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**ARMOUR
BULLETIN**

2013

IN THIS ISSUE:

- NEW CAPABILITIES
- LEOPARD
- TRAINING
- GUNNERY
- DOCTRINE



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Vision Statement

The Armour Bulletin is the official journal of the Royal Canadian Armoured Corps. The Mission of the Armour Bulletin is to annually publish unclassified, bilingual articles of professional interest, with a view to stimulate discussion.



ARMOUR ²⁰/₁₃ BULLETIN

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FOREWORD



THE COLONEL - COMMANDANT'S FOREWORD

I would like to start my address by taking the opportunity to welcome a key player to the RCAC leadership team, the new Director, Col Kelsey. I am confident that Col Kelsey's leadership and discernment will provide the Corps with the proper guidance and resolve required to meet the ever-present challenges that the Corps will face in the future. I am also assisted in my responsibilities by the RCAC Association and Executive led by LCol [ret'd] Bernie Ciarroni and the excellent work they accomplish for the Corps.

The recent restoration of traditional titles and naming conventions within the Canadian Army must be seen in a positive light. I was very pleased with the announcement of the reinstating of the historical name of the Canadian Army and the initiative to restore the Royal Canadian Armoured Corps title. The restoration of these historic titles demonstrates the long heritage of our decorated Corps. All 21 regular and reserve force units of the Corps should be proud to be part of the large family that is the RCAC and to celebrate its history. It should always be our privilege to perpetuate the legacies and traditions of those who have served before us whether during peace or when our nation has been at war.

Since the end of the combat mission in Afghanistan, the Corps has shifted its focus back to more conventional warfare training. This is a sensible shift that is taking place and will only cement our role within the Canadian Army and keep alive our vision for the Corps: expertise in mounted warfare and the production of highly trained and skilled soldiers and leaders who are experts in move, shoot and communication skills.

It has been my pleasure to visit many Regular and Reserve Regiments and the Royal Canadian Armoured Corps School (RCACS) over the past years and witness the outstanding accomplishments and professionalism from all ranks. The activities and training events that I have been fortunate to observe continue to demonstrate our readiness to serve Canada and the significant capabilities and contributions the Corps brings to the all-arms fight. I am most struck and pleased however to observe the importance of family within the Corps and the time and effort that is placed in taking care of our soldiers. When addressing course graduations at the RCACS in the past year or so, I have used the analogy of a strong "wall" to represent our Corps. In this picture the school is our foundation; the Regular and Reserve Regiments are the pillars; and our officers, NCOs, and soldiers are the bricks. But the mortar that holds it up is friendship and families and our Association – all part of our larger Corps family. I will challenge the readership of this publication that this sentiment must never be taken for granted. All of us must take care of our brothers and sisters in arms, leaders and soldiers alike, so that our wall and its foundation cannot be shaken.

I hope that the entire readership will enjoy this edition of the Armour Bulletin as much as I do. I would like to pass on my thanks to the Commandant, RSM and the staff of the school for their efforts to place such a large importance on this publication, a very key communiqué and part of our Corps' tradition. Please remember that our Corps 75th is quickly approaching and I ask you all to contribute to making it a success.

Worthy!

Darrell M. Dean, CD
BGen (ret'd)
Colonel-Commandant



DIRECTOR OF ARMOUR INTRODUCTION

Since appointment as Director Royal Canadian Armoured Corps I continue to be inspired, indeed humbled, with the professionalism and dedication of our leaders and soldiers across the Corps. Our strength remains our people, and the Corps is in great shape in this respect!

While training, structure, and equipment issues continue to pose challenges, I am encouraged with the strong leadership being demonstrated from so many across the Corps - Regular, Reserve, and our Association - to meet the challenges. Challenges are not new to the Corps and are not to be feared. Through adversity we have a strong tradition of exploiting opportunity! The environment in which we operate is changing. Fiscal and other resource constraints are very real, but as one can gather from the excellent articles in this edition of the Armour Bulletin, we as a Corps continue to gain advantage from change through innovation, “outside the box” thinking and boundless determination.

This edition of the Armour Bulletin is an appropriate venue to emphasize that our Corps is but one element of the combined arms fight, so essential to success on operations. There remains, however, a responsibility for all of us to continue to perpetuate both our contribution to the combined arms team and our vision for the future. We are a multi-platform Corps, grounded in expertise in mounted warfare and land manoeuvre, and enabled by world class soldiers. We each share the responsibility to continue to perfect our craft, but also champion and educate in all venues, our complementary and unique contribution to Adaptive Dispersed Operations (ADO). Our expertise is not only the sum of our competencies in mounted reconnaissance, counter-reconnaissance and surveillance, and the direct-fire fight. It is

also the contribution of our command culture and ability to lead at all levels, that offers a unique perspective to land manoeuvre.

Looking forward, our vision will go beyond next year or five years, to the next generation. I very much look forward to collaborating widely across the Corps as we continue to articulate that vision within the framework of a deliberate campaign that provides focus and purpose to enhancing support to our soldiers, advancing capability and preserving our history. In the near to mid-term, challenges will confront the Corps and managing that change will be paramount. Through these challenging times we will strive to remain consistent and speak with one voice, but equally, remain aggressive and bold in the preservation of core skills and competencies. I am fully confident that our Regiments, Regular and Reserve, and our School, supported by our Association, are up to the challenge.

Finally, as the Director, I would like to close by highlighting the excellent work that is being done throughout the Corps. Speaking on behalf of the Col-Cmdt, and the Corps’ General Officers and Senior Officers, we continue to be impressed by the emphasis that has been placed on core skills such as gunnery via the Ex WORTHINGTON CHALLENGE at the RCACS. This event transcends our Corps and promotes excellence in core skills across the combined arms team. Keep up the great work!

Worthy!

S.R. Kelsey, CD
Col
Dir RCAC



ARMOUR BULLETIN EDITOR-IN-CHIEF FOREWORD

I am very pleased to provide the readership with this most recent edition of the Armour Bulletin.

Clearly we are operating in a dynamic period of transition, one which is challenging all aspects of our profession. The challenges in the current environment are omnipresent, be they fiscal, manning, equipment shortages or maintenance, training, structures or a host of others. But where there are challenges, there are strong and capable leaders within the Corps to tackle them. As you can see from the articles contained herein, soldiers, NCOs and officers across the Corps are actively engaged and seeking innovative ways to work through the problem space with enthusiasm, determination, innovation and flexibility.

As you will most certainly appreciate, the Canadian Army is currently undergoing a period of significant transition following almost a decade of combat and stability operations in Afghanistan. The Army has gone from force generating successive Task Forces prepared to operate in a high intensity Counter-Insurgency (COIN) environment in Afghanistan, to force generation for a non-named mission with a broader focus on re-establishing a general purpose combat capability. The Army Commander remains committed to achieving the end-state of developing a combat-effective and agile force capable of ensuring readiness and response both at home and abroad. The generation of combat effective, multi-purpose land forces to meet Canada's defence objectives from a training perspective has provided the Canadian Army with large the opportunity to train across the full spectrum of operations as opposed to the narrower COIN skill-set which consumed our collective force generation efforts for some time. The Corps has responded exceptionally well to this renewed focus and mindsets are clearly shifting.

At the individual training level across the Corps, leadership has ensured a deliberate shift towards "back to basics" in terms of proficiency in crewman skills, crew gunnery and low-level tactics. Our soldiers and leaders are honing their fieldcraft skills and becoming extremely comfortable with operating in more austere environments under demanding training conditions.

At the collective training level, units have broadened training plans to ensure patrol, troop, squadron and regimental level training events are tailored and conducted

to be more inclusive of broader mission-sets. The RCAC continues to provide significant capabilities vital to the success of the combined arms team across the full spectrum of conflict, and we are a force tailored to excel in Adaptive Dispersed Operations. The Regular and Reserve components of the RCAC continue to provide excellence and expertise in close combat command, manoeuvre, direct fire and mounted reconnaissance. As an integral part of the combined arms team, the Corps will continue to provide the Canadian Army with an agile and adaptable capability that is both relevant and essential in both domestic and expeditionary theatres.

With the transition to the Leopard 2 platform, the Regular Force component of the Corps is also shifting away from "recce-centricity". Career courses are increasingly being conducted using tanks as well as reconnaissance vehicles, reinforcing the fact that we are a multi-platform Corps that must have soldiers expertly trained to operate a myriad of direct-fire systems. Meanwhile the armoured reserve community continues to train extremely hard to force generate and train for domestic operations; postured to protect Canadian interests at major security events and to aid during crises as evidenced in the recent past during Operations PODIUM, LUSTRE and LENTUS.

The RCAC is leading the transitional effort in other respects as well. With the arrival of simulation for the Leopard 2, we are approaching the point of being self-sustaining in crewman production on that platform, and will soon cease to be reliant on cross-over training from Leopard 1C2s. Certain training will be decentralised to Divisions and Regiments, technology is being leveraged to maximum effect, and doctrine, TTPs and training plans are being developed for new capabilities such as the Tactical Armoured Patrol Vehicle, Mini UAVs, and the Persistent Surveillance System.

The outstanding articles found within this year's edition of the Armour Bulletin are a testament to the professional dialogue that continues within our Corps' discussions as we move forward during this exciting transitional period in the Canadian Army.

I would like to thank the team of Major Keven Larocque, Captain's Adam Lambert, Olivier Delisle, and Sébastien Millette, as well as the entire team for putting this issue together. I encourage all members of the Corps to contribute to the discussion going forward, be it in this forum or via other means, so that we may continue to adapt to further changes and challenges that will undoubtedly confront us in future.

Worthy!

J.L. Andrews, CD
LCol
Editor-in-Chief



RCAC RSM'S MESSAGE

As this will be the last opportunity for me as the Corps RSM to contribute to the Armour Bulletin, I would like to first of all state what an honour and privilege it has been for me to serve the Corps in this capacity. I have witnessed first-hand the many outstanding contributions of the men and women serving our beloved Corps on a daily basis. They are the Corps' strength and our most treasured assets. They represent the future of our Corps. The future of the Corps is bright indeed.

This year saw a number of initiatives with regard to the preservation of Canada's rich military history in the Canadian Army. These changes include the RCAC non-commissioned members rank nomenclature, which was informally used in the past. This nomenclature has been formalized and within the Corps our Privates are to be officially referred to as Troopers. The restoration of that rank nomenclature is a significant step in the celebration of the RCAC traditions and legacies.

As the Corps RSM, I am proud to see many initiatives to maintain and improve Esprit de Corps and skills through a culture of spirited competition. Challenging competitions at both the unit and sub-unit level are extremely beneficial in maintaining sharp skills related to our profession. The restoration of an inter-unit gunnery

competition as seen with Ex WORTHINGTON CHALLENGE in the fall of 2013 is an excellent way to maintain our expertise as armoured crewman. Gunnery must continue to hold a high importance within the Corps to ensure that the battlefield lethality of our platforms is maximized and in so doing, we mitigate the risk of skill fade. Our crewman skills must never fail us. With not having a specific operational mission at this time, this type of training is an excellent way to keep the troops focused and motivated for high readiness cycles while maintaining basic armour skills.

I will end with a formal opportunity to welcome Col Kelsey as the new Director Armour. It has been a privilege to work with this fine leader and I have all the expectation that he will provide us with the exemplary leadership, guidance, and foresight that is required to steer the Corps for the years ahead.

Worthy!

D.W. Head, CD
CWO
RCAC RSM



RCAC SCHOOL RSM'S MESSAGE

As I pen my first letter as the RCAC School RSM, I first need to state, as my tenure comes to an end this year, that it has been an absolute honour and a privilege to have been able to serve the Corps in this capacity. Further, I need to state that these are both exciting and challenging times within the Corps, but as I have elaborated before to many, “not challenges-but opportunities”. I speak firstly of the wave of next generation vehicles and equipment entering into the Corps and what they bring to the table and secondly, with streamlining more effectively the way we do our business from a Institutional Training perspective. Throughout the year, the School, in true Armoured Corps fashion, graduated just shy of 400 Soldiers and Officers of the Corps, preparing them for their next challenges. This being a true reflection of the soon to be designated RCAC School Motto, “Training Before Growth”.

Many highlights took place throughout the year. There was the Change of Command for the School, in that LCol Malecjuk handed over the reins to LCol Andrews and the many visits which took place to other Armoured Corps Units by the School Commandant and myself throughout the year for that very valuable “face to face” interaction. Our discussions with our counterparts to the south, the United States Armor School, with a view to fostering such things as Small Unit Exchanges with both students and instructors, along with fostering a bit of healthy competition which includes their Gainey Cup Concentration (Recce Skills) and Sullivan Cup Concentration (Tank Crew)

along with our very own Ex WORTHINGTON CHALLENGE here in Gagetown, to be held this year in late September.

Ladies and gentlemen, I'd like to tarp down right there and leave you with some final thoughts that I've realized over my tenure. First and foremost, I cannot state it enough, the Corps' most valuable assets are our young Soldiers and Officers, and we, their leadership, must give them any and every opportunity and consideration to continue to succeed and mature within the Corps. Secondly, we as a Corps are as strong today as ever before. We continue to meet any and all challenges head-on and in the end we speak as one and move forward; for me Ladies and Gentlemen, that is what the Corps Family is all about. And lastly, I want to congratulate and welcome CWO Kevin Mathers as the next School RSM. I know full well that the Corps, the School and our young Soldiers and Officers passing through its hallowed halls, will be well looked after under his watch, all the very best to you Kevin.

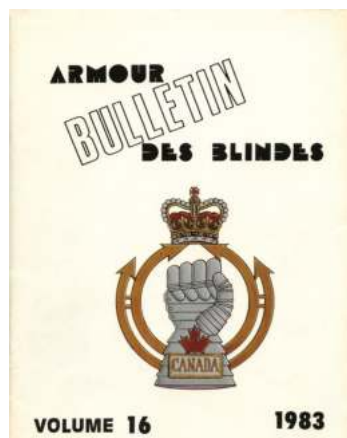
Worthy!

W.A. Laughlin, MMM, CD
CWO
RCAC School RSM

FLASHBACKS

1983
30 YEARS AGO

In 1983, the RCAC was trying to determine the best plan for future employment of the Cougar vehicle after two years in service. The article argues that the Cougar, as a tank trainer for Regular Force, was counter-productive to the Armour Branch and should be replaced as quickly as possible. The author of the article argued that, the Cougar could then be employed as a militia tank trainer or as a reconnaissance vehicle in Regular Force reconnaissance units to replace the Lynx in the 1985 timeframe.

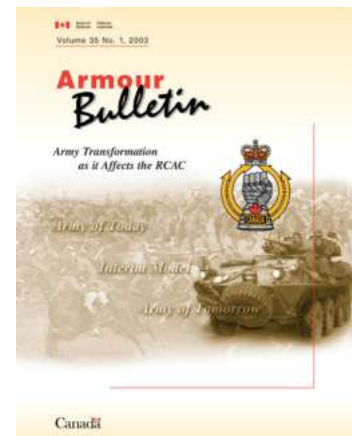
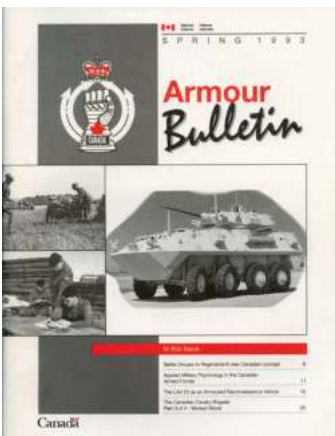


1993 20 YEARS AGO

In 1993, the RCAC was getting ready for the arrival of the Coyote. Capt J. DeCarufel objectively compared the capabilities of the new Coyote reconnaissance vehicle with its predecessor, the Lynx, and the German Luchs. This article identified the many benefits of this new vehicle while highlighting some of its shortcomings, including off-road mobility, non-amphibious capabilities, and its high profile.

