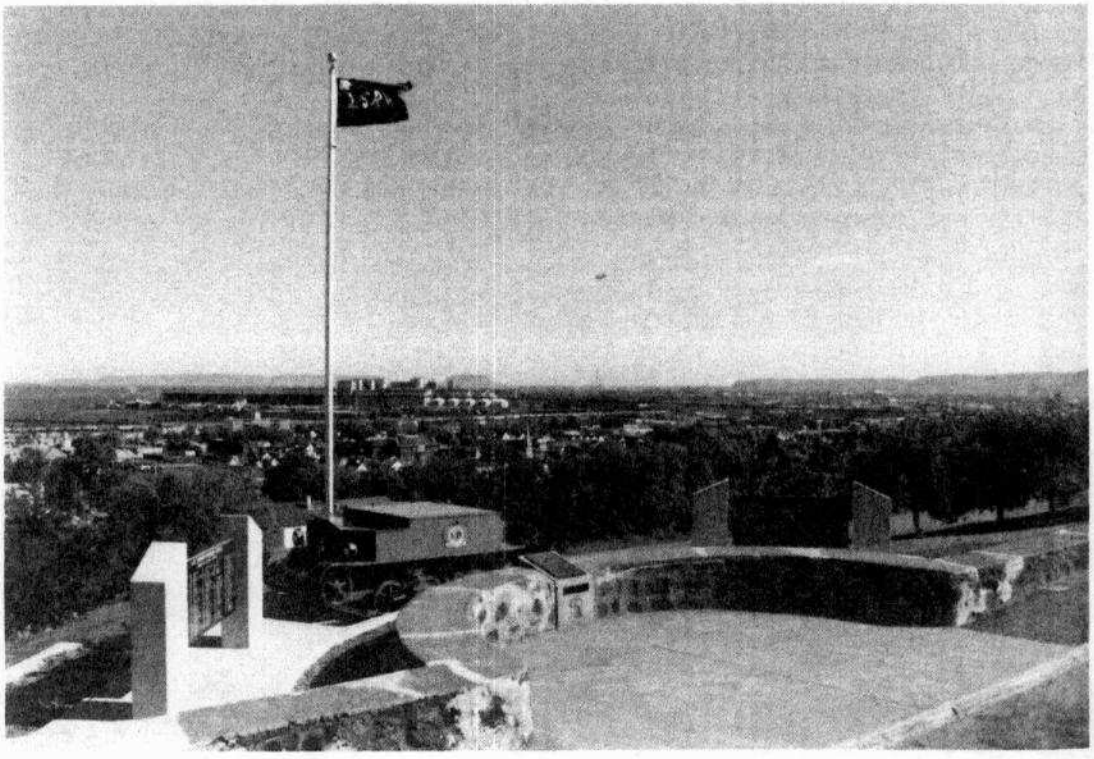
When the call to mobilize finally came on June 5, 1940, the Lake Superior Regiment became part of the 11th Canadian Infantry Brigade along with the Irish Regiment of Canada and the Grey and Simcoe Foresters, all part of the 4th Canadian Infantry Divison.

On October 10, 1940 the unit moved to Camp Borden, Ontario to commence training. In May, 1941 the Lake Superior Regiment moved to Ottawa where it mounted the first guard on Parliament Hill.

A month later, the LSR went on a 120 mile march to Montreal. It then moved to St. John, New Brunswick for a period of coastal defence. More training followed in Nova Scotia at Camp Aldershot and Debert.

In February 1942, the unit was reorganized as a Motor Battalion in the 4th Canadian Armoured Brigade along with the 21st Armoured Regiment (The Governor General's Foot Guards), the 22nd Armoured Regiment (The Canadian Grenadier Guards) and the 28th Armoured Regiment (The British Columbia Regiment).

In August 1942, the Regiment left Halifax for England. It was first stationed near Farnham, Surry, with subsequent moves to Brighton, Worthing, and in particular into



FROM LEFT TO RIGHT
Hap Oldale, Colonel P.R. Cook (Honorary Colonel), Murray Slomke, Colonel The Honourable Dr. George F.G. Stanley, OC, K St J, Des L., D Litt, Colonel The Honourable Lincoln M. Alexander, PC, K St J, QC, BA, LLD, Francis "Pop" Richard, DCM, Mayor Jack Masters and Lieutenant-Colonel Richard J. Dick, CD (Commanding Officer).

the battle training area around Norwich.

In early 1944 tremendous preparation was underway for D-Day. Equipment was stored, ammunition and weapons were in readiness, and all vehicles were thoroughly water proofed. D-Day came June 6, 1944 but the regiment was not sent to the Normandy Beaches until a month later.

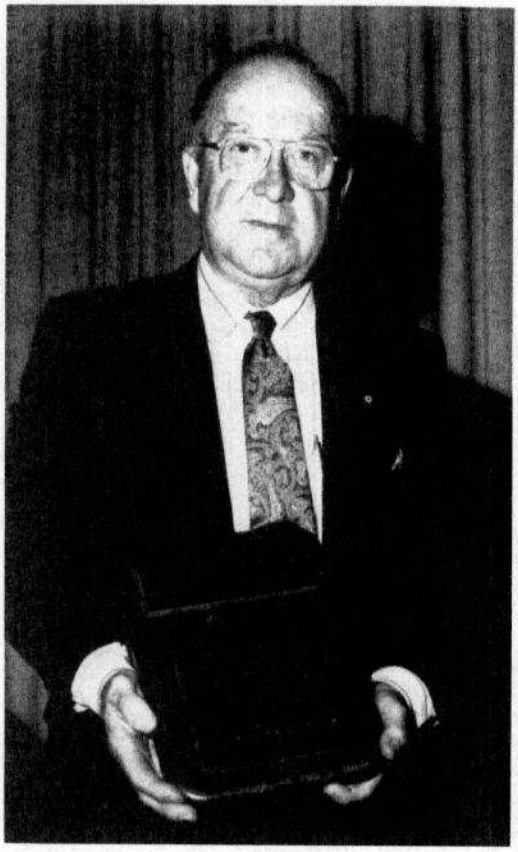
The Brigade was eased into action in the Soliers - Fours area, about three miles south of Caen. The first action took place on August 5, 1944.

The pursuit to Falaise got underway and in attacking Breteville-le-Rabet, LCol J.E.V. Murrell was wounded by the blast of an exploding shell. LCol R.A. Keane took over and remained in command until the war ended.

Over a period of 10 months, the regiment saw action in the Falaise Gap, the dash to the Seine, the Somme, the Leopold Canal, the Mass River, Steenbergen, the Schelde Estuary, Keppelen, Udem, the Hochwald Forest, the Rhine, Friesoythe, the Kusten Canal, and Rastede.

During these operations, eight officiers and 191 other ranks were killed.

The George G. Bell Testimonial Dinner. Wednesday, 8 May 1991. Toronto, Ontario.



The Canadian Institute of Strategic Studies held a testimonial dinner to honour past- and founding-President Brigadier-General George G. Bell, OC, MBE, CD, BS, MA, PhD. The dinner was chaired by Major-General (ret'd) Bruce Legge and paid tribute to Dr. Bell's outstanding leadership of the CISS since its inception in 1976 and his dedicated career of unselfish public service to Canada. The Associate Minister of National Defence, the Honourable Mary Collins, PC, MP, was the special guest of honour. Recollections and tributes were paid by several friends and colleagues of Dr. Bell including, Colonel Irv Matheson, Mr. Martin Shadwick, Major-General Reg Lewis, Dr. David Dewitt and Mr. Alex Morrison, Executive Director of the CISS. The new President of the CISS, Brigadier-General (ret'd) Don Macnamara concluded the evening by announcing the establishment of the George G. Bell Fellowship in Strategic Studies.

CISS Mission Statement:

The Canadian Institute of Strategic Studies provides the forum for and is the vehicle to stimulate the research, study, analysis and discussion of the strategic implications of major national and international issues, events and trends as they affect Canada and Canadians.

Establishment of the George G. Bell Fellowship in Strategic Studies.

The Canadian Institute of Strategic Studies is very pleased to announce the establishment of the George G. Bell Fellowship in Strategic Studies. This annual Fellowship has been inaugurated to honour the founding-President of the CISS, Dr. George G. Bell. It will allow a young Canadian the opportunity to conduct research and analysis at the CISS in an area of strategic importance to Canada. This work will be published by the Institute and distributed across Canada and abroad.

Contributions to support and build the George G. Bell Fellowship in Strategic Studies are being sought. Contributions are tax-deductible and matching grant programmes are encouraged. Institute members, the general public, corporations, government agencies and international organizations are eligible to participate.

Partial text of remarks made by Brigadier-General George G. Bell at the CISS Testimonial Dinner held in his honour on 8 May 1991.

"The need for the (CISS) is as great or greater today, than it was twenty years ago, when we first identified the need. It is essential that there be a (readily-accessible) source of independent and objective opinion, commentary and recommendation based upon study and policy-oriented analysis.

As a nation, we have advanced somewhat in developing a growing base of individuals and institutions with capacities for analysis and forecasting. However, we have yet to develop the capacities in government and other sectors of Canadian society to make effective use of their outputs. This is particularly serious at this critical stage in Canada's evolution. We are desperately in need of a strategic planning approach to our Constitutional dilemma and our foreign, defence and economic policy directions.

We need to seize the high ground above the level of our domestic, inter-regional squabbles and to consider both the external and internal settings of our country. We need to articulate a set of national aims and objectives on which all Canadians or the majority of Canadians can agree regardless of origin - whether Founding Nations, aboriginal or ethnic immigrants.

We need to have a national vision and a set of objectives which allow us to achieve a consensus on a broad strategic posture for Canada which recognizes the range of potentially destabilizing circumstances that can occur in the non-North American regions of the world which can threaten our overall security. We need to indicate what range of political, diplomatic, economic and military capabilities Canada requires in order to play our full part as a responsive (Group of Seven) nation in preserving and restoring regional stability in areas which threaten world stability. For example, how do we approach the volatile and changing world order as found in Latin America, Africa, South Asia, The Pacific Rim, the Middle East, Eastern Europe and the Soviet Union and where and how is Canada best defended?

We need both the academic and the non-academic policy-oriented resources, but, most important to our national development is the public education dimension which the CISS can bring to the public debate on key issues affecting our national security. A capability which is even more important to governments and Canadian society when governments choose to be silent or to limit their participation in debate.

As we have seen in the Gulf War, information on security, foreign policy and defence matters are consumable items. We need the CISS and its members to articulate and explain ideas, situations and issues. The need now is to do something on a persistent and consistent basis in order to create within our public a real understanding of security matters and the policies and actions essential to maintaining Canada's security. This includes understanding our constitution, our heritage and the role that the armed forces have had in building and protecting this proud nation - Canada."

Royal Canadian Armoured Corps School Change of Command

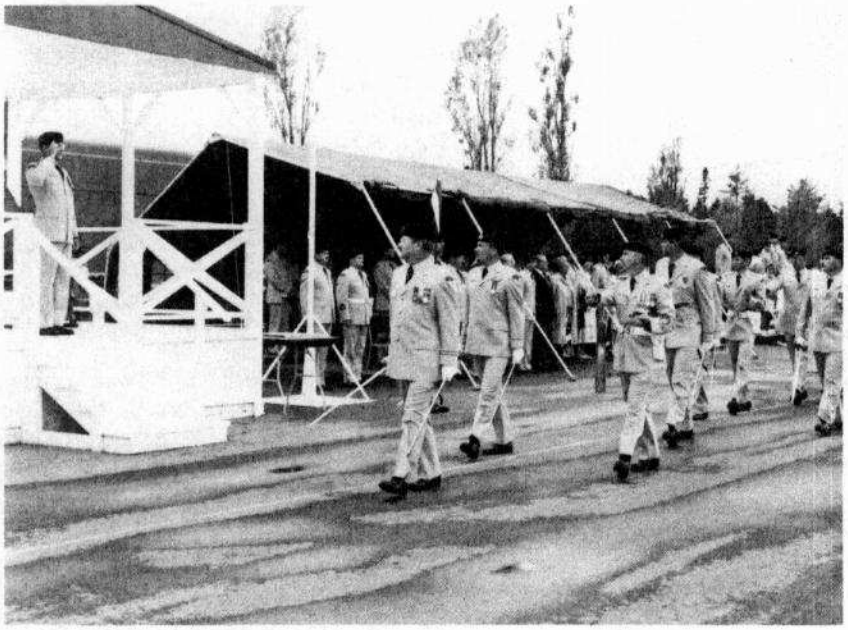
It is said by some that the sun always shines on the Armoured Corps. Although that may not have been the case on Saturday, July 6, the rain did stop and the clouds parted for the Armour School Change of Command parade between Lieutenant-Colonel P. Leentjes, OMM, CD, and the new Commandant, Lieutenant-Colonel W.J. Fulton, CD.

Against a backdrop of all types of armoured vehicles, the troops marched in through an archway formed by two tanks. As the crowd looked on, the School marched smartly into place to the music of the 8th Canadian Hussars Militia Band from Monction, NB, and prepared to show both the old and new Commandant the Royal Canadian Armoured Corps' finest. With the Armoured Corps dignitaries such as Brigadier-General Lockyer, a past Colonel of the Regiment (8CH), Colonel Gaulin, Colonel of the Regiment (12RBC), Colonel Jeffries, Director of Armour, Colonel Boileau, Chief of Staff Atlantic Militia Area, and many other friends and peers looking on, both Commandants and members of the School wanted to have a good parade.

