DND Photo by: Cpl Nightingale, GN-C-99-259-27

LAV III in the CFB Gagetown training area.

AN EXAMINATION OF THE ARMOURED PERSONNEL CARRIER REPLACEMENT PROJECT

by Major J. Craig Stone

From a qualitative viewpoint, the APC fleets have serious deficiencies in protection, firepower, mobility and capacity. Protection levels against direct fire weapons, shaped charge threats and mines have proven inadequate as indicated by the necessity to enhance a number of vehicles in UNPROFOR with gun shields and modest applique armour.[1]

The deficiencies noted in the quotation above are just some of the many problem areas identified in an operational readiness report of June 1994 for the current family of Armoured Personnel Carriers. To resolve the shortcomings, the Army initiated project L2637 Armoured Personnel Carriers Replacement. The project was first identified in the 1996/97 Departmental Part III Estimates with an indication that $5M was to be expended up to 31 March 1996.[2] The identification of funds in the Part III Estimates implies a decision had been made by the government to support the project. As well, within the context of the Defence Programme Management System (DPMS), the identification of funds implies both a Programme Planning Proposal (PPP) and a Statement of Capability Deficiency (SCD) were completed. Both of these documents are required as part of the first phase of the DPMS — project identification. Both the PPP and the SCD are referred to in the Statement of Requirement (SOR) with November 1994 and January 1995 dates respectively.[3]

Those familiar with the intricacies of the military procurement process will understand the previous statement, but many individuals do not understand all the terminology and steps associated with equipment procurement. As a first step, the reader must be aware that any discussion of a recent or current procurement project must clearly identify which 'process' is being discussed — the new Defence Management System (DMS), or the old Defence Program Management System (DPMS). For example, the APC replacement project began in 1994 following the rules and processes laid out in the May 1994 DPMS manual, or more likely, the March 1995 version of the NDHQ handbook titled *An Introduction to The Defence Program Mangagement System (DPMS), tenth edition* (or, *A Survival Guide for the DND Program Management Jungle*). A project in the early stages of identification today would be required to follow the process and procedures in the new

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Royal Canadian Dragoons Coyote surveillance vehicles keeping a watchful eye over the Presovo Valley on the boundary between Kosovo and Serbia.

DMS manual. The new DMS manual reduces the number of steps in the process and accounts for many of the management renewal initiatives that were developed as part of the Defence 2000 programme.

The intent of the this paper is to review the procurement of the APC replacement, more commonly referred to as the Light Armoured Vehicle or LAV III. The paper will briefly discuss the requirements for a new APC, identify the differences from the normal process, and then discuss the project itself. The paper will conclude with some observations on the potential long term impact of the government's decision to go to a directed purchase.

THE NEED FOR A NEW APC

The current fleet of APCs is a mixed inventory of vehicles that includes the tracked M113 purchased in the mid-1960s, the wheeled 6x6 Grizzly acquired in the mid-1970s and the wheeled 8x8 Bison delivered in the late-1980s. As indicated earlier, the Army has identified a number of deficiencies in the current fleet of APCs. In reality, none of the vehicles meet minimum operational requirements in light of the technically sophisticated weapons our soldiers are now encountering during operations.[4]

This is not a new discovery. Although this version of the APC replacement project began in 1994, the Army had identified many of the deficiencies much earlier and had an earlier plan to replace the APC fleet. The predecessor to the current project was the Multi-Role Combat Vehicle (MRCV), with a project office established in July 1991.[5] The MCRV was a $2.8B program intended to provide a common-chassis fleet of combat vehicles to replace the M113, the Lynx reconnaissance vehicle, the Grizzly family of vehicles and the Bison.[6] Specifically, the project was to provide an infantry combat vehicle, an armoured combat vehicle and a reconnaissance combat vehicle. The project was, however, deemed unaffordable and cancelled in March 1992.[7]

Subsequently, the MRCV Project Office became the Light Armoured Vehicle Project Office (PMO LAV), and parts of the MRCV project have been implemented incrementally. The first vehicle to be purchased was the Coyote reconnaissance vehicle, or LAV recce vehicle, from General Motors Diesel Division in London, Ontario. The acquisition of the Coyote has been followed by the APC replacement, which was approved by Treasury Board in December 1995.[8]

Although it is not intended to review all the details of the SOR, it is important to note that the SOR is a mandatory document, regardless of which process is used, and provides much of the technical information needed by all parties during actual negotiations for the contract. With respect to the APC, the SOR identifies the capabilities needed to meet both current and expected future threats, and the need for growth potential in order to cater for future performance improvements.

