



Volume 35 No. 1, 2003

Armour Bulletin

*Army Transformation
as it Affects the RCAC*



Army of Today

Interim Model

Army of Tomorrow



Armour Bulletin

EDITOR IN CHIEF
LCol C.M. Hazleton

MANAGING EDITOR
Maj B.J. Walsh

EDITORS
Capt S.J. Gooch / Capt J.L. Cochrane

DESIGN AND LAYOUT
DGPA Creative Services

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Author's Guide

The Armour Bulletin, as a forum for debate and discussion, welcomes submissions and articles of a technical, tactical, or historical nature.

The following guidelines apply:

- it would be appreciated if all articles could be written on 8-1/2 x 11 paper, double spaced on one side, and be accompanied by a 3.5 inch disk copy;
- articles should not exceed 2000 words (much smaller articles are also welcome, ie, a page or two);
- black and white photographs and illustrations should accompany the article as a separate file rather than imbedded in the article. Photographs cut out of magazines are not acceptable as they are an infringement of copyright laws. Photographs and or illustrations add to the possibility of publishing;
- articles should contain footnotes, where applicable;
- historical articles must be used to illustrate lessons learned. The article must do more than inform the readers of facts and dates;
- only material of an unclassified nature should be submitted;
- the use of military abbreviations should be kept to a minimum for clarity;
- authors should include a very brief description of their current position and location, as well as an electronic photo of themselves.

The Editor reserves the right to reject and to edit articles and letters submitted for publication. Authors should not submit articles which have either already been submitted for consideration to another publication or have already been published.

Postal Address: Editor Armour Bulletin
Armour School
Combat Training Centre
Canadian Forces Base /
Area Support Unit Gagetown
PO Box 17000 Stn Forces
Oromocto, New Brunswick
E2V 4J5

Telephone: 422-2000 Ext 2655



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About the Cover: This collage of pictures shows the evolution of the Corps over the past 100 years. Images include the Battle of Moreuil Wood, the Mounted Troop of Lord Strathcona's Horse (Royal Canadians) and a Coyote on duty in Bosnia.

Next issue's theme:

The Evolution of the Corps to meet Army Needs
Volume 35 No. 2, 2003



Colonel Commandant's Foreword



This foreword is being written less than a month after my appointment as Colonel Commandant of our Corps. Let me begin by saying that I consider it an honour and a privilege to have been offered this appointment and to become our eleventh Colonel Commandant. I anticipate that within the period of this appointment I will complete fifty years of service as a member of our Corps and I have been proud of our accomplishments throughout the whole period. I am equally proud to have my name added to the list of previous Colonels Commandant each of whom I admired as individuals and because of their deeds. I hope to be able to contribute to Corps progress as each of them did in his own way.

Looking at our Corps over the span of years, one has to be impressed with the dedication and professionalism that its members and its Regiments have brought to the Army as a whole and to the country. Running forward from our major contributions in the Second World War, we have proven to be a Corps that has contributed out of proportion to our numbers to Army advancement and to be a Corps that has been adaptable to change. We have changed equipments and organizations frequently within the Corps while always continuing to be operationally ready. We have helped the Army as a whole enter the mechanized era, embrace the helicopter as part of the all arms team, and, more recently, led the way in recognizing the potential of, and introducing, the Coyote and its associated capabilities.

Central to our ability to manage changes of these dimensions and their impact was the combined strength of the attitudes that run through our Corps and that flow from the Regiments, from the School, and from our individual members. These are common Corps attitudes that run through all of our Regiments, both Regular and Reserve. They are based on respect for each other regardless rank, and dedication to always striving for high standards. Openness of mind is a common attribute while not losing sight of the essential principles that have stood the test of time.

Looking at the world that we face today, it is evident that we will have to call on these attributes in full measure in the days ahead. Few of us question the need for change and, as I noted, we have been able to adapt to change throughout our history. The direction to follow as we change to face "the New World", however, is more difficult to determine. While the world situation seems less clear than ever before, the pseudo-experts, and some with other agendas of their own, are prominent in demanding radical change, frequently without any depth of study and based on superficial analysis. Such approaches can be dangerous in the extreme in ensuring that Canada has the Army it deserves and needs in the future. Of equal concern are the low funding levels and other signs of a lack of sustained support for the Army and the Forces as a whole by the Government.



All of this is unsettling to those striving to provide the country with the best equipped and trained soldiers possible, in our case Armoured soldiers. Contributing to the sense of unease is the process whereby major decisions regarding the future roles and structures of the Forces will be taken. In recent Armour Bulletins my predecessor as Colonel Commandant, Major-General (Ret) Clive Milner, eloquently outlined the need for a sound developmental process in the Army and also outlined some essential features of such a process. I completely agree with his assessment. All of us must do what we can to contribute not only to the professional quality of the debates about the future of our Corps and the Army but also do what we can to ensure that the process to arrive at sound decisions is high quality as well. The process is one that involves the Corps as a whole, the Army as a whole, the wider Canadian Forces, the Government, and the public, so that opportunities to participate and influence are extensive.

In that context, the role of the Armour Bulletin is an important one as it provides an on-going focal point for Corps discussions and helps to promote healthy debate. Examination of the range of articles included in this edition is illustrative of the scope of the subjects that concern Corps members. Subjects run from the

broader aspects of the shape of the Army of the future, and our roles and organizations within that Army, to doctrine, training and technical subjects, to quite specific Corps proposals. Befitting our long-standing emphasis on the subject, several articles address the Regular-Reserve interface question. All of these are indicative of the subjects generating heated discussions and concern across our Corps. Positive debate is healthy and I certainly encourage it. A particular aid that we have in providing current information and encouraging wide involvement can be found in the excellent work being done by the RCAC Association via the Internet. I congratulate them on their efforts so far and can only encourage them to keep it up.

There can be no doubt that our active involvement is required in ensuring the future of our Corps and that the Army is of the calibre that Canada deserves. The intensity of focus that we have historically placed on force development and the future is as it should be. It is our responsibility to our successors. We must not, however, let the requirement for this activity distract us from an equally important requirement. We are responsible as well for providing the Army with a Corps, Regiments and individuals of the highest standards we can in the present, *today*. Our training and activities each and every day must

be directed to providing the same professional, well-motivated, spirited people and elements that we always have. The negativism often seen about Army matters and service in the popular media is brought completely into balance by how we, as a Corps, conduct ourselves day to day in the Regiments and at the School. Each individual has a role to play in this: troopers, Senior NCMs and officers. The true spirit and depth of Armour has always been built around its people and we can never lose sight of that as our prime focus. Maintaining a well-trained Corps today, manned by well-trained and motivated members, is ultimately the best guarantee we have of a promising future.

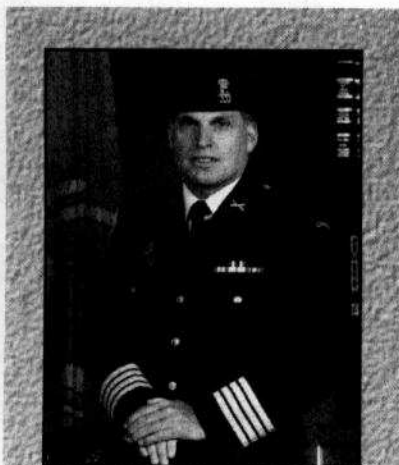
I am looking forward very much to this new role in our Corps and know that I will enjoy it as much as I have previous roles. I will try to see as many in the Corps as I can and am looking forward to that as well. Above all, I encourage each and every member of the Corps to do as much as possible to keep our standards high.

Worthy!

Lieutenant-General (Ret)
J.A. Fox, CMM, CD
Colonel Commandant



Director of Armour's Foreword



Having read the Colonel Commandant's foreword, I was tempted to simply print "DITTO" and sign off. Yet, in the spirit of franc dialogue and openness of mind, which Gen Fox opined as two of our Corps' many attributes, I have decided to provide you with some insight vis-à-vis the imminent changes to our Corps. To accomplish this, I will use the Vision and Strategy statements, which were developed during this year's RCAC (A) AGM.

First, let me christen the ground!

As stated in last year's *Armour Bulletin*, the catalyst for change within the Army remains the CLS's plan to modernize and sustain an affordable Field force. Key to this intent is the continued rationalization of capabilities via the Army Transformation Process. Here, all elements of the Army are weighted against real/current operational needs, which in turn identifies capability priorities, deficiencies, redundancies, as well as providing where applicable low readiness status. Given the Army's meager establishment and funding, most of the MCF capabilities were given a reduced readiness level rather than been eliminated.

You are not without knowing that CLS has now directed the move of our Tank fleet out West, beginning in the summer of 2003. This initiative is part of the aforementioned rationalization process, in which the Commander has accepted a degree of risk (by attributing this warfighting core capability to a lower readiness status) in order to re-invest efforts/resources in new capabilities, namely Command Support and ISTAR.

What does this mean for the Corps?

It means that we must make the best out of a difficult situation. Seek to maximize all available advantages by positioning ourselves in a leading role, making best use of our "flexibility" and innovative attributes, while cautiously embracing this inevitable "fait accompli", rather than adopting a confrontational approach. Our first engagement is to provide CLS with a capability he can afford and readily use, as well as defining our particular needs in order that we may in time maintain all mounted maneuver skill sets.

Hence, although not ratified by CLS, the following has been internally accepted as the RCAC's Vision and



Strategy for the near future: (NOTE: As I will be briefing the Commander early in the year, minor adjustments may be required)

The RCAC Vision:

We are the Armoured Corps – the Army's mounted operations experts. Our skill set includes ground based/mounted reconnaissance and surveillance, and the protected, mobile direct fire capabilities essential to the combined arms team throughout the spectrum of conflict

The RCAC Strategy for Army 2007 is to:

Become the acknowledged masters of mounted Reconnaissance;

Restructure to be a major player in ISTAR;


Focus on reconnaissance, while maintaining the capability for mobile direct fire;

(9 Reconnaissance Sqns and 2 Direct Fire Sqns at CMTC for the

Regular component) *The Reserve component of the RCAC will focus on Reconnaissance Operations only.*

This is our challenge! Therefore, the associated work to develop/articulate Doctrine and establish a meaningful Training strategy will begin shortly. Many of you will be called upon to participate in the process. I look forward to your constructive suggestions, although I caution you all, that the proposed change to our Corps is for the time "irrevocable". Moreover, let me assure you that the decision to re-focus our strategy was taken after much thought and discussion, and the concern over the inevitable erosion of tank skill sets was noted by the CLS. He has accepted the risk and we must move on! As details and decisions firm up, I will keep you informed by providing, through this venue and other, periodic updates.

While on the subject of change! Our Corps has recently said farewell to our Tenth Colonel Commandant,

Major General (ret) Clive Milner. How fitting it was to proceed with his change of appointment while in Borden at the RCAC(A) AGM. It was, after all in Borden that in 1958, the General began his service with the Corps. On your behalf, I had the great privilege/honour of thanking and presenting him with a small souvenir to mark his three year tenure as our Colonel Commandant. Through out his career, he had remained a consummate soldier and leader, earning the respect and confidence of all who came in contact with him. I have no doubt that General Milner will continue to be an active member of our Corps family and I certainly look forward to his insightful counsel. 

Worthy!

Colonel J.W.G. Rousseau, CD
Director of Armour



Editor-in-Chief's Forward



In the last issue of the *Armour Bulletin*, Volume 34 No. 1, 2002, our focus was on the debate over the future of the Armour Corps ACV. Also included in the last issue were several very thought provoking articles on future Corps structure and a number of stimulating technical articles dealing with a variety of equipment issues. I would like to thank BGen Nordick and all contributors for their efforts, as this issue in particular seemed to generate much debate over future structure.

As we go to press with this issue of the *Armour Bulletin* there can be no doubt at all that we are truly *living in interesting times*. Our neighbour and ally to the south continues to lead the way to counter and deal with the threat of world terrorism. Amid seemingly continuous and ever-heightening threats of terrorism abroad in the Middle East, the Balkans and other parts of the world, the Canadian Forces and indeed the Army is actively wrestling with the enormous challenges of fulfilling its assigned mission and tasks in one of the most difficult fiscal climates of the modern era.

Given the current world situation and today's enormous fiscal challenges our Army Commander has undertaken to "*transform*" the Canadian Army to better enable us to execute our mission and tasks today, in the near future, and on into Q1 of this century and beyond. This transformation is proving to be *not-a-very-easy-task* because it is requiring some significant

shifts away from traditional concepts of war fighting and in fact potentially the very way in which we organize and prepare ourselves for battle. As the world learned very graphically on the 11th of September 2001 in New York City, NY and Washington, DC, there is a different type of asymmetric threat facing Canada and the Western World. In order to address this different threat, DND and more specifically the Army have clearly outlined through *Strategy 2020* and *The Army Strategy* the way ahead. I encourage you all to read these documents as they will likely any questions or concerns you may have as to the direction the Canadian Forces are moving in the near and far future.

The Army's Commanders has identified within *The Army Strategy* that structure and doctrine will start focusing more on operations in complex terrain such as urban or large wooded areas, without precluding the more traditional open manoeuvre concepts. In order to ensure we as a Corps are up to this challenge, we will need to continue to employ all of the characteristics of armour which have ensured our success in all past and will ensure our rightful place on the battlefield in future conflicts. As well, there should be no doubt, the Armoured Corps fully recognizes that while we must continue to be the Army's leaders in *Direct Fire Mounted Maneuver* we must also step up and embrace our dominance in *Mounted Reconnaissance Operations* and become fully engaged




in the acquisition, management and passage of information in the modern Battle Space as an integral component and coordinator of ISTAR. As Deputy Director of Armour I can assure you that, under the leadership of Director Armour and in consultation with all of the Corps' Commanding Officers (Regular and Reserve) and our well-placed representatives in the various Directorates of Army Headquarters the Corps has been very active in providing guidance and advice to the Army Commander as he works through this detailed estimate of Army Transformation and Restructure. At the recently completed Corps Association Conference at the original home of the Armoured Corps, CFB Borden, in unison and with one voice all of the Commanding Officers, Regular and Reserve, stated for the record that they were ready to re-roll and refocus all training towards reconnaissance operations using whatever equipment was available, for the short term, to get on what is perceived to be the

Army Commander's vision for the Armoured Corps in his *transformed* Army. This is viewed as a huge step forward for our Corps, and clearly this unity was a clear indication of confidence in our Colonel Commandant and Director of Armour.

Most readers will know that at the annual Royal Canadian Armoured Corps Association (Cavalry) Conference in CFB Borden, MGen Clive Milner handed over the appointment and duties of Colonel-Commandant of the Armour Corps to LGen Jim Fox. The appointment of Colonel-Commandant is a very demanding task and over the past 4 years MGen Milner has made many visits to the Armour School in a variety of official capacities. As he has done throughout his illustrious career he continued to provide clear guidance, leadership and encouragement to me, the Armour School instructors/staff and to the students on course here at the modern-day center of

armour training for the Canadian Army. Thank-you General for everything.

In closing, I would like to thank all of the Regiments within the Corps for their outstanding support they have provided to the Royal Canadian Armoured Corps School. The quality of instructors and support staff you continue to send to the School are world class, as are the students you select for career courses. These personnel as part of the Armour School in turn continue to produce the best 'tankers' and 'recce gods' in the world. 

Worthy,

A handwritten signature in black ink, appearing to read "C.M. Hazleton".

Lieutenant-Colonel
C.M. Hazleton, CD
Editor in Chief, Commandant
Royal Canadian Armoured
Corps School



Royal Canadian Armoured Corps Association (Cavalry) President's Message



A few weeks ago, at the 80th. Annual General Meeting of the Royal Canadian Armoured Corps Association (Cavalry), I was elected as the 57th. President of the Association. I was greatly honoured to be entrusted with this position and will do my utmost to carry on the legacy and traditions of the Corps.

The 80th. AGM was held at CFB Borden, October 16-19, 2002. Commencing with the Armour Board, presentations outlining the current state of the Corps were given and this led directly into syndicate work the following day to try and rationalize the short term goals of the Regular and Reserve Units of the Corps. On Saturday, a dedication ceremony was held which unveiled a new monument to those in the Corps who had been killed in operations since Korea. The monument is located in Worthington Park, adjacent to Worthy's grave in place of the Cairn, which it replaced.

Later in the day the new Corps Commandant, LGen. Jim Fox succeeded the outgoing Corps Commandant

MGen. Clive Milner. A vote of thanks was given to Maj. David Scandrett (LdSH), CO of the 3rd. Canadian Ranger Patrol Group, for hosting the AGM and ensuring that all the participants had a productive and enjoyable meeting.

The Constitution of the RCAC (A) Cavalry states the aim of the association is *"To further the interests of, and to obtain the greatest possible efficiency in, the Royal Canadian Armoured Corps."* I am going to interpret this in its widest possible application. All of us in the Corps, from Trooper to General, Regular and Reserve, must be prepared for the challenges of change which are coming to the fore.

One of the Corps characteristics is flexibility. The ongoing revolution in military affairs is going to challenge that ability and our response to it. Your Association is your advocate to help ensure that these changes are in the best interests of the Corps and the Army.

My vision for the near-term future of this Association is to ensure it is



relevant to its membership, that its decisions and actions are transparent to all. To accomplish this, I am asking for your help. I want to hear from you. Your ideas on what the Association should be doing. How can we make the AGM more relevant to you. I am not just speaking to the Officers here, I want to hear from the Troopers, the Crew Commanders, the Patrol Commanders, the Troop WO's, the SSM's and The SQMS's. Everyone in this Corps is important and the Association is the one way you can voice your concerns.

I intend to bring the AGM to the membership. This means we will

no longer be burdening the Regular Units and their Bases, but will be holding the AGM's right across Canada. I appeal to all of you to join the Association if you are not already members. Frankly we need the money and the clout your memberships will bring with it.

As President, I am also a member of the Conference of Defence Associations Council. The CDA is in fact an association of associations and has been the voice of defence in Canada for some 70 years. They have just published "A Nation at Risk - The Decline of the Canadian Forces". I recommend reading this. If you can not get a

copy, check the CDA web page at www.cda-cdai.ca.

Our next AGM is tentatively slated for 15-18 October 2003 in Edmonton, hosted by the LdSH. Hopefully, you will pass the word and turn up if you are in the area. Check our website at www.rcaca.org.

Faugh-A-Ballagh
(Clear the Way)

P.A. Philcox
Lieutenant-Colonel
President
Royal Canadian Armoured Corps
Association (Cavalry)



Letters to the Editor

Re: Vol 34 No. 1, 2002

What a pleasant surprise to arrive at page 15 (Vol 34 No. 1, 2002) and find a tank of my generation. I was further surprised when I read the caption! A Ram? I think not. Canadian? How about "an American tank in Canadian Service?" Even allowing for the fact that the M3, the M4 and the Ram were kissing cousins, I would suggest that these are SHERMANS. If indeed they

were in Canadian service, they were probably M4A4s.

Your photo presents an interesting example of the evolution of the beast. The lead vehicle has the "early" split hatch cover, M34 gun mount and three piece differential housing. But then it also has the appliqué armour not seen on early production vehicles. The second tank retains the "early" split hatch and the three piece differential

housing but has the "later" M34A1 gun mount, rubber block track and appliqué armour. I'm happy that my 1940-50's training was on the "latest" M4A2E8.

I enjoy the bulletin. Thanks very much.