After Lieutenant-Colonel Leentjes had taken command of the parade, all awaited the arrival of the Reviewing Officer, Brigadier-General Baril, the Commander of the Combat Training Centre. Upon his arrival an inspection was carried out, which only served to demonstrate a high standard of dress and deportment by all. After the inspection, Lieutenant-Colonel Leentjes led the School in a march past, under the scrutiny of his wife, Jean, son Christopher, and daughter Sarah.

After the march past, Lieutenant-Colonel Leentjes was presented with the Commandant's pennant by his driver, Master Corporal Saunders, and a gift from all ranks by Corporal Ward and Trooper Roach.

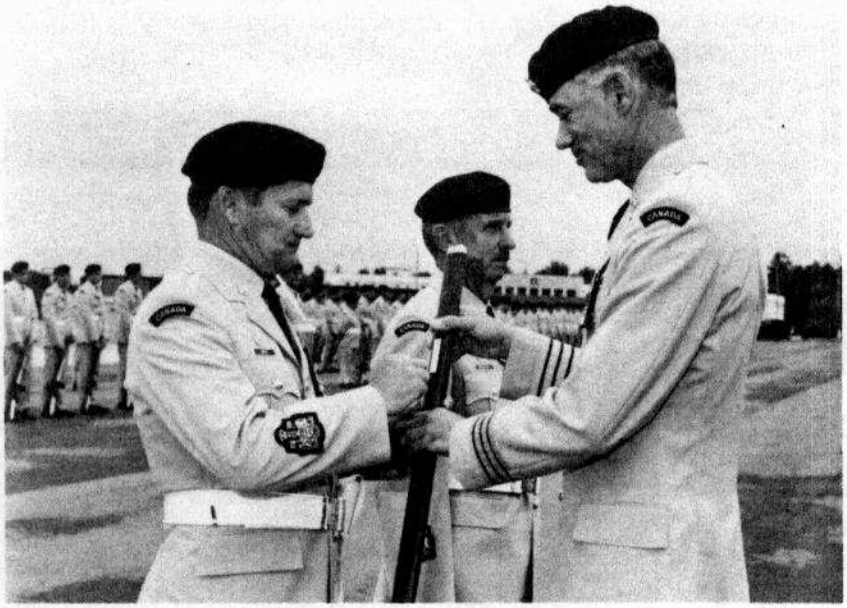
The Director of Armour, Colonel Jeffries, carried out the Changing of the Cane Ceremony between the outgoing Regimental Sergeant Major, Chief Warrant Officer S. Ballard, CD, and the incoming



Regimental Sergeant Major, Chief Warrant Officer A.B. Currie, MMM, CD. With the presentations completed, the two Commandants carried out the signing of the Change of Command documents with Brigadier-General Baril, which made the Change of Command official. Lieutenant-Colonel Fulton was quick to assume command and led the School through a second march past and advance in review order. This time, however, it was done under the watchful eye of his wife Jo Ann, daughters Jolana and Kristina and other family members.

With the ceremony complete, the parade ended and everyone moved to H-12 for the reception. This provided a good opportunity for visitors of all ranks to catch up on the latest news. It was also a good preparation for the Armour School's annual surf & turf dinner, which was held that evening. With fine food, good song, and plentiful drink, the evening rounded out an excellent day for all.

In closing, Lieutenant-Colonel Leentjes, let us thank you for the challenges you gave us over the past two years. Lieutenant-Colonel Fulton, let us welcome you and the challenges that may lie ahead.



FEATURE ARTICLE

Tank and AFV production in Canada

The recent tank acquisition project is now history and an MBT equipped Armoured Corps in the Canadian Forces will not likely survive into the next century. "Light" and "General Purpose" seems to be the way of the future.

The Tank Project could have taken many forms. The simplest and quickest solution would have been to buy "off the shelf". Another alternative would have been to modify an existing design. Building components or even assembling a complete vehicle in Canada, though remotely possible, was yet another option.

There is, however, historical precedent of Canadian production of British and American tanks and, for the most part, the completely original design and production of tanks in Canada.

As most readers may know, the Royal Canadian Armoured Corps was formed on 13 August 1940. However, the first units to be designated "tank" were converted Militia Infantry Regiments. This occured on 15 December 1936 and the units were:

The Argyll Light Infantry (Tank)

The Essex Regiment (Tank)

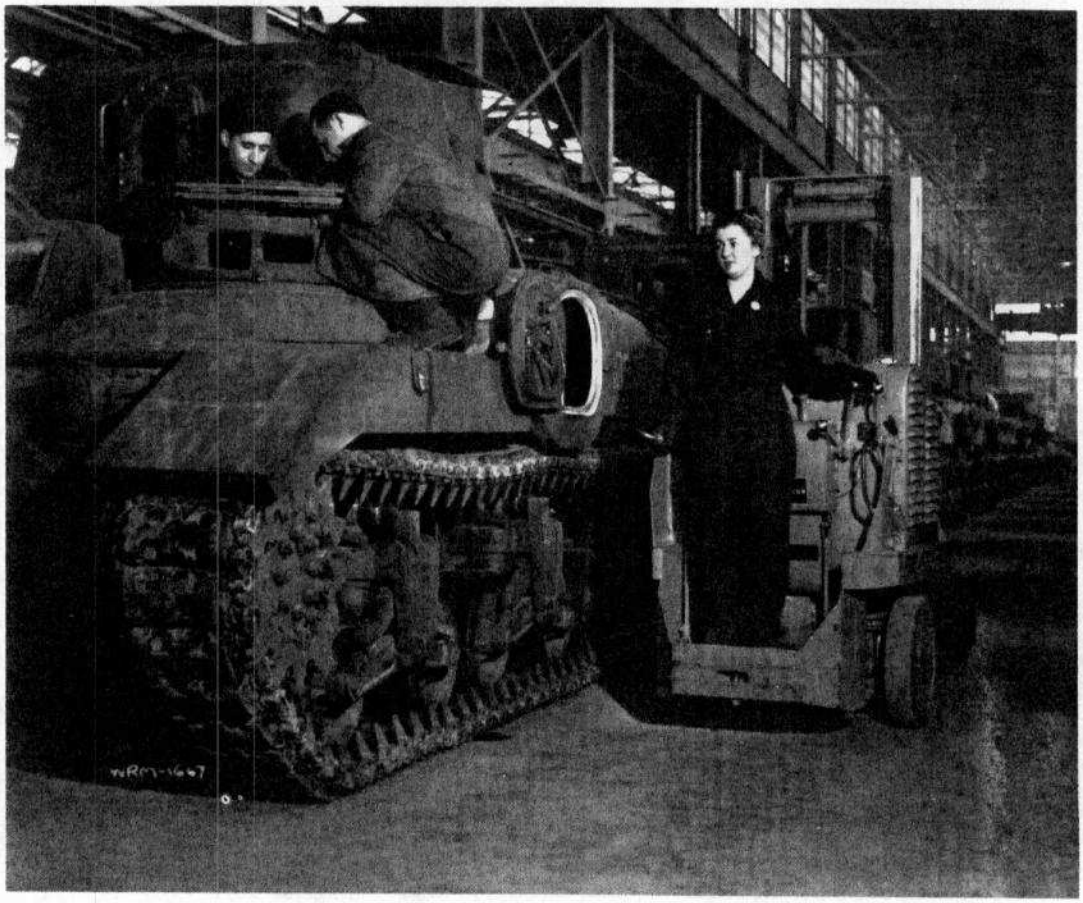
The Ontario Regiment (Tank)

The New Brunswick Regiment (Tank)

The Calgary Regiment (Tank)

The Three Rivers Regiment (Tank)[1]

These units were in name only and the Canadian Tank School which had been established at London, Ontario, consisted of 24 personnel and 12 Carden-Lloyd MG carriers. In May 1938 the Tank School moved to Camp Borden allowing for more tactical training the School changed it's name to the Canadian Armoured Fighting Vehicles School and 14 MK VI light tanks from Britain were added to the



Early production Canadian built Valentines training at camp Borden

inventory in the summer of 1939.[3] No other plans were made to acquire tanks in quantity partly because of expense, but mainly because of the belief at the time that Britain could meet the requirement if any Canadian Expeditionary Force were to be sent overseas.[4] The"Phoney War" of the winter of 1939/40 even led the Government to close the Tank School in December of 1939.

The events of the Spring of 1940 soon changed all that. Britain found herself very short of tanks. Even before the debacle of Dunkirk, the British tank mission was set up and went to Washington with the idea of having British tanks built in the United States.[5] The Americans declined, offering instead to provide Britain with some American tanks. Concurrently, the newly formed Ministry of Supply in Ottawa contacted the Canadian Pacific Railway Company to determine if the latest British tank, the Valentine, could be produced to meet British requirements.[6] The formal contract was signed in June 1940.

A consignment of Amerian M1917 "Six tonners" arrives at camp Borden, Summer 1940

The Canadian Valentine

The initial order with Canadian Pacific called for 300 tanks, less engines, guns and minor ancillary parts, which could be fitted after the vehicle arrived in Britain. The blueprints were to be supplied by Vickers but their arrival was delayed and, as a result of Dunkirk, Canadian Pacific was asked to build and deliver the complete Valentine tank using Canadian built 2 pounder (40 mm) guns and a suitable power pack in lieu of the AEC gasoline engine found in British Valentines.[7]

Meanwhile, the Canadian Armoured Corps was also rapidly expanding. The Department of National Defence placed an immediate order for 488 Valentines in addition to the British order.[8] (As a stop gap, then Colonel Worthington went to the US and bought 229 World War I vintage MK VIII and M1917 "six tonners" at scrap value so that the Corps could at least have something to train on.)[9]

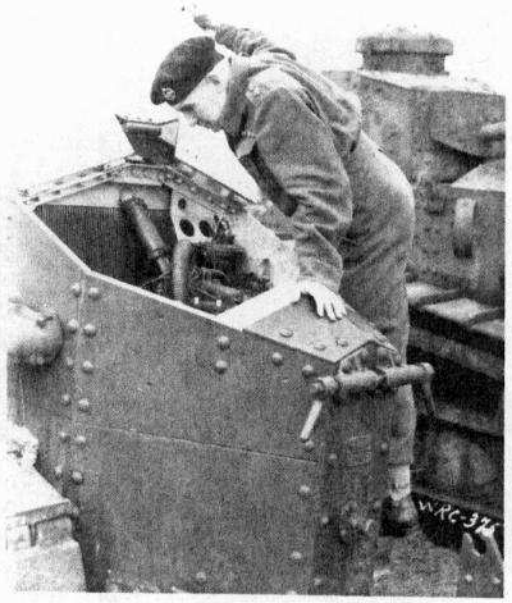
Building the complete Valentines in Canada meant some re-design work had to be done. Specifications from the drawings had to be changed to meet Canadian Engineering Standards.[10] A completely new electrical system was designed.[11] The engine chosen to power the Canadian Valentine was a GMC 6 cylinder two stroke commercial diesel built

by General Motors of Canada.[12] The machine gun mounts were modified to take the American Browning .30 cal replacing the British BESA. The most visible change was the replacement of the riveted hull nose with a cast one piece nose which was intended to simplify production.[13]

Total production by Canadian Pacific was 1420 tanks (orders were subsequently increased). The first 30 were kept in Canada for training and the remaining 1390 were shipped to the Soviet Union under the lend lease program.[14] Not known for acknowledging such equipment, the Soviet Government paid rare tribute by stating "after proof in battle we consider the Canadian built Valentine tank to be the best tank which we have received from any of our allies and we propose to ask... for more"[15]

The cruiser Tank

In August 1940 the Defence Department had set up the Interdepartmental Tank Committee to coordinate tank requirements and procurement. At this time it was known that any chance of getting tanks from Britain was remote. American production was just gearing up and any spare capacity there was taken up by the British Tank Mission.[16] It was estimated that the two new Canadian Armoured Divisons would require 1000 to 1200 tanks so it was decided the only alternative was to build tanks in Canada. A tank arsenal was to be set up and run by Montreal Locomotive Works, a subsidiary of American Locomotive Co., which was already involved in tank production in the U.S.[17]



Colonel Worthington inspects the engine of a newly arrived M1917 "six tonner" at camp Borden Summer 1949

Around the same time, the U.S. Ordnance Department had started work on the M3 medium tank. The British tank mission knew of this and ordered some for British use.[18] However, by late autumn the design work was far enough along for the British tank mission to report on the features they deemed unsatisfactory. The Interdepartmental Tank Committee had initially planned to produce the M3 at the Canadian Tank Arsenal in the interest of standardization, but the British report caused them to re-consider. Therefore, in January 1941 the Committee decided on a compromise. Canada would build a tank using the very reliable chassis and mechanical components of the M3 but would design a new superstructure to meet British (and thus Canadian) standards.[19]

The new tank would have a 2 pounder (subsequently increased to a 6 pounder) gun in a fully traversing turret. The No. 19 wireless would be mounted in the turret bustle. An auxillary MG turret was to be located on the hull and the vehicle was to be right hand drive.[20] Overall design responsibility was given to Montreal Locomotive Works under the direction of the Department of Munitions and Supply.