Perhaps more importantly in this particular case, the SOR for the APC replacement identifies the need for a 'fit-for-purpose' clause.

> Any vehicle, vehicles system, subsystem or component which is not fit for the intended purpose will be unacceptable, notwithstanding the fact that it may meet all of the specified technical requirements. The overriding principle is that the APC, its systems, subsystems and components must be capable of sustained, effective combat operations and meet the peacetime training requirements. All performance requirements are in relation to a fully crewed, combat loaded vehicle.[9]

The SOR notes that this clause is considered essential because it provides the right to disqualify equipment which meets the letter, but not the spirit of the specification. This is important when it is not feasible to address every conceivable detail of requirement and performance. However, the clause was not included in the final agreed contract with General Motors; it was considered too open ended and, therefore, not acceptable.

Also, it is worth noting that the inclusion of this clause in the SOR indicates the Department did not begin the project with an intention of going immediately to a directed purchase. The review of the SOR clearly indicates that tendering was being considered. "Disqualification of an APC contender will occur if, under this clause, the contender: meets the letter, but not the intent of this SOR...."[10] Nevertheless, the SOR is developed very early in the process and, in the case of the APC replacement project, it was the last document and/or step to be followed in the DPMS process before the decision for a directed purchase was made. The issue of intent to tender versus directed purchase may be debatable, since the SOR is dated June 1995 and the Minister's announcement was in August of the same year. Although some might argue that the SOR comment regarding tendering was provided for appearance purposes only, conversations with the Project Director indicate otherwise.[11]

On 16 August 1995, the Minister announced the government's intention to award the contract to General Motors Diesel Division of London, Ontario.[12] However, the actual Treasury Board approval date is indicated as December 1995.[13] Despite the project charter indicating August 1995, discussions with the Project Director indicates Treasury Board approval was not officially received until December, with Treasury Board Minute 823590 dated 14 December 1995. Both of these dates are also reflected in the Part III Estimates. The author believes that the later date for the Treasury Board Minute simply reflects the bureaucracy at work and the overall time required to move the appropriate documents through the bureaucracy after the government decided to proceed with a directed purchase.

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LAV III on patrol in the desert of Eritrea.

Before discussing the details of the directed purchase, it is appropriate to make a few comments on the Department's switch from the DPMS to the DMS. Understanding the intended flexibility with the new process will make the decision to proceed with a directed purchase appear more logical.

THE MOVE FROM THE DPMS TO DMS

The detailed process by which DND purchases major items of equipment has been influenced by many of the government's policy and organizational changes during the past. In the late 1980s and early 1990s, after many changes and iterations in the procurement process, the Department was using what had become a very lengthy Defence Program Management System.[14] The DPMS was a process inside the overall planning process that decided what was needed, what was to be bought and how to allocate the funds.[15] Much has been written on defence procurement in Canada and many argued that this formal system, which had developed over a period of more than twenty years, had not worked. In reviewing the DPMS in 1992, the Auditor General noted that the DPMS was ineffective and cumbersome, and very expensive in terms of resources devoted to following all the steps in the process.[16] The process aimed at achieving zero risk.

The process was centred around several documents that were structured to encourage the orderly and logical development of proposals into solutions. Professor David Haglund noted that it had evolved to the point whereby it could be viewed as a perfect system designed not to accept risk.[17] The Auditor General found that it took on average 6,280 days — or 17 years — to take a proposal from inception to Treasury Board approval.[18] The need for change was obvious to most of the senior leadership, and the new Defence Management System is intended to address many of the shortcomings identified by previous Auditor General and departmental reports.