Yours truly,

Colonel (Ret'd) E.F. Hull
London, ON

I was encouraged to write to the *Armour Bulletin* by several progressive and thought-provoking articles that appeared in Volume 34, Edition No. 1. In that edition I enjoyed a spectrum of articles that spanned issues from today out into the future. It was a worthy (and I do mean Worthy) introduction to what I believe will be a turbulent and opportunity-laden decade ahead. We are on the right track (and I don't mean "Diehl Track-necessarily") with the Colonel Commandant's reminder to *engage* future Corps capability through rigorous combat development. We must face the realities engendered by the Army Transformation initiative. Is this opportunity or threat? We must consider our future options carefully, all the while cherry picking opportunities and technologies that leverage the excellent individual and collective mounted manoeuvre skills that our Corps maintains. We must be careful, however, not to rush to failure or set our sights too short. I found myself agreeing with Capt Darren Bromley

in some fundamentally philosophical ways. We should not be at all reticent to let go of the Leo C2 or any other capability when it reaches the end of its useful life. We should embrace the potential of any platform if it offers us operational mobility and manoeuvre as well as improved fire-power and protection. But is this all worth the investment yet?

I was serving as Director Land Strategic Concepts when the ACV came up for project approval in 1999. As we all know, this project had been in development for a full decade before its priority was raised by Defence Management Committee to the top Army Capital Project in 1998. Staffs throughout the Army were engaged in moving the project forward so as to ensure the delivery of a state of the art, military-off-the-shelf (MOTS) armoured fighting vehicle system by the 2004-06 timeframe. Everything was in place, including the commitment of some 2.2 billion dollars for project delivery. But something was missing.

At the same time we had hedged our tank capability development by introducing the Leopard Thermal sight project. This provided significant night fighting and fire control systems capability that added to the Leopard's lethality against OPFOR threats in the 2000-2010 timeframe. In order to measure the potential combat capability of competing systems, both legacy and new, the Research Wargames team of Director General Operations Research conducted **CARRÉ DE FER** to ascertain how much improvement in capability could be generated by the various systems under study (Leo C2, Rooikat, Centauro, Giat, GM 105mm LPT, etc). In the final analysis, all competitors achieved essentially the same results. That is to say that the Leo C2 was as good as any of the new systems under consideration. Put another way, the new systems added nothing new to our combat power potential! This generated significant concern, but ultimately common sense prevailed. It made no sense to squander \$2.2 B



on a capability that we already owned and which retained viability out to 2010. This would be akin to buying a Y2K-era Cougar that would be obsolete before entering service. As Contingent Commander of Task Force Kosovo I observed the Centauro up close and came away unimpressed that this could replace the Leo in any version, C1 or C2. Quite cleverly, the Army decided to defer the ACV until such a time as industry and the technology could deliver a two to three-fold improvement in firepower, protection, mobility, and information

capability for the money invested. In the time frame of the next ten years this will be possible as our Future Armoured Vehicle System Technology Demonstration Project, parallel DLSC studies and experimentation must be focused, and allied efforts like the US Army's Future Combat System proceed.

The idea expressed by Capt Bromley, like the Crew Commander's estimate, is dead right. It should be applied, however, when the circumstances are right and the combat

system of choice is available to meet our requirements. There is no question that acquisition staffs must remain engaged to exploit the potential that science and technology will deliver. Continued concept development and experimentation is required to maintain awareness of what is being developed.

Let's keep our eyes on the target.

Colonel M.J. Ward
Comd CTC HQ

I read with interest the last issue of the *Armoured Bulletin*, *Debating the Future Corps ACV*. 2Lt Rickard's article, "The Future of the Tank" balanced Captain Bromley's "ACV - The Way Ahead" perfectly. Track or wheels, tank or ACV, the debate is one that excites a great deal of interest and emotion across the breadth and width of the Corps. To my mind, the debate is one that can be characterized as that between the head - ACV - and the gut - tank. In our tanker's heart of hearts, we want a great big tracked monster with lots of armour and heavy hitting power. We want the ground to shake at our approach and that special feeling of invulnerability that accompanies the experience of advancing cross country in a Main Battle Tank. Having acknowledged that, logic tells us that the chances of deploying to an operational theatre in a tank are slim to none, whereas an ACV provides greater flexibility in its operational role. ACV's are more cost effective, and that in and of itself is probably the greatest reason why our head tells us its time to get on the band-wagon.


Initially, I wanted to compare this debate to the one that raged between



the two world wars throughout the cavalry's ranks - horse or steel? Hindsight tells us those who fought the delaying battle against losing their horses in the 1930's were living in the past. The question of the hour is whether we are repeating the same mistake again today in our desire to focus on the tank and keeping its unique capability alive in the Corps.

While I don't agree that the tank has gone the way of the horse, I do believe that given the situation since the end of the Cold War, we cannot afford to hold on to the tank. If we had deployed armour to the Gulf War in 1991, perhaps my view would be

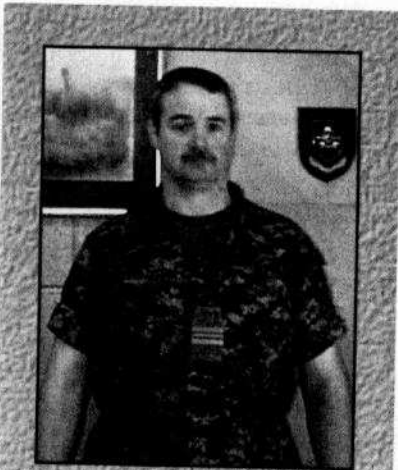
different. That we didn't, and that since then we have only deployed a troop to an operational theatre for a limited duration, is telling enough. Yes, as 2Lt Rickard pointed out in his article, tanks are still a valid and important aspect of modern warfare. It is unfortunate that they are, however, no longer a valid and important aspect of warfare as it applies to today's CF.

Horse or tank, tank or ACV; it is time to think with our heads and not our hearts. 

Captain D. Hardy
2IC TSS
Armd Sch



Army Transformation: What is a Tanker?



Major Chris Rankin joined the Army in 1985. He has held a number of positions in both recce and sabre squadrons, including a two year exchange with the 17th/21st Lancers (UK). In addition, he has served as an instructor at the RCAC School and as a G3 staff officer in LFAA HQ, including a tour as G3 CCSFOR in Bosnia. He is currently the Officer Commanding Training Support Squadron at the School.

By Major C. Rankin

“The only thing harder than getting a new idea into the military mind is to get an old one out”

B.H. Liddell Hart

“You don’t need a weatherman to know which way the wind blows.”

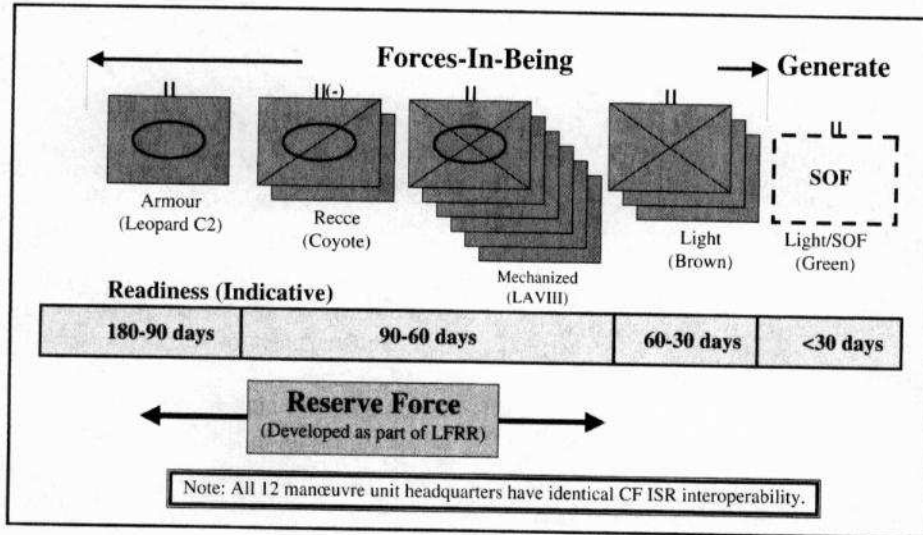
Bob Dylan

By now most of the readership will have had the chance to hear the Chief of Land Staff deliver his message on Army Strategy and the requirement for the army to transform itself. It should be clear that, while not expressly spoken, the words “Gentlemen, orders” underscored his direction on where the army is going. This will bring the Army’s structure into position to conform with its operational framework most recently reiterated in the Commanders supplementary planning guidance issued in January of this year. Strategically, the structure of army expeditionary forces should be of maximum strategic value to a joint/coalition force. This structural requirement includes, but is not limited to, a rapidly deployable, modern, interoperable and sustainable force

balanced to achieve a broad range of missions. Operationally, this means that deployed forces will be task tailored to the mission in which they will be employed. The medium-weight force of the Army of Tomorrow will be capable of participating in all operations of war but not necessarily of executing all tasks associated with these operations. Tactically, the principal high readiness, Defence Planning Guidance (DPG) assigned tasks imply the maintenance of capabilities at both the formation and unit level. The ‘plug and play’ approach inherent in Army’s capability-based planning process requires that the necessary capabilities be held somewhere within the Army inventory. The flexibility to draw on the complementary and supplementary capabilities of the Reserves and to accept asymmetrical Regular Force formation structures in Canada must be inherent in this approach.¹ The key challenge in moving to this construct is to maintain a credible and strategically relevant Army of Today capability while we experiment with new concepts during the transformation period. But we must be clear; the army will move toward an asymmetrical interim model as a mid point change target to focus sustainability and modernization initiatives as it progresses toward the Army of Tomorrow.

1. CLS 3000-8 (DLSP) January, Supplementary Staff Planning Directive 011C/99.

Figure 1



The latest transformation model (Figure 1), based on an asymmetrical brigade structure, accepts the risk of reducing certain capabilities and readiness within the Army in order to provide the resource flexibility necessary to overcome the Army's current inertia and move toward the Army of Tomorrow. This model will have a significant and profound impact on several branches within the Army not least of which is the Armour Corps. Hence, in March 2002, the Army Transformation Working Group (ATWG) requested Corps feedback on the proposed model and Corps subsequently submitted its concerns and recommendations later that month. In short, the Corps expressed considerable reservations with regard to the latest asymmetrical interim model.

In its original form the asymmetrical model, while posing some challenges for the Corps, was generally endorsed. Based on model that

would have seen the Corps consisting of eight Regular (5 recce and 3 tank) sub-units, with two addition sub-units (recce) coming from the Reserve Force, this model was seen to be sufficient to accomplish the Corps' DPG assigned tasks including the Main Contingency Force (MCF), International Security Operations (ISO), and domestic operations. Under this asymmetric model the Corps retained its ability to force generate three battle group headquarters and within the MCF retained the "rule of three". In addition, this model would at last have gone a considerable distance in solving the problem of mixed fleets within regiments and the associated maintenance and logistics issues, as well as, offering excellent potential for a further integration of the Reserve component within the Corps. There would of course have been a need to invest personnel and equipment in the Reserves to make the Reserve recce squadrons effective and there was the issue of creating

new doctrine for the de facto recce regiments. Re-jigging the Corps' Army Training and Operations Framework sequencing, some recurring re-rolling requirements and some training and career management issues would also have to be worked out. But overall, the Corps was enthusiastic about the potential opportunity to dovetail the Army's emerging ISTAR doctrine with the creation of the new recce regiments and, based on its past and present experience in the conduct of NBC operations and cooperation with aviation assets, form the core into which these "plug and play" capabilities could be added.

However, shortly after responding to this model, the current, revised, asymmetrical model appeared. This proposed revision would see the force structure reduce from eight regular (5 recce and 3 tank) and two Reserve (recce) sub-units to a total of only six Regular (5 recce and 1 tank) and two Reserve (tank). This represents a net loss to the Corps of three sub-units from its current nine (3 tank and 6 recce all Regular) representing roughly 250 PYs. From a Corps perspective, while the capability would remain to achieve its DPG, ISO and domestic tasks, the ability to provide a credible MCF would be doubtful at best with two of the three sub-units being at "reduced readiness", read Reserves Force, and the ATOF model as currently envisioned would have to be abandoned. While the revised model would allow the Corps to meet the requirement to generate the vanguard squadron of the MCF regiment based on the Regular squadron, and to maintain a nucleus of planning



capability and conduct vehicle maintenance within the other two Reserve squadrons, it was unlikely the reserve squadrons could be effectively generated.² With only one Regular sub-unit as full time, professional practitioners of armoured warfare, the Corps' ability to maintain the expertise to provide technical advice, deliver training, write doctrine, and contribute to joint/combined planning staff, would be compromised. The critical mass of skill sets and knowledge required to retain our ability to conduct open armoured warfare would be degraded to the point that trying to preserve this capability could become untenable. While the Corps remained enthusiastic about the potential for development in the recce regiments, this remained secondary to the adverse effects that the model would have on its tank capability. Therefore, based on the revised model that would see only one in six Regular sub-units tank oriented, the Corps would need to re-evaluate itself and perhaps consider shifting its focus from its current concentration on open armoured warfare to that of recce operations. While the Corps continued to embrace the opportunities presented by the formation of the recce regiments, it concluded that it had considerable reservations in

fully endorsing the revised model with its impact on the Corps' tank capabilities.

The responses offered by the Corps on both asymmetrical models clearly reflect a certain preoccupation with the effects that these would have on the tank and our ability to conduct open mounted warfare. The question I pose here is, are we making a logical or an emotional response? Are we betraying our heritage by emotionally fixating on our tank capability? And if we allow our emotions to determine our future course of action as the Army moves into the Army of Tomorrow, what will that future hold?

As a Corps we descend from those who fathered the last great transition in land war; mechanization. By 1939, when the prospect of any armour corps in Canada was bleak at best, MGen FF Worthington had already become "solely identified with mechanized warfare."³ As early as 1937, Worthy had come to be associated with the ideals of the "Dangerous Young Men" within the British Army.⁴

They were considered radical crackpots. These men were not necessarily young and they were dangerous only in opposing

complacent and regressive doctrines. Their minds were keen and alive to the growing threat in Europe and to the complete inadequacy of the existing British weapons and methods.⁵

Worthy wrote and openly advocated the conversion of cavalry to armour and surrounded himself by those who were "mech-minded". When the Hon J.L. Ralston became Minister of Defence in 1940, he was instructed to write the order that brought the Corps into existence. The rest as they say is history.

But this transition did not arrive overnight. Since the 1870's, when Prussian riflemen decimated the ranks of French cuirassiers, the writing on the wall was becoming more and more obvious. The perfection of the killing power of the bullet in the machinegun, the disgust at the slaughter inflicted by mass infantry assaults in the First World War and the growing prevalence of the automobile in society all combined to make the horse drawn army a page in history by the beginning of the Second World War. Today it is the accuracy of precision weapons, the societal aversion to casualties and the omnipresence of the microprocessor that seem to be

2. Based on the ATWG planning figure of a 5:1 ratio of trained reservists for every one deployable member required, the Reserves would need to have the ability to force generate 700 personnel (70 Reserve PYs/Sqn x 2 Sqn required = 140 PYs @5:1 = 700). Add to this figure the annual turnover rate within the eleven armour Reserve units (assuming that the current recce units will remain as such to force generate the RHQ recce tp for the MCF regiment, if not there is a cost to re-role these units to tank) and this represents a significant recruiting and retention issue. Viewed from another perspective, the revised model would require the Reserves to generate 8 tank tps to fill the two Reserve squadrons. Again using the ATWG ratio of 5:1, 40 tank tps would be required to be trained to normal ELOC readiness level. The estimated cost of taking such a tp from a normal Reserve readiness level through the required supplemental training up to the point of commencing MLOC training for deployment on operations is approximately \$2.2M/tp, with 101 training days required. As the revised model does not allow for the cascading of any equipment to the armoury floors i.e. Leopard C2, this cost would be over the initial cost of training the Reserve on Cougar first.

3. Larry Worthington. Worthy: A Biography of MGen F.F. Worthington C.B. M.C. M.M. (Toronto:MacMillian Company, 1961), 161.

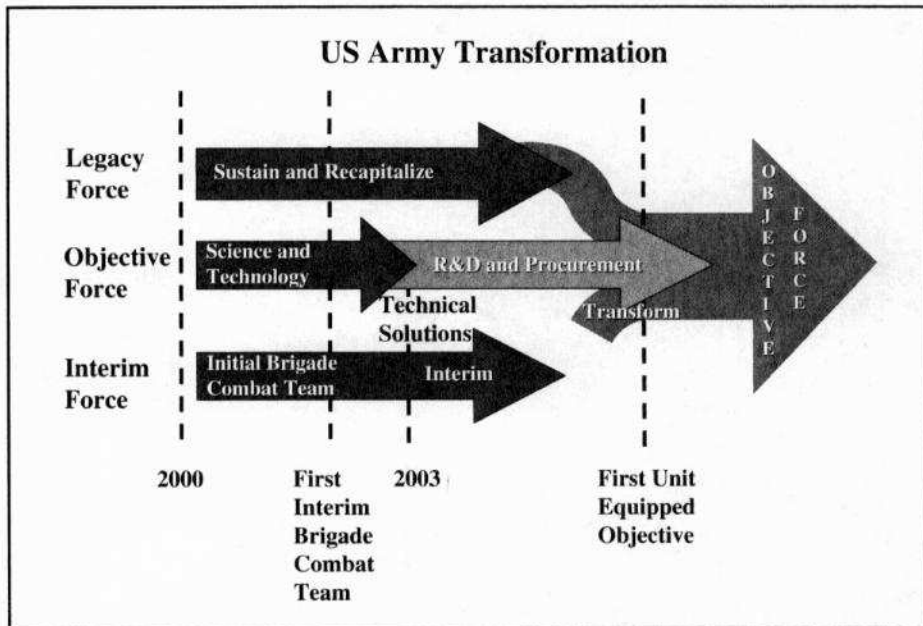
4. The Dangerous Young men were essentially those in the middle rank bracket who believed in the teachings and doctrines of Fuller and Liddell-Hart.

5. Worthington. 144.



driving the future development of 21st Century warfare.

The vision of how this new transition will come to be is best depicted in the United States Army's Master or Trident flowchart on Army Transformation.⁶ In future, the United States wants an Army that will be more responsive, deployable, agile, versatile, lethal, survivable and sustainable.⁷ To get to the Army of the Future, the Objective Force, three separate yet parallel paths must be followed. The Objective Force, which represents the art of the possible, forms the centre of the trident and uses science and technology to produce the means to merge the other two elements; the Interim Force and Legacy Force. The Interim Force will use available technology to become a medium weight, quickly deployable force but with the protection and punch resident in a much heavier counterpart. This force will also allow the Army to remain strategically relevant while allowing for the experimentation with future doctrine and capabilities needed to progress to the Objective Force. The Legacy Force is represented by the Cold War weapons systems that have been the mainstay of the Army for the last fifty odd years and supported its doctrine of manoeuvre warfare; in the United States, ABRAMS and BRADLEY and in Canada, LEOPARD, M-109 and M-113. These systems are to be sustained and recapitalized as they continue to



form the backbone of the US Army's warfighting capability.⁸ At some point in the future, these three elements will merge into one force capable of operating across the full spectrum of operations with all the characteristics envisioned for the Army of the future.

When presented with this vision of Army transformation above, you have to wonder what all the fuss over ACV versus tanks has been about. Clearly, what is required for the Army to get to the future is both. This is not a case of either or. Perhaps it's time we get past issues of equipment and more closely examine what our lot in life is and how we will continue to be relevant in the future Army. How

do we define ourselves? Is it by the vehicles we ride into battle on or is there something deeper?