Colonel Worthington contributed enthusiastic advice. His main objection though, was that the tank should have a

"RAM" tank of the 4th Canadian Armoured Division taking part in a training exercise. Hindhead, England 7 April 1943

"RAM" tanks landing, Llanaley, South Wales, U.K., 25 April 1943

larger turret ring and mount a 75mm gun. The British "rule" at the time was that cruiser tanks should mount a 2 pounder gun, so a golden opportunity was missed for an Anglo/Canadian tank with a turret mounted 75mm gun to be in production and service by 1942.[21] Moreover, at the time Worthington was making his suggestions, the Americans had not yet even started working on the Sherman. His contributions to the new tank's design and the fact that he was already recognized as the Father of the Canadian Armoured Corps led the new tank to be christened "RAM" after the central figure of the Worthington family crest.[22]

The prototype vehicle was completed in June 1941, a mere six months from the time the decision was made to produce it. Series production began in November 1941. The first 50 tanks mounted a 2 pounder gun. Subsequent Rams, designated MK II, mounted 6 pounders (57mm). These began to roll off the line in January 1942.[23]

In mid 1942 the Fourth and Fifth Canadian Armoured Divisions were sent to Britain. The majority of Rams, including the MK Is were also sent to equip these divisions. However, none were to see action in their primary fighting role. By the time of the Normandy Invasion in June 1944, enough 75mm gunned Shermans were available and the Canadian units had their Rams replaced in the month preceeding D-Day.[24] In fact, the decision to terminate Ram production was taken as early as August 1942 when it became apparent that M4 Sherman production in the US would more than meet allied requirements. Production of the Ram, however, did continue until July 1943. A total of 1849 Rams were built.[25]

The Sexton

Built in even larger numbers than the Ram was the Sexton or "25 pounder SP Tracked". The British had first used the Priest or "M7 105mm Howitzer Motor Carriage" at El Alamein and it was an immediate success.[26] They asked the Americans to produce a similar vehicle mounting the 25 pounder. American production could not be diverted to producing a vehicle especially for British service so again Canada stepped in. Montréal Locomotive Works came up with a design similar in layout to the M7 but to British specifications.[27]

The pilot model was completed by early 1943 and it was sent to Britain for trials. It was approved subject to minor changes and went into series production soon afterward. By the time production ceased towards the end of 1945, 2150 had been built.[28] It remained in service well into the 1950s.[29]

"RAM" tanks of the Fort Garry Horse, England, 18 July 1943

"RAM" tank of the Fort Garry Horse being unloaded from a tank transporter, England, 18 April 1944

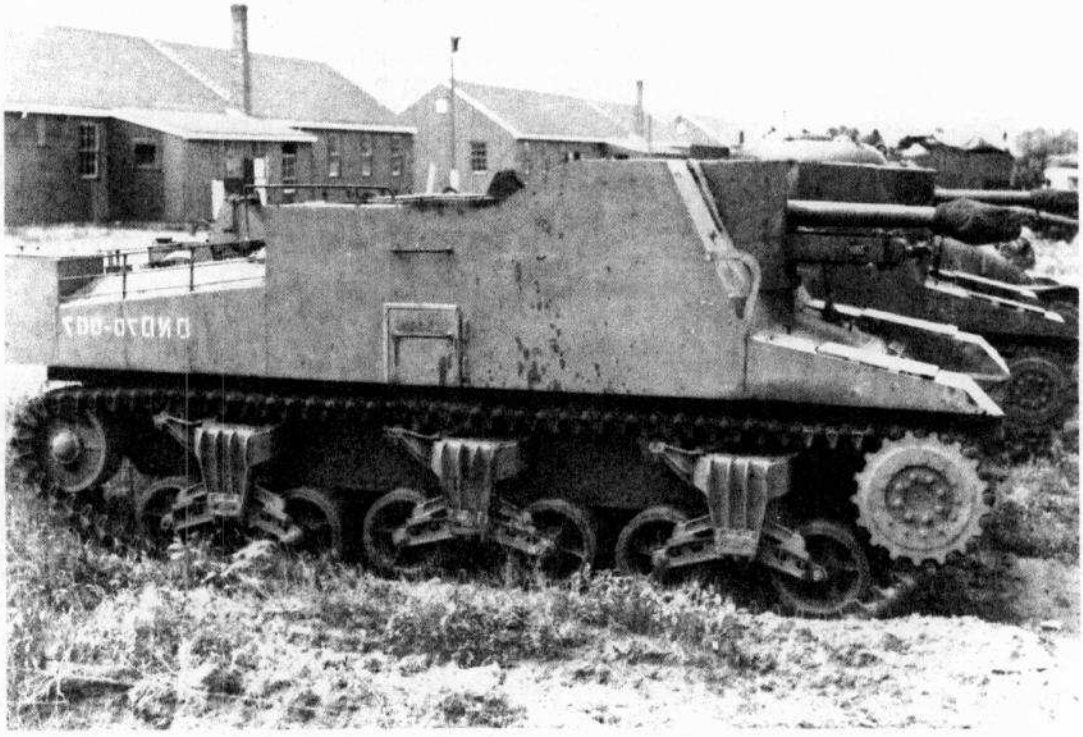
The Kangaroo

The Sexton went into service with British and Canadian Divisions in June 1944,[30] just after the Normandy landings. They replaced M7 Priests under an agreement with the U.S. Army so that all stocks of 105mm ammunition could be earmarked for American divisions.[31]

About this time Lieutenant-General Guy Simmonds, Commander Second Canadian Corps, came up with the idea of removing the 105mm Howitzer from the surplus Priests, weld a plate over the opening where the gun had been and use them to carry infantrymen into battle.[32] Strictly speaking, this idea was simply what the Germans had been doing with their Panzer Grenadiers, but in the British/Canadian armies at least, it was the first use of APCs save for a limited number of half tracks in their armoured divisions.

By September of 1944 a special unit, the First Canadian Armoured Carrier Regiment, was formed.[33] This time, however, Rams were used with the turrets removed, the radios relocated in the hull, and bench seats fitted to carry eight to eleven infantrymen.[34] The British also redesignated 49 RTR as 49th APC Regiment equipping them with Ram kangaroos. These two units operated under 79th Armoured Division control and gave valuable service until the end of the war. Ram kangaroos even remained in small numbers in British Army service after the war until purpose built APCs like the Saracen became available.[35]

It took a crisis, as in the bleak days of 1940, but tank production in Canada became a reality. It would probably take a crisis of similar magnitude to ever make it happen again. As recent events have shown, the tank is still the premier weapon on the battlefield. It may not be necessary, let alone practical, to equip Canada's Armoured Corps with a home grown tank, but our current fleet is aging and nearing obsolescence, and some lessons from the



"Sexton" self-propelled guns, Shilo Manitoba, July 1950

past may be helpful when deciding on something to replace it.

Lieutenant Massimo Novati is a troop leader with C Squadron, the Royal Canadian Dragoons

FOOTNOTES

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15. Ellis & Chamberlain, *AFV 13* pp 4.
16. Chamberlain & Ellis, *BRITISH AND AMERICAN TANKS*, pp 172.
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35. Ellis & Chamberlain, *AFV 13*, p. 16, 17.

The human side of armed conflict in military history

How will I do in battle?... What is battle really like?... These are the fundamental questions that most professional military officers, that is, officers who train to perform competently and efficiently in combat, periodically ask themselves. They are questions based on the lack of direct experience in battle that most officers have. Battle is what military officers train for throughout their careers. Yet most have no idea how they will react when faced with the overwhelming fear and stress of combat, how those men of whom they are in charge will react, and how they will be able to discharge their duties as competent military leaders. By studying military history, the professional officer gains this experience, albeit indirectly, and is provided with many illustrations of the human side of armed conflict. Acquiring

an understanding of the human side of armed conflict is part of the professional development of officers for it deals with an aspect of armed conflict that is, it can be assumed, just as important as tactics, strategy, logistics, or any of the other more scientific aspects of armed conflict. Therefore, the study of military history is important to the professional development of military officers.

What is military history? Military history is the study of armed conflict which encompasses war, battle and combat. To be more specific, I believe it is the study of strategy, tactics, politics, economics, technology and all the other scientific aspects. What could be termed the "technicalities" of war. It is also the study of the emotions, motivations, limitations and spirits of men in battle - what could be termed the "human side" of war.

It is this latter study that seeks to answer the central question concerning the reality of combat: What happens when men are faced against each other in an armed struggle to the death?

As Field-Marshall Lord Wavell once wrote to Basil Liddel Hart:

"If I had time and anything like your ability to study war, I think I should concentrate almost entirely on the"actualities" of war - the effects of tiredness, hunger, fear, lack of sleep, weather....The principles of strategy and tactics, and the logistics of war are really absurdly simple: It is the actualities that make war so complicated and so difficult....."[1]

Wavell, like many professional soldiers before and after him, valued this knowledge because of its scarcity. It is knowledge that only a relatively few human beings, those with real combat experience, possess.

Why is knowledge of the human side of conflict so highly valued? The primary purpose of a military officer's training is to enable him to perform his duty as efficiently and as competently as possible under the stress of combat. Assuming, then, that an officer's greatest professional desire is to perform correctly and effectively in battle, it follows that his greatest professional fear is failing to perform adequately. As John Keegan explains, this professional fear is "the product of some of man's deepest fears: fear of wounds, fear of death, fear of putting into danger the lives of those for whose well-being one is responsible".

These fears lie at the core of the professional officer's psyche. The study of the technicalities of war, which most of his training focuses on, cannot supplant these fears. They must be directly addressed.

The study of military history can address these fears by looking at particular

situations in the past and analyzing how men reacted to the overwhelming stimulus of battle. By imagining one's self in the situation described, one can gain some insight into the emotions and sensations of men involved in battle. As Liddell Hart points out, "military history opens a window on experience thas is infinitely wider and more varied, even if indirect, than any individual would ever experience himself and so is more valuable to him"[3]

An officer, then, can gain indirect experience of battle through the study of military history. But does this new experience necessarily contribute to his professional development? In considering this question, one should ponder the following comment from Frederick the Great:

"A mule who has carried a pack for ten campaigns under Prince Eugene will be no better a tactician for it, and it must be confessed, to the disgrace of humanity, that many men grow old in an otherwise respectable profession without making any greater progress than that mule."[4]

To be more precise, an officer with a great deal of experience will not necessarily have learned many or any lessons. In his paper, Major J.L. Lane points out that, unlike Prince Eugene's mule, an officer must bring creativity and imagination to his study of military history in order to "discriminate between what he can accept as applicable to the present day and what he must reject as inappropriate."[5] In studying past battles, the officer must be able to recognize what lessons are of value to present or future military situations.

For example, most respectable studies of the First World War vividly describe the appalling conditions the soldiers in the trenches had to endure. On the surface, one could say that the lessons of that war would not be applicable to any present war or any war in the future because of the strategy, tactics, and equipment involved. To take this stance, one would be concentrating solely on the technicalities of war. However, on the human side, the First World War offers lessons on how men, under very appalling conditions, can keep their morale high, how officers and NCO's can still apply effective leadership in situations where one would think all hope is lost, and how men will fight and die for each other. These lessons can be applied to any conflict past, present, or future. The officer who has the imagination and creativity to perceive these lessons and apply them, is contributing to his professional development.

Assuming that combat is essentially a brutally violent and chaotic form of human activity, the aim of officer training, as has been stated, is to enable the officer to perform his duty as professionally as possible under the conditions of combat. The officer is taught, by very repetitive methods, a set number of drills, and to organize his thinking into a set number of thought patterns. In other words, training seeks to minimize the effects of combat on the human mind. As John Keegan explains, "by teaching the young officer to organize his intake of sensation, to reduce the events of combat to as few and as easily recognizable a set of elements as possible.... one is helping to avert the onset of fear or, worse, of panic and to

perceive a face of battle which, if not familiar, and certainly not friendly, need not, in the event, prove wholly petrifying."[6]

The study of the human side of military history can have the same aim. By studying past conflicts, the officer comes to know what makes some men leaders and others followers, what kinds of loyalties hold men together in combat, and what kinds of fears men must conquer in order to fight the foe. The more the officer is familiarized with these human elements of combat, the more he will be able to face them for real when the time comes. In other words, an officer is more likely to act competently and efficiently, ie. professionally, when he is aware of the fears he will encounter.

How does the study of military history fit into the overall training of officers? Winton and Lau point out that "the intelligent study of history is a useful adjunct to professional development."[7] However, to steadfastly apply the lessons of the past to every current and future situation would not be practical. As has been mentionned, the professional officer possesses the imagination and creativity to determine what lessons of the past are of value in the present. This means that professional officers must also keep themselves abreast of current domestic and international events, and general trends in their social and professional environment.[8] The knowledge of historical lessons becomes the litmus paper with which the professional officer can evaluate current events and trends.

Having shown the importance of the study of the human side of armed conflict in military history, a note of caution must be inserted. To gain the most from studying military history, to learn the right lessons, the officer must read critically. C.P. Stacey points out that what matters most in good historical writing is authenticity.[9] In particular, the officer must watch out for bias, over-glorification, and omissions of truth. Personal, national, service and even unit prejudices can colour the objectivity of a particular work. If the reader does not remain objective, and does not read the work critically, the wrong lessons could be drawn; thereby retarding his professional development.

In summary, although the technicalities of war have always changed, man's behaviour in war, whether at Sedan, Dieppe, Dien Bien Phu, or Tumbledown, has never changed. The fears, motivations, sensations, and hopes of men in battle have been the same throughout the ages and, therefore, should be an important subject of study in the overall professional development of today's military officer. The human side of armed conflict is best studied through the objective, selective study of military history. By acquiring this understanding, the officer is more likely to conquer his

own fears of failure in combat, and carry out his task professionally when called upon to do so.