This new DMS system, based on a codified system of accountability and responsibilities, is much more decentralized. Instead of large central reserves, it relies on the preparation and implementation of approved 'level one' business plans for the implementation of the Department's defence program. More importantly, it is linked to the government's new Expenditure Management System (EMS).[19] The new DMS shortens the process, reduces the layers of committees for approvals and the amount of documentation necessary at each step.

Notwithstanding the improvements over the old system, the new DMS remains a bureaucratic process, with six steps that must normally be followed to effect procurement projects. The new process lists effective project management as involving identifiable, phased activity, to include:

- **problem identification** – a fully substantiated description of the requirements to be satisfied and a decision to pursue its resolution;
- **options analysis** – examination of a number of options to satisfy the requirement. This examination assesses the rough order of magnitude of costs, benefits, risks and opportunities of all options against the requirements, with a view to finding the optimum option to be further defined in detail;
- **definition** – activities leading to the creation of a detailed plan, cost and risk estimate for the implementation of the selected option;
- **implementation** – activities leading to the acquisition and delivery of equipment, infrastructure and/or services which satisfy the requirement defined during the definition phase. This phase includes the management and monitoring activities needed to ensure that the project delivers the required output within defined time and cost constraints; and
- **close out** – completion of the project and the composition of the associated reports.[20]

It is the integration with business planning and the government's EMS that is supposed to make the process faster, less bureaucratic and more responsive to the needs of the Level One managers. For example, the DMS manual notes, "The process outlined in this document describes an effective way of getting quality staff work done 99% of the time.... There may be exceptions.... DND/CF must never become a slave to the process."[21] The recommendation to proceed with a directed purchase early in the process appears to support the notion that there is flexibility in the system, both at the departmental and government levels. The issue then becomes, why in this case did the government approve a directed purchase?

THE DECISION TO PURCHASE THE LAV III

The LAV III project charter indicates that the Department believed a directed purchase was viable in order to take full advantage of the commonality that existed with the LAV reconnaissance vehicle, including its sub-systems and logistics support. "This option represented the optimum solution to the operational requirement, capitalized on the investments made to develop and procure the LAV-Recce system, and yielded the most timely and economical solution."[22]

The implementation strategy is to capitalize on the performance, schedule and cost benefits accruing from the experience gained through the LAV Recce project development and implementation. As well, existing production lines for systems common to both will be exploited to the maximum extent possible.[23] The intent was to acquire, field and support an initial order of 240 APCs for the Land Forces, with delivery starting in 1997 in accordance with the acquisition strategy

Milestones	Target Dates				
	Project Charter	*96/97 Estimates*	*97/98 Estimates*	*98/99 Estimates*	*99/00 Estimates*
Model contract released	Oct 95				
Contract agreement	Spring 96				
Government approval	Sum 96				
Treasury Board approval	Fall 95	Dec 95	Dec 95	Dec 95	Dec 95
Phase 1 contract	Sum 96	May 96	Dec 96	Dec 96	Dec 96
First vehicle delivery	Dec 97	Jan 98	Jan 98	Jul 98	Jul 98
Last delivery (first order)	Dec 02	Jun 03	Jun 03		
Final date to exercise Option I for 120				1 Nov 98	1 Nov 98
Final date to exercise Option II for 120				1 Jun 99	1 Jun 99
Final date to exercise Option III for 171				1 Jan 00	1 Jan 00
Last vehicle delivery				1 Feb 02	1 Feb 02
All deliverables received				1 Jul 04	1 Jul 04

Table 1: Project Milestones

Source: Project Charter (page 5) and Part III Estimates 1996-1997 through to 1999-2000 (major capital projects summary sheet).

