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Heavy Metal:
A True Armour Capability for the Canadian Armed Forces

Maj R.A. Cooper

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AIM

1. This paper for Chief of Staff Army Strategy will look to create a fourth tank squadron in the Royal Canadian Armoured Corps (RCAC) from existing assets and Person Years (PYs), along with increasing the readiness and deployability of the fleet and the soldiers who man it. The creation of a fourth tank squadron necessitates a fundamental look at how all 1984 PY (all trades) that are allocated to the RCAC, including positions at the three regiments and the Royal Canadian Armoured Corps School (RCACS). Additionally, maintenance PYs at light infantry battalions (LIB) will be examined for re-apportionment, as LIBs currently have the same 48 PY maintenance platoon establishment as mechanized infantry battalions.[1] Lastly, the current suite of tank-related equipment will be examined, including the all Leopard 2 variants, and the many vehicles of the Tracked Light Armoured Vehicle (TLAV) family essential to tank support. This paper will not examine infrastructure requirements, second-line Supply Technician or Mobile Support Equipment Operator (MSE Op) needs, ammunition policy, or procurement and distribution of replacement parts, although these areas all warrant further study.

INTRODUCTION

2. Like many military procurements, the purchase of the Leopard 2 had sundry flaws. Because of the rush to deploy the tanks to Afghanistan, Germany originally loaned Canada 20

[1] Conversation with Major Cole Petersen, former Officer Commanding Administration Company (Adm Coy), 3rd Battalion, Princess Patricia's Canadian Light Infantry (PPCLI), 3 February 2018.

Leopard 2A6Ms[2], the most-advanced variant at the time.[3] Canada ended up retaining these 20 tanks, purchasing 20 of a bespoke Canadian variant, the Leopard 2A4M[4], and 42 basic Leopard 2A4s[5] as an "in-Canada" training platform. The purchase of repair parts and ammunition assumed that no collective training would be done on the Leopard 2 until fiscal year (FY) 2014/2015, and there were limited suites of simulators and Specialized Tools and Testing Equipment (STTE).[6] Additionally, no infrastructure modifications were planned and the support concept in terms of personnel and equipment was not thought out. What this means is that, in effect, the Canadian Army would be hard-pressed to deploy even a small-element of tanks on any expeditionary operation today,[7] despite the fact that the Leopard 2 played an admirable role in Canadian hands during four years of combat in Kandahar.

3. Despite the lack of deployability of this platform due to parts, support personnel, and a Vehicle Off Road (VOR) rate that is usually above 80%, the use of MBTs in collective training has generated more discussion at the general officer level in the army than almost any other issue. During FY 17/18, all four division commanders and Commander Canadian Army Doctrine and Training Centre (CADTC) had a personal stake in the use of tanks.[8] The reason they perceived this engagement was required was due to the fact that there were so few working MBTs and it was difficult to marry them up with the other elements of the combined arms at the right place, at the right time, or in the right numbers. Some fairly straight-forward solutions

[2] M stands for Mine-protected.
[3] They reached Afghanistan in October 2007.
[4] Which had some more-advanced features than the 2A6M, and some less-advanced features.
[5] The first production version.
[6] J.N.M. Parent. *Exec Sum For COS Army Ops – Leo 2 Family of Veh (FoV) Integration.* (Canadian Army Headquarters), 11 February 2015.
[7] UNCLASS elements of Enhanced Forward Presence Battlegroup discussions, October 2017-April 2018. Author's recollection.
[8] Numerous emails Between CA HQ and CADTC, 2, 3, 4, and 5 Cdn Div staffs and Commanders.

using the RCAC's existing structure as a basis are worth examining to avoid this situation in the future and operationalize this vehicle fleet.