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FOOTNOTES

1. Quoted in Richard Holmes, *Firing Line*, (Harmondsworth: Penguin Books, 1987), Page 7.
2. John Keegan, *The Face of Battle* (Harmondsworth: Penguin Books, 1978), page 16.
3. Quoted in Major T. W.Melnyk, "Military History and the Development of the Professional Officer." (Exercise New Horizons Paper, Canadian Forces College, 1987) page 7.
4. Quoted in Major T.W. Melnyk, "Military History: Its importance Today, *Infantry* (May-June 1987) Page 11.
5. Major John L. Lane, "Military History....." Page 12.
6. Keegan, *The face of Battle*, Page 20.
7. Major H. R. Winton et capitaine H.H. Lau, "History and the Professional Soldier" *Military Review*, (April 1974) page 35.
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The use of individual protective equipment while employing the Leopard NBC overpressure system

In any future conflict in which the Canadian Army is involved, the use of nuclear, biological and chemical weapons (NBC) will almost be assured. As one of the characteristics of Armour is to exploit the effects of mass destruction weapons, an even greater reliance will be placed on armour assets in an NBC environment. Proper drills must therefore be in place to ensure that armour is used to its fullest effect.

The following analysis is based on existing equipment only. More specifically, it is limited to the equipment which is currently in service with the Leopard C1 tank. Also, the comparisons will be made with the emphasis on chemical/biological warfare. The reason for this is that the filtration system is most effective against these agents. Apart from radioactive dust, the overpressure system offers no protection against nuclear weapons.

Before any evaluation on the merits or shortcomings of existing or proposed policies, appropriate criteria must be determined for their (the policies) comparison. The Leopard possesses the qualities of mobility, firepower and protection. Any changes made to the tank or to its operating procedures will affect one or more of these three qualities in either a beneficial or detrimental manner. An example of this would be the addition of more armour plate to the turret. While this would increase the protection afforded to the crew, the additional weight would reduce the speed of traverse. The firepower of the tank would be correspondingly reduced due to an increase in engagement time. Similarly, a comparison of various proposals for NBC standard operating procedures (SOPs) can be made on their respective effects on the aforementionned qualities. The following three options for the use of the Individual Protective Equipment (IPE) in conjunction with the Leopard overpressure system will be discussed:

a. present doctrine of full IPE;

b. IPE in the open state; and

c. wearing no IPE but having it immediately available.

"All stations 1 this is 1 TOPP HIGH over"

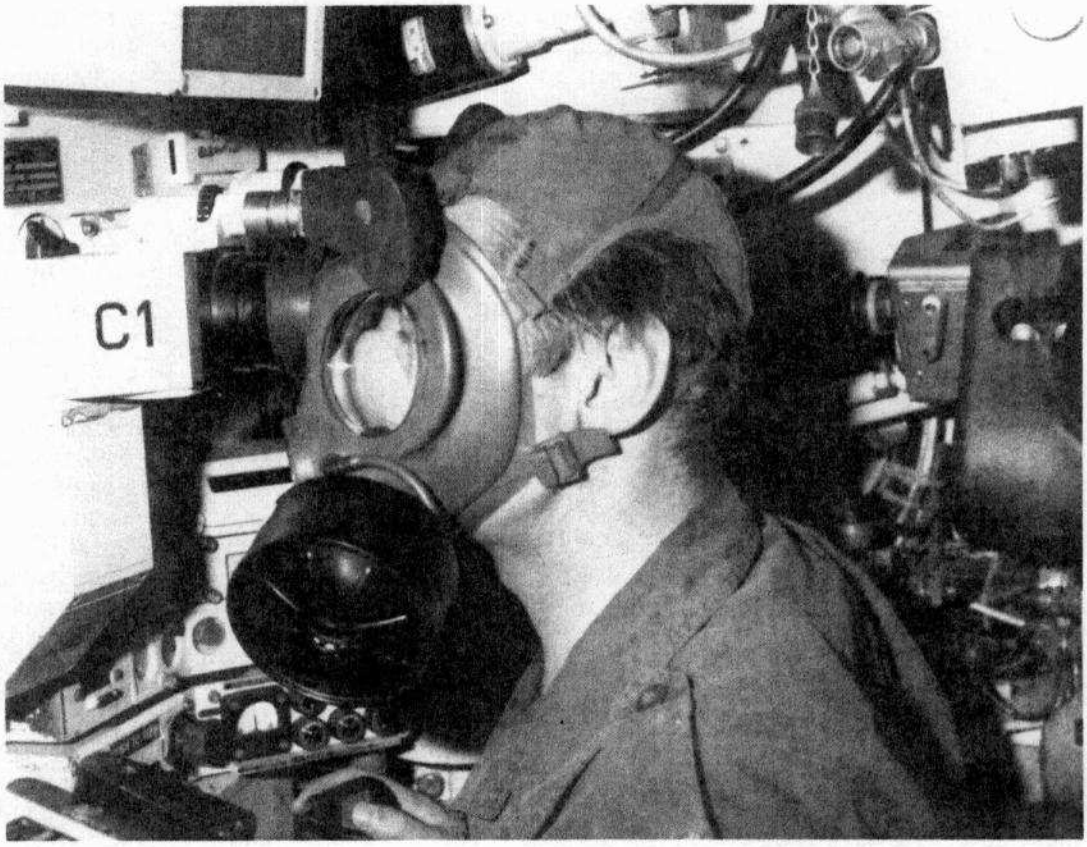
"11 Roger over"

"12 Roger over"

"13 Roger over"

"14 Roger over"

"1 TOPP HIGH now out"



Present doctrine

Let us consider for a moment the effects of the above transmissions at the crew level under existing doctrine. Almost instantaneously, all crew members will don their gas masks, gloves and zip up their NBC coveralls (assuming, of course, that they were already in TOPP MEDIUM). Next, the hatches will be closed and the overpressure system engaged. The crew, now fully enclosed, has full protection against any known NBC agent - even if the NBC overpressure system malfunctions.

The immediate result of putting on full IPE for the loader and driver will be a slight decrease in performance due to reduced vision and loss of manual dexterity. Loading the main gun or coax will require slightly more time. Should a prolonged engagement begin, the loading delay would progressively deteriorate as the mask's breathing resistance causes the rapid onset of fatigue.

For the commander the immediate effects of wearing full IPE are much greater. Communication on the radio will be significantly reduced as the mask will make clear speech very difficult. The commander's speech impairment will be most critically felt, however, when he attempts to issue orders to his crew. The mask's distorting effect on his voice will mean that all speech will have to be slowed down so that it is sufficiently loud and properly enunciated. Even if this is done, the probability of a misunderstood order will increase. This problem can be partially alleviated through the use of the intercom. Unfortunately, the increased use of the intercom may result in the crew commander missing a radio transmission. For a junior crew commander, this may be acceptable, but the consequences for a troop leader, squadron commander and/or combat team commander could be disasterous.

The final area, and most important from a purely combat effectiveness view, is how the mask will affect the gunner's performance. His ability to maintain the sight picture will be severely hampered when using the integrated (IFCS) or secondary (SFCS) fire control systems. This is due to the refraction and opaqueness caused by the extra layer of glass. The gunner will also suffer from tunnel vision (a reduction in his already narrow field of view) as his eyes are displaced further away from the optics. In the case of the SFCS, the filter on the mask makes it almost impossible for the gunner to use the optics as the filter strikes the protective cage before the gunner's

eyes are aligned with the sight eyepiece. The gloves will further encumber fine laying onto targets that are small or at long ranges.

Overall then, the immediate consequences of the present practice of wearing full IPE will be an increase in engagement time, due to gunner and loader delay and a reduction of the gunner's ability to acquire and engage targets. The increased crew protection from NBC hazards will have resulted in a decrease in the tank's effectiveness.

As the battle wears on, the prolonged effect of wearing the complete IPE will result in overheating. As the heat build-up increases, the danger of heat stroke, cramps and exhaustion also increases. Combine this with a hatches down situation, and heat related casualties would be almost inevitable. The combat effectiveness of the crews that did not succumb to the heat would be intensely diminished due to a high state of fatigue induced by the overheating and general discomfort of protracted IPE use. This can be a problem even in cool temperatures. In summarizing the effectiveness of the present SOP, it is obvious that there is a price to be paid for the increased protection against chemical attack. The firepower of the tank is immediately reduced by target acquisition and loading delays and by the commander's diminished ability to control his vehicle. In the long run, the present practice reduces firepower even further as fatigue and heat cause additional degradation of the crew's performance.

Alternatives

The alternative of wearing IPE in the open state should have less of an effect than wearing the complete IPE on the crew's ability to fight their tank. As no additional equipment is donned there will be no "instant" decrease in crew performance other than that emanating from being hatches down. Depending on the reason why TOPP HIGH was ordered, there may be an initial risk of chemical casualties. This could result from either initial contamination before the overpressure was engaged or, a lack of pressure allowing vapours to enter. Should this occur the crew would be able to adopt TOPP HIGH until such time as the fighting compartment was purged of hazardous vapours and liquids. The internal vapours would be eliminated by diluation with filtered air and the liquids can be instantly neutralized using the decontamination bottles located inside the tank. Upon return to the open state the crew would be

subject to a reduced amount of discomfort and overheating. This should not pose a major problem, however, except in very warm climates.

The second alternative, to wear no IPE, is similar to the first in that it has a greater initial risk of contamination. If the tank is contaminated, however, it will become immobile for some time as the crew goes through the laborious process of donning their IPE while inside the tank. In essence, the tank and its crew would become a perverbial sitting duck. On the positive side, wearing no IPE would result in greater crew comfort, freedom of movement and hence, a quicker speed of engagement when compared to the first two options. This comparative increase in firepower would be made with a reduction in crew protection, especially during the initial stages of the battle when the tank could be required at a critical period.

The present doctrine, while providing maximum protection against chemical dangers, will result in an unacceptable degradation of crew performance. Of particular note is the reduction in target acquisition and crew control, increased engagement time and the rapid onset of fatigue and heat stress. It may be argued that if the tank is hit and the crew has to bail out, they will still be protected from chemical agents. The question is whether the additional protection warrants the attendant loss in firepower. A similar dilemma was posed to the Israelis concerning crew commanders operating hatches up or down. Many tank commanders were being killed or wounded by snipers and shrapnel, so the Israelis tried operating hatches down. This resulted in an increase in the loss of entire crews who were being engaged by enemy that had been overlooked. The eventual compromise was to operate hatches up with only the eyes and top of the head exposed, a tactic which gives excellent vision with minimum exposure. The Merkava has been designed with this in mind as the crew commander's hatch can be adjusted in height to allow for optimum viewing.[1] Similarly, we cannot afford to miss targets simply to have an increase in an already capable NBC protection system. After all, would it not be better to detect and engage the enemy rather than knowing that we can bail out "in safety" after being hit?

The two proposed SOPs increase the initial risk of contamination but permit crews to perform much more effectively than present doctrine. However, the alternative of wearing no IPE could result in a tank being out of action for several minutes. This absence from battle could be disastrous when one considers the pace at which modern war occurs. Before dissecting the first alternative we can reflect upon the following quotes from Concept of NBC Defence 1985-2000.

On the conduct of sustained NBC operations:

"The aim must be to reduce the stress of encapsulation but maintain an adequate protection while continuing the mission"[2]

Conditions justifying the requirement for an overpressure system:

"Critical manual dexterity skills, lengthy internal occupation, mounted combat"[3]

Upon reading these quotes, we see that the entire purpose behind an overpressure system is to allow a reduced level of IPE ("encapsulation"). The Leopard overpressure has three NBC filters (as opposed to our masks which have one) and provides 99.995% filtration.[4] Given this efficiency, the tank protection system can at least be qualified as "adequate". Still, there is the problem of the initial risk of contamination if in the open state. This is easily remedied by immediately donning gloves, masks, and zipping up the coveralls. After ten minutes any initial chemical vapours should have been purged and the unmasking drill carried out. If all is well, the crew can then return to the open state.

Conclusion

In the final analysis, the option of how much IPE to wear and for how long has a degree of risk associated with it. If the enemy is in close proximity, too much individual protection will result in lost crews and tanks from enemy tanks and anti-armour weapon systems. Conversely, too little protection when the enemy is not present, in rear areas for example, may result in unnecessary NBC casualties. The commander making this decision must have intimate knowledge of his men's capabilities, their present physical condition, the enemy threat - both physical presence and chemical, as well as the importance and nature of his mission.

In conclusion, the existing policy of donning full IPE while using the overpressure system is redundant and would result in too great a loss of crew

performance for the additional protection afforded. Until such time as a new mask (with better vision and power assisted respiration) or a collective breathing system with individual faceplates enters service, a new SOP must be adopted. This SOP should consist of wearing full IPE initially, but then changing to the open state as soon as the tank is purged of chemical vapours and liquids. In extremely high temperatures the removal of all IPE should be considered.

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FOOTNOTES

1 *Jane's Armour and Artillery 1989-90*, Jane's Publishing Co Ltd., London, England, 1989, pg 48.

2 *Concept for NBC Defence 1985-2000*, Canadian Forces NBC School, Borden, Ontario, pg iv.

3 *Ibid*, pg 24.