According to our current doctrine, the role of armour on the battlefield is to defeat the enemy through the use of firepower and battlefield mobility. Our characteristics are firepower, mobility, protection and flexibility. But these are relative. In the current and future security environment with the increased emphasis on asymmetrical threats and complex terrain, these characteristics, as we have defined them in the past, are becoming irrelevant. We are cumbersome, slow to deploy, terrain restricted and logistically

6. As has been so often the case in matters of doctrine and change, we are largely duplicating the US Army but seem to be reluctant to say so too loudly. We beaver away writing our "own" manuals when really the appropriate FM would do nicely. To understand where the US Army is going, an unofficial document Dennis Steele, *The Army Hoorah Guide to Army Transformation: A 30 Minute Course on the Army's 30 Year Overhaul*, The Association of the US Army, 2001, offers a good yet brief synopsis.

7. Steele. 2.

8. Ibid. 5-6.



hungry. We are at a low ebb in the tank versus anti-tank cycle and susceptible to all sorts and means of destruction. These factors have dramatically reduced our ability to apply our dwindling firepower capability based on the current 105mm. But we are still the best means of providing accurate direct fire support for infantry when closing with and fighting through the enemy. As for flexibility, with all these other problems, I am not sure we could even touch our toes.

For many years I had an article from the July-August 1994 edition of *Armor* magazine posted near my desk. Written by Lt Colonel Steve E Dietrich, it was entitled "What is a Tanker?" Central to the article was an interview conducted with MGen Peter McVey, who served as an armour and cavalry commander and had been instrumental in the creation and introduction of the ABRAMS tank into the United States Army. During the interview General McVey repeatedly used the term "tanker" and was finally asked by the interviewer to define what he meant. He replied, "That's a tough question to answer, we tankers come in all varieties." McVey went on to say:


I think what makes a good tanker is a guy who is interested in mechanics and automobiles. He understands gunnery and likes

to be able to shoot. He likes to get in and make things happen. He doesn't want to go into a fight unless he can knock you out... Maybe we're a little like bullies... Armor guys will hurt you. I think they enjoy it. Armor guys will travel for hours and swallow dust, dirt and grime just to lay their sights on a target and shoot. They like to make a difference. You know when they get there, they will make a difference.⁹

General McVey makes no reference as to whether "tankers" or "armor guys" arrived on wheels or track, in a tank or an ACV. What McVey is talking about is a mindset. If we want to make a difference we have to be relevant and to be relevant we have to adapt to the needs of the future Army; responsive, deployable, agile, versatile, lethal, survivable and sustainable. Right now, we are being left behind and we need to catch up.

The Corps is correct when it takes the position that we need to retain our knowledge and ability to conduct open armoured warfare. This is certainly confirmed by our allies retention of the Legacy Force for the foreseeable future. But we cannot afford to spend too much energy fighting rearguard actions to preserve a force that we know is being phased out. Nor should we dash pell mell into becoming strictly recce oriented. As the

Commandant of the Armour School, LCol C.M. Hazleton, recently stated, "I hope we don't find ourselves in a situation where we are forced to always have to stand back and watch our allies destroy the enemy after we have found them. I hope we will be able to do better than that."¹⁰ Our primary focus must be on the delivery of accurate direct fire on the modern battlefield in both open and complex terrain. In this regard Col Marsh has offered sound advice in the last issue of the *Armoured Bulletin*, "At this stage it is best to think what needs to be done without being distracted by technology."¹¹ If we as a Corps don't look forward and decide our own future, then we will surrender our fate to digital evangelists, high priests of precision fire and imams of information warfare. My guess is we will be unhappy with the result, if indeed we are even around to see it.

This paper has posed more questions than it has offered concrete answers or solutions, and deliberately so. As a collective, we must all engage ourselves in the process. No doubt, by the time this article is published yet another iteration of the interim transformation model as it affects the Corps will be on the street. The battle is not over by a long shot and we can influence the outcome, but time is running out. Who will be the Corps "Dangerous Young Men" of the 21st Century? 

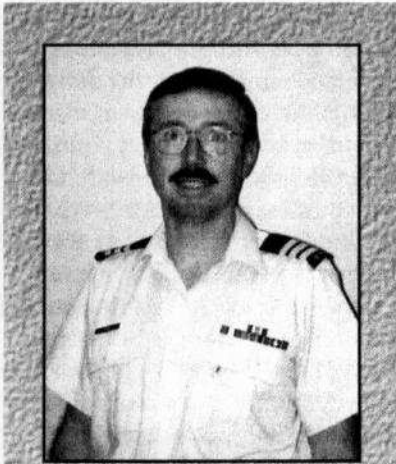
9. LCol Steve Dietrich. "What is a Tanker?" *Armor* (July-August 1994), 48.

10. LCol C.M. Hazleton in conversation with the author.

11. Col H. Marsh, OMM,CD. "Future of Armour: In Three Steps" *Armour Bulletin* (Vol 34 No. 1, 2002), 14.



Direct Fire Vehicle Requirement



Lieutenant-Colonel Luc Petit has been an armour officer for over 22 years. He has served in Valcartier, Cyprus, England, Gagetown, Bosnia and France. For the past 6 years he has been working at the Directorate of Land Requirements in Ottawa. He is responsible for Armoured Fighting Systems requirements definition and life cycle management operational input.

By Lieutenant-Colonel J.J.L. Petit

“Capability deficiencies exist with direct and indirect fire support platforms... These deficiencies need to be addressed if the Canadian Army is to remain combat capable in the future”.

INTRODUCTION

The requirement for tanks has been under scrutiny many times since they first saw action at Cambrai in November 1917. Following the deployment of anti-tank missiles in the '60s some quickly concluded that the future of tanks was doomed. The development of new tactics and improvements in armour technologies proved that tanks were still relevant, and indeed essential, on the battlefield to defeat enemy armour and to provide direct fire to support land forces in all phases of war. The aggressive employment of armoured formations was instrumental in securing many victories in the Middle East in the past 40 years.

Following the end of the Cold War, Western armies have been reduced in size but, elsewhere in the world, tank numbers have remain unchanged or have increased with the cascading of surplus tanks. As an example, over 30,000 Soviet-designed T-72s have been built and some 8,000 have been exported worldwide. Tanks will remain a threat for the foreseeable

future but western armies no longer expect to face them in large numbers as it used to be the case during the Soviet era.

Most analysts now believe that large-scale confrontations are very unlikely and that future conflicts will be regional. They foresee enemy tanks being dealt with from a distance by standoff precision weapons, launched primarily by strike aircraft. For these reasons they conclude that tanks are no longer needed. Those opposing this assessment point to the fact that some enemy targets are bound to evade being targeted at long range by resorting to camouflage and deception, as experienced in Vietnam the '60s and Kosovo in the '90s. Based on past and recent experience, armies have to be capable of defeating tanks with direct fire from protected platforms in the foreseeable future.

ARMY REQUIREMENT

To continue to be relevant in the future the Canadian Army needs to be more agile and lethal. The Canadian Army requirement has a lot in common with what other Armies are committed to. Our closest and most powerful ally, the American Army, unveiled in Oct 1999 “The Army Vision”. This direction is now transforming the US Army into a strategically responsive and dominant force. Fielding of an interim medium weight force will begin in 2003 and fielding of the Objective Force is scheduled to begin with the first unit in 2008.



Tactics and doctrine must change

The Interim Force vehicle fleet will be based on the LAV III family of vehicles. Production of the Infantry variant has begun and development of the Direct Fire platform, the Mobile Gun System (MGS), is near completion. The MGS is based on a LAV III chassis equipped with a 105mm externally mounted gun similar to that of the Leo C2 105mm. The most challenging design criteria for this family of vehicles is the requirement to be air transportable in a C-130 with minimum preparation time. Doctrine and tactics of the Interim Force clearly specify that the MGS is not an anti-tank platform but rather an Infantry support vehicle (it will not carry APFSDS ammunition). Opposing tanks are to be destroyed by air or indirect assets.

The Future Combat System (FCS) will be the cornerstone of the vehicle platforms for the Objective Force. The FCS will not be a single vehicle but rather a system of systems composed of up to 20 different platforms:

- 7 ground vehicles: 16-20 ton APC, command & control vehicles, long-range artillery and re-supply vehicles, netfire artillery, communications.
- 7 unmanned ground vehicles: 16-18 ton vehicles for recce, artillery fire, mortar fire and to carry small unmanned aerial vehicles. Special 6 ton recce vehicles to find enemy forces.
- 3 unmanned aerial vehicles (UAVs): for recce and attack.

- 3 soldier robots: robots shaped like mules and marsupials to carry supplies.

The Canadian Army is closely monitoring the development/fielding of the Interim and Objective forces. To be relevant in the future, we must ensure that our forces are compatible and interoperable with our allies, especially the US Army. Resources being limited, it is not realistic to expect the Canadian Army to acquire the full complement of FCS variants. A very important investment has been made in Coyotes and LAV IIIs and these vehicles will remain in-service until 2025, at least. Capability deficiencies exist with direct and indirect fire support platforms. Leopards and M109s are both deficient in terms of lethality, effective range, survivability and deployability. These deficiencies need to be addressed if the Canadian Army is to remain combat capable in the future.

FUTURE DIRECT FIRE VEHICLE

The Leopard fleet has served us well since the late 70s but the Leopard C2 has limitations in firepower, survivability and deployability. To address these deficiencies DLR initiated the Armour Combat Vehicle project in 1995.

An Armour Combat Vehicle study of the required capability, versus available technology compatible with a light wheeled vehicle, was conducted in the fall of 1999. It concluded that the requisite technology could not be fielded in the original timeline proposed for the ACV. The Army leadership directed that the ACV project be delayed to take advantage of emerging technologies that may be fielded in the 2010-2015 year timeframe. The ACV project is currently scheduled to begin fielding in 2012.





As stated in the recently released Army Strategy document, in the future Canadian Land Forces need to be:

- more agile;
- more lethal;
- more deployable;
- multi-purpose combat capable; and
- interoperable with our allies.

It must not be assumed that the future Direct Fire Vehicles (DFVs) will equip armour regiments as we know them today. Studies have just begun to look at how to best organise tomorrow's Army. The speed at which information will be disseminated in the future might make it more appropriate to have units permanently organised with integral fire support sub-units. This is not a new concept as the French Army infantry regiments have had integral tank sub-units for many years now.

Technology might also make it possible to use one platform in more than one role (direct, indirect, air defence). An option analysis looking into all these factors will need to be conducted when addressing the direct and indirect fire support capability. Doctrine and tactics will need to be revised to take full advantage of technological developments.

Given the changes in anticipated threat, technology trends and Army's recent direction, future DFVs need to have the following characteristics:

- C-130 air transportable, max 18 ton.
- Wheeled, on a LAV III compatible chassis preferably.
- Equipped with a weapon system capable of defeating protected targets at long ranges (improved 105mm gun and/or missile launcher).



- Capable of direct and indirect engagement (terminally guided ammunition).
- Making maximum use of automation: target acquisition/tracking, auto-loader.
- Highly survivable to mine threats, direct and indirect fire.

It should be noted that the above requirement list is unlikely to be fully achievable. Trade offs will have to be developed during the project option analysis phase.

DOCTRINE / TACTICS

Current doctrine, tactics and organization are still primarily based on lessons learned from the Second World War. Attacks against dug in positions with 18 ton DFVs are unlikely to succeed if our doctrine and tactics are not changed. These vehicles are not heavy Main Battle Tanks. This must be recognized upfront and doctrine/tactics must be developed to take advantage of the new

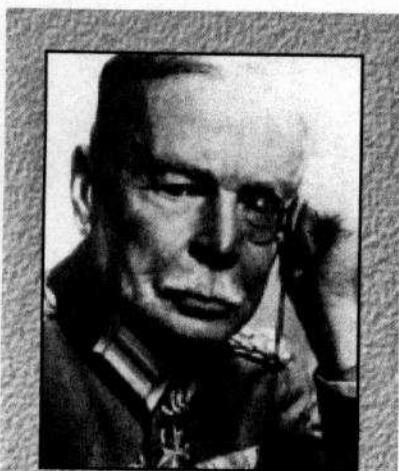
capabilities offered by modern DFVs. Improvements in firepower, lethality, range, command and control must be incorporated into revised doctrine and tactics. The Canadian Army will continue to contribute to coalition forces in future conflicts. Doctrine and tactics must make provisions for allied capabilities as the CF cannot field all the weapon systems and troops required to fight independently.

CONCLUSION

The Army, and particularly the Armour Corps, faces a very serious challenge. Maintaining the status quo in terms of equipment and organization is no longer acceptable. Changes in threat, technology and strategic situation make our current doctrine, tactics and tank obsolete. The Armour Corps must re-organize to make itself more relevant to today's needs and pre-position itself to the fielding of a new DFV at the end of this decade. ■



Thought Piece on the Restructuring of the Armoured Corps – A Rebuttal



Lieutenant-Colonel (Ret'd) Chuck Oliviero was the last CO of the 8 CH in Germany and then became the Armour DS at the Army Staff College. He is currently employed as an Exercise Author and Controller at the Army Simulation Centre in Kingston and is completing a PhD in War Studies at RMC.

By Lieutenant-Colonel C. Oliviero (Ret'd)

“My complaint with General Nordick’s essay is its logic. It is a band aid on a deep wound. It solves the problem at hand without addressing the underlying issues. Doctrine must drive capability and structure *not* political or training expediency.”

Recently my old friend and Infantry Officer, Brigadier-General Glenn Nordick, wrote a short essay outlining some of his thoughts on the restructuring of the Canadian Armoured Corps. This essay is a response to his essay. The thoughts are my own and, like General Nordick’s, are passionately held. I apologize in advance if any reader takes offence, for none is meant.

General Nordick’s self-titled “think piece” is most welcome. Any time that a Canadian army general is willing to put pen to paper and to commit himself to open debate on issues that are the very lifeblood of our army, then he is to be applauded. Too many of our generals have opinions that they are either not willing to share publicly or which they cannot defend in open debate. General Nordick is to be commended for his foray into the open arena of critical debate.



Now that I have paid my respects to my old friend, let me say that General Nordick is seriously wrong. My complaint with General Nordick’s essay is its logic. It is a band aid on a deep wound. It solves the problem at hand without addressing the underlying issues. Doctrine must drive capability and structure *not* political or training expediency.

Let us take a useful example from a sister Combat Arm. For decades the Canadian Army misused and misunderstood Combat Engineers. God bless them, they were the army’s worker bees, who were called upon to lay mines, build and explode bridges and often, because so many senior commanders had no imagination, were tasked to be the “reserve” in their secondary role as infantry. Such foolishness became the norm. Meanwhile, Combat Engineer officers spent entire careers studying obstacle planning. Like Artillery officers, they were taught that engineer resources were to be employed and co-ordinated at the highest levels. Obstacle planning, like fire planning, was correctly done at the highest levels. Regimental, brigade, and battalion commanders should not, and everywhere except the Canadian Army, were not permitted



to lay their own obstacles. It took decades of swimming upstream but eventually Combat Engineers won their struggle to be recognized as integral to the building of combat power and were then allowed their rightful place in the combined arms team.

If General Nordick is to be listened to then the Armour Corps will become what the Combat Engineers fought so hard to leave behind. Armour will become a resource for infantry company commanders to pick over and employ at their whim. (Some would say that Canadian armour is already there.) History teaches us – *over and over again* – that the correct employment of armour is in **MASS**. But we refuse to listen. Armour is expensive and it is hard to maintain in a peacetime army. Other armies manage somehow, but we do not seem to be able. Mistakenly, DND senior management believes that peacekeeping, peacemaking and peace enforcement are roles ill-suited to armour, in spite of many of our NATO allies' having demonstrated the opposite.

There is a historical example that begs to be called upon. After Germany

We must use tanks in mass

lost the First World War, the Treaty of Versailles severely limited its forces. Not only was there no role for armour in this armed forces, there was no role for many other battle-winning components: no armour; no general staff; no air force ... But this did not stop the visionary General Hans von Seeckt from keeping alive the skill sets required to maintain a professionally competent army. War studies students now study von Seeckt's decisions. We praise him for his vision. We admire his dream of a strong and professional army. The fact that the NAZI's took this vision, unfortunately, and warped and misused it, does not deny the correctness of his actions. There were many officers in the German army who argued that Germany should just roll over and let her warfighting skills wither. These officers, some quite senior, pointed out that there was no role for the outlawed components for the foreseeable future. So why train in those roles? What was the point in perfecting the combined arms team.¹

Von Seeckt rightly understood that political impositions did not have to force the army to give up its professional obligation of maintaining its combat skills in order to serve the nation. He started from this premise and would not allow himself to be deterred by the impedimenta of real-life constraints upon his resources.

General Nordick rightly points out that armour currently has but one role: to create a tank unit for the MCF. Armour units have become "a force generation capability." This is a politically correct term for a manpower pool. Current COs are nothing more than resource managers. The three regiments in the Corps have become the carrion, along with the three regiments of the Royal Regiment of Canadian Artillery, over which Canadian infantry battalions pick to top up their "battle groups" for overseas missions. It is also true that if an armour unit were to be sent overseas then its parent brigade might suffer from the lack of armour for combined arms training. But these are self-imposed problems. An army with a real training vision would solve this problem by sending units

1. It is critical to note that the German Army has never seen the combined arms battle in the microscopic terms that the Canadians have. A combined arms team builds its combat power by combining *battalions* into a fighting force **NOT**, *companies*.



to a combined arms training centre – from **wherever** they were needed – in order to keep combat skills alive. The fact that the 12^e RBC was deployed on a UN tour would not stop 1^{er} Batallion R 22^e R, or 5^e GBMC for that matter, from training. The training authority would send armour from somewhere else to assist them.

I must make a momentary aside here for I am certain that some readers at this point must be thinking that I am a simpleton who does not realize that there is no money to send units to the field to train. To quote Colonel Potter, late of the 4077 MASH, "Horse hockey!" There is lots of money! There are millions of dollars spent every day for upgrading computer systems that nobody will ever use fully. There are billions for radio and command and control systems that would make a superpower blush. Billions more for helicopters that are ordered, cancelled and re-ordered. Hundreds of millions were spent to buy LAV Reconnaissance vehicles with capabilities that were astoundingly good but **THAT WERE NOT REQUIRED**. Three decades in the army taught me that there was **NEVER** a shortage of money. The only shortage is of vision to correctly apply resources to need. Please don't tell me there is no money. The army is swimming in it.

Back to General Nordick. His article goes into some detail outlining how armour units should be broken apart and stitched back together. This is a commendable effort but whether we argue about 10 tanks per squadron or 13 is irrelevant. General Nordick's attempt to rebuild armour units as multi-purpose direct fire platforms misses the point. This is "penny packing" by another name. Regiments like this have existed in the past and they have failed for one simple reason: they have no internal integrity. They are trying to be everything to

The Army must keep its fighting capabilities

everyone all of the time everywhere. Do we want armour units or not? If we do then build small battalions (3 companies of 13 tanks each or 4 companies of 10, I don't really care), and leave them as tank units. Armour skills are hard to come by and they are short-lived by nature. I am not referring to crew commanding or gunnery, I am talking about employment of ARMOUR with a capital 'A'. The last officers to throw massed armour about on a piece of dirt were those of us who served in 4 CMBG. Creating regiments that have 10 of these and four of those and six of these and five of those may very well solve the resource problem but where do you go from there?