Year	Currently Estimated Total Cost	Forecast Expenditures to March 31	Estimates Current Year	Future Year Requirements
96/97	873,580	5,000	46,000	822,580
97/98	811,022	14,760	124,162	672,100
98/99	792,421	115,931	274,174	402,316
99/00	1,272,155	383,425	453,618	435,112

Table 2: Cost and Expenditure Details ($000s)
Source: Part III Estimates 1996-1997 through to 1999-2000 (major capital projects summary sheet).

specified by the government. Significantly, the approved acquisition strategy also reflects a change from more recent major capital purchases. The Department negotiated a price based on eventually purchasing 651 vehicles, but only agreed to an initial purchase of 240. The government would exercise options to purchase additional batches of 120, 120 and 171 at a later date.[24]

Although there is no solid evidence to substantiate why the government decided on this method, it is commonly believed that the government wanted to avoid the large commitment and related political issues associated with the EH-101 helicopter project. The issue is one of perception. An announcement to purchase 240 LAV IIIs at $2.2M each would appear to cost less than purchasing 651, regardless of an intention to purchase all 651 in the long term.[25] Additionally, purchasing the vehicles in groups provides flexibility for the government to acquire a smaller number if circumstances warrant a change in funding at a later stage.

The LAV III is an all-weather, day/night, state-of-the-art 8X8 light armoured vehicle. The Army considers it to be a key component of their leading-edge battlefield systems as they enter the 21st century.[26] The project milestones are provided in Table 1 on the previous page.

Since the original announcement to purchase 240 vehicles, the government has exercised the options to purchase the remainder of the 651 LAV IIIs. Option I to purchase an additional 120 was approved in May 1998, and Options II and III to purchase 120 and 171 respectively were approved in November 1998.[27]

The project is certainly being implemented in far less than the 6,280 days referred to by the Auditor General when criticizing the old DPMS. While the first vehicle delivery date was changed from January1998 to July 1998, this six-month delay is attributable to vehicle engineering taking longer than expected.[28] The Army has decided to acquire additional variants of the LAV III and, based on these new requirements, the last vehicle delivery date may have to move to the right, although current expectations are 2003.[29]

Before closing this section on the LAV III purchase, two other issues need to be discussed: the costs associated with the purchase of the vehicle, and Industrial and Regional Benefits (IRBs). Both issues are always important in major capital equipment purchases for the Department of National Defence. Tables 2 and 3 provide expenditure and cash flow data for the project as identified in the annual Departmental Part III Estimates between 1996-1997 and 1999-2000.

Table 2 reflects the non-recurring costs for the project, and Table 3 provides the costs associated with the additional purchases above and beyond the initial 240 vehicles, plus associated support costs. The reader will

Fiscal Year	Costs and Cash Phasing associated with additional 411 vehs and support costs as indicated in 1998-1999 Part III Estimates	Costs and Cash Phasing associated with additional 291 vehs and support costs as indicated in 1999-2000 Part III Estimates
98/99	26,538	0
99/00	192,979	3,637
00/01	552,795	217,113
01/02	483,062	513,555
02/03	86,285	91,425
03/04	67,513	73,425
04/05	8,309	55,478
Total	1,417,481	954,451

Table 3: Cost and Cash Phasing For Options ($000s)
Source: Part III Estimates 1998-1999 and 1999-2000 (pages 63 and 110 respectively).

note that the costs associated with the first option to purchace 120 LAV IIIs have been moved from the cost phasing section of Table 3 to the non-recurring costs in Table 2 during budget years 1998-1999 and 1999-2000. This reflects the decision by the government in May 1998 to exercise Option I. The 2000-2001 estimates reflect a similar move of funding for Options II and III.