4 *Precis 164 Leopard Chassis*, Queen's Printer, Ottawa, pg 1,3,12

Improved lightweight armour for the armoured personnel carrier

The concept of an Armoured Personnel Carrier (APC) is not new. The British MarK IX tank was developed in September 1917 "To meet a requirement for carrying infantry and stores over broken ground in an enclosed armoured vehicle"[1] during World War II the White Halftrack was considered the most suitable vehicle for carrying armoured infantry units: good steerability and a high speed were available due to front wheel steering and low ground pressure. Thus good cross country capability was ensured by the track drive. In 1942-1943 in the United Kingdom, trials were carried out using armoured sleds towed behind tanks as infantry carriers. In fact, similar sleds were used by the United States forces at Anzio in early 1944. The first use of an APC as well armoured as the tank was made by Canadian General Guy Simonds during Operation "Totalize". He took the guns from the Priest, a self-propelled gun, which had just been withdrawn from the 3rd Canadian Infantry Division. The gun holes were filled using heavy gauge steel taken from broken down landing craft. These vehicles were then issued to the infantry as carriers.

Due to the progress made in transmission technology after World War II, wheeled steering on tracked vehicles became obsolete and the carrier became either fully tracked or fully wheeled.

Simultaneously, metallurgists were working on improved materials and it was found that aluminium alloy was ductile yet stiff enough to be used as armour in light vehicles. In the late 1950s, the FMC Corporation of the United States developed and marketed the M113 APC. This was and is the most successful light armoured vehicle on the market with more than seventy thousand in service world wide. However, weapon and ammunition capability has far exceeded the protection offered by this vehicle. It can now be penetrated by small arms ammuniton fired from as far away as 300 meters and the Sabot round from the 14.7 mm machine gun from ranges greater than 1000 meters. There is little doubt that it is now time to replace the M113 APC with a heavier armoured vehicle if we expect our infantry soldiers to survive when vehicle mounted on the battlefield.

Of even greater concern, the new BMP 81 and BMP 2 now mounts a 30 mm cannon as opposed to the 73 mm low - velocity smoothbore. "It would appear that the Soviets are trying to pick up our version of an armor - defeating cannon mounted on

an armored fighting vehicle that has a high rate of fire and a long engagement range."

Lieutemant-Colonel M.H. Hanse, U.S. Army[2]

The threat

There are two types of attack that the APC borne soldier has to be concerned with. These are as follows:

a. attack by non-specialized weapons, which include all conventional direct and indirect weapons; and

b. attack by specialized weapons designed specifically to defeat armoured vehicles.[3]

The modern APC can no longer protect the passengers and crew from small arms fire. The threat forces in any encounter will not likely turn heavy weapons against our light armoured vehicles, but rather use his their light armoured vehicles which mount 14.7 mm machine guns and 30 mm cannons and artillery to destroy our APCs.

In addition to small and medium calibre projectiles, the APC is threatened by an increasing array of mines, delivered through various means. It is especially difficult to protect the passengers and crew from the effects of these and still maintain the mobility required of a light armoured vehicle.

In light of the above, any vehicle used as an APC must at least be given protection from the following:

a. KE projectiles from 30 mm cannons, 14.7 mm machine guns, and 152 mm arty shell fragments;

b. blast and spalling from mines; and

c. small calibre shaped charges (ie RPG 7 or RPG 18).

Armour failure

Armour failure is caused by a different mechanism in each of the above cases. Strengthening against one type of attack may leave the vehicle more vulnerable to one of the others. This failure is described

under three headings; failure by kinetic energy, failure by blast, and failure by shaped charge. Each is described below.

Failure by Kinetic Energy. Kinetic energy projectiles penetrate causing bulging (plastic deformation), plugging (shear failure), discing (lamination failure) or gross cracking. To overcome these it is necessary for the armour to be both strong and ductile and demonstrate uniform through-thickness properties.

Failure by Blast. The blast forms a compressive wave through the armour which reflects as a tensile wave parallel to the plane of the plate. This leads to lamination failure. A ductile material with properties which minimize scabbing can absorb the effects of blast.

Failure by Shaped Charge. The shaped charge jet travels at such a speed, 4 to 6 km/s, that deformation in any way similar to those stated above is precluded. The jet and the armour interact as fluids even though both remain solids. The strength and toughness of the armour becomes less important than the density of the armour material.

Armour materials

There are still only two possible materials available to form the stucture of light armoured vehicles. These are aluminium and steel.

Aluminium has been used in light armoured vehicles since World War II. As an armour it has been shown to out perform steel for the areal density (kg/ cm^2). This advantage is particularly marked for small calibre attack but as the projectile size increases this advantage decreases. The intersection occurs at the 14.5 mm projectile calibre.

Aluminium is also superior to steel in the defeat of shaped charge attack for the equivalent weight. The equation:[4] $P = L (Pj / Pt)$

where P = penetration

L = length of jet

Pj = density of jet

Pt = density of target

predicts the penetration into aluminium to be 1.68 times that for steel, but since steel is 2.8 times denser than aluminium there is a significant advantage to aluminium.[5] By this we mean that there is a significant weight saving using aluminium - steel being 2.8 times heavier but offering only 1.68 times the protection. Thus by weight aluminium is superior to steel. This advantage cannot be exploited because the aluminium plates would have to be of disproportionate size.

The other reason aluminium is used is the stiffness incurred from its proportionally thicker plates negates the requirement for additional supports. Bending thickness is a function of the thickness cubed. To obtain the same ballistic protection as steel, aluminium must be three times as thick implying an increase in stiffness by a factor of nine.

Another major problem that has implications in the use of aluminium for armoured vehicles is the inferior aging (cracking) characteristics as compared to steel.

The pyrophoric characteristics of aluminium become important when considering the behind armour effects of projectiles. This is particularly significant with shaped charge. Serious injury occurs at heat doses of seven calories/cm2 or pressures in excess of 1000 kPa.[6] Heat and pressure from shaped charge attack are reduced as much as 20% when attack on steel is compared to that on aluminium.

Steel is the most commonly used material in the manufacture of armoured vehicles. The majority of these are constructed from rolled homogeneous armour (RHA). Recent improvements in steel production have improved its ballistic performance against KE projectiles.

The road which aluminium travelled was closely paralleled by the steel manufacturers. Improved techniques in production and the careful selection and limitation of trace elements led to a low alloy steel meeting US specifications for armour plate. This was later improved upon by the process of electroslag remelt (ESR) methods. Simply stated, electroslag remelt uses electrical energy to heat the steel and remove trace impurities. The next improvement was the incorporation of dual laminated steel. This has proven to be the most successful steel based armour.

Steel, like aluminium armour gives improved ballistic performance at the cost of mechanical properties such as strength and toughness. The implication is that high hardness steels are susceptible to cracking in structural applications, especially in cold conditions. The higher grades also give increased spalling and a lower tolerance to blast.

The best comparison is the dual or laminated steel. It is hot rolled, bonded with a hard low alloy outer layer of approximately 40% and an inner layer of 60% comprised of normal RHA. The outer layer is designed to break up the projectile while the inner layer deforms to absorb the penetrating energy.

Further ballistic performance is achieved by hardening the very outer skin of the armour with a carburising technique. This is called face hardening. This method is not restricted to dual steel applications. It could be applied to thin sheets and bolted to the exterior of any armour to significantly enhance the ballistic performance.

The above paragraphs have shown that for protection from projectiles of calibre 14.5 mm and above, steel armour offers the best ballistic performance. It is unlikely that any future APC will be manufactured entirely from the same homogeneous material. The need to reduce the weight will require the use of specialist materials. A short discussion of the best of these materials follows.

Ceramics first appeared in applications where weight limitations precluded the use of steel or aluminium, for example, helicopters. There are many and varied forms of this material but the main types in use are aluminium oxide, boron carbide, silicon carbide and silicon nitride.

Ceramics can be compared with steel in two ways, in terms of areal density or length of penetration. Considering length; against shaped charge, 2.2 times less thickness of material is required; and against kinetic attack, 1.2 times less material is required. This has obvious advantages in weight saving for a given level of protection.

There are some unique engineering problems in incorporating ceramics in APCs. Some of these are:

a. ceramic is most effective in countering KE attack when attached to the exterior of the vehicle. Small calibre projectiles and artillery fragments seriously degrade the ceramic when they hit it leaving the vehicle vulnerable to the higher calibre KE munitions, ie 30 mm, that it was designed to defeat;

b. best results are obtained when the ceramic is mounted in some form of matrix or bonded to a metal plate. Since the ceramic is much less ductile than its parent plate or material, it is difficult to prevent cracking. This precludes its use in the main structural armour. This has implications in engineering difficulty and cost; and

c. non-destructive testing of ceramics is extremely limited.

Ceramics offer a high level of protection to the APC against shaped charge and KE attack. The material is light weight but costly and difficult to attach to existing armour. Research continues into both ceramics and methods of bonding them to other materials. Success in these areas will reduce the cost and make their use more acceptable to procurement agencies, designers and users.

Glass Reinforced Plastic (GRP) is a very versatile material. A wide range of mechanical properties can be achieved by changing the percentage of glass and resin, the type of resins used, and the method of production.

GRP has been applied in light weight and composite armour applications, but due to its mechanical properties, it is not suitable as a structural material. Its most common use is as a spall liner. Glass demonstrates a high resistance to shaped charges (thus offering some protection against mine attack) due to its elastic properties restricting the jet. The cost and weight are low enough to make GRP a viable option for upgrading the present APC with a spall liner or including it in the design of the next generation of light armoured vehicle.

Kevlar has similar properties to GRP and is employed in similar roles. In addition it can be used in a matrix for the ceramic tiles mentioned above. This compound is a very effective component of an armour composite and has also been successful when used as a spall liner.

Other. In addition to the above, there are some bolt on materials which offer enhanced protection for the APC. Perhaps the best known of these is Explosive Reactive Armour (ERA). This is a three layer protective composed of steel, explosive and steel. ERA protects the vehicle by exploding when a shaped charge jet penetrates the outer layer of steel and detonates the explosive middle layer. The resultant separation of the steel plates breaks up the jet preventing penetration of the vehicle's armour. Tests have shown reactive armours to have some success against long rod penetrators as well. One of the drawbacks of this armour is that the vehicle must be armoured with the equivalent of at least 20

mm of RHA to prevent damage from the explosion and to defeat the small amount of the jet that penetrates the ERA. Most of the APCs presently in use do not have this equivalency; however, APCs giving protection from 30mm projectiles will require armour of at least this thickness, therefore, future APCs may be fitted with ERA when manufactured.

Active Armour. Active armour uses a sensor to warn of an oncoming attack. When it has been determined that the threat will cause damage to the vehicle a self-forging fragment is detonated at the correct stand-off distance destroying the incoming projectile. This system is in the development stage and a long way from deployment at this time. An example of an active system was the Phalynx Anti-Missile System in use by the Canadian ships serving in the Persian Gulf.

There are of course other materials, for example, titanium, undergoing evaluation. They are at the moment too expensive or not far enough advanced in development to be considered.

Aluminium offers the best armour protection for areal density for protection up to 14.5 mm projectiles. For protection levels above this, steel is the best choice. To reduce weight, laminated steel lined with a spall liner and reinforced with Explosive Reactive Armour is required on the modern APC.

The APC currently used by the Canadian Army to move around the battlefield does not offer enough protection from enemy fire in its present form. The infrantryman is too valuable a resource to squander away in movement up to the dismount line.

A conscious effort must be made to replace or upgrade the APC to the level of protection whereby it will withstand projectiles of up to 30 mm calibre and shell fragments from 152 mm artillery rounds as well as offer some spall protection from mine attack. This can be achieved through the use of compound armours, reinforced by spall liners completely surrounding the internal space of the vehicle and Explosive Reactive Armour mounted to defeat shaped charge attack. It is highly recommended that any future armoured personnel carrier considered for purchase by the Canadian Army have as a minimum this level of armoured protection.

"Nothing is easy in war. Mistakes are always paid for in casualties and troops are quick to sense any blunder made by their commanders".

General Dwight D. Eisenhower[7]

Captain Tom Copplestone is the Training Officer at the Armour School.