2003 10 YEARS AGO

In 2003, the Armour section of Land Force Trails and Evaluations Units at CTC Gagetown was exposing us to the results of the trial of the NM 186 Bi-spectral AFV smoke grenade in order to respond to the Immediate Operational Requirement created from Op APOLLO in Afghanistan. The trial determined that the grenade was safe for handling and that the smoke screen was effective. Future testing would determine a new smoke grenade for the CA.





NEW CAPABILITIES

BI-SPECTRAL 76MM AFV OBSCURANT GRENADE PROJECT



Courtesy of Canadian Army Trials and Evaluation Unit

Demonstration of the DM 55A1 fired from a LAV UP after 4 seconds.



WO W.J. BRYAN
PROJECT DIRECTOR,
BI-SPECTRAL 76MM AFV
OBSCURANT PROJECT,
DIRECTORATE OF LAND
REQUIREMENTS

LOAD MBGDs! This well-known action drill phrase has been performed by mounted soldiers for many years. Because Canadian Army (CA) 76mm vehicle-launched grenade stocks are critically low, usage restrictions have often been issued. It has been a long time since crews could train regularly or even observe demonstrations during basic Armoured Fighting Vehicle (AFV) gunnery courses and valuable training has been missed. The first time a soldier sees any particular ammunition should not be when departing the hide or a Forward Operating Base on a combat mission and it is very important for soldiers to get comfortable firing all munitions designed for their platforms.

CANADIAN ARMY MULTI-BARREL GRENADE DISCHARGER (MBGD) AMMUNITION

The DM 15 is the only fully ‘certified for service’ smoke grenade that the CA has and was purchased with the Leopard 1 fleet over 30 years ago. It is no longer manufactured, emits hazardous gasses, and only produces a screen in the visible range of the electromagnetic spectrum. Its low-voltage igniter is a safety concern when operating vehicle radios and other defensive systems. In short, it is obsolete.

Three bi-spectral grenades have been procured for operations since the 1990s using the Unforecasted Operational Requirement method. These red phosphorus-based (RP) grenades greatly reduce the enemy’s ability to see through the obscurant screen not only with simple optics but also with infrared and thermal devices. RP grenades often have both air and ground burst phases to overpower a sensor’s ability to see through the screen. Local flammable materials also add to the obscurant.

Currently some DM 55A1 remain, originally purchased for use in Afghanistan. It is restricted for general use because it only received an Extraordinary Safety Certificate due to operational time constraints. That is not to say it isn't safe, we just have increased domestic-use Canadian hazard testing standards. Its higher voltage igniter prevents its use on the Coyote and LAV III turrets as they cannot provide enough electrical energy to launch all the grenades consistently. It can be used for platform integration testing with special permission such as for LAV UP and TAPV.

EQUIPMENT

Available grenades have similar ranges of 25-55 metres to provide a gap-free screen that is fully formed within three to five seconds from launch.

CA AFV fleets are equipped with 76mm MBGD systems as will all future AFVs. Barrel angles produce similar firing patterns regardless of the ammunition and platform to effectively deny enemy observation. Barrel angles and barrel quantities are platform specific (most platforms have 8 barrels, TAPV will have only 4). MBGD system controls are either separate devices (Leopard FOV, Bison) or built into the fire control systems (LAV UP, some RWS). These controls have been improved to reliably fire assorted modern grenades by generating an electrical pulse for each barrel with a slight delay between each. This sequential firing circuit pushes the same voltage to each barrel, ensuring higher firing reliability while reducing strain on the vehicle electrical system. This means less risk of a grenade being unintentionally fired because you keyed the radio or are using other vehicle protective suites emitting electromagnetic radiation.

Older systems like Coyote push one voltage to the four barrels in one bank, occasionally causing launch

failure since there isn't enough system power to fire grenades equipped with higher voltage igniters such as the DM 55A1. Assorted platform characteristics also add confusion during operations where mixed AFV fleets and grenades are co-located.

PRESENT INDIVIDUAL TRAINING REQUIREMENT

Gunnery courses are allotted eight grenades to conduct a MBGD demonstration or eight grenades per student in the case of the Army Direct Fire Specialist course. Average annual grenade shortfalls from 2008 to 2012 were 322 grenades per year for gunnery courses, not including field training.

PROJECT SCOPE

Bi-Spectral 76mm AFV Obscurant Grenade Project will procure a minimum of 21,000 bi-spectral grenades for Line of Operations 3 and 4 missions, two years of training stock, technical platform testing, Initial Cadre Training, and inert dummy, display and cutaway grenades for instructional training. The new grenade will be fully certified for service under Ammunition Safety and Suitability Board requirements. Two years of Integrated Logistics Support including a long-term supply contract will provide a stable source for future procurement.

Ammunition stock for gunnery and live field training can easily be achieved with an expected annual purchase of 1700 grenades. There will be no major impacts for personnel, infrastructure or training. Crew drills will see no change for operating the MBGD system. There will be slight misfire drill modifications since modern grenades cannot be hand fired. This project will provide a single grenade type to streamline training and operational supplies and the remaining in-stock grenades will be fully expended through attrition, requiring no demilitarization costs.



Courtesy of Canadian Army Trials and Evaluation Unit

Demonstration of the DM 55A1 fired from a LAV UP after 7 seconds.

FUTURE POSSIBILITIES

The project mandate was to procure bi-spectral grenades for operational use. Because of the RP, there will likely be safety restrictions imposed on domestic field use other than for course demonstrations. A possible future project could procure a field training grenade that produces a visible-only screen using something similar to talcum powder which is already available on the open market today.

Several manufacturers are exploring sugar-based obscurants producing less environmental impact than RP. These initiatives are presently assessed at Technology Readiness Levels 1 to 3 (levels 8 to 9 are considered effective for production after operational testing). It may be possible to simply replace the RP content during production with no impact to the soldier in the field or reduce the obscurant requirements.

PROJECT END STATE

Acquiring one grenade that can be fired by all platforms has been addressed. Contender grenades are all Military-off-the-Shelf devices that meet all of the obscurant requirements and are currently used by allied nations. The Bi-Spectral 76mm AFV Obscurant Project will provide an improved capability, with sufficient stocks, to enhance the training and increased protection while deployed on operations of all CA AFV crews and platforms.

LAV 6.0 SIMULATION SOLUTIONS – ICGS



CAPT J.M.G. WATSON
ARMY INSTRUCTOR GUNNERY
TEAM LEADER, STANDARDS
SQUADRON, ROYAL CANADIAN
ARMoured CORPS SCHOOL

The modernization and transformation of Canadian Army (CA) training doctrine has ushered in many significant changes to how we train soldiers. One of the most significant to the combat arms is the wholesale adoption of simulation to supplement live-fire ranges and field firing exercises. Simulation allows for in-house training that provides realistic feedback to the user without the added resource cost of deploying to the field or firing expensive live ammunition. The strategic benefits of simulation also allows for considerable cost savings in the individual and collective training sphere. With the implementation of the LAV 6.0, and its advanced fire control system, a new simulation solution was needed in order to continue to leverage simulation as a part of baseline turret operator training.

The Army Instructor Gunnery Team (AIG Tm) has been heavily involved in the LAV 6.0 project with a focus on implementation, drills, and training material. Parallel to their contributions with the project, the AIG Tm has been directly involved with defining the requirements, testing possible solutions, and validating the Army's solution for LAV 6.0 simulation. In fact, the AIG Tm initially identified the simulation capability



Courtesy of DLSE

ICGS set up in the Sim center at CFB Gagetown.



Courtesy of DLSE

ICGS prototype on display in CFB Kingston.

deficiency within the project in 2011 when they dispelled the notion that the current LAV III simulation would be compatible with the new fire control system on the LAV 6.0. Once the CA initiated the process for adequate simulation, the Director of Land Synthetic Environments (DLSE) was given the task of assessing the feasibility, designing and building the Interim Crew Gunnery Simulator (ICGS) to fill this simulation gap.

The AIG Tm has assisted DLSE throughout the conceptual, design and initial testing phases. The project has taken the form of a desktop trainer employing touch screens and periphery gun controls to create an effective medium fidelity simulator. The AIG Tm personally reviewed and commented on the initial design of the product in order to render it more conducive to the CA's gunnery training aims and philosophies. Armed with that knowledge, the project re-vamped their bid and is confident in their current product. The AIG Tm met with the heads of the project in fall 2013 to discuss final points and the way forward for product testing. As a major requirement for the baseline LAV 6.0 Turret Operator Course, the success of the ICGS is paramount to the LAV 6.0 implementation and the future of LAV training in the Army. Testing of the ICGS is tentatively scheduled to take place in February concurrent with the TF 1-15 LAV 6.0 Initial Cadre Training in Valcartier. Full scale production and implementation will potentially occur as early as summer 2014.

LRSS UP IN 2013-2014



Courtesy of Capt Dan Saucier

The LAV 6.0 RECCE Risk Reduction Unit on a tilt table at NRC during the Stability and Mobility Trial.

CAPT D.M. SAUCIER
DEPUTY PROJECT DIRECTOR
FOR LAV RECONNAISSANCE
SURVEILLANCE SYSTEM
UPGRADE AT THE
DIRECTORATE OF LAND
REQUIREMENTS



Canada has approved funding for 66 LAV 6.0s equipped with a new, dual-purpose (mast and remote), Long Range Surveillance System to replace the capability currently provided by the Coyote. This project has been developing over the past eight years and has jumped several hurdles during this time. Originally called the Coyote Life Extension project, it is now known as the Light Armoured Vehicle Reconnaissance Surveillance System Upgrade Project

(LRSS UP). The LRSS UP team can now report that the system's requirements were pushed out to industry in a Request for Proposal (RFP). Early 2014 will see industry returns collected by General Dynamics Land Systems – Canada (GDLS-C), who will manufacture the LAV 6.0 and will also serve as the LRSS integrator for our evaluation. Once there is a successful surveillance system bidder, they will become a subcontractor to GDLS-C, who will be responsible for integrating the chosen system into a brand new LAV 6.0 Reconnaissance (LAV 6.0 RECCE) variant as part of an Implementation Phase contract.

2013 was the year of studies and trials for the project. These trials included: a firing trial, which measured the muzzle blast pressure impact on a representative mast and surveillance suite at various cannon elevations of



Courtesy of Jonathan King , LRSS UP Test Engineer

The LAV 6.0 Risk Reduction Unit performing a slalom test as part of our mobility trials with a representational 5m mast.

up to 60°; a human factors engineering study looked at the optimal orientation of the surveillance operator while on the move (should he sit facing forwards or sideways?); and a stability and mobility study, which analysed a LAV 6.0 with surrogate masts with heights of five and ten metres. The final reports of these studies were completed in the fall of 2013.

The process of multiple studies can be exhausting, but there are still more to do. The first is a roof layout and rear ramp study which will investigate the optimal layout of antennas and doors, while providing enough space for an automatically stowed mast-mounted surveillance system. The second is a silent-watch and power management study, which has evolved into an analysis of: the Auxiliary Power Unit maximum output power, noise levels, and the maximum lithium-ion battery capacity that can fit into the LAV 6.0 winch pocket. A third study, now ongoing, is the

survivability analysis of the LAV 6.0 RECCE, which includes considerations for the protection of and from the stowed surveillance system. The results from all these studies will be included in the performance specification of the overall LAV 6.0 RECCE.

The LRSS project team is looking forward to the next stage of development: prototyping and integration. We are excited at the prospect of delivering the first of 66 LAV 6.0 RECCE in 2016, which will follow the introduction of the Tactical Armoured Patrol Vehicle (TAPV). Until then, keep those recce and surveillance skills sharp Armoured Corps, because this upgraded capability will be a great technological leap that will make the Canadian Army, once again, the envy of the world in ground manoeuvre reconnaissance.



Risk Reduction Unit performing a 4 km/hr cross country test as part of our mobility trials with a representational 10m mast.

SITREP – LIGHT ARMoured VEHICLE III UPGRADE



Courtesy of Mr Art Hall

LAV 6.0 on a Range at CFB Gagetown.



CAPT C.J.E. RADL
DEPUTY PROJECT DIRECTOR
FOR THE LAV UPGRADE AT
THE DIRECTORATE OF LAND
REQUIREMENTS

This is an exciting time for the Canadian Army (CA) in terms of new capabilities and vehicles. One of the more exciting projects is the Light Armoured Vehicle Upgrade Project (LAV UP). LAV UP has upgraded the current LAV III fleet and will deliver a new LAV 6.0 that is a marked improvement in all three of the major armoured vehicle design areas, namely mobility, firepower, and protection.

For mobility, the LAV 6.0 will receive a new Caterpillar power pack capable of producing 450 hp, a completely new drive train and suspension capable of supporting a combat weight of 60,000 lbs. The LAV 6.0 also comes equipped with a height management system which will allow the driver to modify the vehicle's ground clearance to better navigate different types of terrain. These advancements will provide the CA with greatly increased mobility over our current worn-out LAV fleet.

Most exciting to the black hat community, are undoubtedly the improvements to the lethality of the weapon system. The M242 Bushmaster 25mm chain-gun has been retained; however, significant advancements

have been made to the fire control system which will allow the crew to engage targets with a first round hit probability approaching that of modern MBTs. This is primarily due to an upgraded Thermal Imager (TI) and the introduction of the Reptile IV turret processor. The Reptile IV will allow for a displaced reticule pattern and a calculated ballistic solution that includes lead angles and non-standard values such as temperature and wind speed. The standard STADIA pattern will still be available in the day sights for use during degraded mode engagements. So yes, every gunnery course will still likely have to memorize the “dots” and their associated ranges!

Crew Protection Kit (ECPK), that will further improve the vehicle’s protection against projectiles and fragmentation. Improvements have also been made to the turret to accommodate human factors such as increased space to better accommodate larger soldiers and their equipment. Lastly, the height management system has the added advantage of being able to achieve more stand-off distance between an under belly blast and the hull. These advancements will go a long way towards ensuring that our troops have the equipment they need to operate anywhere in the world including theatres where high mine and IED threats exist.



Courtesy of Cpl Elley

LAV 6.0 on the driver’s circuit at CFB Gagetown.

By far the most important improvements have been made with respect to protection. The entire hull, both upper and lower, is new. The hull bottom incorporates the General Dynamics Double “V” hull technology, which allows under-belly blast energy to be redirected to reinforced portions of the hull. This hull geometry, combined with entirely new energy attenuation seating (or blast seating) for the driver, turret crew and troop compartment, allow the LAV 6.0 to surpass even the ambitious protection requirements that the project started out with. The LAV 6.0 will also be compatible with add on armour packages, including the Exposed

Getting this capability into the Army’s hands has kept project staff very busy. Every sub-system has been extensively tested and the project is now conducting system reliability and performance testing, known as Initial Product Testing (IPT), with the support of Hotel Company 2nd Battalion The Royal Canadian Regiment (2 RCR). IPT began in September 2013 and will continue until mid-December. During this period the vehicles are being run twenty four hours a day throughout the Gagetown training area and will fire a significant

portion of the CA's 25mm ammunition allotment, with the intent of validating the system by a CA field unit. This type of testing inherently reveals the technical challenges with the system and may, at times, seem daunting; however, this test is providing the project the opportunity to develop solutions to these technical issues before full fielding to the Army.

The challenge now lies with delivering the capability to the Army and institutionalizing LAV 6.0 training. However early involvement of the Centers of Excellence (CoE) in Gagetown has allowed the project to be ahead of the curve with respect to training development. In this, the Army Instructor Gunnery Team (AIG Tm) at the Royal Canadian Armoured Corps School (RCACS) has been instrumental in the early development of drills and training packages, as well as troubleshooting technical issues. Initially, crews will be trained by General Dynamics Land Systems Canada instructors on the technical aspects of operating the vehicles.

From there, the CoEs will be responsible for creating courseware that will lead to formal LAV 6.0 training courses. The RCACS is the CoE for the turret, the Infantry School is the CoE for the driver, and CFSEME is the CoE for vehicle and turret maintenance.