DISSCUSSION

4. Personnel. Currently, the RCAC has 1984 PY across all occupations divided into four units, the RCD, LdSH(RC), 12e RBC, and the RCACS. Figure 1 breaks down PY allocation by both unit and sub-unit for illustration (read in four columns – squadron (type)-total personnel (personnel in echelon):

RCD (628)	**LdSH(RC) (534)**	**12e RBC (489)**	**RCACS (333)**
RHQ – 54	RHQ – 54	RHQ – 54	SHQ-20
A(Recce)-143(42 Ech)	A(tank)-123(42 Ech)	A(Recce)-143(42 Ech)	A-84
B(Recce)-143(42 Ech)	B(tank)-123(42 Ech)	B(Recce)-143(42 Ech)	B-98
C(tank)[9]-141(59 Ech)	D(Recce)-159(46 Ech)	D(Recce)[10]-73(20 Ech)	Stds-28
D(Recce)[11]-72(21 Ech)	HQ-75	HQ-76	HQ[12]-103
HQ-75			

Figure 1

[9] Located in Gagetown, NB, 1200km from the remainder of the RCD in Petawawa, ON.

[10] One of two "reduced" recce squadrons in the RCAC ORBAT. Also, 3 x transformation offset PY have been included here.

[11] One of two "reduced" recce squadrons in the RCAC ORBAT. Also, 1 x transformation offset is included here. The RCD use this sub-unit as Combat Support Squadron now with a UAV troop, weapons troop and regimental recce troop.

[12] This is the new designation for C (Depot) Squadron and includes the REMAR positions for C(47), Holding(5), QM(19), Ech Tp(25), and OPFOR(7).

5. Reduced Recce Squadrons. The current structure reflects a compromise solution with the release of Force 2013. The RCAC had grown from nine to 10 fighting sub-units during the Afghan War (seven recce and three tank squadrons), and was given enough PY for nine full sabre squadrons with the release of the Force 2013 MID in 2011.[13] The Corps decided to protect the 10th sub-unit command position in the field force by fielding two "reduced" recce squadrons, one each at the RCD and 12e RBC, using the PY offsets to build C Squadron RCD, a tank sub-unit, in Gagetown. Though under command of the RCD in Petawawa, C Squadron is composed of soldiers from both organizations, and command rotates between units to maintain tank skills in the two eastern regiments. In practice, it has been found that the "reduced" squadrons either draw from all other co-located sub-units, preventing doctrinal employment, or it remains a cadre, adding little to FG output. Neither solution is optimal.

6. Geographically Isolated/Unique Sub-Units. Because they were co-located with their RHQs and HQ Squadrons and were not unique skillsets in their geographical area, the four larger recce squadrons at the RCD and 12e RBC (A and B Squadrons at both units) were not resourced for a fire-team partner to accompany troop leaders, while the geographically isolated Recce Squadron at LdSH(RC) was. Similarly, the geographically isolated tank squadron (C Squadron RCD) was given a much larger echelon than the other two tank squadrons. For FG and force employment (FE) on operations, it was hoped that reservists would be able to provide the needed personnel to flesh out the additional vehicles in the recce troops and echelons, but it was also

[13] P.J. Devlin. *Force 2013 Master Implementation Directive (MID).* (Canadian Army Headquarters: File 1901-1(DLFD)), Annex E – Force 2013 Armour Corps Force Generation Output Requirements and Resource Apportionment.

acknowledged that this would be extremely unlikely for a roto 0 (initial deployment into a new theatre).

7. RCACS Manning. Though the RCAC is the smallest of the combat arms, with the fewest number of units, at 333 PY the RCACS is actually the largest unit at the Combat Training Centre (CTC).[14] While the RCACS does not rely on instructor augmentation nearly as much as most of the other schools, a very large number of their PY are not instructors, but junior crewmen employed as vehicle drivers. As most instructors are frequently deployed teaching and there are no maintenance personnel assigned to the RCACS, crew ownership tends to suffer and the very large vehicle fleet is not always maintained to the standard it would be in a field-force unit. Lastly, from a professional development perspective, while leaders benefit greatly from time as instructors, junior soldiers tend to flourish in field units where they have the regular guidance and mentorship of a constant supervisor and vehicle crew. The RCACS re-organized in the mid-2000s to attempt to address this issue, but still falls short of the standard of a field-force unit.