It is interesting to note the juxtaposition in the Armour Bulletin of General Nordick's article next to Colonel Marsh's article. General Nordick, and this is my **real** criticism, takes the resources that are available and "fits" them into a structure. Colonel Marsh's piece does the opposite; he states a vision and then calls for a restructure to meet the vision. Once you sacrifice your vision in order to save the resources you have, you will have no defence when the Minister takes more resources away. You become intellectually bereft since you are not defending a vision. Colonel Marsh at least gives the Corps a vision (one with which I do not agree, but which gives the Corps a viable *raison d'être* as opposed to being only the holding platoon for the Canadian infantry.) For instance, many of us have argued for decades that Canadian tank squadrons are too large. They should consist of 10 tanks or 13 tanks but this number should not be arrived at to "make the numbers

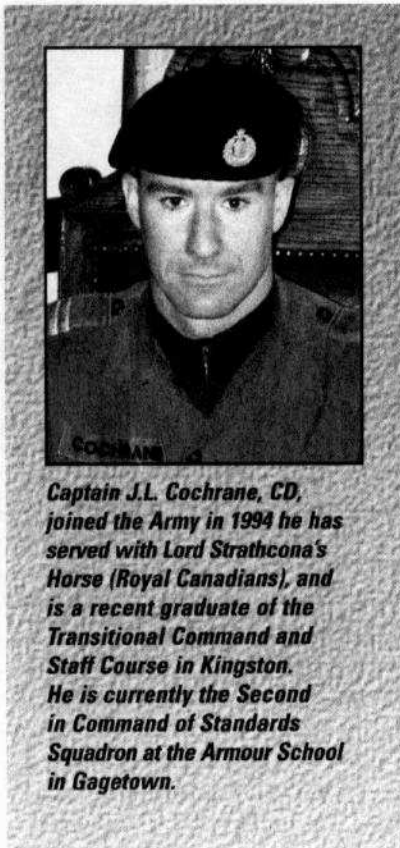
work" across the country and across the brigades. This number makes sense because it makes sense *tactically*. Start with a vision and then apply the resources. That is what I was taught by Colonel Bob Billings when I was a Subaltern. That is what I still believe.

It is time to sum up, for my foaming mouth has begun to drip onto my cavalry twill trousers and happy hour beckons. General Nordick makes some interesting points and I was happy to see him enter the arena of debate on this issue. It is true that the Corps has become a resource pool. It is also true that we have lost much of our role in today's army. It is true that there are too few tanks to go around. But the solution to the Army's and to the Corps' problems is not to take bits and pieces from all across the inventory and stitch them together into some type of Frankenstein monster of a composite being. We have had enough trouble over the years keeping cohesion in regiments that had three tank squadrons and one reconnaissance squadron. Let us not make it worse by adding to the mix! Let us begin with a vision (i.e. doctrine) of what we want armour to do for the battlefield commander. Do we want direct fire? Build small regiments that are tank regiments. Do we want surveillance and target acquisition? Build ISTAR regiments.

The future belongs to those who can iterate a vision for that future. Let us decide what vision best serves the Army so that Canada does not have to learn the lessons of battle by paying for it in blood as we have done several times before. Let us look to the future knowing that combined arms will always be the battle-winning determinant and pursue that understanding with a vision that helps the Corps contribute to the team. Becoming the panacea solution for a resource – driven army is not the answer. —



The Armour School Joins the 21st Century



Captain J.L. Cochrane, CD, joined the Army in 1994 he has served with Lord Strathcona's Horse (Royal Canadians), and is a recent graduate of the Transitional Command and Staff Course in Kingston. He is currently the Second in Command of Standards Squadron at the Armour School in Gagetown.

During the last year it has become apparent to me, through conversations with students, augmentee instructors, and even to a limited extent School personnel, that not everyone is aware of the training resources the Armour School now provides to the Corps. In keeping with the 21st century, the Armour School has developed a number of resources centred on its web page and the computer program Documentum. Recent updates to our web page and operating systems provide all Units and Area Training Centres (ATCs) with access to electronic copies of the School's instructional material.

Additions to the Armour School web page include:

- An up to date staff list with e-mail links;
- A list of Corps Units with links to their web-pages;
- Direct links to the Armour School Training Plans and Courseware on documentum;
- A Web Based Discussion forum site;
- A link to the new AFV Recognition Guide; and
- Links to information about upcoming conferences and symposiums.

Documentum is a national web based program that allows users from across the country to access key training files, such as Training Plans, lesson plans, and presentations. All Canadian Forces Units have access to this information through the Defence Information Network (DIN), provided the necessary software has been installed on their computers. If this is not the case, an ADP request to your local administrator can quickly resolve the problem. In order to ensure that access to this information is as user friendly as possible, the Armour School has established links on its web page, allowing units to jump directly into the Documentum program at the desired course with just a click of the mouse. This alleviates the difficulty of navigating the Documentum site from the start point. In addition to course documentation, the School has established a National Test-Bank and End Course Review (ECR) programs for the ATCs and Units. In order access these restricted programs users require a valid ID and password. Units and ATCs can obtain a user ID and password with a telephone call or e-mail to the Armour School Standards Squadron ADP Representative (MCpl Townsend) at CSN 432-2628, or commercial (506) 422-2000 ext. 2628.

The Armour School is also working on a number of Distributed Learning Programs. These are designed to minimize time spent on in-house training by allowing students to study at home or at the unit. These programs include an AFV Recognition CD-ROM (levels I & II are complete and distributed, level III is scheduled for release in June 2003), a virtual Leopard C2 turret computer guided tour, and Education Objectives (EDOs) such as Army and Corps History.

Lastly the Armour School has developed, with 3 ASG, a Web based conferencing site. Web based conferencing offers a "virtual conference room" where concerned individuals may meet to discuss issues. Discussion forums can provide a context within which essentially all of the same functions of a working group or symposium can be replicated. Forums can be established by contacting the Armour School 2IC Standards Squadron at CSN 432-2655 or commercial (506) 422-2000 ext 2655.

These resources and programs are designed to minimize the amount of preparatory work Units and ATCs are required to do while maintaining a consistent standard throughout the Corps. The School web page and Documentum site are constantly being updated and hold the most current material available. By fully utilizing these resources, we can ensure that our soldiers continue to be trained to the same high standard that has always been maintained from the inception of the Corps.

Captain J.L. Cochrane, CD
2IC Stds Sqn



The Brigade Reconnaissance Squadron – Recommended Organization Based on Multi-National Operations in Bosnia

By Major P.P.J Demers

BACKGROUND

Prior to the introduction of the Coyote, the F echelons of reconnaissance squadrons consisted of three Scout Troops of seven Lynx each and an Assault Troop of four sections in M113. Squadron Headquarters consisted of the OC's Lynx and two CP's. The Coyote surveillance vehicle has replaced, on a one-for-one basis, the Lynx in these squadrons. No consideration of differences in characteristics and capabilities of these vehicles were taken into account. This was simply a vehicle replacement project. Since then it has been decided that additional Coyotes should replace the Cougar fleet. As a result, reconnaissance squadrons were pared down to 5 car troops from 7 and regimental reconnaissance troops and infantry battalion reconnaissance platoons were also reduced in size in order to make a sufficient number of vehicles available to the second Coyote squadron in each armoured regiment. This reduction in the size of reconnaissance troops and platoons was justified based on the long-range surveillance suite of the Coyote.

B Squadron, Lord Strathcona's Horse (Royal Canadians), as part of the 2 PPCLI Battle Group on Operation PALLADIUM ROTO 7, had the opportunity to work with reconnaissance, infantry and aviation sub-units of several nations during the course of the deployment. Lessons learned from and observations of these joint ventures have led to recommendations for an alternate structure for Canadian reconnaissance squadrons.

DISCUSSION

RECONNAISSANCE SQUADRON TASKS

CMBG Reconnaissance Squadron tasks are:

- Route, area, point and zone reconnaissance.
- Screen.
- Guard (including counter-reconnaissance).
- NBC reconnaissance and surveillance.
- RAS.
- Traffic control.
- Convoy escort.



Major Pascal Demers enrolled in the CF in 1983 and has held a number of command and staff positions both with the LdSH(RC) and elsewhere. Recently posted from the Regiment to the Land Staff in Ottawa, he is currently attending the Canadian Forces College in Toronto.



In addition to the above-mentioned tasks, which are normally assigned to the scout troops, specific tasks that are conducted by the assault troop include:

- Anti-armour ambush.
- Dismounted reconnaissance patrolling.
- Clearing or creating minor obstacles (i.e. abatis and wire entanglements).
- Reinforcing observation posts(Ops) by providing dismounted protection.
- Quick Reaction Force for RAS tasks.

PRINCIPLES OF EMPLOYMENT

The principles of employment of reconnaissance operations are as follows:

- Stealth.
- Make, report and maintain contact.
- Maintain accurate communications.
- Avoid decisive engagement.
- Confirm enemy disposition.
- Maintain a reserve.

Fundamentals for screen and guard tasks are:

- Depth.
- Balance and overlap.

- Firepower.
- Reserves.
- Coordination.

RECONNAISSANCE SQUADRONS/COMPANIES OF OUR ALLIES

On various joint operations B Squadron worked with squadron companies and platoons of several nations. Their organizations and major equipment are listed below.

The Netherlands. The BG Reconnaissance Platoon has seven YPR-765, and M113 upgraded with 20mm cannon, or Mercedes Wolfjeeps. They normally operate in three patrols of two vehicles plus the Platoon Leader, and have four soldiers per YPR-765 who can dismount for close reconnaissance tasks. (We did not work with a Dutch reconnaissance squadron). Observation equipment includes weapon sights, binoculars and NVGs.

Spain. The Spanish Armoured Cavalry Squadron has three troops of five VECs. The VEC is a 14 Ton, six-wheeled vehicle with an unstabilized 25mm chaingun. For observation, the crew uses the vehicle day sights, binoculars, NVGs and two observers/scouts who can dismount from the back of the vehicle. They normally operate as two patrols of two vehicles, plus a Troop Leader.

Lithuania. The Reconnaissance Company has one platoon of six MOWAG Eagles and one platoon of six Mercedes Wolf. They operate as three patrols of three, with the Platoon Leader acting as a Patrol Commander as well. Observation equipment is NVG and binoculars.

France. The Division Reconnaissance Battalion has three Companies of 12 VBL and 12 AMX-10RC and one Company of 19 VBL MILAN paired with regular VBLs. (Total 69 VBL and 36 AMX-10RC). Company Commanders have a VBL command vehicle in addition. They operate in patrols of two vehicles, one of which is a small observation vehicle (VBL) and the other an anti-armour capable vehicle (AMX-10RC in three of the companies and VBL with MILAN launcher in the fourth company). Observation equipment includes thermal sights, NVGs and binoculars.

Germany. The Division Reconnaissance Battalion has three companies, each with three heavy and one light platoon. The heavy platoons have three Leo 2A5 each. The light platoon has 10 Luchs. The Luchs normally operate in pairs along the axes being covered and are followed by the tank platoons that are ready to deal with enemy reconnaissance elements encountered or to approach enemy positions to define them in detail from the relative safety of a Main Battle Tank. The





Brigade Reconnaissance Company has four platoons for four Luchs each and one radar platoon of six Fuchs radar vehicles. The Luchs and Fuchs are grouped according to the tasks given and the situation. Generally, the Luchs leads in patrols of two vehicles with over watch from the Fuchs. The Germans are the masters of regrouping to meet the tasks to be performed. They demonstrated by far the greatest flexibility in this regard, which makes them extremely effective in any situation. Observation equipment includes thermal sights, NVGs, binoculars and the radar in the Fuchs platoon.

United Kingdom. The Brigade Reconnaissance Squadron has three scout troops of four Scimitars and an Assault Troop of three sections in Spartan. The Troop Leaders of the scout troops also act as patrol commanders. The scimitar now has thermal sights. Other observation devices include NVGs and binoculars.

LESSONS LEARNED

The current squadron structure is three scout troops of five coyotes (one command variant and two patrols of one mast and one remote variant each) and one assault troop of four sections. Our doctrine calls for seven car troops. Five car troops have proven to be inadequate, even in a peace

support operation, in properly conducting route, area, or zone reconnaissance or escort tasks. Clearly, screen or guard tasks are even more significantly hampered by the reduced troop size. The principles of depth, balance and overlap, and reserves cannot be met. The Spanish troops suffered from the same limitations. But seven cars does not mean seven Coyotes. The Coyote is an expensive system – mainly due to its surveillance suite. In the patrol, the surveillance vehicle requires a partner for its protection. That partner should, in some instances, be a vehicle that can destroy enemy reconnaissance vehicles (up to tanks which many armies use for reconnaissance and/or a vehicle that carries soldiers for local protection.

The importance of assault troop has been highlighted by experiences during this operation. While operating with the Lithuanian reconnaissance company and the French infantry companies, attaching an infantry or reconnaissance section to a Coyote patrol added local security that the patrol itself could not provide for extended periods of time. This has also allowed additional OPs to be established, using individual Coyotes as surveillance vehicles paired with an infantry or reconnaissance section. Dismounted soldiers, specifically French infanteers as well as Dutch and Lithuanian reconnaissance soldiers,

were employed to provide covert OPs and manpower for VCPs. Finally, should the need arise, an assault troop's capability to establish anti-armour ambushes was also validated during an exercise scenario with the Dutch BG (Note that the Dutch BG Reconnaissance Platoon is established like a large assault troop, but without the engineer-type training.)

Pairing the Coyote surveillance vehicle with another system for local protection must also be considered in war-fighting scenarios. While in peace support operations a dismounted presence for local protection is usually sufficient, a system that can destroy enemy reconnaissance vehicles, including tanks, is required to ensure the survival of surveillance vehicles that are vulnerable while their suites are deployed looking for enemy activity at long ranges. Pairing the surveillance vehicle with an anti-tank gun or missile system is necessary. With the current two-Coyote patrol, one set of surveillance equipment is deployed while the second vehicle of the patrol is providing close protection. At \$3 million per Coyote, we have an extremely expensive 25mm gun providing protection for the vehicle conducting the surveillance. Even tanks, wrongly argued to be expensive, would be much more economical and effective in protecting our surveillance vehicles. Leo 1A5 (or C2) can be

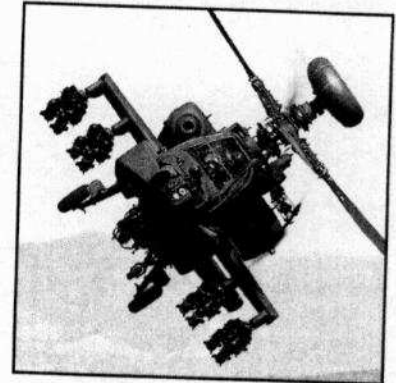
purchased for less than \$1 million each. (Consider it a tracked Armoured Combat Vehicle (ACV)). If the Lav 105 were ever fielded successfully, that system would be a better patrol partner to the surveillance vehicle than another surveillance vehicle. Note, however, that the cost per vehicle will certainly be much more than the Leo 1A5 and probably more than the German reconnaissance tank, the Leo 2A5, as well. These large anti-tank systems or ACVs can replace half of the Coyotes in the surveillance patrols without adding significantly (or at all) to the size and noise of the current two-Coyote patrol. These concepts were trialed during this operation, pairing Coyotes with Spanish VECs, German Luchs, and British Scimitars. This type of employment would be similar to the German tactical employment of their Fuchs radar vehicles.

Due to the size and noise level of the Coyote and its ACV partner that I propose, a light patrol has proven to be extremely useful within the troop on this deployment. A patrol of two smaller, quieter vehicles can be purchased at a cost much less than that of two Coyotes. Some examples from our allies are the Mercedes Wolf jeep (1 ½ ton), the MOWAG Eagle (armoured HMMWV copy, 5 ton), the VBL (3 ½ ton), or the CVR(T) Scimitar (7 ton). I would propose an armoured jeep that can mount an anti-tank missile if required, such as the HMMWV or VBL.

Another observation from joint operations is that the Lithuanian, German, French and British reconnaissance units do not have troop/platoon leaders who travel in line vehicles. The vulnerability of a lone vehicle is

obvious. Conversely, the troop leaders in these reconnaissance units are also patrol commanders. When they are required to leave their patrol or OP for orders or liaison, the troop is left short and potentially OP positions can be compromised. Consideration must be given to providing a "fire team partner" to troop leaders, and perhaps OCs. This of course would increase the cost and manning of the squadron. To minimize such a cost, an alternative would be to make the OCs tactical command vehicle, as well as the troop leaders' vehicles, something is survivable – such as an ACV.

Operations with the US Aviation Scout Weapons Surveillance Team (which consists of an OH-58D D Kiowa Warrior, an AH-64 Apache and a UH-60 Blackhawk) confirmed that the current squadron headquarters structure, with the OC in a tactical command vehicle and the BC in a command post, could easily direct and assimilate the information provided by this additional resource. The team is employed as an additional troop in the squadron. Ideally, two Scout Weapons Surveillance Teams attached to a reconnaissance squadron when the situation warrants it would provide continuous over watch and/or flank security, allowing for refuelling of one team while the second is on station. It should be noted that if we expect to continue to be employed in coalition operations, which I believe is the general consensus, the Coyote should be equipped with a laser designator incorporated into the surveillance suite in order to be able to "paint" targets for attached aviation elements. This would obviously allow aviation assets to engage targets without exposing themselves to enemy fire.





On a number of occasions, reconnaissance patrols operated in conjunction with Canadian electronic warfare detachments from the TFBH EW Troop. The structure of the reconnaissance squadron and EW troop allowed for effective communications and cooperation between each unit. EW assets monitored local radio and cellular telephone activity while the reconnaissance elements patrolled or conducted surveillance. On other occasions EW assets detected local radio transmissions and directed the reconnaissance elements into the source locations to investigate. Interoperability has been confirmed. Grouping of EW assets with reconnaissance squadron should be task-oriented. None of B Squadron's experiences suggest that permanent groupings, as proposed by persons who think the ISTAR is a revolutionary concept, would be more effective. (Remember RISTA? – this is not new.)

SUGGESTED ORGANIZATION

The general structure of three scout troops and one assault troop has

continued to be validated. In terms of the F echelon, I recommend a squadron of:

- An SHQ of one Leopard C2 as the OC's command vehicle, two Bison command posts and one HMMWV for the squadron liaison officer.
- 3 x Scout Troops of two heavy patrols of one Coyote and one Leopard C2 each and one light patrol of two HMMWV (one with ATGM and one with a 7.62mm C6).
- 1 x Assault Troop of four sections in LAV Pioneer and a LAV 3 for the troop leader.

The total number of F echelon vehicles then is:

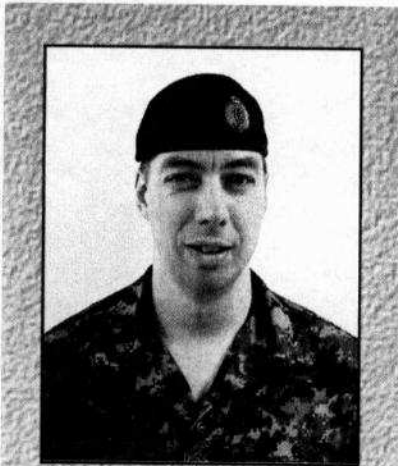
- 6 x Coyote (3 mast and 3 remote variants).
- 10 x Leopard C2.
- 6 x HMMWV.
- 4 x LAV Pioneer.
- 1 x LAV 3.