The question that is likely in the minds of most readers is: when does the LAV 6.0 actually arrive and how will it be used? The current CA plan is to field a Battle Group's worth of vehicles to 1er Battalion Royale 22e Régiment. Delivery of these vehicles will occur in early 2014 in order to allow Task Force 1-15 to train on the vehicles prior to the official task force stand-up in summer 2014. Fielding will not end there, once TF 1-15 is properly fielded, vehicles will be delivered out west to 3 Canadian Division, followed by 4 Canadian Division until a total of 550 LAV 6.0 are delivered to the CA. This approach will take some time, but in the end, the CA will have a reinvigorated vehicle that greatly improves the Army's mobility, firepower and protection.



Courtesy of Capt A. Doucet

LAV 6.0 in the Lawfield Corridor (CFB Gagetown training area).

PERSISTENT SURVEILLANCE SYSTEM UPDATE



Courtesy of Mr P. Richer

Persistent Surveillance System in the moored position.



CAPT R.I. LUND

**TECHNICAL ADJUTANT,
STANDARDS SQUADRON, ROYAL
CANADIAN ARMoured CORPS
SCHOOL**

The Persistent Surveillance System (PSS) has been a part of the Canadian Army's (CA) inventory for several years. PSS has been deployed on operations in Afghanistan and used in domestic operations at the 2010 Vancouver Olympics and G20 Summit in Toronto. It has proven itself to be a useful piece of kit and a capability that the CA wishes to maintain going forward.

The Royal Canadian Armoured Corps took on the task of maintaining a PSS capability and determining a force employment concept for the system. A number of potential force employment concepts were considered, including making PSS an Armoured Reserve force generated task in support of Line of Operations 3 (LoO 3). However, no final decision was rendered on



CAPT K.R.O. COSMAN

**PRIMARY RESERVE
TRANSFORMATION OFFICER,
STANDARDS SQUADRON, ROYAL
CANADIAN ARMoured CORPS
SCHOOL**

the force employment concept of PSS, so in November 2013 the decision was made to have PSS placed into storage. This is not the end of the PSS however.

The current fleet of PSS will be placed into storage with Rheinmetall Canada until the systems are required for operations. Rheinmetall Canada will be responsible for maintaining the systems during this storage period. This includes deploying all systems on a regular basis to confirm full functionality. In the event faults are observed, they will be repaired immediately. This will ensure that all PSS are fully operational should they be required for either domestic or expeditionary operations.

In order to maintain a level of readiness with PSS, a plan has been proposed to the Directorate of Land

Forces Development (DLFD) that would see one system be made available in order to develop a training package for PSS. It would see Initial Cadre Training (ICT) and a pilot course being run in Spring/Summer 2014 at the Royal Canadian Armoured Corps School (RCACS), followed by the development of a full training package, including Qualification Standard (QS), Training Plan (TP) and courseware. This also includes the potential for a pilot course to validate the courseware. In the event that the PSS is needed for operations, the time required to train operators would be significantly reduced because all courseware will already be developed and validated. These efforts would be completed by the development of a PSS Force Employment Concept (FEC) that would codify aspects of PSS employment, including force structure, support and maintenance concepts as well as readiness timelines.

The CA has made it clear that PSS is an essential capability that needs to remain within our inventory. While the current fiscal realities may reserve its employment specifically to operations, it is still a component of the Army's Managed Readiness Plan (MRP) in support of the Canada First Defence Strategy.



Courtesy of Mr P. Richer

Above: Training on the PSS at CFB Edmonton.

Below: Mast of the PSS deployed.



Courtesy of Mr P. Richer

TACTICAL ARMoured PATROL VEHICLE (TAPV) UPDATE



Courtesy of Sgt Pascal Hebert

A TAPV returns from a stab run.



CAPT L.A. DUNN
DEPUTY PROJECT DIRECTOR,
TACTICAL ARMoured
PATROL VEHICLE PROJECT,
DIRECTORATE OF LAND
REQUIREMENTS

In June 2012, the Government of Canada awarded Textron Systems Canada Inc. (TSCI) contracts for the acquisition and long-term support of up to 600 TAPV. The project will initially procure 500 (193 Recce and 307 General Utility variants) and if additional funds become available, an option exists to procure an additional 100 vehicles (40 Recce and 60 General Utility). The TAPV project has spent the last year conducting extensive engineering design reviews on the TAPV resulting in the delivery of six Pre-Production Vehicles (PPV) to DND in August 2013. Five of these vehicles were delivered to CFB Valcartier for the conduct of Reliability, Availability, Maintainability, and Durability (RAMD) testing and one was delivered to the Aberdeen Test Center, MD, USA for the

conduct of qualification testing. Also, a stripped-down hull was also delivered to CFB Valcartier for blast and ballistic testing to confirm that the TAPV meets the Canadian Army's (CA) required levels of protection.

The TAPV RAMD will run from August 2013 until April 2014 with the main goal of driving a total of 130,000 kms and operating the Remote Weapon System (RWS) a total of 4,700 hours to confirm that the TAPV meets required reliability levels. RAMD testing will also ensure that all of the maintenance tasks on the TAPV are verified and that they are described correctly in the associated technical manuals. Secondary goals of RAMD include validation of the TAPV Initial Cadre Training (ICT), associated courseware, operator manuals, and the collection of operator and technician feedback for possible design improvements. The TAPV RAMD started in August 2013 with the training of personnel from 5 CMBG who are operating the TAPV throughout the testing period.



Courtesy of Capt L.A. Dunn
A convoy of TAPV driving at CFB Valcartier.



Courtesy of Capt L.A. Dunn
A TAPV after a day of driving at CFB Valcartier.

Concurrent to RAMD is the verification of the PPVs at the Aberdeen Test Center. Each PPV will undergo an extensive qualification programme to verify that the vehicle meets the CA's requirements. This testing will be conducted in various aspects including mobility, firepower, human-systems integration, and verification that the TAPV is compatible with all of our communications equipment.

The TAPV offers a high degree of protection to its crew members from ballistic and blast threats including small arms, mines, and IEDs. This is accomplished through the use of blast-protected seats, add-on armour, and spall liners. The TAPV RWS mounts both the Heckler and Koch 40 mm Automatic Grenade Launcher and the C6 General Purpose Machine Gun simultaneously and can be controlled by either the gunner or crew commander. It is also equipped with four 76 mm grenade dischargers.

Upon successful completion of RAMD and qualification testing, the first TAPVs are scheduled to be delivered to 1 CMBG in the fall of 2014 with an Initial Operational Capability consisting of 30 TAPVs. Deliveries are then scheduled for the Royal Canadian Armoured Corps School, 2 CMBG, 5 CMBG, and finally the Division Training Centres with the Final Operational Capability being achieved by 2016.

Additional information on the TAPV project can be found on the TAPV SharePoint site at <http://acims.mil.ca/project/TAPV/default.aspx> or on the Capability Investment Database (CID) by searching for TAPV at http://otg-vcd-webs018.ottawa-hull.mil.ca/CID/search_e.asp



Courtesy of Sgt Pascal Hebert

Members of 5 CMBG load the TAPV RWS in preparation for a stab run during RAMD RWS Operator ICT at CFB Valcartier.

INITIAL FIELD TRIALS – TACTICAL ARMoured PATROL VEHICLE



Courtesy of Sgt J. Dunnett

TAPV during the RAMD in CFB Valcartier.



SGT J.M.E. DUNNETT
MEMBER OF 12E RÉGIMENT
BLINDÉ DU CANADA
PARTICIPATING ON THE
TAPV RELIABILITY TESTING

For several months, the Tactical Armoured Patrol Vehicle (TAPV), built by Textron Systems Canada, has undergone performance and capability trials at Canadian Forces Base Valcartier. The TAPV is a wheeled armoured combat vehicle that can perform a wide range of tasks on the battle field, including reconnaissance and convoy escort. It has the ability to transport personnel and equipment while navigating through diverse and challenging terrain. It is designed to protect against the threat of Improvised Explosive Devices (IEDs) and will both replace the RG-31 armoured patrol vehicle and Coyote reconnaissance vehicles in the near future.

The TAPV is a four wheeled vehicle (4x4) weighing 37,200

lbs and is powered by a Cummins Diesel 8.9 litre engine capable of producing 370 hp and achieving speeds of 110 kph. Two versions of the TAPV will be produced for use by the Canadian Army (CA): a general utility variant and a reconnaissance variant. The reconnaissance variant will have seating for a crew of five as well as increased battery capacity for surveillance tasks, while the utility variant will have seating for six.

Approximately 50 soldiers from the 5th Canadian Mechanised Brigade Group (5 CMBG) are currently validating the new TAPV, which is undergoing reliability testing throughout 2014 at CFB Valcartier. Soldiers from the *3e Battalion Royal 22e Régiment* and the *12e Régiment blindé du Canada* were qualified on the platform over the summer months and will now have the task of conducting the trials which began in September 2013. These trials at CFB Valcartier are divided into three categories consisting of driving, remote weapons station operation, and observation.

The first test category will see each TAPV driven approximately 26,000 km over varying types of terrain



Courtesy of Sgt J. Dunnett

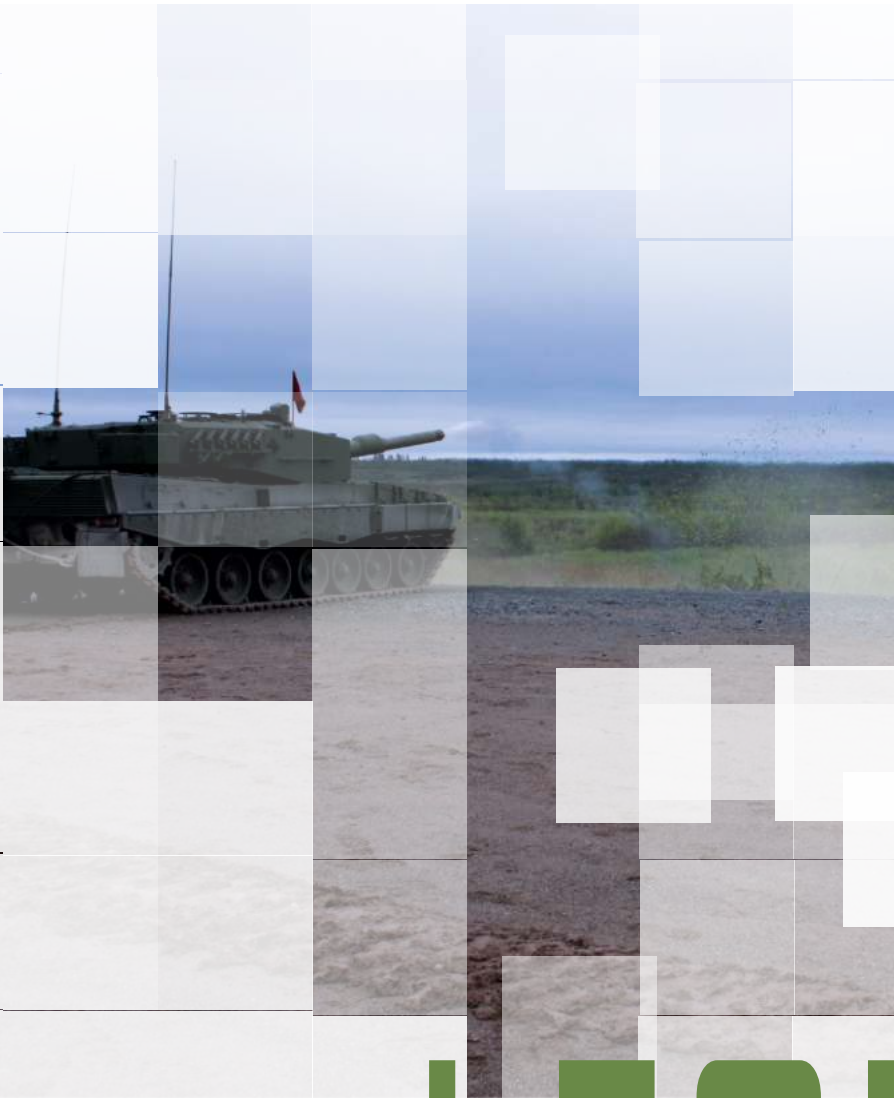
TAPV driving off-road in the CFB Valcartier training area.

including gravel roads and cross-country in order to test the drive and suspension components of the vehicle. Secondly, the weapons system which is a Remote Weapons Station (RWS) equipped with a C-16 (40mm automatic grenade launcher) and a C-6 machine gun will be tested. The weapons mounted on the RWS are currently in service within the CA, as a result the trial for the gunnery system will ensure the interaction of the weapons with the remote station itself by firing approximately 1000 x 40mm grenades and 3000 x 7.62mm with the C-6. The third test category is observation. Although the TAPV is not equipped with a purpose built surveillance system (such as found in the Coyote reconnaissance vehicle) the vehicle can employ the optics (including thermal) on the RWS to accomplish reconnaissance tasks. Additionally, the soldiers will ensure the vehicle possesses sufficient battery power to conduct surveillance tasks for the length of time required by the CA and its ground manoeuvre reconnaissance elements.

Once the testing is completed in 2014, the delivery of 500 TAPV's will begin, but spread across the next three years. From a soldier's perspective, it is not everyday that one has the opportunity to be involved in the delivery of a new capability. We have been fortunate to be a part of this testing and we will enjoy the chance to move, shot, and communicate with the TAPV over the next several months.



Courtesy of Sgt J. Dunnett



LEOPARD

CANADA'S NEW LEOPARD 2 ARV – IT'S MORE THAN JUST ANOTHER TOW TRUCK



Grant ARV, Italy 1942.



Courtesy of Combat Camera

Leo 1 ARV lifting a power-pack in Afghanistan.



MAJ M.J. DUGGAN
PROJECT DIRECTOR,
TANK REPLACEMENT
PROJECT, DIRECTORATE
LAND REQUIREMENTS



MAJ M.J. WIONZEK
FORMER PROJECT DIRECTOR,
TANK REPLACEMENT
PROJECT, DIRECTORATE LAND
REQUIREMENTS

The Armoured Recovery Vehicle (ARV) has become one of the most versatile combat support vehicles on the modern battlefield. Most tankers have had time to consider this fact while we were stuck in the mud or broken down on the side of the road, waiting for the arrival of our only hope: the ARV. We have developed a great respect for the vehicle and crews that serve on them. The ARV has a long history that goes back to the First World War when British Mark IV tanks were converted to “salvage tanks”. During WW II, Sherman and RAM tanks were modified with heavy-duty winches and cranes to create the first true ARVs. In Canada, these early vehicles were replaced with ARVs based on the Centurion and Leopard 1 tank chassis.

To support combat operations in Afghanistan, in 2007 the German Government loaned Canada 20 Leopard 2 A6M tanks and two Büffel 3 ARVs. Prior to

deployment, the ARVs were upgraded with Canadian equipment, additional armour modules, and a mine protection belly plate. Employed in the A1 Echelon, the ARVs were never far from the action. An IED crippled one of the Büffel 3s, but it was quickly returned to service. The performance of the vehicle vastly exceeded expectations of the soldiers and its manufacturer. In 2011, these two ARVs were repatriated to support the Leopard 2 fleet in Canada.

In addition to fielding MBTs, Canada’s Tank Replacement and Force Mobility Enhancement Projects are procuring twelve ARVs to provide integral maintenance support for the Leopard 2 family of vehicles. The new ARV will replace the Leopard 1 ARV (Taurus) with the majority being employed to support individual training and force generation.



Courtesy of Rheinmetall
Leopard 2 ARV.

The key high level mandatory requirements include the following:

- Towing. The new ARV will be capable of towing all combat loaded Leopard 2 variants (64.5t) with damaged tracks or wheel assemblies;
- Recovery. The new ARV will be capable of recovering all combat loaded Leopard 2s. The winch is capable of a 35t one-one pull;
- Combat Recovery. With the ARV operated hatches down (crew under armour), an A-frame attached to the rear of the ARV can be operated remotely to connect to the disabled vehicle; and
- Support to Repair Activities. The new ARV will be capable of the removal and installation of the Leopard 2 turret and power pack. The crane can lift 30t.