8. Maintenance Personnel. When the echelons of the five large recce and three tank squadrons are examined, it becomes immediately apparent that all eight sub-units are manned relatively symmetrically, with 12 technicians from all RCEME trades.[15] Similarly, the maintenance troops of all three regiments are identical at 17 technicians and senior maintenance

[14] Next is the Infantry School at 317; the Artillery School at 266 (which includes a gun battery for training support); the Signals School at 231; the Engineer School at 219; the Royal Canadian Electrical and Mechanical Engineering School at 187; the Army Advanced Warfare Centre at 100; and the Tactics School at 42.

[15] Annex A. Also, ACISS-CST (Radio Technician) is technically a signals trade and they wear the Royal Canadian Corps of Signals (RCCS) hat badge, but they are always included in maintenance ORBATs at the squadron and regimental levels because that is their function.

personnel each. Given that the number of hours required to maintain tanks is orders of magnitude higher than the time required to maintain an identical number of current or projected recce vehicles, this symmetry is extraordinarily illogical. In correspondence with CA HQ, 3 Cdn Div suggested increasing maintenance personnel at the Strathcona's to over 80 technicians from 54 to bring them in line with American, British, and Australian units.[16] However, while there is a clear lack of maintenance capacity at tank squadrons, there is no surplus at other RCAC units, which means increased technicians for tank capabilities need to come from another element of the CA.

9. Light Infantry Battalion Maintenance Platoons. The Infantry currently has nine units in the field force: six mechanized battalions and three light battalions. Currently, all nine units have maintenance platoon establishments of exactly the same size: 48 PY each.[17] Even if it is accepted that LIBs will receive some additional vehicular capacity with the current capabilities enhancement, it can safely be assumed that their maintenance requirements will remain lower than mechanized units. Because there is no requirement for all the technicians in their establishment, maintenance platoons in LIBs are generally manned at about 50%, and there is no deleterious effect to their respective VORs as a result. Given this, and the fact that the primary capacity of a light unit is derived from man-portable weapons and the soldiers who carry them, it is a fairly safe assumption that the PYs allocated to the LIB maintenance platoons could be cut from 48 PY to 24 PY, with the resultant savings immediately reinvested in tank maintenance as an opening gambit while the Army G4 staff continue with their PRICIE+G analysis of all

[16] W.D. Eyre. *Leopard 2 Sustainment Concerns.* (3rd Canadian Division Headquarters: File 12350-4(G4)), 18 February 2016, paragraph 2.d. Letter from Comd 3 Cdn Div to CCA et al.

[17] Vice Chief of the Defence Staff Group: DPGR website, last accessed 26 January 2018; http://cmp-cpm.mil.ca/en/support/military-personnel/dpgr-index.page

support trade positions in the CA.[18] This would expose 72 maintenance PY for use in development of a true capability built around the MBT.

10. MBTs, AEVs and ARVs. In total, 112 Leopard 2 platforms will be brought into service with the CA. Of these, 82 are gun tanks, 18 are AEVs, and 12 are ARVs. The current and planned final locations are outlined in Figure 2 below:

EDMONTON (65)		GAGETOWN (37)	
LdSH(RC):	11 x 2A6M	**C Sqn RCD**:	5 x 2A6M
	11 x 2A4M		5 x 2A4M
	20 x 2A4 CAN		11 x 2A4 CAN
	3 x ARV 2 CAN (**45 Total**)		1 x ARV 2 CAN (**22 Total**)
1 CER:	2 x ARV 2 CAN	**RCACS**:	2 x 2A6M
	17 x Ram AEV		2 x 2A4M
			9 x 2A4 CAN (**13 Total**)
1 Svc Bn:	2 x ARV 2 CAN		
		5 CDSG:	3 x ARV 2 CAN (all Maint Coy)