FOOTNOTES

1 The Victory Campaign, page 210.

2 The Mechanized Battlefield, Lieutenant-Colonel J.A. English, page 123.

3 The Royal Military College of Science Weapons and Vehicles Handbook, page 4-1

4 Bernoulli's equation for the penetration of armour.

5 Aluminum Armour for Fighting Vehicles, R.M. Ogorkiewicz, International Defence Review, Volume 2, June 1980, page 200.

6 Royal Military College of Science Handout.

7 Sword Point, Harold W. Coyle, page 196

A true birth

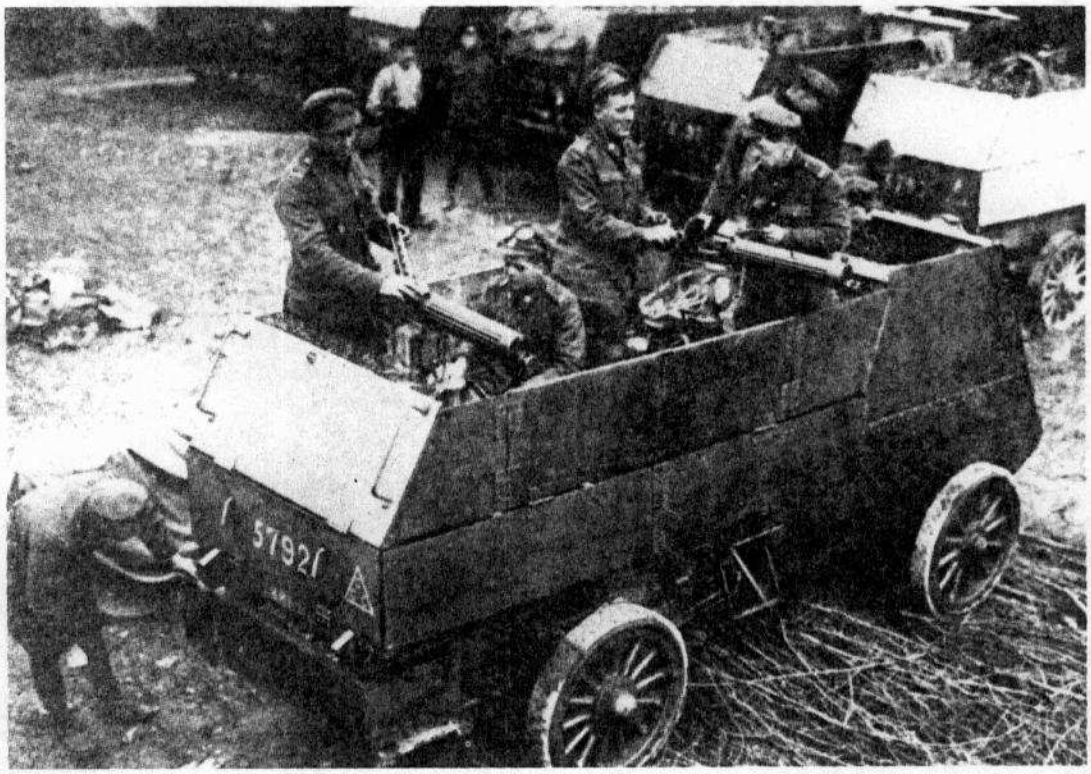
The Automobile Machine Gun Brigade No. 1, or Brutinel's Brigade as it was more fondly known, was conceived on 11 August 1914. This newly-created Brigade was given the distinction of being the first armoured unit of the Canadian Army and British Empire.[1]

The founder of the Automobile Machine Gun Brigade No. 1 was Major Raymond Brutinel. Brutinel an entrepreneurial engineer and journalist from Western Canada, combined an interest in the internal combustion engine and an appreciation of the firepower of the machine gun (demonstrated in the Russo-Japanese War of 1904) into a proposal for a privately financed Motor Machine Gun Unit.[2]

Brutinel tabled his idea before a close personal friend, Sir Clifford Sifton, Federal Minister of the Interior, who in turn presented it to the Honourable Sam Hughes. The proposal was presented at a time when no further offers of formed units were being entertained by the Federal Government, unless the person, city or province making the offer was prepared to pay the cost of one million dollars to equip and maintain the proposed force for a year in active service.[3]

Fortunately for the Automobile Machine Gun Brigade No. 1, the subscription of 150,000 dollars by fifteen public-spirited Canadians for the purchase of machines and vehicles was to greatly help sway Hughes' decision.[4] Eleven August 1914 saw the approval and acceptance of the Brigade by Hughes. Brutinel, given the go ahead, quickly organized his unit, and by 1 October was prepared to sail with the first Contingent of the Canadian Expeditionary Force.

Canada, as usual, and against recommendations, produced in the pre-World War I period only sufficient war materials to barely maintain her Militia forces. Thus, when war eventually broke out, the country found itself without the large quantities of equipment, clothing and stores required for mobilizing an overseas expeditionary force.[5] Brutinel's Brigade, on the one hand, not only faced the problem



Canadian Motor Machine Gun section on the Cambrai road ready to go into battle

of attempting to equip itself with armoured cars, a newly conceived concept, but, on the other hand, of equipping its officers and men with the essential clothing and stores.

Major Brutinel, with the backing of the 150,000 dollars from the fifteen subscribers, found the solution to the armoured car dilemma in the Autocar Company of Ardmore, Pennsylvania. Using Brutinel's own design, the Ardmore Company hastily constructed eight armoured cars, 12 unarmoured trucks, four unarmoured cars, 18 motorcycle scouts and one motor ambulance. Upon observation it can be said that Brutinel's unit "was a self contained mechanized force without a horse or marching man to be seen anywhere."[6]

The armoured cars constructed by the Ardmore Company were a unique breed of mechanical steed. They were constructed from a special alloy steel which was shown to be bullet proof up to 100 yards.[7] "They were powered by a 22 horsepower motor, having a fuel consumption of nine mpg at 12 mph resulting in a maximum range of 175 miles; their top speed was 25 mph."[8] All eight of the armoured cars were equipped with two Colt .303 Machine Guns possessing 12,000 rounds of ammuniton per car.[9]

In retrospect, the purchase of equipment made by Brutinel was a humble start. "In the course of the next three years however, the Brigade would expand considerably in size, and its equipment would be vastly improved".[10]

Examining the organization of the initial armoured car units and those which evolved during the war, one will readily discover that the basic unit of operation was the battery, consisting of either four or eight armoured cars or trucks depending on the unit. These units generally employed nine officers and 114 other ranks.[11]

The main problem that exists in determining the branch organization of the Motor Brigades is the attempt to keep the various units names and placement during the war correct. For example, Brutinel's Brigade was to make its debut in history under the name of the Automobile Machine Gun Brigade No. 1. Prior to its arrival in France on 21 June 1915, however, it was redesignated the 1st Canadian Motor Machine Gun Brigade and was expanded to encompass the 101st Machine Gun Battalion, minus one company, and the Canadian Cyclist Battalion.[12]

Other varieties of armoured formations include the Borden, Eaton and Yukon armoured truck units. These units were

Members of the 1st Canadian Motor Machine Gun Brigade carry out maintenance on their Vickers guns and their armoured cars

donated by the same public-spirited citizens who first equipped Brutinel's Brigade, and were sent to Europe with the second contingent of the Canadian Expeditionary Force.[13]

The four armoured units mentioned continued independant action until an overall reorganization in 1918. This reorganization "saw the existing Motor Machine Gun units absorbed together with the three Machine Gun companies of the 5th Division to form two Motor Machine Gun Brigades each containing five eight-gun batteries."[14] The new 1st Canadian Motor Machine Gun Brigade consisted of "A" and "B" batteries from the original Motor Machine Gun Brigade, the Borden Battery and the 18th Canadian Machine Gun Company. The new 2nd Canadian Motor Machine Gun Brigade was comprised of the Eaton and Yukon Motor Machine Gun Batteries and the 17th and 19th Canadian Machine Gun companies.[15]

The armoured car units of World War I incorporated firepower, mobility, flexibility and survivability as their basic characteristics of battle.[16] Their role was quite basic but specific-to get in touch with the enemy, kill as many as possible and delay his advance or if conditions were favourable, promote and exploit the Allied advance.[17] Their tasks were many, and involved advance to contact, infiltration and exploitation, defensive and withdrawal under contact battles, flank, gap and rear area security, and the guarding of vital points, just to name a few.

In general, it can be seen that the characteristics, roles and tasks of the armoured car formations of that period were, in fact, quite similar to those of the present day Armoured Corps. Although the wording is different, the role is still present-to defeat the enemy through the aggressive use of firepower and battlefield mobility. The following comment by a wartime newspaper correspondent readily expresses all the above-mentioned attributes:

"...the splendidly gallant and useful part played by the Canadian Motor Machine Guns... They gained precious time for the getting away of all kinds of things that would otherwise have fallen into enemy hands. Everywhere they went they steadied the line...Everytime they were given a line to defend they held it for the necessary period... The cars were especially active on the bank of the Somme and stopped many attempts to cross."[18]

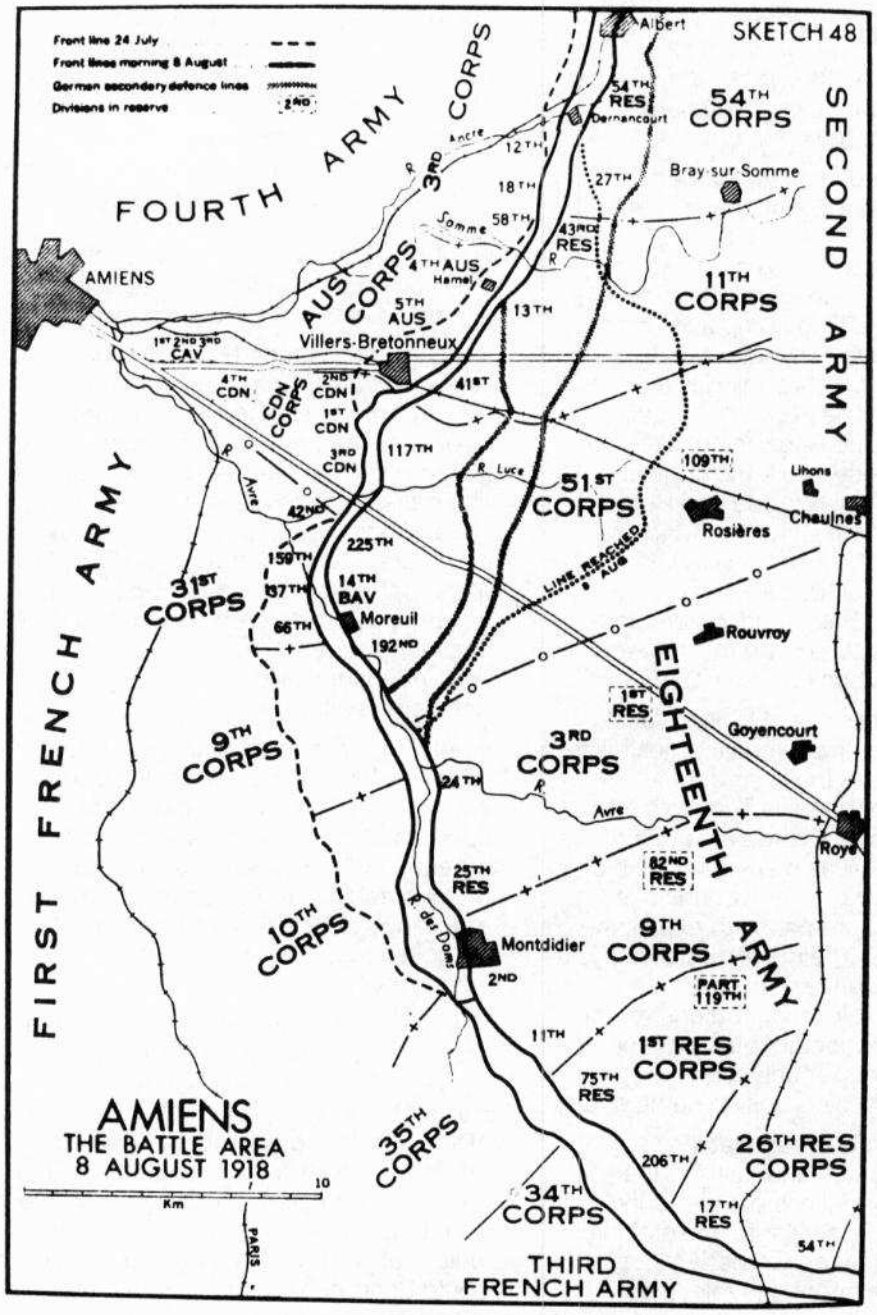
The battle worth of the armoured car units of World War I is easily observed in the battle of the Somme, in stemming the tide of the German offensive for Amiens, the Allied battle for Amiens and the last 100 days of the war. In fact, "the influence of the armoured cars upon the Germans were so out of proportion for their numbers, that they could practically roam free behind enemy lines finding and exploiting prolific intelligence."[19]

In one such instance during the battle of Amiens, two batteries of armoured cars finding a weak spot in the German lines easily passed through and began to wreak havoc within the German rear echelons. The batteries quickly set about opening fire and completely destroying enemy horse-drawn transport and convoys. One of the batteries even managed to surprise a German Corps Headquarters luncheon, scattering its remnants and pillaging detailed plans of the Hindenburg defensive system.[20]

In another instance during the German offensive for Amiens, it was decided to employ the unit to fill any gaps that occured along the Army's front. All told, "in a period just over 24 hours the Canadian Motor Machine Gun Brigade had travelled a distance of 97 miles and was in action on both flanks and in the centre with the Fifth Army."[21]

Upon examination, it is readily seen that the performance of the 1st Motors signalled the end of the horse soldier and illustrated the future of warfare to follow. "The finest horse soldiers in the world could not have travelled so far in such a short time and still be fit to fight; even less could they have taken into action the weight of firepower that the armoured cars could bring to bear."[22] The battlefields of World War I had become fixed, immobile killing ground where victory could only be realized through attrition. It was hoped that, through the employment of armoured units, mobility would once again return as the key factor on the battlefield.

In retrospect, one is easily able to see that the Armoured Corps has come a long way from the slow and bulky armoured cars developed by the Ardmore Automobile Company. One does not have to look hard however, to see the similarities that exist between the armoured formations of yesterday and what we experience today. The equipment, organization, characteristics, role, tasks and battle worth which they created and used was the birth of what has today developed into the Modern



Armoured Corps. It can be started that the Royal Canadian Armoured Corps was not created in the administrative chambers of National Defence Headquarters, but was forged through the vision, experimentation, triumph and losses of a great number of dedicated men who were brave enough to fight and die for a country they believed in.

Lieutenant Jason King is the Regimental Liaison Officer for the Royal Canadian Dragoons in Petawawa.