CONCLUSION

Extensive experiences in an operational theatre during both normal framework operations as well as warfighting exercise scenarios have shown that the all-coyote structure is not the most effective, nor is it a cost-effective organization for our Canadian Mechanized Brigade Group Reconnaissance Squadrons. While our command-and-control system is sound and allows the squadron to effectively command attachments such as aviation or to operate with EW assets, the scout troops need to be changed. A mix of surveillance vehicles and ACVs is required within the patrols. Five car troops lack depth and are simply, too small to properly perform the tasks expected of them. Since there is also a requirement for a small, quiet, patrol within each troop to provide stealth, a light patrol added to each troop would address both shortfalls. Commanders require a survivable vehicle. Finally, the assault troop is vital, especially for local protection of Coyote Ops, dismounted patrolling and OPs, and anti-ambush.



Sector Reconnaissance – Does That Doctrine Still Apply to the Coyote?



Major Stéphen Tremblay is presently serving as the Officer Commanding Reconnaissance Squadron 12^e Régiment blindé du Canada (since summer 2000). He is the Officer Commanding Reconnaissance Squadron with the 2^e Royal 22^e Régiment Battle Group, Roto X OP PALLADIUM.

By Major S. Tremblay

AIM

The aim of this article is to present a new view on how to employ the Coyote in a sector reconnaissance role. Our intention is not to reconsider reconnaissance doctrine as a whole, but rather to open the door to innovative considerations that would enhance the Coyote's performance and thus prolong its survival on the battlefield.

INTRODUCTION

There have been many articles written about the Coyote since its introduction into the reconnaissance squadrons (recce sqns). Although many have discussed squadron organization as well as the strengths and weaknesses of the Coyote as a recce vehicle, very little time has been devoted to doctrine for the use of this new vehicle. Having said that, it is the Lynx doctrine, with minor adjustments, that is being applied to the Coyote. According to that doctrine, the aim of sector reconnaissance is to obtain information on the enemy and the terrain in a corridor that usually includes the full width of the brigade's line of advance. When applied, this often means deployment of the complete recce sqn to the front to carry out a detailed reconnaissance of all the terrain used by the brigade. Even with the new ISTAR program, it is

not anticipated that the mission will change significantly.

Unfortunately, those that know about reconnaissance and have had the opportunity to train on the Coyote know very well that continuing to use that vehicle with the current doctrine would mean sacrificing the brigade recce sqn. The fact is that the Coyote does not have the characteristics of a reconnaissance vehicle and, thus, is not suitable for conventional reconnaissance as laid out in the current doctrine. Perhaps the time has come to amend that doctrine.

To better situate the discussion that follows, let us imagine a scenario where the brigade's mission is to "continue the advance and destroy the enemy on the other side of a river 50 km from the start line". Assuming favourable terrain, the brigade would surely advance with two (2) battle groups (BG) leading, one along the main axis and the other along the secondary axis. The brigade commander would ask the recce sqn to advance rapidly, locate the enemy and provide as much data as possible on the terrain in general and especially on crossing sites. The sector to be covered would be open, with wooded areas and interspersed with roads and rivers. In his appreciation of the situation, the squadron commander would consider several factors, among which: the pace of the mission, the open ground to



When used alone, the Coyote cannot defend itself

reconnoitre, the obstacles to cross, the condition of bridges, the enemy threat, etc.

DISCUSSION

The 12^e Régiment Blindé du Canada recee sqn studied different possible uses of the Coyote, better suited to its capabilities. That study arrived at several conclusions on employing the Coyote in a reconnaissance role. The first one concerned the vehicle's limitations. However admirable Coyote's qualities may be, the fact remains that it is more or less ineffective as a reconnaissance vehicle because of its high silhouette, lack of cross-country mobility, lack of amphibious capability, lack of medium range armament, etc. Imagine the scenario described above, with the recee sqn deployed in front of the brigade and Canadian Leopards following behind. The tanks would soon overtake the recee sqn. That fact was confirmed during 12^e RBC EX SABRE AUCLAIR in April 2001 at Gagetown. In fact, the Leopard travels twice, if not three times as fast as the Coyote when moving cross-country. With such a scenario, even if the sqn crosses the start line a few hours before the brigade's mobile elements, on reaching the water obstacles, the sqn advance would be stopped and its operations limited to the reconnaissance of crossing sites and the identification of enemy positions and obstacles on the river. Such tasks are of a dismounted nature and can easily be done by other resources in the battle group (BG) or combat team. Those observations were again confirmed during an



Ex JANUS where results were quite lamentable. In the end, a river that the Coyote could not cross because all of the bridges had been destroyed stopped the sqn. Thus, the sqn suffered heavy losses while attempting trying to do a reconnaissance of the crossing site, before the brigade could react.

On the other hand, the Coyote was quite successful as a surveillance vehicle, both on exercise and during operations. So, why should a sqn equipped with such top notch and effective surveillance equipment be sacrificed to a role with such a short life expectancy in battle? Is it still necessary to locate the enemy in the same way as was done by mobile formations during the Second World War? Considering the capabilities of today's technology, is it still necessary and prudent to deploy recee elements forward, in such great numbers? Satellites, aircraft and the surveillance systems found in the Coyotes enable us to gather information about the enemy from a great distance. That information can be confirmed in place by recee elements within the BG.

Further, considering the strategic context under which Canadian Forces are likely to participate, perhaps we

should review our doctrine to better match our capabilities with the needs of our allies. Even if it is difficult to determine the precise tasks our army would be assigned during a global conflict, it is clear the CF would not find itself alone on a battlefield. Because of the size of our army, it is more likely that we would combine with another allied army. Whether that be with the United States, the United Kingdom or with France, for example, we quickly conclude that those countries would have their own medium and long distance surveillance facilities suited to their own needs. It is more likely that the Coyotes with their exceptional surveillance capability would be twinned with allied recee elements, to maximize their use. Other less vulnerable recee resources would be attached to Canadian brigades.

Finally, we must consider the likely threat and its implication on the use of the Coyote. Although difficult to define, if we consider Granovian context, enemy reconnaissance and reconnaissance support weapons are long range when compared to the Coyote. Although it is difficult to visualise a precise threat, you must agree that the Coyote does not meet the fighting reconnaissance



characteristics of Granovian vehicles such as the BMP-2 and 3 with their 4000 to 5000 meter range missiles, combined with the support of the T-72 tank. Threatened with that type of opposition, it would be difficult to imagine that the Coyote, used alone, could defend itself and survive. However, when twinned with an allied reconnaissance element or with a brigade mobile force, the Coyote's thermal imagery camera and 24 km range MSTAR radar could make a major contribution to defining the enemy picture.

RECOMMENDATIONS FOR A NEW EMPLOYMENT DOCTRINE

With experience acquired on exercise and considering the points raised above, 12RBC recce sqn has studied the employment of the Coyote during sector reconnaissance and has come to the conclusion that there is probably a better solution. It is proposed to use the Coyote only on the flanks in order to provide all-around protection, that is to say covering all directions. Thus, Coyotes should no longer be deployed in front of the brigade but rather stay level with the mobile units deployed on the flanks. This would mean, primarily, that the recce sqn would provide the brigade not only with cover to the front but also with very effective protection on the flanks and to the rear. Information on the enemy obtained by the Coyotes and their surveillance equipment would provide the brigade and its mobile units with a reasonable reaction time. In fact, many such employment modes have been developed by the recce sqn and checked on JANUS within a brigade scenario. Mainly, the leading BGs deployed with their recce elements (60) in front and with the recce sqn on the flanks. The recce sqn task was to provide protection for the BGs from all directions. The results were very conclusive. After many

trials, the sqn concluded that the use of patrols, leapfrogging three patrols per troop, was the most effective way to accomplish the task. Under control of the troop commanders, the patrols, together with the mobile elements, led the brigade from the flanks, their surveillance equipment providing maximum possible warning about any type of enemy, from any direction. Although it was difficult to keep up with the leading tanks, the Coyote's long-range surveillance capability enabled them to report enemy movement in front of the Brigade. It is to be noted that when thus employed, the Coyote was able to use roads and that factor greatly facilitated its movements. Further, even if they were deployed on a wider front, the patrols in depth were able to report information reasonably early. The overlapping of patrols was done easily enough, without significantly diminishing the extent of surveillance. In other words, the leading patrols, that is to say those that were with the mobile elements in front of the brigade, were looking for a new position with the support of patrols in depth. As soon as they were in position and able to report information, the patrols in depth began the leapfrogging action. Other patrols, a few kilometres behind and in the observation mode, provided protection to the flank/rear. The last patrols, those completely behind, broke contact and were en route to assume the lead.

This new employment of the Coyote for sector reconnaissance was not only checked on the JANUS simulator but was also verified during EX SABRE AUCLAIR 2001 at Gagetown in April 2001. Had we used the sqn in its conventional role it would have been destroyed after only a few bounds and the tanks would have soon overtaken us. Why sacrifice the sqn on a sector reconnaissance task when in any case, after a few kilometres it would be

able to do nothing or very little for the Brigade. On JANUS, the life expectancy of the Coyote s on the flanks was much greater because the mobile forces preceding them provided protection. Further, the enemy attention was no longer concentrated on the reconnaissance vehicles but rather on the main body, which was advancing at high speed. In addition, the present Coyote radar system is very difficult to detect during the first hour of use and that enhances Coyote performance when it is authorized to use radar.

CONCLUSION

The recce sqn must be able to locate enemy positions and maintain contact. It must also be able to transmit that information at the opportune time so that the Commander can make use of it. That is part of the ISTAR program. The Coyote is an effective surveillance tool, capable of gathering incredible amounts of information and thus participating to the maximum in the task of collecting information. That is why the Coyote cannot be used in the same way as the Lynx. If we continue believing that the current doctrine can apply to the Coyote and keep thinking along those lines, we may as well dispose of the Coyote's equipment to make room available for conventional reconnaissance. Applying the current doctrine of using the Coyote in the advance to contact is suicidal. The recommendations proposed above have been put to the test and produced results that deserve serious consideration. If we decide to keep the current organization for recce squadrons in the Armoured Corps, the above proposals should be studied in greater depth or even verified by the Armoured School or by another regiment in order to produce a doctrine more worthy of the Coyote and more applicable to the facts of life in our Army.



Jockeying for Relevancy: Tank Training and Armour Reservists



Captain Gordon Smith joined the Governor General's Horse Guards in 1993. He holds a Bachelor of Arts in History and Philosophy as well as a Master of Arts in War Studies from the Royal Military College of Canada. Capt Smith currently serves as the Battle Captain for the Horse Guards' Cougar Squadron.

By Captain G. Smith

"It is within the reserves that the maintenance of the skills for a combat capability can be consistently pursued, undeterred by operational necessities."

For Canadian armour reservists who train in tank tactics, their efforts may seem sometimes less than applicable in a post-Cold War world. With over a decade having passed since the fall of the Berlin Wall and a half-century since Canadians last lobbed an armoured round in anger, these skills can appear anachronistic. Ensuring that public-funded military training is relevant should always be a concern when resources are limited. Vigilance on this takes on still greater meaning when it involves reservists, who have volunteered time away from work and family to pursue such training.

It is the objective of this paper to examine the validity of reservist participation in armour tank training and to suggest how this could be effectively undertaken. It should be stated that this is not an attempt to defend why the Canadian Forces (CF) needs tanks. That discussion is probably best left

to the makers of strategy and doctrine.¹ It will be assumed that so long as the Government of Canada expects its military to field multi-purpose, combat-capable armed forces, even if only in medium level environments, tanks will remain a requirement.²

Currently 11 of the 17 reserve regiments designated with an armour tasking undertake tank training with the Armoured Vehicle General Purpose (AVGP) Cougar. The remaining six regiments are engaged in armour reconnaissance training, specifically as *Light Recce* mounted in jeeps. As the Cougar reaches the end of its usable life, it is suggested that reserve armour tank units would better serve the CF in other rolls. Some of these suggested taskings include more units as *Light Recce*, as APC drivers for the infantry or to switch to entirely different trades based on current operational requirements.³ It is my assertion that so long as the Canadian Forces retains tanks within its military capability, reservists trained in this role are both relevant and essential.

Reservists are an integral component of the nation's response to a wide scale emergency or armed conflict. This was articulated in the *Report of The Special Commission on the*

1. For a recent foray into this discussion see Major Lee J. Hammond's "Tank: The Canadian Army's Four-Letter Word" in *The Army Doctrine and Training Bulletin*, Winter 2001-2002. pg 74-83.
2. This phrase, first articulated in the 1994 *White Paper on Defence*, was reiterated in *Defence Planning Guidance 2001*, Department of National Defence: Ottawa; 2000. pg I.
3. In 1997 the Elgin Regiment, a *Light Recce* regiment, was re-rolled to the Engineers.



Restructuring of the Reserves (SCRR). It identified reserve involvement at every level of the mobilization plan from Force Generation to a National Mobilization.⁴ In a conventional conflict that involves wide-scale use of our land forces, reservists skilled in the use of tank tactics will be valued commodities. With only three regular force armour regiments, tank trained reservists will be called upon to augment and form replacement crews for the regular force early on within the conflict.

It has been identified that, due to the high tempo of operations, regular force units have not been able to maintain training in conventional war-fighting skills. In his 2000/2001 Annual Report, the Chief of the Defence Staff (CDS) identified that:

The Army... has had to reduce the frequency of its conventional combat training... to meet operational demands.⁵

The constant engagement in preparation, deployment and post-deployment for overseas peacekeeping missions along with domestic emergencies has meant a shift away from their primary role. The focus is less on war fighting than involvement in operations other than war.

Reservists in contrast are not as dramatically affected – if at all – by ongoing operational necessities. While individual personnel or even complete troops from reserve



regiments deploy on overseas missions and taskings, their home units still follow their scheduled training calendars regardless of their absence.

It is within the reserves that the maintenance of the skills for a combat capability can be consistently pursued, undeterred by operational necessities. Armour reservists should be encouraged to pursue tank training, as these are skill sets particularly identified with war fighting. In the reserves, the maintenance of an armour culture can and should be promoted. Should a conflict arise requiring tanks, the nation will need to call upon its armour reservists to help fulfill this role. Far better that there is a trained cadre prepared to accept this challenge.

In the summer of 1990, the military forces of Iraq invaded the neighbouring state of Kuwait. The western world viewed this as an act of aggression that threatened the stability of the

region. Following United Nations' Resolutions against Iraq, a coalition was formed under the leadership of the United States, which included Canada. Should negotiations have failed, the objective of this coalition was to remove Saddam Hussein's invading forces from this sovereign state.

Canada's eventual commitment to the Persian Gulf War excluded a large deployment of ground forces.⁶ However, in the build-up to *Dessert Storm*, options for a larger ground commitment by Canada were examined. Dubbed *Operation Broadsword*, staff checks by Mobile Command looked at the deployment of the 4th Canadian Mechanized Brigade Group (4 CMBG) from Germany to the Middle Eastern Theatre. Faced with issues such as logistics and politics, *Broadsword* was not implemented.

What is relevant to this discussion is the fact that had *Broadsword* been

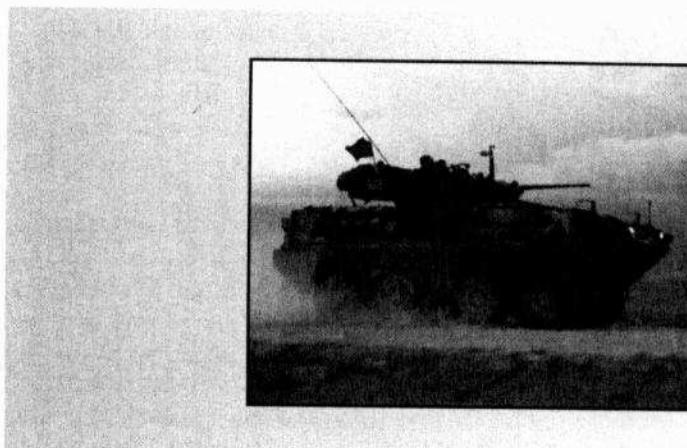
4. Force Enhancement (Level 2) is currently undertaken by reservists through participation in peacekeeping operations. Should a situation require a higher degree of mobilization with Force Expansion (Level 3) or National Mobilization (Level 4) reservists and their units will play a critical role in resourcing these plans. The SCRR's plan was accepted in principal by the CDS. http://www.vcds.dnd.ca/cres_cdt/scurr/report/anx-a_e.asp
5. *Annual Report of the Chief of Defence Staff 2000/2001*, Department of National Defence: Ottawa; 2000. p 18.
6. This consisted of a naval task group, CF-18 fighters along with support aircraft, and a field hospital with a protective infantry component.



activated, armour reservists would have been required to augment and support their regular force counterparts in a war-fighting environment. If Canada wanted to sustain a brigade group in-theatre for a period longer than six months, reserve forces would have to be employed.⁷ To sustain the crew strengths of the tank regiment in 4 CMBG, armour reservists would have had to be called up to fill tank-fighting roles.

As signs that the Cold War was coming to an end at the start of 1990, few could have predicted that, in a year's time, military forces would be engaged in the largest land offensive since the Second World War. The future is always uncertain, fraught with the potential of armed conflict. It would be presumptuous to think that the need for the deploying of tanks by this country will not arise again. Based on our current force structure, this would also mean the deployment of reservists in this role.

Having examined the relevance and the essential need for reservists to undertake tank training, a quick review of how this training is being undertaken is required. In the late 1970s the Canadian Forces replaced its ageing fleet of nearly 300 Centurion tanks with just over 100 German built Leopard C-1 main battle tanks. The lion's share of these went to form a tank regiment within a mechanized brigade stationed in Germany as part of Canada's ongoing commitment to NATO. This left the remaining



Coyotes will fulfill the needs of the Reserves

regular armour regiments back in Canada devoid of vehicles to train on or to deploy on other operations. To meet this disparity of equipment, the AVGP was adopted. This family of wheeled vehicles was to:

“provide a general purpose combat training capability for field units, both Regular and Militia, based in Canada. They will also improve the operational effectiveness of units engaged in internal security and peacekeeping tasks”⁸

While meeting these requirements, it was understood that the adoption of the 6 wheeled AVGP Cougar was a compromise when it came to actual tank training.

“The ideal programme to ensure a combat ready-armed force is to

buy tanks...The AVGP programme is the next best solution, it is less costly, meets Canada's training needs, and redresses a long-standing equipment deficiency in the Combat Arms.”⁹

Tank-trainers are not a bad idea. Using substitute resources instead of logistically heavy and expensive tanks has been a mainstay of training programs for national armies for decades. Tank training using alternate means has become more realistic with advances in computer technology. To this end the US Army developed the Virtual Training Program at the Armored Centre in Fort Knox, Kentucky.¹⁰

While computer-generated simulators are effective training devices, there is a need to be on an actual vehicle to properly learn all of the skill sets associated with being in an armour crew. Hence a tank-trainer can come into play. While technology promises to deliver more realistic simulations,

7. Sean Maloney *War Without Battles: Canada's Nato Brigade in Germany 1951-1993*, McGraw-Hill Ryerson Limited: Toronto; 1997. pg 452.

8. John Marteinson and Michael R. McNorgan *The Royal Canadian Armour Corps History*, Royal Canadian Armour Corps Association: Toronto; 2000. pg 390.

9. *Ibid*, pg 390.