Key secondary requirements include the following capabilities:

- Refuelling and Defuelling. The new ARV will be capable of fuelling or defuelling other Leopard 2 variants;
- Cutting and Welding. The ARV crew will be capable of making battle-damage repairs on all Leopard 2 variants;
- Light Dozing Tasks. In addition to stabilizing and anchoring the ARV, the dozer blade will be capable of performing light earth-moving tasks; and
- Towing Other Canadian AFVs. The new

ARV must be capable of towing other Canadian AFVs including M113 variants, LAV II and III variants.

On 17 Nov 11, Rheinmetall Land Systems (RLS) was awarded the contract to convert 12 Leopard 2 A4 tanks into ARVs. The design of the new ARV is based on the old German Büffel 3 that was designed in the late 1980s. Close collaboration with the Swedish and German Armies, has ensured that the Canadian ARVs will incorporate significant modifications and the newest technology. Key upgrades include the following:

- Remote Weapons System. The ARV will be equipped with the Kongsberg M 151 RWS mounting the FN C6 MG;
- Mine/IED Protection. A fully integrated protection system that includes armour and seats will protect the crew from acceleration injuries arising from collisions, mine blasts, and IED blasts including side attacks;
- Add-on-Armour. A combination of passive technologies will protect the crew from ballistic and shape charged threats; and
- Crew Vision Enhancement. Like the MBT, integration of the Thales CVE system will provide the driver with the ability to drive forward and backward in reduced visibility.

In addition to the vehicles, RLS will provide eight sets of operational upgrade kits. The kits include mine protection kits (MPK), add-on-armour (AoA) and electronic counter measures (ECM). All of the ARV will be fitted to accept this mission specific equipment. To reduce wear and tear on the vehicle, the ARVs will be delivered without these kits installed. The kits will be stored in the CFSS and installed as required prior to a deployment to a high explosive threat operational theatre.

The two loaned Büffel 3's have performed admirably the past six years in Canadian service, however they will start the return to Germany in January 2014. This corresponds with the scheduled delivery of the first of two Leopard 2 ARV CANs, which will take place

in November 2013. Upon delivery, as with any new capability to the CA, Initial Cadre Training will take place followed by an extensive Initial Product Testing to validate the improvements mentioned above. This will slightly delay the arrival of the vehicle to the CA and cause a capability gap which will be covered temporarily by the legacy Leopard 1 ARV. The first Leopard 2 ARV CANs will arrive at the LdSH(RC) and 3 ASG in February/March 2014 timeframe. One

additional vehicle will be delivered each month starting in May 2014 for a total of 12 vehicles distributed as per figure 1.

With the application of lessons learned from the deployment of the Büffel 3 to Afghanistan applied to the development of the Leopard ARV 2 CAN, the CA is well situated to have an ARV capable of supporting its Leopard 2 fleet during both training and deployed operations.



Courtesy of Rheinmetal

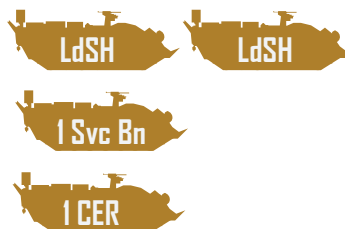
Leopard 2 ARV supporting maintenance on a Leopard 2 power pack in a Forward Operating Base in Afghanistan.

ARV Distribution

Gagetown



Edmonton



Borden



Figure 1: ARV Distribution

LEOPARD 2 SIMULATOR



Courtesy of Cpl Elley
Leopard 2 Driver Station Simulator (DSS).



SGT R.M. PHILLIPS
MEMBER OF THE ARMY
DRIVER AND MAINTENANCE
TEAM, STANDARDS
SQUADRON, ROYAL
CANADIAN ARMoured
CORPS SCHOOL

With the arrival of the Leopard 2, the Royal Canadian Armoured Corps (RCAC) quickly identified a need for a simulation capability that would augment and facilitate driver instruction and at the same time reduce associated maintenance costs of our Leopard 2 fleet. The Army Driving and Maintenance (AD&M) Team as part of the Royal Canadian Armoured Corps School (RCACS) has

been involved with two major projects: a replica of the Leopard 2 Driver Station and an emulator that provides a digital representation of the driver's compartment.

LEOPARD 2 DRIVER STATION SIMULATOR

The RCACS received the new Leopard 2 Driver Station Simulator (DSS) in February 2013 and received the Instructor Cadre Training (ICT) from Rheinmetall Defence. The DSS is a replica of the Leopard 2 driver compartment and enables the Corps to effectively assist in driver fault training. The system allows instructors to insert scenarios and faults, forcing the driver to respond and rectify the problem; this can not be done in the actual tank. An example includes activating fault lights to signify a fire in the engine compartment. Being

able to show the students the driver station without having to jump in and out of the tank also saves time and is very beneficial when teaching a larger crew. Two simulators were purchased, one is being kept at the RCACS and the second was sent to the LdSH(RC) in Edmonton. It has already been used on several courses with excellent results.

LEOPARD 2 EMULATION PROGRAM

While the DSS provides a full size driver compartment, it does not possess the simulation of a digital environment where the driver can manoeuvre his vehicle. Accordingly, the AD&M Team identified a need for a driving emulator. In response, the Army Learning Support Centre (ALSC), located in Gagetown, introduced the AD&M Team to the Leopard 2 emulation Program in March 2013. With an exact digital replica of the Leopard 2 driver's compartment (using multiple computers) an instructor can not only



Courtesy of Cpl Elley
Sgt Rachelle Phillips instructing a student on the DSS.



Courtesy of ALSC
Screen capture of the Leopard 2 Emulation Program as seen by the student.

teach the driver's components of the compartment but also conduct testing from the instruction station. The digital "tank" is fully functional and can be both started and driven. This is now a true asset to the Leopard 2 D&M course, saving time on testing and pointing out all the components within the driver station. The product is outstanding and it was greatly appreciated by both the instructors and the students that used it on their course.

Simulation has been accepted and relied on for decades in the world of gunnery. It is now fundamental in how we train and produce gunners and has a tangible cost savings for training as it reduces live fire ammunition. Simulation can and is having the same effect for driving. With mileage restrictions for the Leopard 2 fleet being applied for both individual and collective training simulation will play a more prominent role in how we train drivers.

TANK CAPABILITY SUSTAINMENT AT 12E RÉGIMENT BLINDÉ DU CANADA



Courtesy of Cpl Alonso

105mm team members representing 12e RBC during the Ex WORTHINGTON CHALLENGE on 25 September, 2013 at CFB Gagetown.

CAPT K.G. BELLEFONTAINE
REGIMENTAL LIAISON
OFFICER, 12E RÉGIMENT
BLINDÉ DU CANADA



Although the tanks left Valcartier in 2011, the 12e Régiment blindé du Canada still has tank capability sustainment as one of its training pillars. In fact, it is part of the mission: *[trans.] to generate, sustain, and employ armoured reconnaissance troops and, on order, tanks to skilfully, aggressively and agilely accomplish the tasks we are assigned across the full spectrum of operations, both domestically and abroad.* In addition, in



Courtesy of Capt Dessouroux
Leopard 1C2.

the Regiment's vision, we must be armoured manoeuvre experts, both with respect to reconnaissance and tanks.

To reach this training objective on tank capability, the 12e RBC has three main approaches. The first is to support C Squadron (RCD) located in Gagetown with qualified members; this composite tank squadron currently has around 40 members from the 12e RBC. Second, the upcoming introduction of Leopard 2 LCGT simulators in the 12e RBC lines will make it possible to have ongoing crew training, which will facilitate capability sustainment. Recently, a major transformation of our regimental gunnery cell began. The renewal work on Building 308 started in June 2013. Since then, the civilian company in charge of carrying out the project has worked tirelessly to finish it. To date, it has re-fitted the building by creating four completely soundproof classrooms with a cutting edge air conditioning system. Three of the four rooms will contain Leopard 2 LCGT simulators that crews will use. The fourth room will be used to teach classes on armoured vehicle reconnaissance. The renovations will be completed on January 16, 2014, and the members of 12e RBC will soon have the opportunity to update their expertise on this impressive machine.

Third, even though the tanks have left, 12e RBC has been ready to lead major armoured operations involving tanks. During Ex LION INTRÉPIDE and MAPLE RESOLVE 2012, the regiment was given a tank squadron for ad hoc operations. In addition, during 5th CMBG digital exercises, 12e RBC is always ready to take on tank squadron roles. All of those activities, which are related to squadron-level operations, show that 12e RBC is able to plan and execute tank operations within a mixed battle group.

The 12e RBC gunnery cell is critical to maintaining expert knowledge on tanks. WO Legault is currently deeply involved in revitalizing the regimental gunnery



Courtesy of WO Patrick Lepage
12e RBC's Gunnery WO, WO Stéphane Legault (right) in discussion with the Defence Construction Canada services coordinator in September 2013.

cell while continuing to develop the regiment's gunnery skills. WO Legault has, among other things, organized the training plans for the 12e RBC tank crews for the past two Worthington Challenge competitions, where they have achieved excellent results. 12e RBC placed second in 105-mm category, after the RCD C Sqn, whose crew commanders were also from 12e RBC.

Throughout the training year professional development sessions and simulation exercises on tank tactics will be conducted in order to familiarize officers on tanks. With no tanks at Valcartier and the officer DP 1 training on the 25mm platform, it is important that they be initiated so that they are able to acquire basic knowledge on tank tactics up to the squadron level.

In closing, we are all extremely proud to have the opportunity to continue to train and perfect our members' skills and our command posts on armoured and direct-fire operations here at Valcartier. Although there are no tanks, 12e RBC will definitely be in a position to sustain its tank capabilities in the future, both at the crew, troop and squadron level.

ADSUM

THE HISTORY OF THE LEOPARD 1 MAIN BATTLE TANK SERVICE IN THE CANADIAN ARMY



Courtesy of Capt. Dessouroux

Leopard 1C2 in CFB Gagetown training area.



CAPT V.S. DESSOUROUX
TROOP LEADER, A
SQUADRON, ROYAL
CANADIAN ARMoured
CORPS SCHOOL

The Leopard project was started in November 1956 as a German replacement to the American M47 and M48. This tank design was the first for the German military since the Second World War. While initially a joint project between France and Germany, the Germans would eventually go in alone and start producing the Leopard 1 in 1964. The Leopard 1 was a product of the Cold War, an era where the advance of hollow charge ammunition made conventional armour almost obsolete. In the triad of mobility, protection and firepower of tank design, the emphasis was placed on firepower and mobility. This made the Leopard 1 a fast and mobile tank with good firepower, but with limited protection. With a strong emphasis on firepower, the Leopard 1 was fitted with the famous 105mm Royal Ordnance L7A3 rifled gun. This popular gun would be used not only on the Leopard 1, but on later marks of the Centurion, M60 and early versions of the M1 Abrams.

Power would be created by a 10 cylinder 37.4 litres, multi fuel engine, producing 830hp. This power-to-weight ratio meant that the Leopard boasted a cross-country performance, unmatched by any other tanks of the era. The threat of radioactive fallout on the nuclear battlefield, along with chemical and biological threats, resulted in the creation of an overpressure system. This allowed the crew to remain in the tank for an extended period of time without fear of being exposed to containments in the air. Sighting systems were constantly improved through each successive mark of the tank to include thermal night vision system and a commander's independent sight.

Canada bought its first Leopards in 1978 to replace its aging Centurion fleet. The Leopard C1 was Canada's first Leopard variant, which was a Leopard 1A3 with a laser range finder and minor upgrades in armour through a refit initiative. When the Leopard 1 was first commissioned into service with the Canadian Army in 1978, 114 of the total 127 tanks were put into active service. The vast majority were stationed in West Germany during the Cold War, with a few tanks at CFB Gagetown for training purposes. Although 1978 was the first year that Canada actually purchased the



Courtesy of Combat Camera
Leo 1C2 with the dozer blade.

Leopard tank, a select team from the Royal Canadian Dragoons (RCD) in West Germany “rented” Leopard 1 A2s from the Germans in order to participate in the 1977 Canadian Army Trophy competition.

A new tank for the Army meant that other branches would be upgrading their hardware as well. In order to support the Leopard 1 on the battlefield, the engineers received the Beaver Bridge Layer to allow quick bridging of large anti tank trenches. The engineers also received an Armoured Engineer Vehicle (AEV) or Badger, equipped with a dozer blade and an excavator bucket, frequently used to dig ditches, holes, and drop fascines into ditches to allow movement. The Royal Canadian Electrical Mechanical Engineer (RCEME) branch received the Taurus, an Armoured Recovery Vehicle (ARV) capable of recovering and towing the Leopard 1. These vehicles would also be used in extracting and replacing its power pack in the field. All of these support vehicles were built on the Leopard 1 hull to allow commonality of parts.

The first overseas deployment for the Leopard C1 was in Kosovo. A troop from C squadron LdSH(RC) deployed five tanks outfitted with a MEXAS armour upgrade. These tanks were used for two rotations with KFOR.

Starting in 2000, the 114 Leopard C1's in service were upgraded to the C2 variant at a cost of \$139 million. The turrets of 123 surplus Leopard 1A5 tanks, purchased from Germany were fitted into the existing hulls. The upgrades included the EMES 18 Fire Control system which had upgraded thermal sights. The turret also had a gun data computer which calculated the factors



Courtesy of Combat Camera
Leopard 1C2 operating in Afghanistan.

affecting the engagement, creating a precise firing solution to ensure a first round hit. The thermal sights at the time were one of the best in the world allowing crews to detect vehicles and dismounted personnel through adverse weather, making the Leopard C2 a much more effective hunter.

In October 2006, B Sqn, LdSH(RC) deployed to Kandahar, Afghanistan with 15 uparmoured Leopard C2 to provide additional protection and fire support to the task force operating in Kandahar Province. This marked the first time since the Korean War that Canada sent tanks into an active war zone. The tanks served several crucial roles such as direct fire support in combat, intimate support, hasty obstacle breaching, Forward Operating Base (FOB) defence, and convoy protection. The last was accomplished by proving routes using mine rollers. In the direct-fire role, the Leopard C2 proved especially useful by using the HESH rounds to punch through thick mud brick walls, allowing more freedom of movement and reaching the enemy hiding behind cover. The Leopard C2s were augmented by Leopard 2A6M's in 2007 and were eventually replaced completely. With the Leopard 2A6M's being used as the frontline tanks, the Leopard C2 was moved to secondary roles such as base defense.

At home in Canada, the Leopard C2 was still widely used by the LdSH(RC) as well as newly reformed C Sqn RCD in CFB Gagetown. It has been the workhorse of the Royal Canadian Armoured Corps stretching five decades. The Leopard C2 will officially be retired in March 2014, with an impressive service record of 36 years.

THE DIVESTMENT OF THE LEOPARD 1 C2 AND THE TRANSITION TO THE LEOPARD 2 – A SNAPSHOT IN TIME



MAJ C.S. GARDNER
OFFICER IN COMMAND,
B SQUADRON, LORD
STRATHCONA'S HORSE
(ROYAL CANADIANS)

WITH INPUT FROM
WO STEVEN CHURCHILL,
SGT JASON CLARK, AND
SGT YANNICK CIMON

The Strathconas are currently executing a rapid divestment of the Leopard 1 C2 fleet and transitioning to an almost all Leopard 2 fleet. This is certainly an exciting time for the Strathconas and the Royal Canadian Armoured Corps (RCAC), as the Leopard 2 is a first class tank with capabilities that will be of benefit to the Canadian Army's (CA) combined arms team for years to come. This tank, coupled with excellent crews, many having proven themselves in combat, will continue to give the CA an armoured capability that is second to none. This is a time of significant transition, and all periods like this usually require multiple issues or kinks to be worked out. This article will briefly highlight some of the challenges and opportunities associated with the transition from the Leopard 1 C2 to the Leopard 2 at this moment in time (September 2013).