[18] Presentation by Colonel Osmond, Army G4, at the Combined Army Conference, 22 February 2017. PRICIE+G stands for **P**ersonnel and Leadership; **R**esearch & Development, and Operational Research and Analysis(plus Experimentation); **I**nfrastructure, Environment, and Organization; **C**oncepts and Doctrine; **I**nformation Management and Technology; **E**quipment and Support; **G**enerate; Additional Areas. To include the meaning of this acronym in the text would have severely interrupted the flow of the argument, hence its inclusion in the footnotes.

BORDEN (5)

RCEMES: 1 x 2A6M
1 x 2A4M
1 x 2A4 CAN
1 x ARV 2 CAN
1 x Ram AEV (**5 Total**)

DGLEPM (Ref): 3//1 x ea Leo 2A6M/2A4M/2A4 CAN (Location TBD)

Figure 2

11. The distribution of tanks was directed by the Force 2013 MID, but a number of assumptions that underpinned the allocations were flawed. Though manned for a doctrinal 19 tank squadron, each field-force sub-unit was allocated 21 tanks for an internal "op reserve." Much more concerning, the RCACS, with no maintainers and few dedicated personnel, was assigned 13 gun tanks of all three variants.

12. Due to its geographic dispersion, the RCEME School received a tank of every variant (including an ARV). While this is not problematic from a maintenance perspective, none of those tanks support any individual or collective training. Additionally, having only a single platform of each variant available for courses limits throughput and provides no capacity for a surge.

13. Retaining three reference vehicles is similarly problematic. These three MBTs alone represent almost 4% of the tank force, and the CA cannot afford to have such a high percentage of such a valuable, low density fleet as permanent reference vehicles. The Army would be much

better served to have DGLEPM make periodic use of field force tanks in Edmonton or Gagetown than it would permanently having unused and un-maintained vehicles resident in a third location.

14. Lastly, there is no firm deployment plan for any activated tank forces in the Line of Operations 3 (LoO 3) Materiel Pivot Table. Instead, there is just a loose assertion that the RCAC will tell the CA what it wants to do when deploying, drawing tanks from both Gagetown and Edmonton. This is of concern for two reasons. First, literally every single other major end item (all 1038 of them) has a spot on the Pivot Table, and second, there is only one tank garrison location that it makes sense to deploy tanks from. Edmonton is a major rail and air hub, Fredericton is neither. While there are just enough tanks in Edmonton to meet the LoO 3 task of deploying an entire, 19-MBT squadron, this would leave nothing from the deployable fleet for follow-on and operational reserve forces to train on and maintain currency.

15. TLAV Family of Vehicles (FoV). Current in-Canada practice sees the tank sqn echelon equipped with a combination of a few TLAV variants and a number of MLVWs. If equipment bins were removed (at no capital cost), the MTVF[19], with an up-rated 400hp diesel armoured cab, and ability to mount RWS could provide this level of mobility while providing the level of protection and defensive firepower expected of a modern, deployable CA vehicle. If echelons, which currently lack the ability to manoeuvre on rough terrain, were so equipped, they would be able to ensure combat teams were supplied with required fuel, rations, and combat stores in all

[19] Mobile Tactical Vehicle - Fitter

terrain, greatly increasing effectiveness against a wide variety of both peer and asymmetric threats as per the ADO concept.

CONCLUSION

16. The CA's Leopard 2 fleet is currently languishing due to inappropriate personnel apportionment RCAC-wide, sub-optimal vehicle distribution, and a distressing lack of maintenance personnel within the RCAC – it is not operationally employable in its current state. A properly resourced, fourth tank squadron is both achievable and desirable, with no capital expenditure and re-allocation of PY completely under the CA's control.

