

CANADIAN FORCES SUPERANNUATION ACCOUNT

ACTUARIAL REPORT

AS AT DECEMBER 31, 1970

Department of Insurance
Ottawa K1A 0H2
Canada

Canadian Forces Superannuation Act - Part I

Report on the Actuarial Examination
of the
Canadian Forces Superannuation Account
in the Consolidated Revenue Fund
as at December 31, 1970

The Canadian Forces Superannuation Act, hereinafter referred to as the "Act", came into force on March 1, 1960. In most respects the provisions of the Act continued the provisions of Part V of the Defence Service Pension Act, hereinafter referred to as the "former Act". The Canadian Forces Superannuation Account is a continuation under the Act of the Permanent Services Pension Account which was established pursuant to Part V of the former Act.

In accordance with instructions and pursuant to section 27 of the Act we have made an actuarial examination of the Account as at December 31, 1970, and have the honour to report thereon.

The report is divided into the following sections:

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In 1970, legislation was enacted to provide supplementary retirement benefits to persons in receipt of annuities or annual allowances under the Canadian Forces Superannuation Act. Although those provisions do not affect the operation of the Canadian Forces Superannuation Account it was considered desirable to include a description of the provisions in Appendix 2 to this report, in order to present a more complete picture of the total pension provisions for contributors to the Canadian Forces Superannuation Account in addition to the benefits available to them under the Canada Pension Plan.

I. Terms of the Superannuation Plan

A. Recent Amendments

The report on the actuarial examination of this Account as at December 31, 1965, included details of the 1966 amendments to the Canadian Forces Superannuation Act and the effect of these amendments on the cost of the benefits.

Further amendments were made to the Act in 1969 and 1970. The more important of these are as follows:

1. In 1969, the basic contribution rate was increased for male contributors from 6.0% to 6.5% of pay and decreased for female contributors from 6.0% to 5.0% of pay. These basic rates are reduced by the member's contribution to the Canada Pension Plan, namely, 1.8% of that portion of the member's pay falling between the C.P.P. contributory earnings lower and upper limits. (For 1972, these limits were \$600 and \$5,500, respectively.) This amendment made the contribution rates the same as those for contributors to the superannuation plans for the Public Service and the Royal Canadian Mounted Police.

2. Some changes were made in 1969 in the benefits payable to contributors on retirement for various reasons with ten or more years' service. Notably the number of situations requiring referral to the Treasury Board was substantially reduced. Details of the current scale of benefits are given in the Summary of Benefits later in this section of the report.

3. One of the changes mentioned above provides for a contributor to receive, under certain circumstances, a deferred annuity commencing at age 60. The amendments also provide that if such former contributor becomes disabled prior to age 60 and entitled to a disability pension under the Canada Pension Plan, his deferred annuity will be converted to an immediate annuity. In the event of recovery from such disability prior to age 60, his entitlement will revert to the deferred annuity.

4. In 1970, the Act was amended to provide a new formula for integration of the benefits under the Act with those of the Canada Pension Plan. Similar formulae are used for integration of benefits under the Public Service Superannuation Act and the R.C.M.P. Superannuation Act with those of the Canada Pension Plan. Under the terms of this amendment, the annuity payable to any retired contributor after reaching age 65 is reduced by 0.7% of the contributor's average annual pay used in determining the amount of his annuity, but not exceeding the C.P.P. Average Maximum Pensionable Earnings for the contributor, multiplied by the contributor's number of years of pensionable service after 1965 or after his 18th birthday, if later, but not exceeding 35. A similar reduction is applicable to any annuity payable to a retired contributor before reaching age 65 if he has become entitled to a disability pension under the Canada Pension Plan.

The C.P.P. Average Maximum Pensionable Earnings for any contributor is the average of the Year's Maximum Pensionable Earnings under the terms of the Canada Pension Plan for the year in which he ceased to be a member of the regular force and for each of the two preceding years.

5. The Act provides that in the event of the remarriage of a contributor's widow who is entitled to an annuity, the annuity is suspended, but that payment of the annuity will be resumed upon the death of her husband by that marriage. An amendment in 1969 provided that the payment would also be resumed upon the dissolution or annulment of that marriage.

6. Since 1969, benefits have been payable to children of a deceased contributor up to age 25, provided the child, if over age 18, is unmarried and is in full-time attendance at a school or university, having been in attendance substantially without interruption since he reached age 18 or the contributor died, whichever occurred later. This amendment was made in order to have benefits to children payable under the same circumstances as under the Canada Pension Plan. Until that time only children under age 18 were entitled to benefits after the death of the contributor.

7. In 1969, the Act was amended to require that the amount representing interest on the balance in the Superannuation Account be calculated at the interest rate used in the most recent actuarial valuation, and that a further amount representing additional interest on the Account based on the difference between any higher rate of interest, as may be prescribed by regulation, and the valuation rate of interest also be credited each year.

However, the Minister of Finance may in any fiscal year apply an amount not exceeding the amount representing additional interest toward reducing the amount of any instalment required to be charged to the Consolidated Revenue Fund in that year as the result of statutory credits to the Account as are in the opinion of the Minister required to provide for any increase in cost of benefits resulting from a general increase in pay to members of the forces or for any deficit in the Account as reported in the most recent actuarial report.