10. Use of computer generated tank simulators such as Simulation Network (SIMNET), and more recently the Close Combat Tactical Trainer (CCTT) has been going on for close to a decade and are part of the training of both Reserve and Active Component units in the US Military.
<http://www.knox.army.mil/partners/ari/index.htm>



it cannot match dealing with the diesel and dust of deploying with a squadron of vehicles to the field or the intensity of firing actual rounds down range.

The adoption of the Cougar by the CF proved a boon to the reserve armour tank regiments. For close to a decade following the withdrawal of ageing Sherman tanks in the late 1960s and early 1970s, units had been resigned to a light reconnaissance role in jeeps. The idea of a true tank culture within the army reserves had all but disappeared. In a Cougar with its 76-mm main gun and cross-country capability (though limited), reservists could begin to train again towards defeating the enemy through firepower and battlefield mobility.

Mounted in the same vehicle, armour reservists had more in common with their regular force counterparts than they had since the years immediately following the Second World War. Cross component training between regulars and the reserves was a feasible reality. Also the sense of being part of one corps was fostered through activities like gunnery competitions such as the Ram's Head Trophy where all Cougar-equipped units, Regular and Militia, were eligible to compete.¹¹

While the Cougar was in service with the regular force, their employment forming whole squadrons of tank trainers was never questioned. Though

only a substitute for a tank, the skills developed through their usage was seen as being adequate and readily transferable to tank employment should the need arise.

The AVGP Cougar was withdrawn from Regular Force Armour Units in 1999. This was done in part because of the vehicle's shortcomings on overseas missions than in its role specifically as a tank trainer. The **1996 Report of the Auditor General of Canada** had identified that:

"the Cougar does not provide an acceptable armour capability for low-level operations."¹²

Deficiencies with the Cougar in its operational role had been known since as early as 1981.¹³ Moreover, as the Cougar reached its twenty-year mark in service, wear and tear was beginning to show. With a limited six-wheeled, cross-country capability and the mounting a non-stabilized low velocity main gun, the Cougar generally seemed less than ideal.

The shift away by the regular force armour units from the Cougar seems to have been further precipitated by the procurement of the Coyote. This vehicle platform, based on the LAV-25 used by the US Marines, was originally intended solely as a replacement for the Lynx reconnaissance vehicle. Their timely arrival was seen as a better fit for

regular armour units particularly when it came to operations.

At time of writing, the three regular force armour regiments are composed of three squadrons each: A Leopard Tank Squadron, A Coyote Reconnaissance Squadron and a Direct Fire Support Vehicle Squadron (DFSV) in Coyotes without the reconnaissance sensor suite.¹⁴ Reserve armour units in the tank role still use the AVGP Cougar. These are pooled at area training centers with individual vehicles sometimes downloaded to units for specific gunner or driver training.

A disconnect has been created between armour reservists, being the only units using the Cougar, and their Coyote and Leopard equipped regular force counterparts. The Fraser Report on Land Force Reserve Restructuring (LFRR) had identified that different standards and training regimes will exist between the regular and reserve forces.¹⁵ It would be unrealistic to assume complete equivalency in support of resources distributed between full-time and part-time organizations within a meagrely funded CF. But if training within the reserves is to remain relevant; access to modern effective equipment is essential.

Though the Cougar was removed for use from the regular force only in 1999, knowledge on the vehicle

11. Marteinson, pg 392.

12. The report goes on to "confirm the documented conclusion that the Cougar is increasingly inadequate for the full range of peacekeeping missions". *The 1996 Report of the Auditor General of Canada*, Section 7.81. <http://www.oag-bvg.gc.ca>

13. Ibid.

14. As Cougars became more and more employed on operations they lost the label of "tank trainer" and became a "Direct Fire Support Vehicle". This name and the training DFSV Squadrons pursue now try and fall into the evolving model of a Cavalry Troop in an American Light Mechanized Brigade. This may be just smoke and mirrors for armour personnel in denial about being in just tank trainers.

15. *In Service of the Nation: Canada's Citizen Soldiers for the 21st Century*, Department of National Defence: Ottawa; 2000. http://www.dnd.ca/menu/press/Reports/Fraser/english/recommendation_e.htm



outside of the reserves is already becoming a rare commodity. Ironically, Regular Force personnel posted to reserve units, who are to provide training support and skills knowledge, often have no working experience on this vehicle. In Central Area, Cougar training is limited to ATC Meaford where civilian contractors now maintain these vehicles. The Regular Force maintainers have long since turned in all of their Cougar vehicle tools.



The result of this is that armour reservists are effectively isolated from their regular force counterparts. Considering the size of the Land Force, let alone the Armour Corps, this is a foolish dichotomy. The links within the Corps that were created when the Cougar was introduced through shared competitions and the potential for sub-sub-unit exchanges are lost. Armour reserves are ghettoized from their regular force counterparts. While LFRR recognized that there would be differences in training needs between regulars and reserves and how they are sourced, there is no justification for this sorry situation. Neither from a training perspective or one of costs does this situation make sense. As mentioned above, Cougars are now maintained through civilian contracts. Being a specialized area a monopoly is created for these service providers. The end result is that costs will go higher and higher every year these vehicles are used. As their hulls are already close to being over 25 years old the likelihood of the need for major repairs on them will increase the older they get.

An issue also arises with armour reservist ability to quickly integrate in mounted organizations on overseas

missions. While the regular force deployed on UN and NATO taskings with the Cougar, it was very easy to supplement vehicle crews with reservist gunners and drivers who already knew the role from their experience in their home units. Now at minimum, there is the necessity for a driver conversion to Coyote or the infantry's LAV III. At the other extreme, gunners require completely new training if they are to play this role in the turret. These obstacles almost make it not worth employing armour reservists as crewmen at all and, instead, tasking them to roles where the crew skills that they have learned are wasted.

From what has been identified above, the Cougar is no longer an appropriate tank trainer for armour tank reservists. This is an ageing vehicle whose planned sustainability to 2010 is highly suspect. Armour tank reservists should be supported with equipment that can at least return them to a resourced level that existed when the Cougar was first introduced. It is recommended then that they be sourced with the Coyote in the DFSV role.

This is not the best tank trainer in the world. It is still a wheeled vehicle, with only a chain-gun. However, with its improved mobility, overall conditions of the fleet, and the benefits of a measure of equality with the regular force, the Coyote can meet the interim needs of reservists until a decision is made in the realm of a wider replacement armoured combat vehicle.

Conditions would have to apply for this recommendation to work. There would need to be an adequate number of vehicles resourced both to the training areas for squadron level deployments and at the units themselves for crew skills training. Fleet strengths at training areas would need to be commensurate with the number of units they are supporting. Enough vehicles should be made available to ensure continuous training regardless of maintenance schedules and repair work. Access to resources, such as gunnery simulators that are well maintained, is also essential.

Training should not be undertaken in isolation for reservists from their regular force counterparts. Depending



on operational deployments, cross component training should occur when possible. Events like the Ram's Head competition need to be re-instated. Component transfer training should, where feasible, not only be with Coyote DFSV Squadrons but with the Leopard squadrons as well. Through such actions can reservist tank training not only remain viable and effective but also re-instate the potential for interchangeability that should exist between regular force and the reserves.

Armour reservists training in tank tactics, and the Canadian public who are paying for it, can be assured that the skills being developed and the lessons learned are of value and have relevancy for the CF. It is the requirement of those in positions of influence to ensure that resources as discussed are in place to make such training truly effective. —

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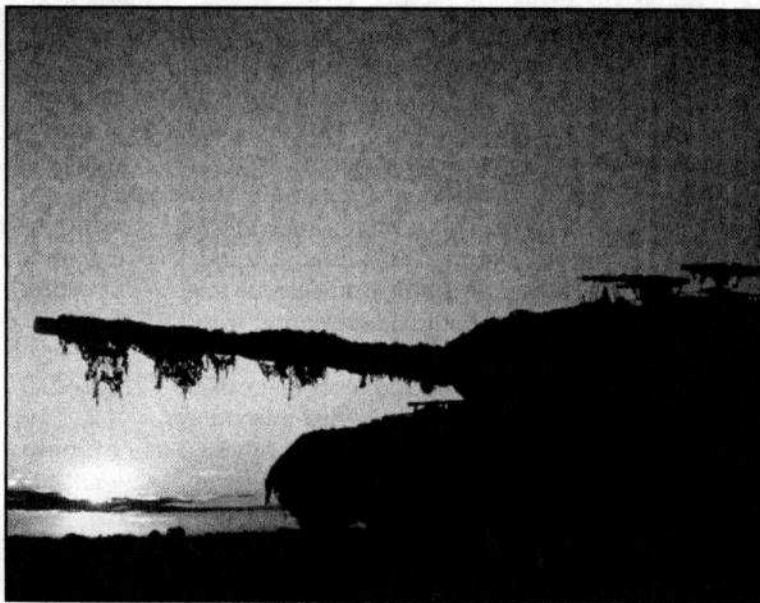
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Armour Reserve Regiments and the LAV III



Lieutenant H. Hisdal graduated from RMC and served as a platoon commander and company 2IC with 3 PPCLI. He is currently serving in Headquarters Squadron, British Columbia Dragoons.

By Lieutenant H. Hisdal

“The Army will generate, employ and sustain strategically relevant and tactically decisive medium-weight forces.”

– Commander’s Vision and Intent, The Army Strategy

Our reserve force armour regiments cannot provide soldiers with relevant Primary Combat Functions (PCF) to augment the regular force for overseas operations. The Coyote requires gunners, drivers, and surveillance operators; these PCF’s cannot be taught using the Cougar, the Iltis, or the Iltis replacement. If the reserve armour regiments were equipped with the LAV III then at least one of these PCF’s could be taught. The armour reserve soldiers would also be able to augment mechanized infantry formations as gunners, drivers, and crew commanders. This would make the reserve armour soldiers both useful and relevant to a tactically decisive medium-weight force.

By distributing the LAV III to reserve armour regiments the Armoured Corps could provide itself with some depth to its personnel resources as well as to the personnel resources of the Infantry Corps. This would help sustain any mechanized force in a long-term deployment.

Equipped with the LAV III, the reserve armour regiments could train in conjunction with the reserve infantry regiments. This would benefit the reserve infantry by giving them mechanized experience before overseas deployment and allowing them to concentrate on dismounted fighting, their traditional field of expertise. It would give the reserve armour regiments modern armoured vehicles and allow them to concentrate on armoured vehicle fighting, their traditional field of expertise.

The reserve armour regiments would still be able to practice tank warfare and armoured reconnaissance training when on their own. The LAV III is more similar to a modern tank than the Cougar and more similar to the Coyote than the Iltis. However, the armour reserve would also be taking on the role of carrier or kangaroo regiments. This role was pioneered by the Canadian Armour Corps in the Second World War and dropped after the war. It is a role that is maintained by the reserve armoured regiments in Australia.

Equipping the Armoured Reserve Regiments with the LAV III would also help the Regular Force by providing a reserve of operational armoured vehicles. If a conflict unexpectedly widened, or new commitments appeared, there would be a reserve of vehicles and crews at hand.



LAV III – Gives depth to personnel resources with the reservists

force that Canada sends overseas would be a composite battle group or combat team rather than a pure regimental group. It might also mean that the armoured personnel carriers would be employed differently than they are now. At both the platoon and company levels there would be a dual command. This could be very useful, allowing greater flexibility, and therefore would be a force multiplier.

Regardless of whether or not the armour reserve regiments are re-equipped with the LAV III, they must be re-equipped with some sort of modern, deployable armoured vehicle. If the present situation continues the reserve armour regiments will remain unable to contribute to the Army Commander's vision and intent. They are a potential help to our heavily tasked Regular Forces and should not be side-lined to training with obsolete or non-deployable vehicles.

The distribution of the LAV III to reserve regiments would help bolster homeland defence. Vital point security and rapid reaction forces would have greater protection, more firepower, and better logistical support if transported by LAV III rather than helicopter or jeep. The film *Blackhawk Down* illustrates the vulnerability of both helicopters and light wheeled transport in an urban setting. Another advantage of distributing modern armoured vehicles to reserve formations would be a higher profile for the Canadian Forces and enhanced recruiting for both the Reserves and the Regular Forces. A minimum of ten vehicles per regiment would allow half squadron deployments and the lifting of two platoons and a company headquarters.

The big drawback is expense. This is not something that could be easily done at the present funding level. The issue of funding is beyond the scope of this article.

Another drawback would be maintenance. Maintenance personnel positions would have to be restored to reserve armour regiments. Armouries might also have to be upgraded to house and secure these vehicles.

To implement this plan would require a shift in doctrine. Since the Second World War the armoured personnel carrier role has belonged to the infantry. If these vehicles were driven, gunned, and commanded by officers and soldiers of the Armour Corps it would mean that any mechanized



Digitization and the Armour Corps



Major Andrew Lussier is currently serving as G3 Reserves at LFAA HQ in Halifax. His BG HQ experience includes senior duty officer for Op KINETIC and Trg O and Ops O RCD.

By Major A.J. Lussier

Imagine a Battle Group (BG) net silent except for the Commanding Officer's direction to Sub-unit commanders. Imagine real time or near real time situational awareness. Imagine a BG decision – action cycle of less than 5 minutes. Imagine battle procedure time reduced by hours. Welcome to the world of Digitization, the next wave to sweep over the army. In early April 2001, the RCD were tasked to provide an armour BG HQ to support Army Experiment 6A (AE6A). This experiment, directed by the Army Digitization Office in Kingston (ADOK) was designed to test the Land Forces Command and Control Information System (LFC2IS) with a trained BG HQ from the field force. In this article, I will discuss the components of LFC2IS, how it will work and more importantly, the impact that it will have on the Armour Corps.

LFC2IS is a command and control tool that incorporates many components. The main components are the Athena Tactical System (ATS), the situational awareness system (SAS), JC2IS/Titan, Electronic Battle Box version 3 (EBB V3) and, finally, the precision light GPS receptor (PLGR). All these systems are connected by combat net radio (CNR) using Opcap 3 or Tactical Message Handling System (TMHS). Eventually, LFC2IS will run through the [MSOffice1] Army tactical digital backbone (ATDB) which will enable larger files of data to be transferred

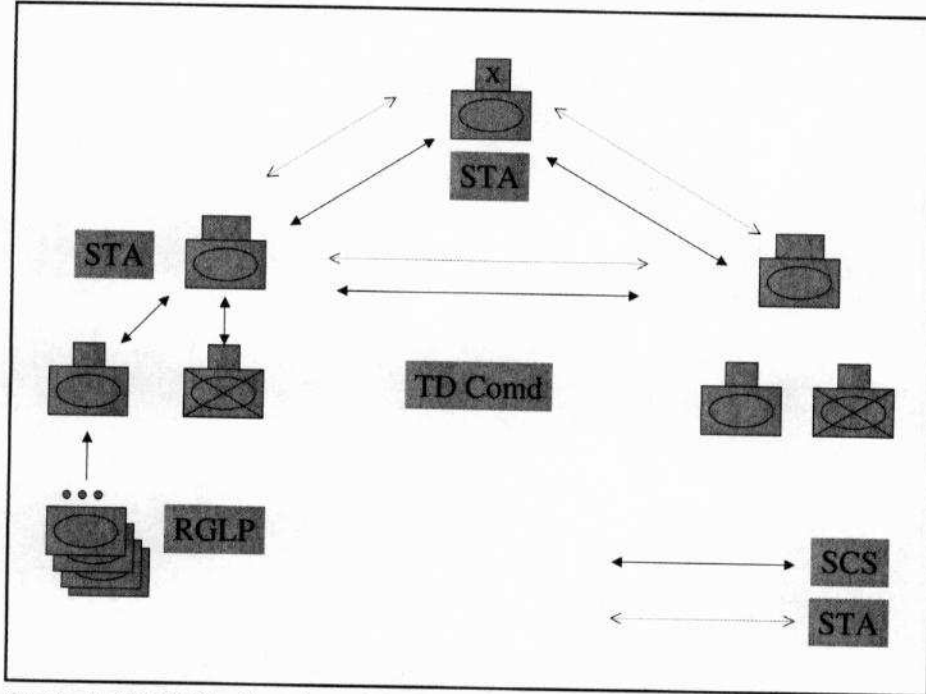
in a shorter time. ATS is a staff tool that brings digitized maps, traces, orders, staff products and information into or out of the command post (CP). BG HQ is the lowest level in the chain of command that this system will go. This system allows a tremendous amount of information to be exchanged between BG and Bde[MSOffice2]. The Operations Officer (Ops O) uses this system to develop a common operating picture (COP) which provides commanders at all levels with a unified picture of the battlefield. The COP requires a clear understanding or situational awareness (SA) of BLUE, RED and BROWN activities. This information allows the CO to quickly complete his decision action cycle, issue graphical orders and execute the plan.

SAS is the system that produces BLUE SA. Each vehicle in the squadron has a PLGR that sends its location through CNR at proscribed intervals. A command data terminal (CDT) in each command vehicle (OC, BC) will continually update the locations of all vehicles within the squadron. This information is displayed on a computer screen and takes the form of an icon on a digitized map. The icons can be aggregated to show either a troop or individual vehicles. Figure 1 shows the information path of flow for LFC2IS.

This technology will have a tremendous impact on the Corps structure and SOP's. First and foremost is



Figure 1



Eventually LFC2IS V1 will run through the Army Tactical Digital Backbone (ATDB).

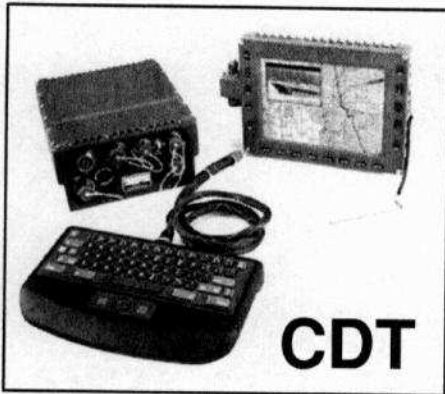
the loss of a radio. The SAS system requires a dedicated net. All tanks will have only one means. The Squadron Commander will naturally be commanding the squadron/ combat team on his net. His battle captain will monitor BG command net. How will the OC talk to his BC? How will the BC keep BG informed of the situation if he is not hearing it for himself? How will BG Comd speak with the squadron commander? Some suggestions are to have SAS active for only a set time specifically for data updates. Other suggestion is the Armoured Corps' well-developed art of "flicking" nets to incorporate both. Clearly, procedures and SOP's will be developed with further trials especially in a field environment.

At the time of AE6A, there was no provision within the Army for installation of CDT into the Leopard C2 fleet. Quite frankly, there is no room on the crew commander's side. The question that arises from this is whether the CO, the OC, and the BC will command from a tank or be in a LAV III in the future. Will the Sqn 2IC be required to be forward in a CP and be designated as the data link? There have been many heated debates on this in the short time that LFC2IS has been around.

Digitization has a larger impact within the BG CP. As already explained, the digital pipeline between brigade and BG is the ATDB, with both SAS and ATS information travelling

through/over it. Information must be digitized at the lowest level in order for this system to work properly. For example, the BC will send a consolidated situation report through the SAS system that will populate every screen that subscribes to it. That information will create an enemy icon on the SAS/ATS screen. If the information is received by voice, then the BG CP operators must input this information. Information management now becomes critical. Who manages that icon? It will stay on the screen until somebody removes it. There is a real danger of misinformation if SOP's are not developed to manage the population/ movement and removal of enemy icons from the system.