RECOMMENDATIONS

17. Personnel. By re-apportioning the 1984 Crewman positions resident in the RCAC, and reinforcing maintenance organizations through the 72 maintenance personnel gained from LIB optimization, the following personnel structure is recommended:

RCD (515)	**LdSH(RC) (687)**	**12e RBC (568)**	**RCACS (267)**
RHQ-54(n/c)	RHQ-54(n/c)	RHQ-54(n/c)	SHQ-20(n/c)
A(Recce)-155(+12 Crmn)	A(tank)-129(+6 Maint)	A(Recce)-155(+12 Crmn)	A-55(-29)
B(Recce)-155(+12 Crmn)	B(tank)-129(+6 Maint)	B(Recce)-155(+12 Crmn)	B-55(-43)
D(CS)-76(+4 Crmn)	C(tank)-129(new)	D(tank)-129(+6 Maint)	Stds-28(n/c)

HQ-75(n/c) D(Recce)-155(-4 Crmn) HQ-75(-1 Crmn) HQ-109

(-7 Crmn + 13 Maint)

HQ-91(+16 Maint) 1 Svc Bn Maint Coy(+19 Maint)

Figure 3

18. Field Force. Figure 3 indicates symmetry by function. Four of five full recce sqns gain 12 Crewmen, and every tank squadron gains six technicians. The Strathcona Maintenance Troop also gains 16 technicians to ensure proper first-line support for annual, semi-annual, and quadrennial inspections (C Sqn receives this from 5 CDSG Maint Coy). The reduced recce squadron is removed from 12e RBC's ORBAT, but C Sqn becomes a 12e RBC sub-unit. The fourth tank squadron goes to LdSH(RC) as most good collective training areas are in the west, and Edmonton is a major rail and air hub. The RCD codifies its Combat Support Squadron and becomes capable of acting as a division level Recce Regiment if required. 1 Svc Bn in Edmonton, the only deployable second-line tank support element in the CA, gains an additional 19 PY for tank maintainers.

19. RCACS. A tank maintenance instructor cell of 13 RCEME personnel is created at the RCACS, and this becomes the RCACS responsibility. The RCEME School retains all 187 of its current PY, but no longer teaches tank maintenance in Borden. This allows for the concurrent activity of fixing tanks in need of repair with teaching new Leopard technicians their trade. The RCACS loses a number of junior NCMs but retains all its instructors. The junior soldiers move to the field force where they are better employed and retained. As was past custom, C Squadron

supports the RCACS with MBTs at key training junctures, de-conflicted from major CT events with 5 GBMC.

20. Vehicles. With the creation of a fourth tank squadron in Edmonton and the movement of the tank schoolhouse to Gagetown from Borden, a number of efficiencies are realized. This allows for the concentration of all tanks in just two locations:

EDMONTON (86)		GAGETOWN (26)	
LdSH(RC):	17 x 2A6M	**C Sqn RCD**:	3 x 2A6M
	17 x 2A4M		3 x 2A4M
	26 x 2A4 CAN		13 x 2A4 CAN
	5 x ARV 2 CAN (**65 Total**)		1 x ARV 2 CAN (**20 Total**)
1 CER:	2 x ARV 2 CAN	**RCACS**:	3 x 2A4 CAN
	17 x Ram AEV		1 x ARV 2 CAN
			1 x RAM AEV (**5 Total**)
1 Svc Bn:	2 x ARV 2 CAN		
		5 CDSG:	1 x ARV 2 CAN (Maint Coy)

Figure 4

21. One of the three Edmonton Squadrons would be scaled and equipped for operations, with 10 Leopard 2A6Ms and 9 Leopard 2A4Ms. The other three squadrons would have three each of the 2A6M and 2A4Ms, along with 13 Leo 2A4s. The remaining three operational tanks would reside in RHQ at LdSH(RC), ready to provide a small operational reserve for deployments and

equipping the Commanding Officer. Every tank squadron retains an ARV, and HQ Squadron at the Strathcona's gains a second ARV to allow it to be cut with a squadron if attached to an infantry-heavy BG. The RCACS retains three Leo 2A4s for driver and technician training, along with an ARV and AEV to support RCEME IT as well.