FOOTNOTES

1. Brereton Greenhous, *Dragoon 1883-1983*, (Ottawa: Campbell, 1983) p. 176.
2. Ibid., p. 176.
3. Col G. W. L. Nicholson, *Canadian expeditionary Force 1914-1919* (Ottawa: Queen's Printer, 1964, p. 20.
4. Ibid., p. 20 (note).
5. Ibidd., p. 25.
6. Greenhous, p. 176.
7. Ibid., p. 176.
8. Ibid., p. 177.
9. Ibid., p. 176.
10. Ibid., p. 177.
11. Nicholson, p. 20 (note).
12. Ibid., p. 432. (Note)
13. Ibid., p. 111.
14. Ibid., p. 384.
15. Ibid., p. 384 (note)
16. Greenhous, p. 228.
17. Nicholson, p. 372.
18. Greenhous, p. 227.
19. Kenneth Macksey, *Tank Versus Tank* (Toronto: Totem, 1988), p. 13.
20. Barrie Pitt, 1918 The Last Act (New York: WW Norton Inc., 1962), p. 201.
21. Greenhous, p. 227.
22. Ibid., p. 227.

The Canadian Cavalry Brigade Part 1 of 4 – Saulcourt-Guyencourt

At 4:30 PM, 27 March 1917, the weather was cold and heavy snow had started falling. As the troopers stood by their horses, a battery of 13 pounder guns galloped into position and set about their preparations for firing. The cavalrymen watched with interest. After a 30 minute wait in the driving snow the order to mount passed through the ranks of the Canadian Cavalry Brigade. At 5:15 PM the 13 pounders opened fire on the objective a mile away. On each flank of the brigade squadrons peeled off, riding north and south respectively to get into position of their cut-off role. The main body continued to wait. Finally, the column of horsemen moved off to the south at a walk. On their left a snow-covered hill capped with the village of Liéramont, behind them the guns of the Royal Canadian Horse Artillery increased their rate of fire. The bugles sounded the order to change direction left. The squadrons turned left into line and cantered up the slope. Cresting the hill they could see the objectives, Guyencourt on the left, Saulcourt on the right. The fire of the cut-off squadrons could be heard behind the villages, as a dark column of smoke rose in the sky over Saulcourt. The enemy had blown up an ammunition dump setting fire to the village.

The distance was now two thousand yards. The squadrons charged down the hill jumping a series of partially dug, unmanned trenches across their path. Enemy machine-guns were firing, but were unable to keep the range to their swiftly moving targets. Horses and riders were falling as the squadron lines galloped into a fold in the ground where they were protected from direct fire. Overhead bullets could be heard striking a line of telephone wires. The enemy fire was hotter and more accurate as the cavalry rode over the last rise in front of the objective.

Two hundred yards out the order came to dismount. The men flung themselves from the saddle with their rifles. Firing into the villages they saw the enemy trying to withdraw. Working towards the burning buildings, they collected prisoners, while in the distance other enemy soldiers were seen throwing away their equipment and running back. To the left and right more firing could be heard as the flanking squadrons closed in from north and south. In the east, about a mile away, three squadrons of enemy cavalry paraded up and down, tempting the brigade commander to attack them, but not interfering in the fight. The objective secured, the tired troopers settled into the ashes to await relief from the oncoming infantry.

This charge was unusual because it took place during the Great War of 1914-18. In a war best remembered for the horrific slaughter of the trenches, cavalry actions of any sort were rare and full scale charges all but unknown. The other point of interest is the formation which carried it out, The Canadian Cavalry Brigade (CCB). It was never part of the famous Canadian Corps and although it did share some of the Corps' battles, its service was primarily with the British.

The Brigade owed its origin to Sam Hughes, Canada's Minister of Militia and Defence in 1914. A life-long supporter of the Militia, Hughes was strongly prejudiced against regular soldiers. When war was declared, Hughes threw out the mobilization plans (they had been prepared by the despised regulars) and issued personal invitations to friends across the country to raise battalions for a Canadian Expeditionary Force (CEF). The result was utter chaos. Having created a gigantic mess, Hughes used his considerable powers of organization to straighten it all out again. To his credit he managed to raise, equip and despatch the 1st Division to Europe in an very short time, earning himself a knighthood. He still had the problem of what to do with Canada's tiny regular army. The sole infantry battalion, The Royal Canadian Regiment, was sent to Bermuda to relieve a British unit. The Royal Canadian Horse Artillery (RCHA) and the tow cavalry regiments, The Royal Canadian Dragoons (RCD) and Lord Strathcona's Horse (Royal Canadians) (LSH)[1] were used to set up and run the new Camp Valcartier where the CEF was being assembled. To get overseas the regulars used some political

Major-General Sir Sam Hughes

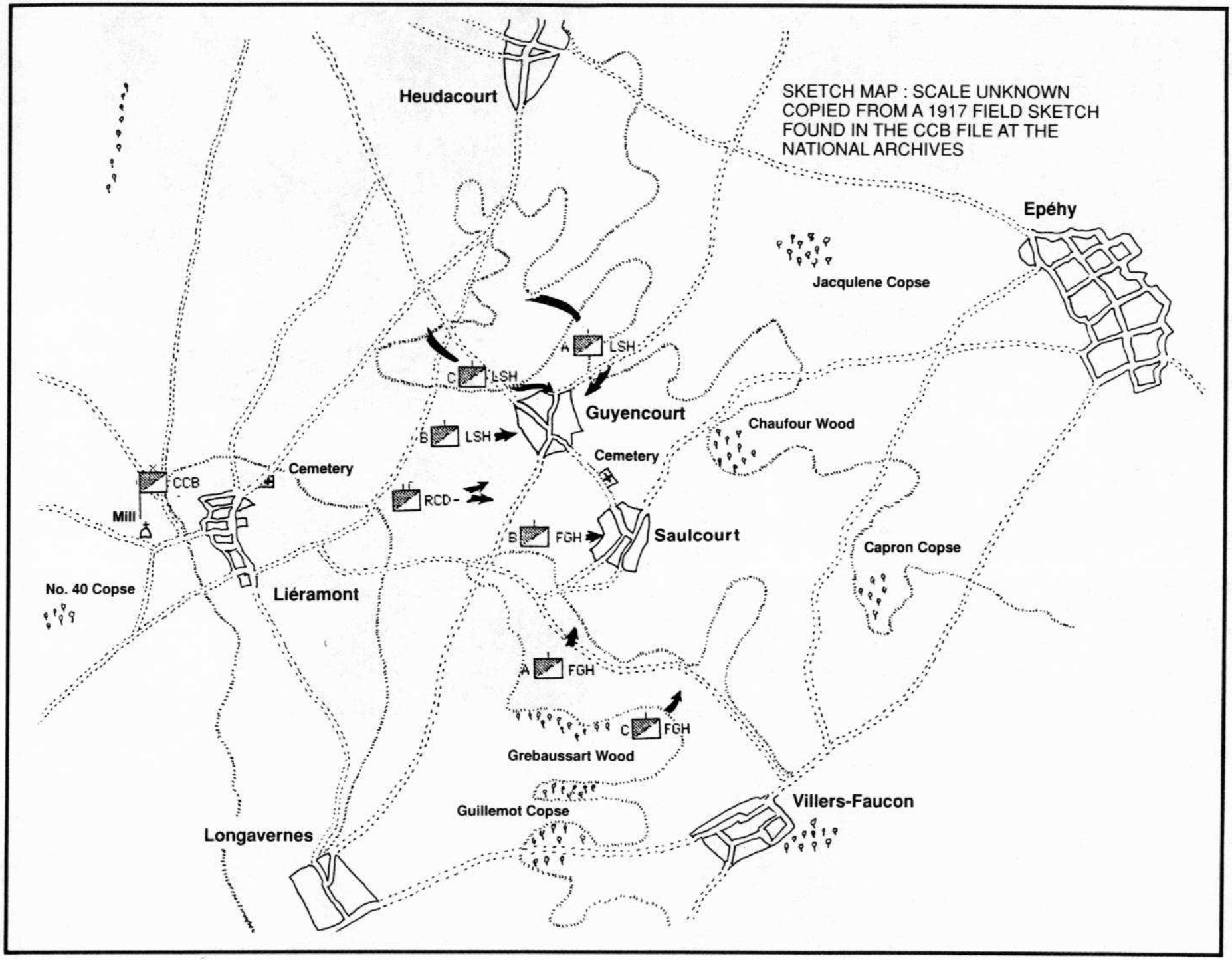
Brigadier-general J.E. Seely who commanded the Canadian Cavalry Brigade, january1915 to may 1918

pull of their own and Hughes gave in. The regulars were formed into an independent brigade and transported to England. Once overseas, the 1st Division was soon in Flanders, where it received its baptism of fire at Ypres. There it held the line in a desperate defence against the world's first gas attack. While the Militiamen were covering themselves in glory, the regulars sat on Salisbury Plain in England. Here they lived in mud which veterans later commented was worse than any encountered on the western front! Oddly enough salvation came to the regulars in the form of another politician.

His name was Jack Seely. Until the spring of 1914 he had been Britain's Minister of War, but had been forced to resign in a controversy. He, like Hughes, was a reservist, and had been decorated in the South African War. With the outbreak of the Great War he went to France to work for the commander of the British Expeditionary Force (BEF). On 1 February 1915 he was appointed to command the orphan brigade on Salisbury Plain.

The CCB was rounded out to three cavalry regiments by the addition of the Second King Edward's Horse, a British Territorial unit raised in 1914. This regiment was somewhat unusual in that it was composed of colonials living in England. The reason it was the Second Regiment was that there already existed a unit of colonials called King Edward's Horse. The First Regiment hotly resented the Second Regiment stealing their unique basis of organization and their name. When the First Regiment was sent to Ireland, to relieve a regular unit, the Second Regiment profiting from the confusion of names promptly picked up the latter's recruits. It was thus at full strength when the opportunity came for it to join the CCB.

Since the CCB was an independant formation it needed its own depot in the UK to supply it with trained reinforcements and remounts. The job went to the 6th Battalion, CEF, a Winnipeg unit based on a Militia regiment called The Fort Garry Horse (FGH). In January 1916 the FGH replaced Second King Edward's Horse as the third regiment in the brigade. Other units later added to the brigade were the CCB Machine-Gun Squadron, a squadron of Royal Canadian Engineers, a detachment of the Canadian Army Service Corps and the 7th (Calvalry) Field Ambulance.


SKETCH MAP : SCALE UNKNOWN
COPIED FROM A 1917 FIELD SKETCH
FOUND IN THE CCB FILE AT THE
NATIONAL ARCHIVES
Heudacourt
Epéhy
Jacqulene Copse
A LSH
C LSH
Guyencourt
B LSH
Chaufour Wood
Cemetery
Cemetery
CCB
Mill
RCD
B FGH
Saulcourt
Capron Copse
No. 40 Copse
Liéramont
A FGH
C FGH
Grebaussart Wood
Guillemot Copse
Villers-Faucon
Longavernes

The lack of opportunity for mounted action in 1915 led to the CCB volunteering to serve as infantry. Throughout the next year the brigade periodically provided a battalions worth of men for the trenches, while still maintaining their cavalry skills and caring for their horses. They were remounted in January 1916.

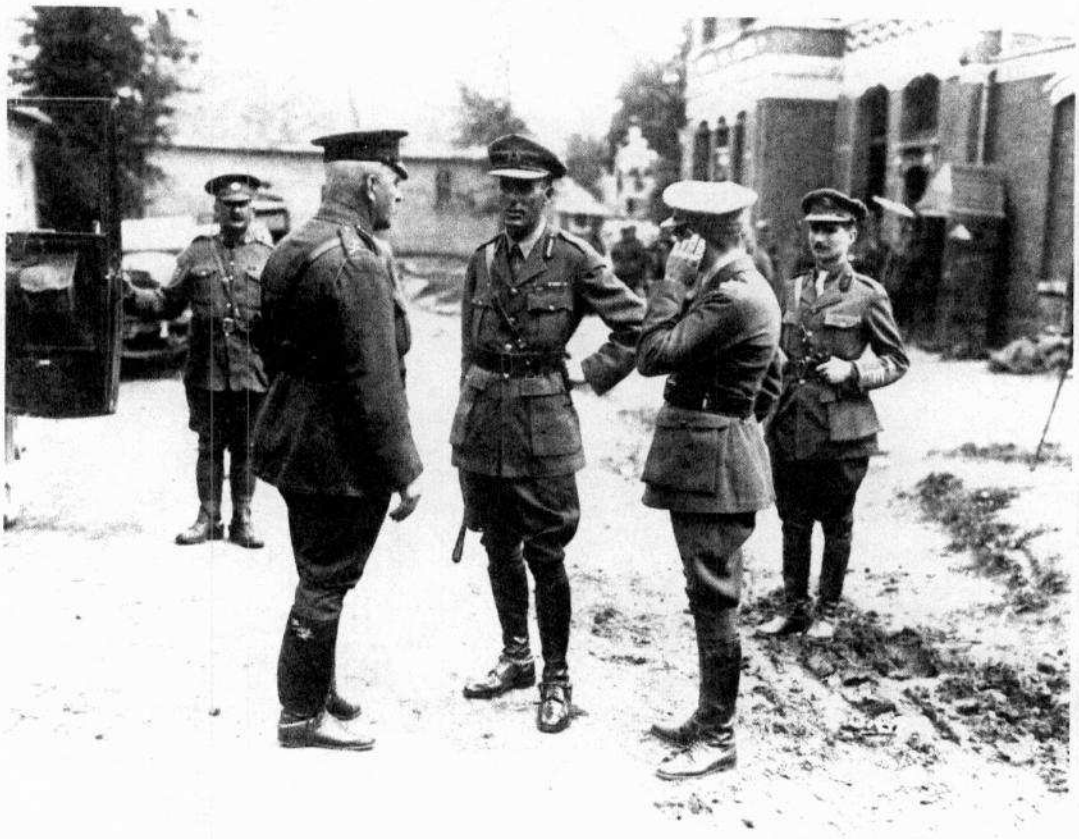
In the spring of 1917 the German General Staff eliminated a large salient in their line. This gave them a significant saving in manpower and a new, shorter line constructed on ground of their own choosing, called the Hindenburg Line. The withdrawal from the salient started on 15 March, and took the Allies by surprise. It abandoned an area of ground 100 miles long by 20 miles in depth, all of it subjected to a scorched earth policy. Fourth British Army scrambled to regain contact. The infantry, unused to mobile operations, had difficulty keeping up, and so the cavalry was called forward including the CCB.