Without a detailed knowledge of the budget system, it is difficult to use the data reflected in the Part III Estimates to follow the spending of money for the project. As well, it is difficult to determine what the overall cost will be for the project based on the data presented in the Part III Estimates. As indicated earlier, the Project Director indicated the basic cost of the vehicle was $2.2M. Using this figure, the 651 vehicles would cost just over $1.4B. Table 2 shows that the 1999-2000 Part III Estimates indicate a cost of just under $1.3B, fairly close to this $1.4B, figure. However, in Table 3, the cost and cash phasing data for 1998-1999 indicates the additional 411 vehicles will cost approximately $1.4B, and in 1999-2000 the data indicates the additional 291 vehicles will cost $954 million. This implies that the additional costs associated with exercising Option I is $446M or $3.7M a vehicle. One might also assume from this data that the $1.4B associated with the additional 411 vehicles (Options I, II and III) should be added to the $870M associated with the initial 240 vehicles, for a total project cost of about $2.27B or $4.1M per vehicle. Alternatively, accepting a $2.2M cost for the vehicle indicates the support costs for the project are almost $900M. Either way, a clear picture of the total cost is not provided in the estimates.

Combat Camera Photo by: MCpl Danielle Bernier, ISD01-0022a

Canadian LAV IIIs forming up for a road move from the port of Massawa, Eritrea, where they were unloaded from a cargo ship, to the Canadian base at Camp Dunn in Dek'emhare.

Discussions with the Project Director indicate the latter statement is true. Support costs for the project will be around $900M. There are a number of additional items being purchased for the vehicle that will add to its combat capability. For example, a driver's thermal vision aid and a turret cannon are being included, and the costs for these additions are included with the support costs.[30]

The final issue for discussion is the relationship of the project to IRBs. Most readers will be aware that the inclusion of IRBs has been a normal practice of the government, and IRBs were part of the contract negotiations with General Motors from the very beginning. The 1996-1997 estimates indicate, "As part of the contract negotiations for the APC, and associated logistic support, the Government will negotiate Industrial and Regional Benefit commitments."[31] The 1999-2000 estimates indicate "Total IRBs of $808M are split evenly between direct and indirect IRBs. Regional distribution to the Atlantic regions, Quebec and the West are for the amount of $60.7M each, and the small business portion will equal $82.8M."[32] As well, there is only one major sub-contractor for the project, an American firm providing design integration for the turret system.

At this early stage of the project, it appears that the decision for a directed purchase was appropriate. It is providing a new and capable armoured personnel carrier to the Army now, as well as meeting other government objectives such as IRBs and reduced costs. However, the decision to proceed with a directed purchase may have long term implications for both DND and Canadian industry.

DIRECTED PURCHASE IMPLICATIONS

The decision to purchase the LAV III in order to take advantage of commonalities with the Coyote (LAV Recce) appears sensible, particularly in light of the budgetary realities that exist for the Department. However, the LAV III is not an armoured fighting vehicle like the American M-2 Bradley or the German Marder. Some will thus argue that the Army will have only limited battlefield capability in the mid- to high-intensity spectrum of combat.[33] The stated policy, "Canada needs armed forces that are able to operate with the modern forces maintained by our allies and like-minded nations against a capable opponent — that is, able to fight alongside the best, against the best" will not be achievable across the spectrum of conflict.[34]

More importantly, in terms of procurement, Professor James Fergusson has argued that the future armoured combat vehicle purchase, should one occur, is already settled in favour of a LAV variant produced by General Motors Diesel Division.[35] Both the LAV III and the LAV Recce or Coyote were directed purchases from General Motors. Recalling the reasons discussed earlier in the paper for choosing the directed purchase route for the LAV III, the same reasons would exist for making a directed purchase of an armoured combat vehicle. It is, of course, not possible to foretell the future, but Fergusson's comments will need to be taken into account when the time comes to purchase a replacement for our main battle tank.

This issue is related to the need for demonstrating that there will be a Canadian economic benefit and, therefore, political benefits. This is not new for the Department. Canada has had an industrial benefits policy since the early 1970s and, although a satisfactory IRB proposal will not make an unacceptable operational bid acceptable, an operationally acceptable bid can be lost because of an unsatisfactory IRB plan.[36]

The issue within the context of a directed purchase is that, in the long term, industrial capability and industrial considerations will be more important and therefore determine military requirement. Stated another way, if a prime contractor production facility exists in Canada, the military will define its requirements in terms of that facility to ensure the project will win government support. As well, based on the present structure of the Canadian defence industrial base, there is a strong likelihood that future procurement will further limit CF flexibility for operational employment across the spectrum of conflict. The Canadian defence industrial base is comprised mainly of small and medium size companies which depend to a large degree on exports and are not capable of making major weapon systems.[37]