The rapid divestment of the C2 is forcing crews and maintainers to get to know the Leopard 2 in short order, as we will rely on the serviceability of the Leopard 2 to conduct the next Regimental exercise in early October 2013 and support the Combat Team Commander's Course at the end of October 2013. As of now, both tank squadrons at the Strathconas each hold only three Leopard 1 C2s. The two distinct areas that are affected by the transition from the Leopard 1 C2 to the Leopard 2 are training and maintenance. The issues highlighted by this article are only those experienced at this "snapshot in time", and these issues will continue to



Courtesy of Cpl CR Roselle

Cpl Andrew Sherlock-Hubbard holding a HE round during the trial of this ammunition in Germany.

be resolved as we move through this transition period.

There are two main areas that affect our training and tactics, and they are ammunition and implements. New ammunition and tanks will certainly affect the theory and application of gunnery. We are currently using Sabot with the new tanks, but we will use the new High Explosive (HE) round in large quantities for the first time on the upcoming Regimental exercise, Ex STEELE SABRE. A crew from B Squadron, LdSH(RC), led by WO Stephen Churchill, recently returned from Germany after conducting a HE round trial. From the trial, we have learned that the HE round is faster and

more accurate than HESH, and the force it produces has more of an effect on the recoil system. If there are any Leopard 2A4 variants that do not have the proper recoil cylinders, they may have to cool down after firing as few as 4 – 6 rounds. This can be easily fixed with the correct recoil cylinders, but until that occurs the gunfire method of the troop shoot may be affected. The extent of this problem, if it is an issue at all, will soon be further defined during Ex STEELE SABRE.

The HE round is fin stabilized and has a much flatter trajectory compared to the HESH round, but the splash of the HE round can still be observed like the HESH round. For troop shoots, the old method of using the traverse indicator to register is not possible as the Leopard 2 does not have a traverse indicator. The graticle pattern on the gunner's sight can be used instead, but this means that the measurements in mils are restricted to the set measurements on the graticle pattern.

The second main issue affecting tactics and training are the implements. Mine rollers and mine plows are being developed for the Leopard 2 variants, but at this point they are only available for the Leopard 1 C2. This means that each Strathcona tank squadron can only mount three implements, provided all the Leopard

1 C2s are operating. For a complex obstacle breach with a minefield and a ditch, a squadron requires four implements (two plows and two rollers) in order to attempt two lanes as per our doctrine. Currently, we are short one implement in order to conduct a proper breach. Therefore most of our breaching attempts will have to be notional. It is extremely important that we maintain current on breaching tactics and procedures, as these skills and equipment save lives, as proven on operations in Afghanistan.

The second area that is significantly affected by the tank transition is maintenance or vehicle serviceability. It may seem very perplexing to the outside observer as to why the Vehicle Off Road (VOR) rate for the Leopard 2 at the Strathcona's is so high, given that they arrive at the Regiment after being refurbished at the factory. There are five main reasons for this: some vehicles arrive in poor condition; maintainers are still becoming familiar with the new vehicle which leads to an increase in inspection and repair time; crews are still unfamiliar with the vehicle; there is not enough specialty tooling and heavy lift capability; and, a lag in the spare parts system.

The maintainers currently take three to four weeks to conduct an F3 inspection on the Leopard 2, as opposed to two to three weeks on the Leopard 1 C2. This is due to the fact that maintainers are still familiarizing themselves with the new platform, and many tasks that crewmen used to do as part of the F3 are now done by maintainers. We are working on establishing a F3 maintenance program that equally balances tasks between maintainers and crewman. As the maintainers become more familiar with the vehicle and more tasks are given to crewmen, the F3 process will occur faster. Right now, overdue F3 inspections are the primary



Courtesy of Maj Gardner

A Leopard 2A6M driving through Sherwood Park Alberta during Freedom of the County, 24 Aug 13.

reason for the high VOR rate for the Leopard 2.

It will take time for all armoured crewman, both experienced and newly qualified, to completely understand and remember the nuances of the different Leopard 2 variants. Tasks such as F1 inspections, hot and cold checks, daily parades, and field maintenance remain the primary crewmen functions that help the maintainers keep the fleet serviceable. A common issue that has arisen is Leopard 1 C2 qualified drivers regress to their old training while conducting checks on the new vehicle. This issue has resulted in problems such as excessive top ups of engine and transmission oil as well as improper brake inspections. The obvious solution is proper supervision and understanding the key differences between the Leopard 1 C2 and the Leopard 2 variants. This understanding is imperative for not only newly qualified drivers, gunners, and loaders but also commanders who must learn the differences between the old and new tanks in order to properly supervise their crews.

The rapid divestment of the Leopard 1 C2 is the best

plan to push us forward. Without this rapid divestment, it may be too easy to revert back to our comfort zone with the impact being too much time and resources being spent on the old fleet. This divestment allows crewmen and maintainers the opportunity to better focus on learning the new fleet from maintenance and, tactics, techniques and procedures perspectives. There is much more that us tankers have to learn with respect to Leopard 2 variants, even for those who deployed on the Leopard 2A6M. That being said, this is an exciting period for the LdSH(RC) and the Corps is very fortunate to have the opportunity to work through these issues on a main battle tank such as the Leopard 2.

Perseverance



Courtesy of Maj Gardner

Cpl Clayton McConnell and a Field Service Representative (FSR) from KRAUSS-MEFFEI WEGMANN (KMW) repairing a Leopard 2 power pack.



TRAINING

ARMY DRIVING AND MAINTENANCE SPECIALIST COURSE



Courtesy of Cpl Elley

Driving & Maintenance (D&M) course on Leo 2.



CAPT O.J.R.R. DELISLE

**ARMY DRIVER AND
MAINTENANCE TEAM LEADER,
STANDARDS SQUADRON,
ROYAL CANADIAN ARMoured
CORPS SCHOOL**

With the retirement of many Senior Non-Commissioned Officers in recent years, a great deal of institutional knowledge has been lost within the Royal Canadian Armoured Corps. Without formal training on maintenance, planning, and supervision, the Regiments now have a lot less knowledge concerning maintenance, rail movement, and driving instruction.

The possibility of creating an Army Driving and Maintenance specialist course is currently being examined. Right now, the concept presented is based on a modular course format that would be accessible to the four combat trades starting at the rank of MCpl. The first module would be common in order to include the Army's common vehicles. The second module would be specific to the Leopard 2 tank. This modular approach would make it possible to integrate new vehicles in the Army's fleet in the future. There are also plans to include distance learning to the course that would include most of the theoretical classes in order to shorten residential training.

MODULE 1

- Plan and supervise a unit's driver training;
- Plan the unit's maintenance plan;
- Plan the road, rail, and trailer movement;
- Advanced recovery and repair techniques;
- Basic theory and mechanics;
- Generators; and
- Instructional techniques for D&M.

MODULE 2

- Operation and maintenance of the mine plough;
- Operation and maintenance of the mine rollers; and
- Operation and maintenance of the dozer blade.

With respect to the Royal Canadian Armoured Corps School, the re-instatement of this course would make it possible for units to reduce their dependence on vehicle technicians and increase the units' ability to deliver driver courses. That would improve maintenance management at the unit level and allow for better instruction and supervision of driving and maintenance in a decentralized manner.

ADVANCED TRAINING OPPORTUNITIES – IS MORE IT A SOLUTION?



Courtesy of Cpl Alonzo

A dismounted recce patrol in CFB Gagetown.



CAPT K.W. CUSHING
TACTICS TROOP LEADER,
STANDARDS SQUADRON,
ROYAL CANADIAN
ARMoured CORPS SCHOOL

There are two capability deficiencies within the units of the Royal Canadian Armoured Corps (RCAC). These are advanced reconnaissance skills and communication skills – two areas of desired tactical and technical expertise that are nowhere formally taught or captured within our training system. These are skills that we hope our soldiers obtain, and they often do, but at no time do we deliver the material during Individual Training (IT). This article aims to identify this gap and promote one possible solution to rectify it.

It is widely acknowledged that the magnitude of skill and knowledge expected of a Patrol Commander (Ptl Comd) in a Formation-Level Recce Sqn is significant. As the smallest independent armoured

recce manoeuvre element within the battle space, a recce Ptl Comd is expected to operate independently over a vast geographical area and to do so with little integral or immediate support. The potential tasks of a Ptl Comd are numerous, including reconnaissance, surveillance, and tactical security and, he is expected to transition between this wide array of tasks at a moments notice. In fact, very few sergeants in a Bde have as much autonomy or independence as the Ptl Comd within a medium reconnaissance squadron. However, the shortest tactical course at the Royal Canadian Armoured Corps School (RCACS) is the Ptl Comd which has 15 training days.

While the training delivered on the new DP3 Recce Ptl Comd course lays the foundation of the skills required, it is inadequate to provide the wide spectrum of tasks and advanced skills within such a short timeframe. The rest of their development must fall on the unit within the realm of Collective Training (CT). However, there is already a large demand on CT in terms of expectations (Management Readiness Plan) versus time; also, CT is aimed at higher levels than the

individual and is not ideally suited to tackle individual skills. Therefore a reasonable solution is to address this training gap during IT, namely an advanced reconnaissance course open to a few select Ptl Comds.

An advanced instruction course would allow the Ptl Comd to further refine their abilities and bring these skills and experiences to their troop. Most of the items on the list below are no longer taught during IT. Advanced skills which have been identified for further training include:

- CBRN recce and survey;
- Bridge and route classification;
- Operations in complex terrain / built up areas;
- Advanced dismounted operations;
- Advanced OP and screen operations;
- Movement control;
- Mobility and counter-mobility;
- Counter reconnaissance; and
- Miniature Unmanned Aerial Systems (MUAS).

Delivering advanced training in these areas to selected Ptl Comds would further their ability to collect valuable information and provide commanders with increased awareness of the battle space in order to enhance decision-making.

Effective communication is a cornerstone of mechanized operations and knowledge of communication procedures and equipment is vital to mission success. There is currently no official communications training in the RCAC other than what is taught in DP1 for NCMs and Officers, 70 and 25 instructional periods respectively. This lack of training leaves a significant gap between the knowledge and skill of an Armoured Crewman or Officer and the Squadron Signaller, who is not always available to assist. What is more, doctrinally, there is only one signaller



Courtesy of Cpl Alonzo
Route recce in CFB Gagetown.

in an armoured reconnaissance squadron. Traditionally this gap has been filled by troop or squadron communications representatives who receive no formal training but are expected to operate and troubleshoot communications equipment when the designated signaller is not available to assist.

Although informal training has managed to cover this gap, more robust training should be provided to ensure units in the field are adequately supported. The required skills for advanced communications training would include:

- Installing and uninstalling communications equipment in armoured vehicles;
- Loading encryption into devices;
- Comprehensive troubleshooting of communications equipment; and
- Creating expedient and long range antennas and comprehensive programming for RRBs and long range broadcasts.

Delivering this training to a select number of soldiers within each troop or squadron would augment the available signals support, reduce the amount of time spent resolving communications issues, and allow us to employ our equipment to its fullest potential.

Expanding the tactical and technical skills of our soldiers has the potential to allow greater effect with existing levels of manning and equipment. Identifying gaps or deficiencies in the skills of our soldiers is the necessary first step in having them resolved. Currently the RCACS is undergoing the training design process to investigate the appetite for advanced, low-density courses. The first step is conducting a Needs Analysis that will be pushed to the field force for feedback and comment during 2014. IT cannot be the solution for every capability gap, but it is a good place for the desired skills outlined above.

COURSE REVIEW UPDATE



Courtesy of Cpl Alonzo



CAPT K.W. CUSHING
TACTICS TROOP LEADER,
STANDARDS SQUADRON, ROYAL
CANADIAN ARMoured CORPS
SCHOOL

A comprehensive review of Royal Canadian Armour Corps (RCAC) training is currently underway by the Combat Training Centre (CTC), the Royal Canadian Armoured Corps School (RCACS), and the Regiments. This review allows us the opportunity to modernize our training methodology, streamline delivery of training and incorporate feedback from course critiques. Creating

and delivering well-designed career courses is vital to building skills which prepare our soldiers and officers for employment in specific roles and, equip them to participate in further collective training at the units and on deployed operations.

The recommendations and observations given by representatives of the field force during Qualification Standard (QS) Writing Boards are critical to developing effective Training Plans (TP). Creating a TP is a collaborative effort that requires oversight from the CTC HQ Armour Training Design team, contribution from Training Development Officers and the experience of skilled instructors from the RCACS.

An innovative feature which is being incorporated into all courses is the progressive training model, often referred to as the “block system.” This model is applied during the field portion of each course and has students practicing scenarios of increasing difficulty before being assessed during higher complexity tasks. This approach incorporates aspects of the Theory of Adult Learning which has proven successful in coaching top level athletes in the world of sports. The level of complexity is based on the intensity of enemy activity including the number of contacts, changes to the friendly disposition, and the requirement to execute transitional tasks. Block 1 and 2 include a demonstration and lower complexity scenarios allowing students to focus more on navigation, execution, and making successful bounds. Block 3 and 4 offer medium and higher complexity scenarios, offering more challenges with each trace. This gradual approach allows students to gain a higher comfort level sooner and introduces the always difficult “multi-tasking” in a more controlled approach. Qualifications are granted based on a student’s performance during the final block of high complexity traces (all students must pass 1 trace in the last Block).

Below are some of the highlights regarding individual courses and milestones for their review and implementation:

DP1 CREWMAN:

- Training to be streamlined, with BMQ (Land) elements devolved to divisional training establishments;
- Course will include AFV recognition, comms, Land Force Command Driver Wheeled, RCAC history as well as one PCF;
- Training to be decentralized for delivery by Field Force Units;
- TP Writing Board to be held February 2014; and
- Pilot course to run Fall 2014, sponsored by LdSH(RC).

DP3 ARMOUR CREW COMMANDER:

- Replaced Armour Reconnaissance Crew Commander and Tank Crew Commander courses;
- Combines all crew-level training into a single course for PRes and RegF;
- Ensures crossover training from Recce to Tank or Tank to Recce is efficient and modular;
- Pilot Course completed Fall 2013 at the RCACS
- Review of Pilot Course – Winter 14

DP3 PATROL COMMANDER:

- Back to basics approach with emphasis on RAPZ tasks, RAS tasks, Screen Operations, and Dismounted Patrolling;
- Decentralized for delivery by the Field Force;
- Will be delinked from promotion to Sgt for RegF and training focused on the identified recce crew comd’s who require it;
- TP Writing Board conducted Fall 2013; and
- Pilot course will run Fall 2014 at the RCACS.

DP3 ARMOUR TROOP WARRANT:

- This course will encompass both Recce Tp WO and Tank Tp WO training with separate streams based on regimental employment;
- TP Writing board conducted Fall 2013; and
- Pilot course to run Fall 2014 at the RCACS.

DP1 ARMOUR OFFICER:

- Mod 1: Leopard 2 will be used as primary platform for teaching crew commanding as there is no other suitable platform;
- Mod 2: Reconnaissance Troop Leading;
- Post DP1 Conversion to Tank will be reduced – only Tank Tp Leader required as all students will receive tank CC gunnery and CC during Mod 1;
- QS and TP Writing Boards to be held in 2014; and
- Pilot Mod 1 NB Summer 15, Pilot Mod 2 NB Fall 15.

THE DEFENCE LEARNING NETWORK AND THE ROYAL CANADIAN ARMoured CORPS



MWO D.G. GOODWIN
MEMBER OF TACTICS TROOP,
STANDARDS SQUADRON,
ROYAL CANADIAN
ARMoured CORPS SCHOOL

Today, the modernization of training affects all of us in the Canadian Army (CA) and the Royal Canadian Armoured Corps (RCAC). Simulation, emulation and e-learning are but a few methods currently being employed. The Defence Learning Network (DLN) is one delivery method being introduced, providing “anywhere, anytime and just in time” access to e-learning opportunities to all members of the CA at home and abroad. DLN was a DND/CAF purchase to replace the existing DND Learn and provide distributed learning throughout the CAF, as an initiative to meet the needs of all branches. The Royal Canadian Air Force has been using a form of this program for several years with great success. The goal is to create a national repository for the information stored, accessible by all DWAN users (if proper access rights are eventually granted) for common courses and training material used by all elements. Through a keyword search, lesson plans and training documents will be available to all users in order to prevent duplication of effort.