If you thought a BG CP was hectic with radio logs and push pins on a map, you will be traumatized with LFC2IS. The sheer weight of information and input is staggering. Maintaining soldiers' skills to operate all these systems above and beyond what we already require from them will create a challenge within the Corps. As with all high tech training, the skill fade is significant. Skills, SOP's and refresher training will need to be exercised throughout the training year. It will be rather impossible to throw together a CP crew for an exercise with LFC2IS. As well, throughout AE6A, it was observed that fatigue set in after approximately two hours of high tempo operations. It is clear that if Regimental Headquarters (RHQ) is required to run 24/7, the number of operators will need to be increased and rotated at relatively short intervals. The RCD as the Command Support Pilot BG will be



The system is two way – can send info between BG and Bde Gp HQ, not just down to BG HQ.

augmented with both vehicles and personnel to provide the additional capabilities to function “digitally”. The most obvious increase in capability will be the addition of an intelligence vehicle manned by Intelligence personnel.

step up, all that remains is a snapshot of the situation. SAS will continue to be updated by CNR but the digital link to Brigade and flanking units is gone. What impact will that have on highly mobile operations? How can the Step-up CP maintain a mirror of Red or Blue COP/SA? Will the hot CP require more soldiers for security, manning? What will be the security requirements placed on this UAN?

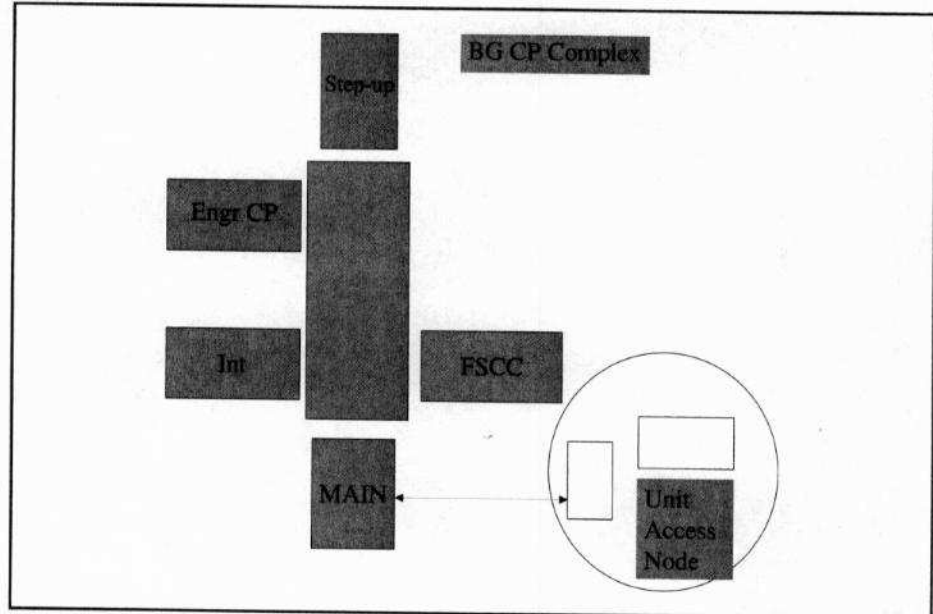
Digitization may be in its infancy as far as the Canadian Army is concerned, but it will arrive at the Regiments in the near future. As this is cutting edge technology, some of the requirements for LFC2IS to be fielded have not been invented yet. ADOK is working diligently to answer the plethora of questions that arise from each step they take in the digitization process.

The Army is barely keeping up with all the technological advancements that have been introduced over the last few years. The requirement for our soldiers to learn and retain even more skills will place new challenges to commanders at all levels. The digitization of the army will not be an easy affair. LFC2IS will change the way command and control will be exercised within the army. It may even change the face of armoured regiments. This system’s potential is immeasurable. It is imperative that the Armour Corps be proactive in the digitization process in order to continue to lead the army of the future. Innovative thought throughout the Corps will enable us to collectively determine the way ahead.

Audax et Celer

Figure 2 shows a BG CP lay out configured for LFC2IS. The Unit Access Node (UAN) provides access to the ATDB, which enables all data transfers. If this system fails, the data link will be reduced to transfer of data on CNR/TMHS. For example, TMHS transmits 100 bits per second. A typical operation order using the electronic battle box Army operational templates is approximately 237 KB. It would take approximately 40 minutes of constant transmission to send the operation order. If that transfer is interrupted, it will need to be sent again. The fielding plan has only one UAN allocated per BG. The emission rate will be immense from this system and there is no back up. The hot CP will be digitally current. However, the second that the node is removed from the CP, in the case of a

Figure 2



You are now in the ATDB world – the correct term in the Unit Access Node (UAN).



LFTEU Armour Update



Capain Stephan Martin, RCD graduated from the Army Command and Staff Course (Shrivenham) in 1991 and has worked in the technology field, both at LFTEU and the Armour School, ever since. He is currently the LFTEU Armour Trials Officer.

By Captain S. Martin

As technology becomes an ever more important aspect of military operations, and as the complexity and capabilities of systems increase, so do the concerns of users and leaders at every level. When one's life may depend on the ability of equipment to function as advertised, an individual may be forgiven for expressing scepticism with regard to the often miraculous claims of some defence industries. A poorly designed or manufactured item can at the least be an annoyance and at the worst be lethal to operators and operational success. Nearly everyone can name some piece of equipment that has not lived up to expectations.

To mitigate these problems, all NATO countries use test establishments whose primary purpose is to provide input at all stages of the procurement process. Canada is no exception with six land oriented establishments and units providing technical and user expertise to the NDHQ project staff. Of these, only two are primarily involved in gathering data directly from users under field and operational conditions. ATES, located in Trenton, Ontario, provides expertise in Airborne and air dropped equipment. The other, the Land Force Trials and Evaluations Unit (LFTEU) at CTC Gagetown, is responsible for conducting tests on all other army related equipment. The unit has the capability to bring expertise to bear on systems for the whole spectrum of Land Force operations.

All Combat Arms are represented by tech staff qualified Captains and Chief Warrant Officers. Logistics, Signals and Maintenance branches are represented by tech qualified staff officers and senior technicians.

The Armour Section of LFTEU is comprised of one captain and one CWO (Mr Gnr) tasked with all Armour Corps related user trials and evaluations. In addition, any non corps specific trials are passed to this section on an "as available" basis. Trials can cover such diverse topics as ballistics testing, add-on armour systems, vehicle modifications as well as combat clothing and boiling vessels. What follows is a brief description of some of the more recent trials conducted by the section:

NM 186 Bi-spectral AFV Smoke Grenade IOR Trial. The current AFV smoke grenade, the DM 15, is obsolete. For OP APOLLO, the deployment of troops in Afghanistan, there was an Immediate Operational Requirement (IOR) to acquire an obscurant grenade that would obscure both the visual and IR spectrum to defeat day and TI sights. The NM 186 76 mm IR SMK Grenade is currently used with other NATO forces and could be delivered quickly. LFTEU was given a small quantity of these grenades to trial. The aim of this trial was to certify that the NM 186 grenade was suitable for vehicles deploying to OP APOLLO and that there were no problems associated with this product. The trial took place 30 Jan 02 on FP 4 at Camp



Gagetown with crews and one Coyote from the Armour School. The trial determined that there were no problems with handling drills or with the equipment. The smoke screen created with this grenade was effective. The report recommended the acceptance of this grenade for Op APOLLO. A future, more detailed trial with several other contenders will determine the final replacement of all DM 15 Smoke grenades for all AFVs

Grizzly EP CP. The WLAV LE Project Grizzly conversion phase is mandated to life extend and convert Grizzly infantry section carriers (ISC) into Grizzly Command Post (CP), Radio Re-broadcast (RRB), Maintenance Repair Teams (MRTs) and VSHORAD variants. The project will produce a total of 74 Grizzly CPs to be fielded to all Brigade HQ and mechanized units and a total of 10 RRBs for mechanized infantry battalions. The Grizzly CP will gradually replace all interim Bison CPs currently being fielded by TCCCS. In order to provide sufficient volume for the new roles, a Grizzly Expanded Platform (EP) has been developed for the CP, RRB and VSHORAD roles. The Grizzly EP can best be described as a 6 X 6 Bison look-alike. The Grizzly CP will be based on the existing TCCCS and Athena Bison CP, improved and adapted to the new Grizzly EP configuration. The contractor, General Motors Defense (GMD) in London Ontario, has built the first Grizzly CP and RRB prototypes. The aim of this trial was to test the Grizzly CP and RRB prototypes to determine the suitability, efficiency and functionality of their respective configurations. The trial consisted of a user trial of the prototype Grizzly CP and RRB under simulated operational conditions during

a 12RBC field training exercise held in the Gagetown training area. The trial tested the ability of users to carry out all aspects of the operation of both platforms under as many conditions as possible. As a result of numerous recommendations by the 12RBC trial participants, several minor modifications were made by the project were made and implemented by the project.

25mm Boresighting and Zeroing.

Since the introduction of the 25mm weapons system into the Canadian arsenal, the question of optimum range for boresighting and zeroing has been a point of discussion. The aim of this trial was to determine the optimum range for both boresighting and zeroing as well as examining the current procedures to confirm their effectiveness. A total of 10 vehicles from the Armour and Infantry Schools were fired using the current range of 1200m and the current five round technique. The vehicles were also fired at 1200m using a ten round technique. Each method was repeated five times for each vehicle to establish a statistically significant database. After analysis of the boresighting procedure and the zeroing results, it was determined that a range of 800m and a five round technique would provide the optimum results. This was independently confirmed during subsequent Armour School tests.

TLAV MTVL Turret Trial. A user trial for the M113A3 with a Grizzly Turret and the Mobile Tactical Vehicle Light (MTVL) was required to validate a number of detailed changes that were made to the Grizzly turret and that were not available during the Mobile Tactical Vehicle Engineer (MTVE) trial. All Tracked Light Armour Vehicles

(TLAV) will be issued with night vision devices and, as a result, a number of available mounting options needed to be tested. The trial was conducted in two phases:

Phase I. This phase of the trial was conducted in the Armour School J7 hangar and on the Camp Gagetown driving circuit. It included the initial inspection of all systems, the mounting of the night driving sights and the use of the driving sights in negotiating normal obstacles.

Phase II. This phase of the trial was conducted on Firing Point 6 of the Camp Gagetown training area. It included the measurement of the Fire Inhibit Zones (FIZ), the ballistic confirmation of the .50 cal graticule pattern in the M36E4+ sight as well as the dispersion pattern of the Wegmann 76mm grenade dischargers.

No major difficulties were encountered in the tests and it was recommended that all components could be brought into service with only minor modifications.

Individual Soldier's Shelter. The LF currently procures a standard bivy bag for general issue to soldiers. Although the standard bag is generally accepted as an effective piece of equipment, there is some room for improvement. There are certain inadequacies such as sizing and overall design. The current bag is difficult to get in and out of and does not allow for an adequate exchange of air while the soldier is fully encased inside the bag. The current bag also restricts the free movement of the soldier inside the bag. Many soldiers across the country have expended their own funds to purchase their own



shelter, which provides them with increased comfort and protection from the elements. DLR, in conjunction with Canadian industry, has developed a new generation of bivy bag which is similar to the many bivy bags and shelters currently available on the commercial market. The Individual Soldier Shelter (ISS) is equipped with a pole system, head and foot ventilation and front and side entry. Three types were tested by the soldiers, all the same model, but of different material. The aim of this user evaluation was to assess the operational performance and suitability of the ISS. India Company of 2 RCR in Camp Gagetown used the ISS during normal field deployment. The soldiers used it on average about six days, from Jan to May 2002, with the unit deployed at least three times during that period. Very valuable information was gathered on all three prototypes. One of the main concerns during the evaluation was the difficulty in setting up during low light conditions.


Improved CADPAT Rainsuit. The current Land Force (LF) rainsuit has been identified as a garment that is in need of improvement. Over the years, several attempts have been made to improve the LF rainwear with various different iterations of jackets and pants being introduced into service. Several unsatisfactory condition reports have also been received from the field force stating that the rainsuit does not fit properly, the design lacks

many necessary features and the garment does not provide proper ventilation and breathability to the soldier. DLR has initiated a small project, which is looking at improving the design and fabric used in the construction of the rainwear. Concurrently to this activity, the Directorate of Air Requirements is working on the introduction of an Airforce rainsuit. Their rainsuit is going to be constructed using a breathable fabric and will be printed in the Canadian Disruptive Pattern. Based on the outcomes of the Land Force user trial there may be scope for both the Airforce and the Army to procure the same rainwear for airmen and soldiers. DLR, in conjunction with Canadian industry, has developed a new design for the rainsuit, which requires validation from the field force. Along with the various new design changes, DLR is also investigating a change in the fabric, which is used in the construction of the garments. The new design features being considered for the garments are as follows:

- printed in CADPAT (TW);
- zippered openings under the arms and across the back;
- hood which can be zippered away into the collar;
- double flap covering on the front zipper of the jacket;
- zippered pass-through to the inside of the jacket when it is fully done up;

- real usable side pockets;
- waist draw string;
- draw string at bottom of jacket that can be adjusted on both sides;
- leg pull-through for use in windy conditions;
- pants with 2 pockets;
- zippered leg bottoms with Velcro flap for closure and adjustment;
- reinforced elastic waist with pull draw string on pants;
- jacket designed so that it hangs down longer at the rear; and
- cuffs of jacket with an internal "lycra like" cuff and the exterior cuff can be fastened closed by Velcro.

Two contender systems are currently undergoing extensive user testing by members of W Bty RCA at Camp Gagetown and will conclude at the end of November 2002.

As you can see, the Armour Section of LFTEU engages in a wide spectrum of trial activities, providing the procurement executive as well as other sponsors with valuable information on the acceptability and effectiveness of military equipment. As our Motto states, we strive for "De Armis Veritas", or the truth about arms. 



Driving Simulator: In a Perfect World...

By Corporal P.T. Coldwell

Introduction

"Cpl Jones, are you qualified on the Bison?" Sergeant Major Smith asked inquisitively. "Yes Sgt Major, I completed my basic course last year," reported Cpl Jones excitedly. "Hop in, we have to deliver some supplies to OP Alpha," directed the Sgt Major.

The daylight drive of 19C through the small villages was uneventful. Cpl Jones had the first couple of hours to reacquaint himself with the feel of the vehicle as they rolled down the narrow streets and the eerily quiet country roads of Bosnia. After completing the re-supply and enduring the barbs of a couple of less senior corporals over Jones' lack of experience with the Bison, the crew of 19C remounted their vehicle for the return trip to base camp. It was now evening and it began to get dark. A light rain was falling and Cpl Jones was starting to get nervous. "Sgt Major, I am having problems with the glare on the road. I just can't seem to get a feel for the vehicle in these wet conditions. With this rain hitting my windscreen I am having problems seeing the road ahead!" "That's all right son," the Sgt Major replied in the soothing, all knowing, having experienced it myself tone that Sgt Majors have. "Just ease off the gas and as soon as we get to a place safe enough to pull off the road I'll take over." No sooner had these words been said than the vehicle took a sharp and violent turn to the right as Cpl Jones attempted to navigate a switchback. Out of control, the vehicle went over the embankment.

"Stop! The scenario is finished. Everyone dismount from the simulator," yelled Sgt Hawkins. Sgt Hawkins was the Training Sergeant responsible for the Regiment's driver simulators and for the pre-deployment training of all Bison qualified drivers going to Bosnia. "Cpl Jones, Sgt Major Smith, lucky for you two this was a simulator and not the real thing! Remember, when you are in Bosnia, the elevation change affects the road conditions much quicker than in Canada and black ice becomes a major concern for all drivers. The aim of this simulation was to prepare you for the various types of weather and road conditions that you may encounter in Bosnia. It is better to make your mistakes on the simulator than on the road where lives are at stake."

Why Driver Simulators?

In the Armour Corps we train everyday on simulators either as Leopard, Coyote or Cougar gunners or in the Coyote surveillance suite simulator. Driving however, which is arguably the one aspect of an armoured soldier's life in which he is most likely to encounter an accident or injury, is not given the same consideration. We train our drivers on basic courses and then send them off to their units. In many cases, the drivers never see the vehicle again until they are tasked to drive it one or two years down the road - often on operation overseas. Providing our drivers with the opportunity to train in absence of the vehicle would produce a number of benefits to both the drivers and the Corps.

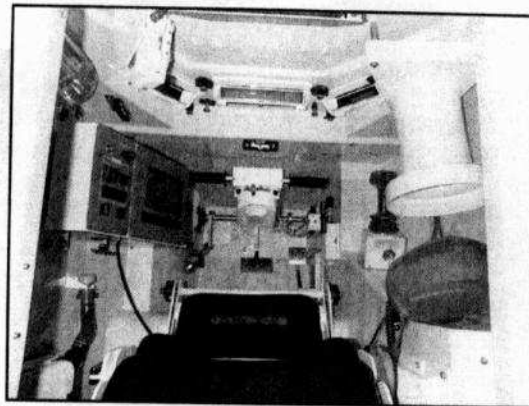


Corporal Todd Coldwell has served as both a gunner and driver with the Royal Canadian Dragoons and has served on deployment in the FRY on IFOR. He is currently employed at the Armour School as the Ops NCO in RHQ.

In a perfect world a soldier would be trained in a Primary Combat Function (PCF) ie. as a driver, then go off to the Regiment to serve on the vehicle they were trained to drive. This would allow new drivers to develop their skills and increase their knowledge of the vehicle they were trained on. However, we all know that we do not work in a perfect world. In fact, one of the more appealing aspects of the military is the constant state of change found in the workplace. Nowhere is this more evident than within the confines of what Canadian Forces (CF) members have come to know as "being on tour." Whether in Bosnia, Kosovo or any other theatre of operation that Canadian soldiers may find themselves deployed, there is an excellent chance that they will be expected to carry out a task such as driving when they were originally filling a gunner's position. The lag time between the initial training given on a vehicle and the driving task at hand could be years.

Personal Experience

The example in the beginning is not too far from the truth. Although the accident is fictitious, the experience of being thrown into a similar situation as Cpl Jones is not. While on tour in Bosnia our Bison driver was tasked out to drive at Brigade HQ. This left us short a driver with no one qualified to take over. Even though I was only Iltis driver and Leopard gunner qualified, the decision was taken that I would be given an "in theatre qualification" to cover the shortfall. Like so many other soldiers before me I found myself in the driver's seat of an armoured vehicle in a country boasting an extremely challenging network of roads. Mountain switchbacks covered by freezing rain, cratered roads and pontoon bridges



Driving simulator with complete moving system

were all part of my daily driving experience. These conditions can be challenging to an experienced driver, let alone someone with little or no time on the vehicle. Add to this the narrow city streets and unfamiliar urban traffic signs in the Balkans and drivers quickly learn the limitations of their vehicles. Given that the number one cause of death to Canadians on tour is vehicle accidents, it seems reasonable that a driver should be given the opportunity to experience these conditions prior to deployment. As the Cpl Jones scenario shows, being able to make mistakes and learn and experience different foreign traffic systems ie. regionally distinct road signs and traffic patterns without actually "rolling track" would be a great benefit to both drivers and crew commanders. A driving simulator would provide a risk free learning environment in which drivers could be exposed to the potential dangers faced on foreign deployments.