22. TLAV. Every tank squadron should be equipped with 14 TLAV variants, including one MTVA (ambulance), one M577 (CP), two MTVL (SSM and Adm Sgt), five APC (Maint Sgt and four MRTs), and five MTVF (two for tank ammo, two for POL/diesel jerry cans, and one for rations and water). In addition, LdSH(RC) RHQ should gain 4 x M577s and HQ Sqn should gain an MTVA as a surge capacity.

23. Collective Training. The Gagetown tank squadron should conduct and support training in Gagetown, and the Edmonton squadrons should conduct and support training in the west. The Gagetown tanks must remain in situ in order to support RCACS training. Only in the event of a named mission should tankers from eastern Canada conduct collective training in the west, and if that occurs than they should use tanks already present in the west rather than shipping them. The serious issues that recently arose with eastern soldiers using western tanks in 2014 and 2017 existed due to a lack of proper resources, not because the idea lacked merit.

24. The Regimental System. The regiment has long been a strength of the CA, but it is not without its challenges. While NCMs can specialize to a degree, officers must be generalists.

Under this new proposed structure, 12e RBC is able to give Francophone soldiers opportunities to serve with both tank and recce elements. While there are many new potential opportunities with the proposal, it should be accepted that Anglophones moving between the RCD and LdSH(RC) is an unspectacular phenomenon. Re-badging was extremely commonplace during the Second World War, and a relatively regular occurrence during the RCAC's revival in the Cold War. This needs to be true for the future as well.

Annexes

Annex A – Royal Canadian Armoured Corps PY Line-by-Line

Bibliography

Cadieu, T.J. *Leopard Family of Vehicles (FoV) –Outstanding Integration Concerns.* (Headquarters, 1 Canadian Mechanized Brigade Group: File 12350-1(G4)), 4 December 2014.

Cooper, R.A. *Briefing Note for Director Royal Canadian Armoured Corps – Re-Balance of Leopard 2 FoV Based on Operational and Training Imperatives.* (Lord Strathcona's Horse (Royal Canadians)), 12 September 2014.

——. *Briefing Note for Chief of Staff, Army Operations – Re-Examination of TLAV Divestment: Low-Density, High Utility Variants.* (Lord Strathcona's Horse (Royal Canadians)), 23 January 2015.

Devlin, P.J. *Force 2013 Master Implementation Directive (MID).* (Canadian Army Headquarters: File 1901-1(DLFD)), 30 June 2011.

Eyre, W.D. *Leopard 2 Sustainment Concerns.* (3rd Canadian Division Headquarters: File 12350-4(G4)), 18 February 2016.

——. *Leopard Family of Vehicles (FoV) – 3rd Canadian Division's Outstanding Integration Concerns.* (3rd Canadian Division Headquarters: File 12350-1(G34)), 24 January 2015.

Force 2013 Armour Corps Structure. (Canadian Army Headquarters: Undated Powerpoint presentation, last modified 17 September 2011).

Major, J. *Update on Shortage of Critical Tank Parts.* (Lord Strathcona's Horse (Royal Canadians): File 1000-1 (OC HQ)), 26 January 2016.

Parent, J.N.M. *Exec Sum For COS Army Ops – Leo 2 Family of Veh (FoV) Integration.* (Canadian Army Headquarters), 11 February 2015.

Vice Chief of the Defence Staff Group: DPGR website, last accessed 26 January 2018; http://cmp-cpm.mil.ca/en/support/military-personnel/dpgr-index.page

Wood, J. *BN For COS Army Ops: RCEME Technician Qualifications and Extension of Leo 2 Original Equipment Manufacturer (OEM) Field Service Representatives.* (Canadian Army Headquarters), 9 Feb 15.