This paper has taken a first look at the APC replacement project within the context of the Department's procurement process. Although there is a new DMS in place, this project cannot be measured against that process. In addition to beginning before the new system was implemented, the government made a decision very early in the process to go with a directed purchase of the LAV III with General Motors Diesel Division. There were very good military and fiscal reasons for doing so. Nevertheless, as discussed in the paper, there may be longer-term implications as a result of this recent trend by the government to approve directed purchases with a Canadian company.

The issue of overall cost remains unclear, primarily because of the way data is presented in the Estimates. Further, the costs for the LAV Recce and the LAV III should be assessed against the overall cost of the original MRCV project. Will the capability provided by the current LAV projects equal the capability that would have been provided by the MRCV project? At this stage, the Army has two of the three main parts of the original MRCV project, and has expended over $2B. The issue warrants further study, particularly when considered in the context of breaking large projects into smaller projects to avoid the appearance of large, expensive and perhaps politically sensitive projects.

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Combat Camera Photo by: Cpl Marc Plante, ISD00-079-04A

Lord Strathcona's Horse Coyotes during a live firing exercise at Glamoc Range, Bosnia.

NOTES

1. Canada, Department of National Defence, *Project L2637 APC Replacement Statement of Requirement* (Ottawa: DND June 1995), p. 2.
2. Canada, Department of National Defence, *National Defence 1996-97 Estimates Part III Expenditure Plan* (Ottawa: Canada Communications Group, 1996), p. 160. The APC replacement project is listed in the details of the major crown project section. The summary indicates a forecast of expenditures of $5M to March 31st, $46M for the 1996-1997 period, and $822.580M remaining in future years.
3. Canada, Department of National Defence, *L2637 Armoured Personnel Carriers Replacement Project Charter* (Ottawa: DND, 24 January 1996), p. 3.
4. *Project Charter*, p. 1.
5. Lieutenant-Colonel R. Carruthers, Project Director L2637 Armoured Personnel Carriers Replacement Project, interviews 26 March and 7 April 2000. LCol Carruthers has been with the Project Office since its inception in 1991 for the MRCV. Before the MCRV project there was the Canadian Combat Vehicle 90 and the Armoured Infantry Fighting Vehicle Project.
6. Alistair D. Edgar and Davis G. Haglund, *The Canadian Defence Industry in the New Global Environment* (Montreal & Kingston: McGill-Queen's University Press, 1995), p. 88.
7. Interview, LCol Carruthers.
8. Part III Estimates, 1996-96, pp. 4-71.
9. Statement of Requirement, p. 7.
10. Statement of Requirement, p. 6.