Prior to a rotation in Bosnia or deployment of any kind the squadron that "picks up" the tasking inevitably grows in size. As the unit goes through its pre-deployment work-up training the troops are drilled on the Rules of Engagement (ROE), mine awareness and first aid. Time constraints dictate how much training can be spent on

developing "action on contact" drills and SOP's, but a driver simulator would quickly bring new drivers up to speed on a vehicle and allow the unit to rehearse drills at the same time. This would allow constant, consistent and continuous training on these skills without decreasing the emphasis on the other required skills.

Benefits of Driver Simulation

Soldiers from the Armour School visited Fort Knox, Kentucky in April of this year and were given the opportunity to train on the M1 tank driver simulator. Using two simulators, in the space of one hour fifteen of us were put through various scenarios selected by our American hosts. It was this experience that convinced me of the need for a driver simulator within the CF. Using the driver simulator we were able to experience everything from narrow European streets and mountain switchbacks to artillery attacks. Driving conditions shifted from summer to winter, from day to night and from good visibility to poor all at the discretion of the simulator's operator. Whether a soldier has been with the squadron for years and has an intimate knowledge of its vehicles or is new and just received his/her PCF, a simulator gives all drivers



the opportunity to work with their new crews. Knowing what your crew commander expects from you as a driver in a given situation could be easily worked out prior to deployment in a training simulator.

With the arrival of the Coyote drivers are faced with a vehicle that demands a consistent level of practice in order to maintain a working knowledge of its equipment. Due to operational commitments and training schedules time in the driver's seat is limited. Basic skills may be utilized, but there is little time for advanced driver training. As a result most Coyote drivers do not know how to use, or are not confident in the use of, such systems as the Tac Nav or the Driver's Viewing Aid (DVA). Nor are they fully comfortable with even driving the vehicle. As well, drivers tend to have little or no experience driving hatches down and therefore lack the confidence to do so.

Training Cost Benefits

The use of simulators would constructively address these problems and allow a realization of savings in both fuel and parts as well as the extension of the Coyote fleet's life span. The average cost of maintaining the Coyotes for one year at the

Armoured School is \$22 000 and the cost per Coyote driving course (20 students) is \$5 240 for POL alone. One can easily see how simulators could give drivers a wealth of experience at a fraction of the cost, while at the same time providing exposure and training on systems such as the Tac Nav and DVA.


While at Fort Knox the soldiers from the Armour School were given an eye opening briefing on how driving simulators have benefited the US Army. Constructed at a cost of 58.7 million dollars the Fort Knox driver simulation facility currently houses 18 M1 trainers and 2 M1A2 simulators at a cost of \$8.58 per simulated mile of driving, compared to a cost of \$152 per mile to actually drive the M1 tank. To date they have trained over 26 700 students, driving some 723 000 miles and saving more than 2 047 000 gallons of fuel. This translates into a dollar savings of over 67.7 million dollars. As you can see the US Army's system has more than paid for itself in fuel savings alone, while the benefits to training were explained as follows:

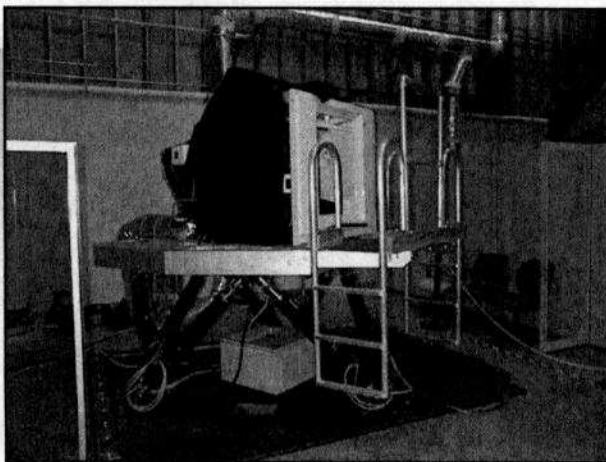
The Tank Driver Trainer marks the [US] Army's newest addition to simulated training environments in efforts to realign the force and

reduce expenditures Army wide. The trainer solves the training problem brought about by the complexity of combat driving skills and the high operating costs involved in vehicle driver training. It's mission is to develop basic and advanced driving skills in all types of terrain, visibility and weather and under conditions that range from malfunctioning equipment to enemy fire.

The training benefits therefore are:

1. Reduced cost of driver training from reduction in fuel consumption, maintenance and vehicle downtime, and avoidance of third party damage costs;
2. Basic and advanced driving skills are learned under a variety of weather and visibility conditions;
3. Response to unexpected malfunctions is learned from instructor induced fault conditions; and
4. Free play environment provides diverse training scenarios such as bad weather driving, rail and aircraft loading, blackout convoy driving and cross country and urban driving.

The US Army has chosen driver simulation to address these problems faced by their personnel. I believe that there is a lesson for the Armour Corps here. I know that there is no replacement for actual time in the driver's seat, however, an inconsistent work environment caused by numerous deployments and the lack of funds for training has eroded quality driving time. A simulator would solve the problems faced by drivers in the Armour Corps and give them the confidence and competence needed to operate their vehicle in Canada and overseas. 



Driving simulator Lockheed Martin Wolverine



Laze and Blaze...



Captain S.A. Pires is presently the 60 Troop Leader within Headquarters Squadron. Sergeant S. Daigle is currently the Patrol Commander of 60C. Sergeant D.E. Chaloux is currently the SGWO and 23 Troop Sergeant in B Squadron, 12th ARBC. The authors of this article submit this argument as part of their findings from their Technical Research Project AGS 0101.

By Captain S.A. Pires, Sergeant S. Daigle, and Sergeant D.E. Chaloux

“Range limitations must be dictated by the ammunition and ordnance of the platform, and not by the observation capacity available.”

As Canadian armour soldiers, we have all recently witnessed the next generation in Canadian Leopard technology, that being the evolution from the C1 to the C2. This upgrade has brought the Canadian MBT to the leading edge of target acquisition and tracking technology. This transformation, much like the one made from the Centurion to the Leopard C1, has also brought radical adaptations to the application of fire for the Leopard. Fire orders, engagement techniques, and our implementation of the Leopard C2 have been completely overhauled in an attempt to maximize the capacities of our new IFCS. Today, a gunner is able to initiate

an engagement at a target spotted at ranges up to 4000m. It seems that with the addition of the new fire control system, we now have a new battle tank, and from that a new implementation philosophy. As with all adaptations, we must experience some growing pains until an accurate understanding of our new abilities can be confirmed. In the case of the C2, we hope to remedy these before committing the tank to combat. The goal of this discussion will be to examine the current application of fire for the C2. Investigation will reveal that there are obvious and hidden shortcomings within our C2 ideology, and we will suggest ways that the system should be used to improve performance, maximize effectiveness, win battles and save lives.

After detailed examination of the current application of fire chart for the Leopard C2 it becomes terribly obvious that the chart is too complex to memorize and cumbersome for the crews to apply instinctively (see table).



Engagement Limitations of the Leopard C2 MBT

Ammunition	Mode	Turret Off (SFCS)	Observation (IFCS)	Stab Ready (IFCS)		Stab Active (SCTI)		
				Static Targets	Movers	Static Targets	Movers	Firing on the Move
Sabot	Lasing Tech		190m/4000m GNR-Re-Lase C/C-Re-Lase	190m/4000m GNR-Re-Lase C/C-Re-Lase	190m/3000m GNR-Re-Lase C/C-Re-Lase	190m/4000m GNR-Re-Lase C/C-Re-Lase	190m/3000m GNR-Re-Lase C/C-Re-Lase	190m/3000m GNR-Re-Lase C/C-Re-Lase
	Estimated Tech	0m/2400m GNR-B.O.T. C/C-Sabot Correction Drill, Dir, Tgt Size, Elev, Combined	0m/4000m GNR-B.O.T. C/C-Sabot Correction Drill, Dir, Tgt Size, Elev, Combined	0m/4000m GNR-B.O.T. C/C-Sabot Correction Drill, Dir, Tgt Size, Elev, Combined	0m/3000m GNR-B.O.T. C/C-Sabot Correction Drill, Dir, Tgt Size, Elev, Combined	0m/4000m GNR-B.O.T. C/C-Sabot Correction Drill, Dir, Tgt Size, Elev, Combined	0m/3000m GNR-B.O.T. C/C-Sabot Correction Drill, Dir, Tgt Size, Elev, Combined	0m/1700m GNR-B.O.T. C/C-Sabot Correction Drill, Tgt Size, Elev, Combined
Hesh	Lasing Tech		190m/4000m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/4000m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/4000m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined
	Estimated Tech	0m/3500m GNR-B.O.T. Standard, Combined C/C-Dir, Elev, Tgt Size, Combined	0m/4000m GNR-B.O.T. Standard, Combined C/C-Dir, Elev, Tgt Size, Combined	0m/4000m GNR-B.O.T. Standard, Combined C/C-Dir, Elev, Tgt Size, Combined	0m/1500m GNR-B.O.T. Standard, Combined C/C-Dir, Elev, Tgt Size, Combined	0m/4000m GNR-B.O.T. Standard, Combined C/C-Dir, Elev, Tgt Size, Combined	0m/1500m GNR-B.O.T. Standard, Combined C/C-Elev, Tgt Size, Combined	E00 GNR-B.O.T. C/C-Elev, Tgt Size, Combined
Smoke	Lasing Tech		190m/4000m C/C-Dir, Elev, Combined	190m/4000m C/C-Dir, Elev, Combined		190m/4000m C/C-Dir, Elev, Combined		
	Estimated Tech	0m/3500m C/C-Dir, Elevation, Combined	0m/4000m C/C-Dir, Elevation, Combined	0m/4000m C/C-Dir, Elevation, Combined		0m/4000m C/C-Dir, Elevation, Combined		
Coax	Lasing Tech		190m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	190m/1500m GNR-B.O.T. C/C-Elev, Tgt Size, Combined	190m/1500m GNR-B.O.T. C/C-Elev, Tgt Size, Combined
	Estimated Tech	0m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	0m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	0m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	0m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	400m/1500m GNR-B.O.T. C/C-Dir, Elev, Tgt Size, Combined	400m/1500m GNR-B.O.T. C/C-Elev, Tgt Size, Combined	E00 GNR-B.O.T. C/C-Elev, Tgt Size, Combined



The objective of any application of fire and implementation of any weapons system must be at its most basic level – simple to learn, quick to memorize, and instinctive to employ. After all, the purpose of crew drills is first to ensure an instinctive response to a familiar order under stress. Secondly, they are used to increase speed and reaction time while minimizing the possibility of error. And finally, to ensure the standardization of replacement crews. Therefore, as previously stated, the most obvious draw back to the currently used application of fire for the C2 is that it is too complicated. A revision of the current modes of operations is essential.

In the past, the methodology for teaching the application of fire was to teach the varying modes of operation, which started with the Turret Off mode and ended with the Full Stabilization mode. This methodology creates unnecessary repetition and precious time is wasted concentrating on modes of operation that are rarely employed. As an alternative, the 12^eRBC recently conducted a pilot QL 4 Leopard gunnery course based on direction from the Tank IG Team of the Armoured School. The course was taught by focusing on the Full Stabilization mode first, and all degraded modes afterward. This seemed to be more realistic, as it allowed candidates to concentrate on using the weapons platform in a mode that it is designed for; to operate fully stabilized, firing stationary at static targets, or at moving targets while on the move. This permitted students to concentrate 90% of their time using the system for its original

design use. The application of fire for the C2 should not be taught as different modes of operation. Instead, there should be only one Operational State, that being Full Stabilization. The new IFCS was designed and created for the effective and rapid engagement of moving targets while on the move. In fact, during the recent MA-IS trials conducted at CTC Gagetown, statistics demonstrated that moving platforms firing at targets, stationary or on the move, were twice as effective as those who first adopted fire positions before beginning an engagement. The Full Stab operational state provides better implementation of fire power, decreases reaction time allowing for a quicker response time, and increases not only survivability, but as well as the probability of that decisive first round hit. Therefore, 90% of the time allocated for learning the application of fire and use of simulation should concentrate on this.

Critics might argue about the necessity for future gunners to learn degraded modes of operation. This cannot be contested, because such critics are right. However, these modes of degraded operation should be taught, understood, and treated for what they truly are: System Malfunction Drills. With further explanation these drills will become clear. The Leopard C2, as stated, is most effective when employed in the Full Stab mode, employing the laser and IFCS. If anything should cause any part of the system to become non-serviceable, the subsequent drills must be immediate. The gunner would report to the commander what the defect is. Examples of this would be:

Laser Broken, IFCS Broken, Stab Broken. This would immediately inform the crew of the problem, allowing for a rapid transfer to secondary actions. Should the laser go down, the commander would know immediately, and continue instinctively, with the estimated technique. Should the IFCS become non-operational, the crew would instinctively begin to employ the SFCS. During the AGS course technical trip visit to the CFSEME at CFB Borden, FCS technicians confirmed that should the stabilized sight mirror of the IFCS, to which the gun is normally slaved, malfunction, the crew still has stabilization. FCS technicians explained that the old turret gyroscopes continue to operate. Therefore, if the stabilized sight mirror fails, the system reverts back to that of the old C1. This means that the SFCS can be used in the event of an IFCS failure, and will continue to follow the gun, which is stabilized by the constantly spinning turret gyroscopes. Crews must realize that in this case they would be forced to adopt a purely defensive posture. Further study should be done to determine the effectiveness of this system malfunction drill. Given all of the factors on the modern battlefield which could disable the IFCS, it seems clear that this type of situation will probably occur. Should all stabilization fail, crews will be left with hydraulics. Only if this is the case should all measures be taken to recover the crew and vehicle by the echelon.

It must be understood that, although the Full Stab mode is the ideal for crews to master, time should be allocated to ensure effective use of the



other secondary sub-systems. It is obvious to any soldier that once the line of departure is crossed, artillery shrapnel, small arms fire, or any other catalyst could cause primary systems to fail. The theory of Smoke shooting, and the implementation of fire with GLI should continue to be taught as theory and practiced at both the basic gunner and crew commander levels to ensure an instinctive response to any such order.

Now that attention has been focused on the Full Stab mode, the application of fire can be further refined to discuss the current limitations and engagement techniques that are in use. Effective engagement ranges for the Leopard C2 are currently dictated and taught according to the observation capacity of the sighting system in use, be it IFCS, SFCS, or TRP. There is currently great confusion between the effective engagement ranges for 105mm ammunition and the new observation capacity of the EMES-18. In actuality, there should be no confusion at all; the solution is clear. The EMES-18 can acquire targets up to 4000m. However, the L7A3 ordnance is only able to effectively perforate, let alone penetrate hard targets with currently used service 105mm Sabot ammunition up to 2400m. Range limitations must be dictated by the ammunition and ordnance of the platform, not by the observation capability. Just because a baseball player is able to see for 3000m does not change the fact that he/she can still only throw the ball 60m. Trials using the current service Sabot ammunition have proven that first and second round hit probability, as well

as penetration of hard targets, drop sharply after 2400m. To engage targets beyond this range is very risky. This costly lesson was learned by Iraqi forces who were defeated by the more advanced Coalition forces during the Gulf War. The effective range limitations proven and used for years with the Leopard C1 should continue to be used. We have not changed the ordnance or its ammunition. These alone are the true deciding factors of effective engagement ranges and limitations and must be employed with tactical use of terrain in order to ensure surgical first round killing hits, and to save lives and equipment. These factors must be respected until a modern replacement MBT with a 120mm cannon and improved armour is purchased by the CF. We currently teach the application of fire for the Coyote and LAV III according to the capability of the ammunition they use, and not the ability of their observation systems. Why is it now we try to teach the exact opposite with the C2?

Presently, it seems that there is some need to have minimum engagement ranges designated. However, this seems to be redundant. The minimum range of any weapon's platform begins at the end of the barrel, even if a laser is employed, and to include a specific number for memorization serves no real purpose. Further, the currently employed range limitation for the FNC6 coaxial MG is 1500m for engaging stationary or moving targets. During the two separate gun camps, which were conducted during the AGS course, candidates attempted to engage static coax targets from

stationary zeroed platforms at ranges out to 1400m in ideal climatic and atmospheric conditions. The results being, after multiple ranging bursts, targets were eventually hit. This was only observed as the fall of shot was witnessed striking the bare soil around the target area because the cone of fire was well beyond tracer burn out. As mentioned this was against stationary targets. Therefore, to teach – and employ – an effective coax engagement range of 1500m against stationary, let alone moving targets, is not acceptable. The effective range limitation for the implementation of coaxial fire must be according to visual tracer burn out, and environmental conditions during fire.

The last area of revision to be considered is the various corrections currently available to the gunner and commander. The Leopard's Class IIIA LRF is one of the FCS's most important tools. The tank is designed to hunt on the move, while employing its LRF. The term laze and blaze is paramount to initiate all engagements. The current correction available when employing the Sabot Lazing technique is to re-laze for each hit and or missed round. During the AGS course's Leopard live fire range, the re-laze correction was applied and in some cases subsequent rounds continued to miss. What appears to be flawed with this available correction is that the gunner is obligated to continue to use this dictated correction of re-lazing, even if the gunner was able to observe the fall of shot in relation to the target. In such a case, if the gunner could switch to BOT immediately, he/she could achieve




that decisive second round hit. To continue to re-laze and miss not only wastes ammunition but dramatically increases the chance of losing a C/S. The IFCS of the Leopard is modern and complex. However, simple BOT corrections when properly applied, much like hunting fowl, are extremely effective.

Recently a large group of qualified crew commanders was polled concerning the corrections that they normally employ. Their response, as this panel of investigators found, was unanimous. The commander's target size correction was used almost all of the time. This correction offers the crew commander almost the same flexibility to apply corrections as the gunner has when employing BOT corrections. However, it too must be modified. Currently, the commander can make a target size correction of three target sizes in azimuth, one target size in elevation, and half target size corrections once the target is struck. Since most MBT engagements employ Sabot, which is a flat trajectory, high velocity round, any probable miss would normally be one in elevation as the round is generally unaffected by external influences. Since this is where the error normally occurs,

the target size correction for elevation should be changed to two target sizes for elevation. Further, a correction of three target sizes in azimuth when applied, even if employing HESH at long ranges, most certainly means that the gunner is laid on the wrong target. This was readily apparent during the AGS course in both simulation and during live firing. The target size correction for azimuth should also be a maximum of two targets. With these modifications, of two by two in any direction, the commander will have the same target acquisition correction ability as the gunner has with BOT.

Those corrections normally involving the use of mils, or multiples of 100s of meters such as those used in the implementation of Smoke and GLI, should be taught as theory and practically applied at the basic gunner and crew commander level. Critics might argue the necessity to continue to actively teach and use currently available corrections, especially when firing HESH. Once again, their point is justified. However, it must be reiterated that the C2's primary ammunition is Sabot for engaging other MBTs. Although basic gunners should have a working knowledge of the

applications of these other corrections, the focus of the majority of their time must be spent practicing for hard target engagements at ranges less than 2400m.

By now, common sense and intuition have clearly presented themselves concerning the apparent and hidden shortcomings associated with the current application of fire for the Leopard C2. A careful examination has revealed that many of these faults can be easily remedied. Our proposed recommendations are threefold. First, the Armour School should conduct a pilot course for basic Leopard gunners teaching the Full Stab mode followed by the various degraded system malfunction drills. Second, available corrections should be simplified and should be similar to those used with the Coyote. Last, there is no justifiable reason not to change our doctrine concerning longer effective range limitations for the C2 back to those shorter of the proven C1. We have greatly improved our observation ability but have not changed our Leopard ordnance, or its ammunition, and therefore have not enhanced its firepower. 

Adsum