New technology comes with fresh challenges. In order to reduce costs, contracted Learning Management Systems (LMS) programmers were given notices of termination or transfers, with the intent of having “Greens” (Soldiers) to do their jobs. LMS programmers have taken several years of courses in order to be able to manage the systems, while soldiers generally have none, requiring additional specialized training. Also, contractors generally do not move a great deal and will stay in place while the contract is there. A soldier however will change positions on a regular basis, usually spending between twelve to twenty-four

months before changing jobs in order to progress. This will create an entirely new training and experience requirement moving forward.

DLN has replaced DND Learn without being tested for full functionality and user support; in essence we have jumped into a project that is still in development. This is a problem no different than if we delivered the new TAPV without ICT or an integration plan – in short, the user is overwhelmed. Once these initial challenges are overcome and all capabilities are functional, then DLN will be an extremely useful educational medium. In the meantime, there are questions that the RCAC will need to answer in the short term; the first and foremost, is how we can utilize DLN in order to train our soldiers. Due to the nature of training of NCMs and Officers in the Corps, DLN should only be considered suitable to reduce garrison training for senior courses at the Royal Canadian Armoured Corps School (RCACS). Due to the levels of experience of the students on junior courses, the in-house garrison training is viewed as essential at this time. The look of confusion on a student’s face may be the only indicator that the student is having difficulties during the learning process; this cannot be replaced. DLN may become an important tool with the decentralization of courses, running from various locations across the country. Future DLN uses could be the delivery of a standard pre-course training package that all regiments will offer to better prepare students for training. Other than actual vehicle movement, all other materials normally taught in the classroom can be created and delivered to registered students as refresher before the conduct of courses.

Although the DLN has a promising future in the CA, the questions remain as to how we in the RCAC utilize it to best train our soldiers. Before full implementation, its use will be trialed at the RCACS in order to determine best practices for application in our particular training environment.

PUNCHING ABOVE ITS WEIGHT -THE ROYAL CANADIAN DRAGOONS BATTLE GROUP: EX MAPLE RESOLVE 1301



LT C.J. MCNAUGHTON

**TROOP LEADER, A
SQUADRON, ROYAL
CANADIAN DRAGOONS**

During May and June 2013, the RCD were tasked to lead a Battle Group (BG) to act as the Contemporary Operating Environment (COE) Enemy Force at Canadian Manoeuvre Training Centre (CMTC) Wainwright for Exercise MAPLE RESOLVE 1301 (Ex MR 1301). The Regiment's aim was to confront 1 Canadian Mechanized Brigade Group (1 CMBG) and 1st Battalion, PPCLI BG (1 VP BG) with a viable enemy force. The RCD BG consisted of an infantry company, provided by B Coy 1 RCR, an armour recce sqn provided by A Sqn RCD, combat engineers from 23 Field Squadron 2 CER, and a troop of tanks from B Sqn LdSH(RC). Y Bty 2 RCHA provided an Artillery Tactical Group consisting of Forward Observers, Forward Air Controllers, and an FSCC and battery commander, while 21 Electronic Warfare Squadron attached a pair of light Electronic Warfare (EW) detachments. For much of the exercise, the BG employed a dedicated Shadow Unmanned Aerial Vehicle (UAV), flown by elements from the Utah National Guard. HQ Sqn RCD provided logistic support to the BG, while RCD Regimental Headquarters (RHQ) formed the BG Headquarters.

With the RCD BG lacking in apparent combat power when compared to our 1 CMBG counterparts, it appeared that the BG would only stand as a footnote in 1 CMBG's road to high readiness; this was not the case. Largely given free rein by CMTC to act as a thinking, conventional enemy throughout the exercise, the RCD BG consistently punched above its weight. This presented 1 CMBG and 1 VP BG with a robust enemy force that enhanced their experience as the Primary Training Audience (PTA). Crucial to the RCD BG's success was a solid foundation in Canadian Army's tactical war-fighting doctrine, which enabled the BG HQ and manoeuvre sub-unit commanders to



Courtesy of Cpl Bellamy

Coyote in a patrol base during Ex MAPLE RESOLVE 1301.

synchronize combat power and implement creative solutions to an array of tactical problems.

Generally, the force on force portion of Ex MR 1301 occurred in three phases. These included the initial border skirmishes along the Battle River, the consolidation of the 1 VP BG bridgeheads on the east bank of the river against desperate RCD BG offensive action, and finally culminated with the 1 VP BG switching to deliberate offensive action on prepared defensive positions. Each of these phases presented unique challenges to both the PTA and the enemy force. Despite force ratios favouring 1 CMBG, the RCD BG frequently overcame this limitation via thorough consideration of the tactical problem, Intelligence Preparation of the Battlefield and the wider Operational Planning Process,

The initial border skirmishes saw the RCD BG arrayed in a screen to the East of the Battle River, with A Sqn observing key crossing sites and with troops in ambush positions. B Coy, with the tanks of 2 Troop LdSH(RC), stood poised to enact a mobile defence, aiming to block the 1 VP BG's advance. A Sqn's screen, coupled with embedded light EW detachments effectively determined the PTA's concentrations and main axis of advance. A Sqn eventually withdrew from the screen and left patrols in place to report for nearly six days. 1 VP BG consolidated its gains and made ready to push East into the waiting B Coy Combat Team (Cbt Tm). This Cbt Tm successfully halted 1 VP BG's

advance through well-sited, dug-in platoon positions supported by robust obstacles including minefields and tank ditches constructed by 23 Fd Sqn. The RCD BG then staged a tactical withdrawal and prepared for offensive operations to dislodge the enemy's newly won bridgehead.

The offensive phase for the RCD BG saw A Sqn composed of two dismounted troops, a mounted Coyote troop, an attached tank troop, plus an infantry platoon. B Coy was to seize key terrain in order to attack the main defensive positions of the 1 VP BG by fire.

As it turned out, the RCD BG had the opportunity to run the counter-recce portion of this plan twice. On the first iteration, A Sqn Cbt Tm linked up with its dismounted elements and conducted an effective counter-reconnaissance, taking the enemy by surprise after picketing their positions the night before. This resulted in the destruction of 1 CMBG Recce Sqn. In order to help the flow of the exercise, CMTC hit the reset button. The result the second time was largely the same, but was achieved by other means. Instead of directly assaulting 1 CMBG Recce Sqn's screen, it was displaced by the use of indirect fire. The enemy countermoves force was subsequently neutralized after identifying it with the UAV and firing Field Artillery Scatterable Mines (FASCAM). Although unable to dislodge the enemy BG, the RCD BG was able to disrupt their timetable through aggressiveness and bold action, denying them the initiative despite their advantage in numbers. Success was attributed to the synchronisation of enablers throughout the battle.

The main defensive battle hinged on one key crossing site along Ribstone Creek: Cattalo Bridge. B Coy 1 RCR along with 23 Fd Sqn began work on the Main Defensive Area immediately upon arriving in Wainwright. By occupation time, it was a well-sighted, well dug in, company-sized defensive position with an effective obstacle plan. A Sqn, with an attached tank troop, formed the countermoves force. However, with the sqn hide east of the Ribstone, the bridge was the only viable crossing site that enabled our tanks to swiftly counterattack at the critical moment. To their credit,

1 CMBG blew up the bridge, rendering our defence in depth inadequate to respond to their advance further to the North. Racing against time to cross further North, A Sqn fell victim to steady attrition as the remaining elements of 1 VP overran B Coy and 23 Fd Sqn.

Although not the PTA, the training opportunity Ex MR 1301 afforded RCD RHQ was second to none. The ability to act as an adaptable and thinking enemy who was not forced to conform to a preset template was critical to creating a realistic training scenario. All elements of the BG, regardless of cap-badge, demonstrated a sound grounding of our tactical doctrine and their respective areas of expertise that enabled 'outside the box' thinking. RHQ, as the orchestrator of the BG's success, demonstrated the considerable ability of armoured units to act as the basis for a BG. Whether on operations or in training, it seems counter-intuitive for the army to continue to form exclusively infantry BGs in the future. Ex MR 1301 proved that a BG based on armoured recce, paired with appropriate enablers, could perform effectively, and excel, in the command and control of multiple arms. It falls on us, not as a regiment, but as the Royal Canadian Armoured Corps, to continue to demonstrate at every opportunity the capability of our units.

Worthy!



Courtesy of Cpl Bellamy

Reconnaissance troop from A Sqn RCD during Ex MAPLE RESOLVE 1301.

FORWARD TO FUNDAMENTALS: TANK TRAINING FOR THE “NEAR-PEER” FIGHT



Courtesy of Combat Camerat

On the final attack of Ex MAPLE RESOLVE 1301, a Chinook prepares to drop a pre-fabricated over-bridge to allow A Squadron LdSH(RC) to insert its Leopard 2s deep into the enemy’s rear.



MAJ E. ANGELL
OFFICER IN COMMAND
A SQUADRON, LORD
STRATHCONA’S HORSE
(ROYAL CANADIANS)

Since the summer of 2006 when the first Leopard 1C2s deployed to Afghanistan, the tank squadrons of the Canadian Army (CA) have been fighting an inferior enemy. This enemy was not uniformed, operated with loose doctrine, had no armoured fighting vehicles (AFVs) or aircraft, and fought us with mostly antiquated anti-armour weapons. Consequently, tank training has been focussed on fighting an inferior enemy, albeit in an extremely complex environment. To be clear, I in no way mean to understate the complexity of the environment that we operated in, but simply to highlight that we overmatched our enemies within the tactical and

operational sphere and adjusted our training accordingly. It was only in the fall of 2011 on Ex MAPLE RESOLVE 1101 that tank specific training began to refocus on the “near-peer” fight after concentrating on counter-insurgency for many years.

Near-peer is best described as an enemy force that is a similar size to us, and matches our level of training and equipment. They are also a uniformed force and are organized in a military fashion employing standardized tactical doctrine. Due to various political sensitivities, the CA has adopted a fictitious enemy to train against, the near-peer component best known as the Port-Au-Prince Guards Battalion. They use a similar doctrine to old Soviet forces.

When operating as part of the combined arms team, the Main Battle Tank (MBT) is still the dominant weapon on the modern battlefield. Our tanks bring firepower, mobility, protection, and shock action to any and every fight. This is true for both conventional and counter-insurgency operations; the usefulness of tanks in the latter was proved by

our crews in Afghanistan. However, there are an increasing number of weapon systems capable of destroying a tank. This list includes perhaps our greatest battlefield foe: enemy tanks. One must not forget this basic truth when considering training our crews and squadrons. In short, we must train against the greatest battlefield threats, which include enemy armoured forces, or lose our tactical edge for every other fight. Therefore, force-on-force training is the best and only effective way to train against a near-peer enemy.

The best tool and method the CA has to simulate the near-peer fight is the Weapon Effects Simulation (WES) system. While far from perfect, WES is an invaluable tool in measuring true effectiveness in tank versus tank combat during training. Many have the impression that WES is only used during Ex MAPLE RESOLVE serials; however the LdSH(RC) has also used it to great effect during Level 6 training, more specifically pitting one tank squadron against another. This proved to be an invaluable learning opportunity for all involved.

While training for the near-peer fight is easier to plan and execute, the resource requirements are much higher. A handful of replicated insurgents firing Rocket Propelled Grenades (RPGs) and emplacing Improvised Explosive Devices (IEDs) do little to exercise tank manoeuvre skills. In order to truly exercise a tank squadron you need a tank squadron as the enemy. Collective training is moving toward this ultimate goal, and Ex MAPLE RESOLVE 1301 had the largest number of vehicles using vehicle-borne WES kits ever. There was a total of 392 vehicles with WES: 285 in the Primary Training Audience (PTA), and 107 in the Opposition Forces (OPFOR). The PTA (A Squadron LdSH(RC)) had 14 tanks with WES and the OPFOR had four. The OPFOR tank troop was intended to replicate a full squadron.

The LdSH(RC) recent training proved that one of the biggest changes in mentality from counter-insurgency to a near-peer fight is the reemphasis of crew commander skills and employment of the squadron as a whole. In Afghanistan, the most tactically advantageous position was often in the open, on the high ground, with security achieved from standoff and long clear lanes of fire. While this works well against RPGs and IEDs, it is a good way to get killed when the enemy has tanks, long-range anti-armour weapons, artillery,

aircraft, etc. In order to survive against a comparable enemy, speed and manoeuvre are the key. This includes speed of movement, speed of engagement and speed of planning, decision, and action. Crew commanders must take quick short bounds of no more than 800-1000m where the ground permits, which is tied to cover by fire and range bands. In Afghanistan from various high ground positions tank crews could realistically engage personnel and technical vehicles out to ranges approaching 4000m with High Explosive Anti-Tank (HEAT) ammunition. Recognizing that sabot is the most effective tank killing round we have re-emphasized the 2000m range limitation of sabot against hard targets. Another key aspect of training crew commanders is re-invigorating the use of tank mobility implements and drills for beaching complex and deliberate obstacles, acknowledging that a near-peer enemy will likely have robust engineer assets.

In the fight against a near-peer enemy at the combat team level, the hasty attack is vital. As previously mentioned, the ability to win against a near-peer force is predicated on speed and mastery of the fundamentals. It is absolutely essential that tank training include all arms co-operation. To be clear,



Courtesy of Maj E. Angell
Sgt J.B. Hamilton is all smiles after bringing death and destruction to the enemy (note smoking hulls in the background) courtesy of 21 120mm rounds.

training with the other Combat Arms is key, and the Royal Canadian Armoured Corps (RCAC) cannot hope to win a near-peer fight without it. The best training vehicles for this are the Combat Team Commander Course (CTCC) and Ex MAPLE RESOLVE. The CTCC is invaluable in preparing sub-unit commanders with the skills they need to fight and



Courtesy of Combat Camera

The Combat Team operating during Ex MAPLE RESOLVE 1201, regardless of weather conditions.

win against a commensurate force. It is most definitely “key-terrain” that must not be lost or under-emphasized. The Combat Team and utilisation of a well executed hasty attack will allow the all-arms team to dislocate the enemy forces and destroy them before they can react. Another excellent training event this year was Ex PROMETHEAN RAM, a 1 Canadian Mechanized Brigade Group live-fire exercise. This exercise saw the bulk of the brigade “bomb-up” live ammo on day one and not clear weapons until the end of day ten. This exercise re-emphasized many all-arms lessons on live-fire ranges and most definitely “trained to excite”.

The LdSH(RC) have also had to re-establish how we avoid being attacked by aircraft; a tankers’ greatest enemy. In an age of thermal cameras on aircraft and Unmanned Aerial Vehicles, the best protection is dispersion and cover and massing combat power to strike, before quickly dispersing again. This applies specifically toward weaning armoured forces from a reliance on static administrative and replenishment areas, such as Forward Operating Bases (FOBs), semi-permanent maintenance areas and close leaguers. The days of circling the wagons to protect the soft-skinned vehicles in the echelon under the Squadron Sergeant Major are gone. The Regiment has re-invigorated the use of hides and hide routine, living “lean and mean” off the tank for weeks at a time, camouflage nets, track discipline (to include covering and erasing tracks) and running replenishment, etc.

So in summary, everything old is new again. This approach does not advocate taking a step back to basics but moving forward to fundamentals. It may seem a minor distinction, but it is an important one nonetheless. The RCAC must reemphasize the fundamental crew commander skills: adopting positions, quick short bounds, and cover by fire. We must train against the deadliest battlefield threats to ensure we maintain our tactical superiority. Mastery of these fundamentals will win the tactical battle against any near-peer enemy and prepare us better against the inferior ones as well.



Courtesy of Sgt J.B. Hamilton

OC A Sqn LdSH(RC), Maj E. Angell in front of his Leopard 2A4 (Archangel).