Seely was told to screen 12 miles of front, to gain and maintain contact. He quickly did so encountering the enemy rear guard east of the village of Ypres. A quick attack was made by C Squadron FGH and the village was taken.

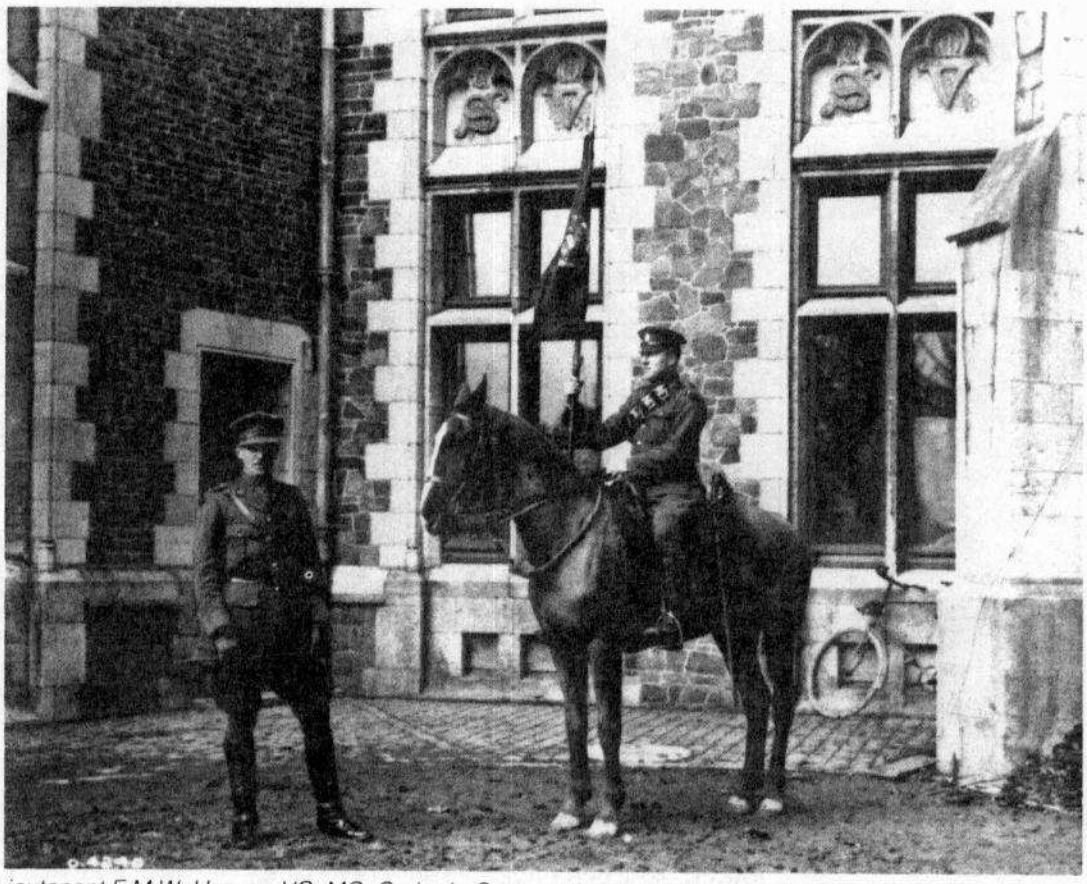
The following day, fighting on foot, the FGH and RCD secured the area. From a vantage point at Ypres, Seely could see that the key to the enemy positions was the village of Equancourt some miles behind the German line. The brigade Intelligence Officer, Captain Prince Antoine d'Orléans, RCD, made a daring personal reconnaissance to determine the enemy strengths and dispositions.

Captain d'Orléans was a member of the French royal house and as such was forbidden by law from serving in the French forces. He, and his brother Louis, had both been in the army of the Emperor of Austria. On the outbreak of war the Emperor had allowed them to resign their commissions and arranged their safe passage to France. Rejected again by their countrymen, Seely arranged for them to join the British forces. Through Seely's influence Prince Antoine was commissioned in the RCD.

The infantry were still far to the rear so, Seely decided to attack the next day with only his own brigade. To concentrate the



Sir Max Aitken (right), general Hughes, brigadier-general J.E.B. Seely talking to Sir Sam



Lieutenant F.M.W. Harvey, VC, MC, Croix de Guerre, photographed standing by the Regimental Guidon in Belgium, January 1919.

CCB for an attack however, meant abandoning the area he had been given responsibility for covering. Nevertheless, the next day the attack went in and was an immediate success. The village was captured, casualties were light, and the enemy was forced to withdraw over a wide area. A relieved Seely sent word to the delighted infantry that the enemy was pulling back. The infantry, already stopped for the night, resumed their march east without opposition while Seely went to sleep in a ruined house. The following day, Tuesday 27 March, Seely was awakened by an irate infantry general who demanded to know by what authority had he, Seely, ordered forward his troops! Seely pleaded that he had not ordered anyone forward, he had merely informed the infantry that the enemy was withdrawing and they had moved themselves. Seely was saved from further abuse by the timely arrival of a note of congratulations from the BEF commander, Field Marshal Sir Douglas Haig. In fact Headquarters was so impressed Seely was ordered to duplicate his feat and capture the enemy's next strong point, the villages of Guyencourt and Saulcourt. (See sketch map).

To prepare for the attack, C Squadron RCD secured the village of Liéramont. This was done with two troops occupying the village and the cemetery on the high ground east of it. Meanwhile A Squadron RCD had been tasked to support the 8th Battalion of The Warwickshire Regiment advancing south of Longavernes. B Squadron RCD was likewise attached to the Warwick's 2nd Battalion in the same area. Lieutenant Evan Price of B Squadron, whose troop was operating on the Warwick's left flank, charged 25 enemy soldiers killing three and capturing nine. At this point his troop came under heavy machine-gun fire. Price retired to the cover of a quarry where he was sheltered from fire but unable to move. The detached RCD squadrons were now recalled to join the LSH and FGH who were being concentrated west of Liéramont. The infantry arrived at 4 PM to relieve the two troops from C Squadron RCD, permitting

1 The LSH would become the LdSH(RC) in 1941 after King George VI observed that he thought the appropriate abbreviation for Lord was Ld. The King's suggestion was acted on immediately.

them to rejoin the remainder of the Regiment, less Price's Troop, in brigade reserve. H-Hour was set for 5:00 PM, however, as already described, at 4:30 PM a blinding snowstorm began. Thus it was not until 5:15 PM that the RCHA opened fire and the lead squadrons crossed the start line. Meanwhile, Lieutenant Price used the cover provided by the snowstorm to make a successful break from the quarry, returning with all his men, horses and prisoners.

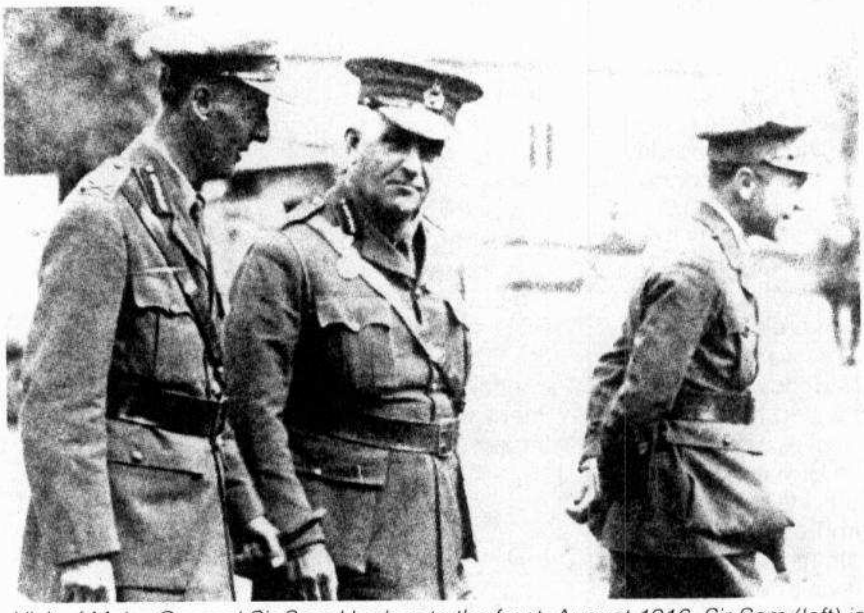
The FGH formed the right flank of the attack. C Squadron, on the extreme right, had the greatest distance to cover. They moved off before the main body, hooking south where they secured Grébaussart Hill and Wood both overlooking Saulcourt. Here they established machine-gun posts hoping to catch the enemy in the flank. They did not succeed only because the enemy wasted no time withdrawing to Epéhy one mile further east. One troop of C Squadron made contact with the British 8th Hussars who were attacking Villers-Faucon. Another C Squadron troop pushed on behind Saulcourt to act as a cut-off force. A Squadron FGH also hooked south then turned north and rode toward Saulcourt under the supporting fire of C Squadron's machine-guns.

On the left flank of the brigade the LSH were carrying out a similar maneuver circling north of Guyencourt. The two LSH squadrons advanced east using the cover of a ridge which lay to the north of the village. Although they were protected from observation and fire from Guyencourt itself, the LSH encountered long range machine-gun fire on the north slope of the ridge. To escape this fire C Squadron turned south earlier than planned and rode toward the north-west corner of Guyencourt. A Squadron continued past C Squadron before turning south to take the village from the rear.[2]

Protecting the north flank of the village was a trench with a single strand of wire in front of it. As the Strathcona's charged over the ridge 20 to 30 German soldiers ran out of the village to man the trench. Their machine-guns opened fire bringing down 10 C Squadron horses. Lieutenant Harvey, leading Second Troop, was the first to see the wire stretching from the north-west corner of the village back to the enemy's depth positions further east. Leading from well in front Harvey had time to turn right and guide his men to the shelter of the village walls near the north-east corner. Then he turned alone to ride toward the wire and the machine-gun he had spotted guarding the obstacle. As he approached at the gallop he leapt from his horse, vaulted the wire and landed in front of the enemy gun which jammed at the crucial moment. With his pistol he shot one of the machine-gun crew. The remainders ran, totally demoralized by his amazing assault. With the defences breached, the Strathcona's stormed into Guyencourt.

A week later Seely had time to recommend decorations. Among them Military Crosses (MC) for Captain d'Orléans, Lieutenant Price, and Lieutenant Harvey. The others received the MC but Harvey did not. Sir Douglas Haig on reviewing the recommendation thought that Harvey should receive the more prestigious Distinguished Service Order (DSO) instead. The DSO ribbon was presented to Harvey on parade, and he had worn it for two weeks when he was told to take it down. The King had reviewed Harvey's citation and concluded that his actions had merited the supreme award, the Victoria Cross (VC). King George V later presented the VC to Harvey, the first of three the CCB would win.

Major Mike McNorgan is a staff officer at NDHQ Ottawa dealing with National level exercices.



Visit of Major-General Sir Sam Hughes to the front, August 1916. Sir Sam (left) is talking with Seely (center).

2 The eight officers who served in C Squadron LSH in 1917-18 would win between them 11 decorations including two VCs, four DSOs, four MCs and a Croix de Guerre. This record was likely unequalled by anyother sub-unit during the war

Postscript

Brigadier-General(Major-General) the Right Honourable JEB Seely, CB, CMG, DSO, MiD

He continued in command of the CCB until May 1918. Suffering from the effects of gas encountered at Rifle Wood, he was sent home, only to be made the Cabinet Minister responsible for the Royal Air Force. Created a Baron, he died in 1947.

Lieutenant (Brigadier) FMW Harvey, VC, MC, Croix de Guerre, CD

Harvey would win an MC at Moreuil Wood the following year and finish the war with a Croix de Guerre as well. He later commanded LSH, and served as a Brigadier in World War II. When he died in 1980, Harvey Barracks in Calgary was named in his honour.

Captain Prince Antoine Gaston Philippe d'Orléans et Braganza, MC, Légion d'Honneur

In the following year he would receive the Légion d'Honneur for his work at Moreuil Wood. Transferred to a staff position in the summer of 1918, he was killed in a flying accident 18 days after the Armistice. His brother Louis died at Ypres.

Lieutenant EE Price, DSO, MC and Bar

Only 19 years old, with less than a year of regimental service, Price would win a Bar to his MC and a DSO in the next few months to become the most highly decorated RCD in the war. He was severely wounded at Moreuil Wood, dying of his wounds shortly after his return to Canada.

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