11. Interview, LCol Carruthers.
12. Project Charter, p. 2.
13. Part III Estimates 1996-1997 onwards.
14. From a Canadian Forces perspective, changes began back when MND Hellyer introduced, in the early 1960s, a series of changes that stemmed from a general belief that there was waste and inefficiency in departmental affairs. The program study group set up in 1964 looked at the requirement for a programming system, and the Seven Year Integrated Defence Program (IDP) was introduced in 1966. This process has evolved over the years and included the multi-step Capabilities Planning Process (CPP), which is a variation of the Planning Programming and Budgeting System (PPBS). The CPP began with a Strategic Assesment document and finished with defence capabilities. See DPMS Guide 3 and George Bell "The Policy Process in National Defence Headquarters" in *Canada's International Security Policy*, David B. Dewitt and David Leyton-Brown, eds. (Scarborough, ON: Prentice Hall Canada Inc., 1995), p. 5.
15. Douglas Bland, *The Administration of Defence Policy in Canada 1947 to 1985* (Kingston, ON: Ronald P. Frye & Company, Publishers, 1987), p. 171.
16. The Report of the Auditor General to the House of Commons for the Fiscal Year ended 31 March 1992 (Ottawa, ON: Minister of Supply and Service Canada, 1992), p. 411.
17. D.A. Haglund, *Canada's Defence Industrial Base: The Political Economy of Preparedness and Procurement*, (Kingston: Ronald P. Frye and Company, 1988), p. 167. See also Maj Mark McQuillan, *Capital Acquisition: Trapped by Policy and Process*, (Toronto, ON: CFCSC New Horizons Paper 1994), p. 1.
18. McQuillan, p. 19.
19. *ibid.* The EMS is a cyclical process by which the government establishes broad national priorities and a budget strategy, arrives at a national budget decision (announced as the budget speech) and issues subsequent direction from which federal departments create their business plans. The system provides a linkage between the government's report to Parliament, Cabinet and Treasury Board. DMS Manual 1-6. For further information on the EMS, readers should visit the TB website at www.tbs-sct.gc.ca/Pubs_pol/opeofpubs/TB_H/EXMA_e.html
20. Canada, Department of National Defence, *Defence Management System Manual A-AD-125-000/FP-001* (Ottawa: DND, 1999), p. 7-1.
21. DMS Manual, p. 2.
22. Project Charter, p. 2.
23. *ibid*, p. 4.
24. *ibid.* See also Part III Estimates 1997-1998 onwards. The decision phase in projects is not common for major capital projects. A review of the past Part III estimates does not provide a similar reflection of cash phasing like that found for the LAV III. For example, even the more recent Canadian Patrol Frigate project has the additional six ships reflected as an "increase in work scope" and a reflection of expenditures vice cash phasing. See Part III Estimates 1994-1995, p. 125.
25. The Project Director indicated the average cost is about $2.2M, but some figures will be as high as $2.6M depending on what is included. The difference between 240 and 651, using an average cost of $2.2M, is just over $900M, a significant amount of money for the public.
26. LFC Equipemnt Fact Sheet. LAV III equipment site found at www.army.dnd.ca/equip/veh/LAV-3_E.html as of 31 March 00.
27. LCol Carruthers. See also Canada, DND, *National Defence 1998-99 Estimates Part III - Reports on Plans and Priorities* (Ottawa, ON: Canadian Government Publishing, PWGSC, 1998), p. 78, which provides new dates for exercising the options, and also Canada, DND, *National Defence 1999-2000 Estimates Part III - Reports on Plans and Priorities*, (Ottawa, ON: Canadian Government Publishing, PWGSC, 1999), p. 62, which indicates "to the end of December 1998, Option 1 for 120 vehs has been exercised for a total of 360."
28. Part III Estimates 1998-1999, p. 79 and LCol Carruthers.
29. Part III Estimates 1999-2000, p. 63. The Army has decided to acquire variants designed for some specialized functions. These include variants for artillery forward observer and mortar fire controller, infantry pioneers and tow under armour.
30. Interview, LCol Carruthers.
31. Part III Estimates 1996-1997, p. 160.
32. Part III Estimates 1999-2000, p. 63.
33. Fergusson, James, "Beyond the Dollar Crisis: Defence Strategy and Procurement in Canada" in *Security, Strategy and the Global Economics of Defence Production*, David G. Haglund and S. Neil MacFarlane, eds. (Montreal & Kingston: McGill & Queen's University Press, 1999), p. 102.
34. Canada, Department of National Defence, 1994 White Paper on Defence (Ottawa: Canada Communications Group, 1994), p. 14.
35. Fergusson, p. 102.
36. Edgar and Haglund, p. 73. Some might argue that even the issue of being operationally acceptable is debatable. The vehicle problems associated with the recent LSVW project are considered by many to be a clear example of IRB issues taking precedence over operational capability. See the Land Engineering Test Establishment LSVW Reliability, Availability, Maintainability, Durability (RAMD) Test Report of 20 May 1994 for details on the operational problems associated with the vehicle.
37. Haglund, David G. "Transatlanticism versus Regional Consolidation: Lessons from the Canadian Experience?" in *Security, Strategy and the Global Economics of Defence Production*, p. 74.