GUNNERY

INTERNATIONAL MASTER GUNNERS CONFERENCE 2013



SGT C.J. BULMER

**MEMBER OF THE ARMY
INSTRUCTOR GUNNERY TEAM,
STANDARDS SQUADRON, ROYAL
CANADIAN ARMoured CORPS
SCHOOL**

This year's International Master Gunners Conference (IMGC) was held from 7 to 11 October 2013 in Camp Rena, Norway. The IMGC is a yearly conference where the Master Gunners (Advanced Gunners in our parlance) of different nations come together and discuss a wide range of topics. This is an important forum for like minded nations, especially for Leopard tank users, to share operational experiences and training techniques. As relatively new users to the Leopard 2, it is important for the Royal Canadian Armoured Corps (RCAC) to leverage other user nations to gain knowledge and experience from their use. At this year's conference various topics included: bore sighting and zeroing techniques, gunner and commander's firing techniques, fire distribution at platoon level, national tank gunnery concentrations, climate tests and optics versus monitors. Each country gave a presentation on their assigned topic after which the various delegates would comment or ask questions. The flow of information was extremely positive, as nations would weigh in with their experience. The delegates were most impressed with Ex WORTHINGTON CHALLENGE as we are one of only a few countries currently supporting gunnery concentrations in order to improve gunner quality. Excellent questions and comments were drawn from the presentations and some nations expressed interest in Ex WORTHINGTON CHALLENGE at a future date. This could herald the return of the Canadian Army Trophy of the past.

Other nations' experiences and tank fleets varied dramatically. Some countries, like Brazil, are just getting into the tank business. Others, like Denmark, have had armoured

forces for decades. I have included a summary of some of the relevant information derived from the conference for possible use across the RCAC:

- When zeroing their tanks in the winter, the Norwegian army will have the barrels of their tanks to the front vice over the back deck. The Norwegians found that the barrel is heated by the engine creating discrepancies, which causes errors in boresighting and zeroing;
- CLP should not be used on the main gun as a preservative. The Danish and Dutch armies both found CLP will work its way under the chrome lining, creating discrepancies which will affect boresighting, zeroing, and ultimately, accuracy. Barrel life can also be affected. Gun oil SMX is recommended to be purchased and used;
- The canister round M1028 should only be fired from a temperature of -32°C to +49°C for the L44 barrel. Above the highest temperature, dangerous overpressure can develop. The L55 barrel for the Leopard 2A6 is made out of higher quality metal and can withstand firing the M1028 round at a higher temperature of +63°C; and
- The United Kingdom has an annual live fire testing program in which all crews have their gunnery skills evaluated. The testing is very thorough with each crew having to pass live fire shoots with sabot and HE at various ranges, coax shooting, and a live fire battle run. The U.K. measure hits, accuracy and target acquisition.

The information and experience obtained at these events are invaluable. Learning from others who have already tackled similar issues provides an excellent means to assess our own procedures with a view to improving the way we do business. Next year, the Master Gunners conference will be held in Thule, Switzerland.



Courtesy of Norwegian Army
Participants of the International Master Gunners Conference 2013.

EX WORTHINGTON CHALLENGE 2013



Courtesy of Cpl Alonso

Leopard 1C2 on the CFB Gagetown range during Ex WORTHINGTON CHALLENGE 2013.



LT M.J.C. BASTIEN
ARMY INSTRUCTOR
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The Royal Canadian Armoured Corps School (RCACS), as the Canadian Army's (CA) Centre of Excellence (CoE) for mounted direct fire, hosted the second annual Exercise WORTHINGTON CHALLENGE. Although the origin for this event was a tank gunnery concentration, the scope was widened this year to include the 25mm platform and allow non-armoured units to participate. The concentration was broken into two categories: Leopard 1 C2 (105mm) and LAV III (25mm). The three Regular Force armoured regiments and the RCACS competed in both events. The non-Armoured Corps competitors included three additional units within the geographical area: the Infantry School, the Royal Canadian Artillery School, and 4 ESR. The intent is to expand the concentration each year in order to broaden CA participation.

Continuing with the format that was developed the previous year, the event was held over a four day period. The tanks competed in fire teams while the LAV IIIs were limited to single vehicle battle runs. Tanks and LAV III's

were provided by the RCACS to visiting units, while C Sqn RCD provided tanks for themselves and the 12eRBC. The first day of the concentration included the welcome brief and opportunity to practice on the Leopard Crew Gunnery Trainer (LCGT) and the LAV Crew Gunnery Trainer (LAV-CGT). The second day consisted of vehicle preparations, deployment to the range, bore sighting, zeroing, and dry battle runs. The third and fourth day witnessed both Leopard and LAV III live-fire battle runs. Each team was allotted a battle run each day, allowing participants to incorporate the AAR process and learn from the day's events. Each team's second run offered a new target array, thereby gradually increasing the complexity and difficulty of the range.



Courtesy of Cpl Alonso

Leopard 1C2 during Ex WORTHINGTON CHALLENGE 2013.

The winning team in the tank category was C Sqn RCD. Second and third place was extremely close between the 12eRBC and LdSH(RC). On the 25mm side, 12eRBC took top honours followed closely by the RCD. Of note, the Royal Canadian Artillery School bounced back with an extremely strong performance on their second run that put them in third place. While a judges decision and penalty points can be frustrating for some, all competitors, especially non-armoured units, agreed that it was an excellent event and look forward to next years event.

Similarly to last year's results, all teams performed roughly the same in regards to their level of accuracy. The deciding factors, once again, were target acquisition and aggressiveness; the teams that fired more rounds were the ones that hit more targets and in turn achieved higher scores. Even though all teams did well, it was noted that there is still room for improvement with regards to basic gunnery skills. These include bore sighting and zeroing procedures, target acquisition, and fire team communication. The planning for 2014's event has already begun.



Courtesy of Cpl Alonso

Coyote during Ex WORTHINGTON CHALLENGE 2013.

BENEFITS OF A SUB-CALIBRE TRAINING DEVICE FOR 120MM



Courtesy of Cpl Alonso

Leopard 2 on a CFB Gagetown range.



CAPT R.I. LUND
TECHNICAL ADJUTANT,
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With the introduction of the Leopard 2 to the Royal Canadian Armoured Corps (RCAC) in 2007, Canada's direct fire capability significantly improved with the switch from a 105mm to a 120mm main gun. In general, a 120mm tank round provides marked improvements in firepower, accuracy, range and shock action in comparison to the smaller 105mm round. Unfortunately, a marked improvement doesn't come without a substantial increase in cost. 120mm training ammunition costs nearly three times that of 105mm training ammunition. This poses a serious challenge to the RCAC as the Canadian Army (CA) responds to fiscal pressures.

In an effort to reduce training costs the CA has relied on the use of simulation to supplement training and prepare users for live shoots. Current gunnery simulation systems in use include the Leopard Gunnery System Trainer (LGST) and Weapons Effects System (WES). Both systems offer varying degrees of realism but also come with a number of limitations. The LCGT provides effective and realistic training for tank crews but has a limited ability to conduct collective training and it does not replicate the consequences of fire. WES is the current collective training tool but falls short from a perfect solution in several ways. It does not properly train the loader, it does not replicate the consequences of fire, and it does not provide any fall of shot, making the gunner unable to call corrections.

A method that is currently being explored to bridge the gap between simulation and live fire is the use of an In-Bore Sub-Calibre Training Device (SCTD) for the 120mm gun. A SCTD can augment the firing of 120mm full bore training ammunition and provide gunners and crew commanders with opportunities to engage targets on the open range.

A SCTD is a device that is inserted into the bore and is integrated into the existing fire control system allowing the crew to complete most gunnery functions. A SCTD simulates the firing of a 120mm round, allowing the gunner and commander to observe the fall of shot and make corrections. It can also provide limited training to the loader, as aspects of his drills can be simulated, depending on the SCTD system.

A SCTD uses a smaller calibre round with similar ballistic properties, up to a certain range, as its larger brethren to simulate fire. Commonly used calibres include 25mm and 35mm, which are used in 120mm SCTDs for the Leopard and tanks of other nations. Both calibres offer similar ballistics to a 120mm round in excess of 1,500m.

The use of a SCTD can be beneficial during the conduct of collective training to provide a volume of fire during level 3.5, 4 and 5 training at a substantially decreased cost. A 25mm training round is only a fraction of the cost of a 120mm round. It is important to note that a SCTD should not be leveraged to replace existing individual training rounds, – but could augment existing rounds with additional practice opportunities for the gunner.

A SCTD comes with significant cost savings, but as with any simulation tool, it has its limitations. Limitations include: it does not properly train the loader (who may require adapted drills), it does not replicate the consequences of fire, and it cannot simulate all natures of ammunition at all ranges.

As the CA works to reduce National Procurement expenditures, the need for effective gunnery simulators has become paramount. The addition of an effective SCTD would help bridge the gap between simulation and live fire while providing the army with significant cost savings in training ammunition. The Tank Replacement Project is currently investigating procuring a SCTD for the Leopard 2 at the request of the RCAC.

DOCTRINE



A REVIVAL OF THE DIVISIONAL RECONNAISSANCE REGIMENT



L COL P.J. HALTON
COMMANDING OFFICER OF
THE QUEEN'S YORK RANGERS
(1ST AMERICAN REGIMENT)

“Altogether, cavalry operations are exceedingly difficult, knowledge of the country is absolutely necessary, and ability to comprehend the situation at a glance, and an audacious spirit, are everything.”

– Maurice de Saxe, *Mes Reveries*, 1732

The Canadian Army (CA) has not had a long history of having functioning divisions on our order of battle. Although we wait to see what impact the formation of Divisions will have on how the CA intends to train and fight, some forward thinking commanders are already pushing to make these new structures deployable (and therefore employable). Functioning divisional headquarters would have a positive impact on the Royal Canadian Armoured Corps as a whole, Regular and Reserve, and the author feels strongly that we should both support initiatives that strengthen this level of headquarters, as well as lead the way in determining their structure and employment.

Although five divisions were raised for service over the course of the First World War, they were all disbanded in 1919. Two divisions were formed again in 1939, with six more created in the following six years (in addition to a “Canadian Army Occupation Force” division created for occupation duty in Germany) – but all were again disbanded by 1946. 1st Canadian Division has existed in various forms over the past few decades, although



Courtesy of Combat Camera
Coyote during a reconnaissance patrol.

essentially only as a shell of a formation. The recent renaming of all Land Force Areas as Divisions brings the CA back into line with a structure that has not existed in its history outside of the two World Wars.

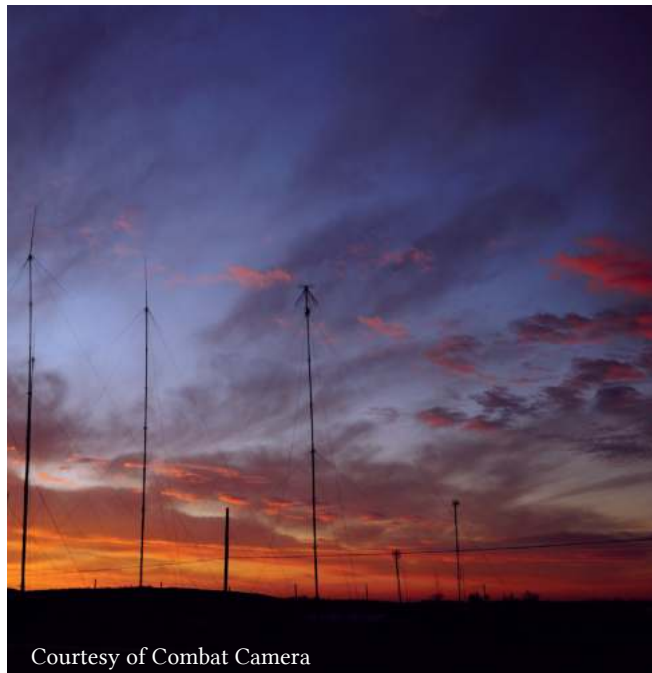
As organized in the Second World War, each Division had a Reconnaissance Regiment as part of its basic structure. No Canadian doctrine currently exists to describe how such a Regiment should be employed, and this structure has not been a topic of instruction at Staff College since the mid-1990s. A modern conception of reconnaissance at the divisional level is embodied in the doctrine of our neighbours to the south, who see this role as the domain of the armoured cavalry.

The purpose of armoured cavalry is to “perform reconnaissance and to provide security in close operations...[in order to]...facilitate the corps or division commander’s ability to maneuver...and to concentrate superior combat power. Cavalry serves as a catalyst that transforms the concepts of maneuver warfare into a battlefield capability.”¹ The key roles of armoured cavalry are defined as:

- Reconnaissance to detect enemy weaknesses;
- Close security to protect the flanks or rear of the infantry line;
- Countering enemy cavalry;
- Counterattacking enemy infantry attacks;
- Reserve;
- Administering the decisive blow to a faltering enemy;
- Covering retreat; and
- Pursuing a retreating enemy.²

Clearly, the US vision for cavalry is that they need to fight for information, and take a more active role in shaping the battlefield than is typical for Canadian reconnaissance organizations. Canadian doctrine defines Ground Manoeuvre Reconnaissance (GMR) as: “A set of activities conducted by land operations forces that assist the commander in defining and shaping the battlespace.”³ The inclusion of shaping would point to the potential for some of the tasks noted above. This potential is not well explored in GMR, which focuses on tactical and intelligence, surveillance, target acquisition

and reconnaissance (ISTAR) related operations in support of tactical formations – without exploring more kinetic operations or operations above the brigade-level in any depth. This is further underlined by what it defines as the four core capabilities of GMR



Courtesy of Combat Camera

capable forces: reconnaissance, surveillance, counter-reconnaissance and population engagement.⁴ While this is a far cry from the speed and violence exemplified by cavalry tactics, such tactics remain in the scope of the broad definition of GMR. The fact that the doctrine is largely silent on how a GMR force might shape the enemy leaves this open to interpretation, and therefore exploration and innovation.

The obvious criticism of trying to employ U.S. cavalry tactics in the Canadian Forces is the disparity in equipment between our two armies. The disparity is only made worse when considering such a role for the Canadian Reserves. Our Army has made a habit of having doctrine follow procurement rather than driving it. Our Corps must place a focus on the platforms from which we fight, but should not become so fixated on having the right platforms that we ignore the underlying need to develop and maintain the right doctrine and mindset as a precursor for success. Armoured officers should be defined by their attitude and approach to problems, not the vehicles they command. The US 2nd Armoured Cavalry Regiment, organized as “light cavalry” from

1993 to 2006, was equipped with HMMWVs and armed with an assortment of machine guns, Mk19 grenade launchers, and TOW missiles. So equipped, it saw service in Haiti, Bosnia, Afghanistan and Iraq.⁵ Some version of this structure is an achievable model, even for the Army Reserve, although coordination with both the Air Force and supporting arms would be required to fully implement all of the capabilities seen in the US organizations.

The greatest challenge we will experience in taking on the divisional reconnaissance role will not be one of resources. It will be our own preconceived notions of our role. The designation of all Reserve armoured units as reconnaissance came with a change of MOC for all Reserve armoured officers to armoured reconnaissance officers. In the past, armoured officers were expected to be able to undertake either a tank or reconnaissance role as a matter of course. Cavalry tactics strike at this notion of a split between armoured and armoured reconnaissance, and will challenge us to forget about platforms, forget about the boundaries of our formal training, and to focus on achieving a mission that requires broad situational awareness, swift movement,

the measured application of violence, and the rapid execution of novel solutions to tactical problems. The ability to do all of these things successfully should be seen as the hallmark of an armoured or armoured reconnaissance officer. The artificial division between these two classifications should be erased.

The creation of a Divisional structure in the CA creates meaningful historical connections with our past, and fulfills a modern requirement to broaden our conception of the employment of armour and reconnaissance forces. We could just assume that this process is nothing more than a name change, or we could take advantage of the opportunity that it creates. Our Corps must expand its perspective beyond that of the Battle Group or Brigade, into realms where reconnaissance troops and armour are best employed. It is in the best interests of the Corps for us to embrace and support these new structures, and in doing so, to take the opportunity to reinvent ourselves for the better.



Courtesy of Combat Camera

Aerial view of the JOINTEX headquarters compound in CFB Wainwright.

¹ Department of the Army, FM 17-95 Cavalry Operations, (Washington D.C.: TRADOC, 1996), 1-1.

² Ibid., 1-2.

³ Department of National Defence, B-GL-394-002/FP-001 Ground Manoeuvre Reconnaissance. (Ottawa: DND Canada, 2008), 1-21.

⁴ Ibid., 2-3 – 2-4.

⁵ History, Customs and Traditions of the “2nd Dragoons,” accessed 14 January 2014, <http://www.2cr.army.mil/info/History/2SCR%20History%2020%20Jan%202011.pdf>

THE FUTURE OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR (CBRN) AND THE ROYAL CANADIAN ARMoured CORPS



MAJ D.L. CHILDS
DIRECTORATE OF LAND
FORCE DEVELOPMENT

Look no farther than the situation in Syria for the status of the contemporary CBRN threat. After a Cold War of empty threats and the hiatus of Afghanistan, the civil war in Syria has demonstrated a state that is both willing and able to employ such weapons on a large scale. In consideration of the adaptive dispersed nature of conflict, increasing accessibility of such weapons and their potential to fall into the hands of non-state actors, it is clearly time to refocus Canadian Armed Forces (CAF) efforts on CBRN operations and defence.

Considerable work has already been completed to rekindle a CAF and Canadian Army (CA) CBRN capability, the first wave being a significant reinvestment in equipment. The Directorate of CBRN Defence and Operational Support (CBRN D & OS), working with the Directorate of Army Requirements (DAR, formerly DLR), has and will be procuring the following equipment:

- Sensors. These will be a diverse array of Chemical Agent Sensors capable of detecting a wide range of chemical warfare agents and toxic industrial chemicals. The sensors envisioned include a new hand-held detector to replace the Chemical Agent Monitors (CAMs), fixed site detectors, improved sampling and testing kits, lightweight and compact personal detectors and a stand-off area detection capability to provide improved early warning. Wireless technology will be leveraged to improve connectivity between many of these sensors.
- Networking. In addition to leveraging wireless technology to improve communication



Courtesy of MCpl Eric Gordon

Incorporation of CBRN threats within existing training events is an efficient means to practice soldier skills, which can often be done with minimal equipment. Such inclusion not only encourages discussion about CBRN requirements but also conditions soldiers to operate effectively in that environment.

between most of the sensors listed above, a Sensor Integration and Decision Support System will aid in the automatic collection, collation and interpretation of sensor data to improve situation awareness and command and control at all levels.

- Decontamination. Systems capable of decontaminating vehicles, ships and aircraft exteriors as well as personnel and non-sensitive personal equipment will be purchased. An interim decontamination capability already existing with 5e GBMC and will be formalized as part of the Force 2016 force development.
- Collective Protection. Procurement of Transportable Collective Protection will enable the continuance of essential tasks such as command and control, medical care, rest and recuperation in a toxic-free environment. These will consist of a series of modular shelters for 50 and 100 persons.
- Reconnaissance. Small remotely-operated vehicles will be mounted with sensors thus reducing the risk of operator exposure.



Courtesy of Cpl Cynthia Wilkinson



Courtesy of Cpl Cynthia Wilkinson

Decontamination of personnel, vehicles and equipment are complex and resource intensive operations. While current efforts focus on formation level decontamination (e.g. Service Battalion in support of a Brigade), there is also a need for sub-unit level hasty decontamination, especially for the Brigade Recce Squadrons.

- Respirator. An improved General Service Respirator that will reduce the physiological and psychological stresses inherent in the existing respirator.

While equipment tends to be the focus of any capability, there is considerable capacity that can be developed within means already available to the Royal Canadian Armoured Corps (RCAC). Following queries from the Directorate of Land Force Development (DLFD), the Royal Canadian Armoured Corps School (RCACS) conducted a quick working group in July 2013 in an effort to determine an interim and future RCAC CBRN position. Acknowledging that much of the doctrine and tactics, techniques and procedures (TTPs) related to CBRN remain extant, the working group quickly identified the following impacts on the Corps:

- Armoured Recce. As outlined in Ground Manoeuvre Reconnaissance, the Brigade Recce Sqn should expect to receive the majority of CBRN recce and survey tasks largely due to its inherent flexibility and the technical capabilities of the LAV II Coyote.

- Tank. The Leopard tank retains a collective protection capability that makes it ideal to both exploit and defend against exploitation of contaminated areas.
- Sustainment. The ability to sustain forces in a CBRN threat environment is by far the most complex and overlooked aspect of such operations. Look no farther than the conduct of resupply and casualty evacuation once a threat has been detected.

The interim Corps position acknowledged the status of doctrine and TTPs, as well as the limited access to both legacy and new equipment. That said, the following recommendations were made:

- CBRN needs to be considered as part of LAV II Coyote replacement. The CA needs a vehicle mounted capability with the Tactical Armoured Patrol Vehicle – Recce (TAPV Recce) being the most logical option given the timing of its fielding and its relative expendability in comparison to the future LAV Recce.
- Primary Combat Function (PCF) training should continue to include technical CBRN equipment training where such equipment is provided.



Left:
CBRN Sensor Integration and Decision Support System will automatically collect, collate and interpret CBRN sensor data and pass CBRN situational awareness to command and control systems and the tactical, operational and strategic levels. The system will provide a unique, world-leading, CBRN situational awareness capability.

- The Crew Commander and Recce Patrol Commander were identified as nexuses of supervision especially for the Patrol which is seen as the most likely tasked element.
- There are a wide range of specialist skills that could be incorporated in some form of Armour-specific advanced training, such as an advanced Armour Recce course.

All participants concluded that there is tremendous potential to conduct low-level CBRN training within Armoured Regiments but emphasized that such training should stress the limits of CBRN operations through extended exposure (hours) vice the typically brief exposures (minutes). This would expose soldiers to the complexities of the environment and better prepare them to operate within it.

In terms of future capabilities, many of the recommendations coincided with the ongoing CBRN equipment projects mentioned above. The working group recommended equipment and methods that would improve stand-off as this would limit both contamination and risk. Unmanned vehicles and sensors should be leveraged for detection, identification and monitoring to improve early warning. An integral sub-unit decontamination capability was also identified given the likelihood for exposure (especially the Recce Sqn) and their relative autonomy. Finally, it was acknowledged that a much more detailed analysis of sustainment would be required in order to determine how prolonged operations would be sustained in a high threat environment.

As the CA starts to refocus on CBRN operations, this is the ideal time to determine the role for the RCAC in support of those operations and ensure that we are properly trained, equipped and postured to respond.

Visit D CBRN D & OS on the DWAN (<http://cfd.mil.ca/sites/intranet-eng.aspx?page=15637>) for more information about the CBRN *Operating Concept* as well as details related to new CBRN equipment.



Modular collective protection will enable command and control, medical care and rest and recuperation in a toxic-free shelter environment during the threat of a CBRN incident.



The LCD 3.3 Personal Chemical Detector.



CBRN Reconnaissance System will employ small, remotely-operated vehicles with a variety of sensors thus minimizing exposure by personnel.

OP LENTUS – LESSONS LEARNED FOR PRIMARY RESERVE RECCE



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REGIMENTAL OPERATIONS
OFFICER AT THE KING'S OWN
CALGARY REGIMENT

BACKGROUND

Heavy and continued rainfall in areas of Southern Alberta resulted in flooding and a State of Local Emergency in over thirty affected communities in late June 2013. After a Request for Assistance (RFA) was issued by the province the 41 CBG Territorial Battalion Group (TBG) generated approximately 500 soldiers with less than 24 hours' notice. The TBG was organized into two domestic response companies, an engineer squadron, a recce sqn(-), an admin company, and a TBG HQ. The composite recce sqn(-) was comprised of a recce troop(-) from B Sqn SALH in Edmonton, a recce troop from the KOCR, an SHQ, and admin troop elements from both units. Once linked up in Calgary, a variety of traditional tasks such as Traffic Control Points (TCP), convoy escorts, zone and point recces were completed by the composite recce sqn to provide a responsive sense capability to the TBG during the rapidly changing situation. A Sqn SALH was also mobilized, but remained in Medicine Hat and conducted sandbagging operations as part of the 3 PPCLI BG.



Courtesy of Maj Hunt

Area recce in downtown Calgary during Op LENTUS.

SUMMARY OF KEY LESSONS IDENTIFIED

The mobility, communications, and ability of the recce sqn to gather and synthesize information was a unique and valued capability to civilian authorities.

Recce was brought to bear in traditional and non-traditional roles to aid the TBG, providing a strong “sense” asset to the TBG, and by extension the Calgary Emergency Management Agency. The scope of the flood was such that one of the challenges for both civilian emergency management authorities and supporting military units was to develop and maintain situational awareness. Despite the City of Calgary having approximately 25,000 staff deployed as part of their flood response operations, most personnel and teams had specific tasks such as repairing utilities, caring for evacuated families, or manning checkpoints. While they reported information as a secondary or tertiary duty, the information often came in the form of spot reports, and it was challenging for emergency operation centres (EOCs) to collate and process the reports into a more comprehensive operating picture. After initially being employed as the TBG reserve, the recce sqn was employed to conduct zone recces of some of the flood affected neighbourhoods in order to provide EOCs with fidelity on the scope (depth) of flooding on a block-by-block basis. Recce patrols fanned out across flood affected neighbourhoods across the city and within a couple of hours were able to push consolidated sitreps into a comprehensive operating picture to the City EOC (through SHQ and TBG HQ). This information allowed the City to reallocate engineering resources to severely affected areas, and allowed families to return to their homes in neighbourhoods that the recce sqn had identified as safe. The mobility, communications, and reach of the recce sqn provided a unique and extremely valued sense asset to civilian authorities. This was the case even within the City of Calgary which had tremendous resources at its disposal within a relatively small geographic area. This capability would be even more valued in large rural areas where civilian authorities are likely to have more limited internal resources available.

Recce can help the Commander define the Operating Environment.

The role of reconnaissance is to gather information for commanders. Upon receipt of a warning order, commanders begin identifying information requirements that can assist their decision making. Reconnaissance units can help answer many of these questions, particularly about the ground and operating environment. Initially during Op LENTUS, recce patrols were used to escort engineer and other units to their task locations, with the rationale that recce crew commanders had more navigational experience. This practice soon proved somewhat redundant as most elements could navigate using city maps without much difficulty. It was identified that recce patrols could conduct route recces and prove routes, identify staging areas, and conduct initial liaison with on-site personnel. This ensured deployment of follow-on forces went more smoothly and assisted their battle procedure. At the TBG level of Op LENTUS, much of the first 24 hours was spent waiting for tasks and building situational

awareness. Early deployment of the TBG recce sqn as a vanguard during future missions would help the TBG build situational awareness more rapidly, and identify probable tasks for TBG sub-units as well.

Recce Battle Task Standards (BTS) are extremely relevant to Domestic Operations

Route, area, point, zone (RAPZ) recce tasks are all likely tasks during a major disaster response. Obviously the focus is going to be developing situational awareness on the impacts of the disaster on the people, infrastructure, and terrain, as opposed to an enemy, but the core skills of gathering and collating relevant information are the same. TCP and escort convoy tasks (particularly for linking up civilian and military resources) are also likely tasks. These core skills are part of recce BTS that are practiced routinely as part of general purpose training conducted on collective training exercises at patrol level and up.

A Recce Sqn(-), not a Recce Troop, should be the minimum recce construct in a TBG.

Calgary was a relatively limited sized Area of Operations (AO) with patrols operating with a 15 km radius of the Sqn and TBG HQs which were located on high ground in order to ease communications. Despite this fact, maintaining Combat Net Radio (CNR) communications throughout the operation was frequently problematic, and mobile phones were frequently used as backup. In a larger AO, a more robust SHQ and admin troop would be essential to support operations, particularly if those operations were not conducted from a central TBG operating base like they were during Op LENTUS. The Army's transition to Adaptive Dispersed Operations (ADO) as the Force Employment Concept for the Army of Tomorrow (2021) reinforces the requirement for an SHQ and admin troop to support dispersed recce elements. Network Enabled Operations (NEOps) is a key component of ADO yet digital connectivity only exists in the establishments of SHQ command posts in the Primary Reserve. During OP LENTUS, equipment shortfalls meant the Sqn command post still lacked the digital connectivity to TBG and formation networks; however, SHQ staff built



Courtesy of Maj Hunt

Flooded infrastructure in downtown Calgary during Op LENTUS.

a common operating picture using CNR and traditional map boards, which they then conveyed to the TBG HQ who provided consolidated info to civilian agencies. ADO also emphasizes integrated effects, and an SHQ has the staff capacity (personnel and experience) to do the tactical integration of effects that does not exist at the sub-sub-unit level. In a domestic operations context, this integration of effects usually involves collaboration with civilian agencies to support their efforts.

TBG readiness for Domestic Operations requires more attention by units, but particularly by higher formations and the Army



Courtesy of Maj Hunt
Support from 41 Signals Regt was required for the SHQ to establish effective comms throughout the AO.

The fact that 41 CBG TBG generated over 500 soldiers on 24 hours' notice and was at times the largest single unit deployed on Op LENTUS proves the TBG concept is valid for domestic operations. But for it to work consistently for domestic operations requires improved attention to readiness issues by both units and higher formations. Unit administration must be effective with up to date nominal rolls, fan-out lists, and effective organization of stores. A readiness mindset must be reinforced by the chain of command that demands good organization and administration so that quick deployments are indeed possible. The unit annual training cycle and progression through collective training exercises provide an effective venue to test and drill the supporting administration, particularly using deployment and re-deployment drills for exercises that

reinforce those required for a domestic operation. For higher formations and the Army, units need to be given the support that enables readiness. In recce units, the most tangible support would be in the form of better and more reliable vehicles and enhanced maintenance support. The 41 CBG composite recce sqn(-) could only muster one operational command post (CP) to support Op LENTUS between the two sqns that force generated. At least one other CP had been listed as Vehicle Off Road (VOR) for over six months awaiting repairs, and both SALH and KOCR have had multiple G-Wagons VOR'd for a variety of maintenance and communications issues prior to and since Op LENTUS.



Courtesy of Maj Hunt
B Sqn SALH refuelling during a 600km redeployment from MEDICINE HAT to EDMONTON Alberta in April 2012 during a weekend exercise. Training recce crews and helping prepare them for the next DOMOP.

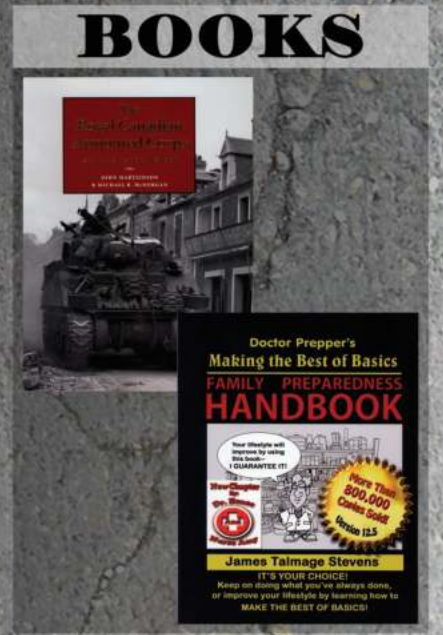
CONCLUSION

Recce Sqns generated by the Primary Reserve provide a very valuable contribution to domestic operations and should be one of the first elements deployed. A minimum of a sqn(-) construct in the TBG is required to provide the command and control and service support required to make best use of recce elements. The general purpose training recce sqns conduct on an annual basis is relevant to preparing for domestic operations, particularly the administration, deployment, and redeployment drills required for moving elements from the armoury to training areas. Domestic operations will likely continue to be a frequent occurrence, and with reserve recce units located in nine of ten provinces, we are ideally situated to be a vanguard of CF response when emergencies strike close to home.

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