B. Coverage

Persons covered by this plan comprise

- (a) every member of the regular forces of the Canadian Forces, hereinafter referred to as the "forces", who
 - (i) was a contributor under Part V of the former Act immediately before March 1, 1960, the date on which the Act came into force,
 - (ii) not having been a member of the forces immediately before March 1, 1960, became a member of the forces on or subsequent to that date,
 - (iii) having been a member of the forces on March 1, 1960, thereafter ceased to be a member and subsequently was re-enrolled in the forces,
 - (iv) having been a member of the forces but not a contributor under Part V of the former Act on March 1, 1960, elected to become a contributor under the Act within one year from that date,

- (v) having been entitled to a pension under any of Parts I to III of the former Act on March 1, 1960, elected to become a contributor under the Act within one year from that date, or
 - (vi) was granted a permanent commission or was appointed as an officer for an indefinite term on or after March 1, 1960, having been enrolled as an officer of the forces temporarily or for a fixed term immediately before such grant or appointment but not having been a man of the forces immediately before he became so enrolled;
- (b) former members of the forces who are entitled to annuities payable out of the Account; and
 - (c) widows and children who are entitled to annual allowances as dependants of contributors who died either while members of the forces or while entitled to annuities payable out of the Account.

C. Pay

The term "pay", as it applies to a contributor under this plan and as it is used throughout this report, means pay at the rates prescribed by the regulations made pursuant to the National Defence Act together with the allowances prescribed by the Canadian Forces Superannuation Regulations.

D. Pensionable Service

The amount of any annuity, cash termination allowance or annual allowance to which a contributor or his dependants may become entitled under the Act depends upon the number of years of "pensionable service" to the credit of the contributor at the date he ceases to be a member of the forces.

"Pensionable service" is described in detail in the Act. In general, the pensionable service of a contributor includes any period of service in the forces for which he has contributed or has elected to contribute. It may also include, if the contributor elects to contribute therefor, any period of prior service

- (a) as a full-time, paid employee in the Public Service,

(b) as a member of the Royal Canadian Mounted Police,

(c) as a member

(i) on active service during time of war of the naval, army or air forces of Her Majesty raised by Canada,

(ii) of the Canadian Army Special Force established in 1950,

(iii) for six months or more of the Canadian Forces or of the naval, army or air forces of Her Majesty raised by Canada, other than the regular force, provided that such service was full-time and continuous,

(iv) of the naval, army or air forces of Her Majesty other than those raised by Canada, provided that such service was full-time service during time of war or otherwise in the permanent forces, and

one-fourth of any period of prior service in the Canadian Forces or in the naval, army or air forces of Her Majesty raised by Canada, other than the regular force, during which the contributor was liable to be called out for periodic training or duty otherwise than during an emergency.

E. Service in the Forces

The length of a contributor's "service in the forces" together with the circumstances of his termination of service govern the type of benefit payable to him or to his dependants.

For most purposes, "service in the forces" means service in the regular forces of the Canadian Forces excluding any service for which a contributor was paid a return of contributions or lump sum payment under this Act and for which he did not on subsequent enrolment elect to pay. However, for the purpose of computing the length of service in the forces of a contributor who dies leaving dependants entitled to benefit or who is compulsorily retired either because of disability or, in some circumstances, to promote economy or efficiency, certain types of elective service are prescribed by the Act as "service in the forces" in addition to service in the regular

forces. Such additional "service in the forces" consists of any periods of elective pensionable service described in items (a), (b) and (c)(i), (ii) and (iii) of the preceding section with the proviso that the service described in item (c)(iii) must have been in a theatre of active operations.

When calculating the length of service for purposes of determining the benefits payable upon voluntary retirement of a contributor with 10 or more years service in the regular forces, any period of active service during time of war in the naval, army, or air forces of Her Majesty raised by Canada is included.

F. Summary of Benefits

Further explanatory notes regarding benefits as indicated in the following summary, are given in Appendix 1 to this report.

1. Contributors who are members of the forces

<u>Type of Termination</u>	<u>Service in the Forces</u>	<u>Benefit</u>
Retirement because of age (Note 1)	3 years or less	Return of contributions (Note 2)
	More than 3 years but less than 10 years	Return of contributions or cash termination allowance (Note 3), whichever is the greater
	10 years or more	Immediate annuity (Note 4)
Compulsory retirement because of disability	Less than 10 years	Return of contributions or cash termination allowance, whichever is the greater
	10 years or more	Immediate annuity
Compulsory retirement to promote economy or efficiency	3 years or less	Return of contributions
	More than 3 years but less than 10 years	Return of contributions or cash termination allowance, whichever is the greater
	10 years or more but less than 20 years	At the option of the contributor, return of contributions, a deferred annuity (Note 5), or with consent of the Treasury Board, an immediate reduced annuity (Note 6)
	20 years or more	Immediate annuity

<u>Type of Termination</u>	<u>Service in the Forces</u>	<u>Benefit</u>
Compulsory retirement because of misconduct, as defined in the Act	Less than 10 years	Return of contributions
	10 years or more	Return of contributions or with the consent of the Treasury Board, the whole or any part specified by the Treasury Board of the annuity to which the contributor would have been entitled, at the time of his retirement, if he had been compulsorily retired to promote economy or efficiency (Note 7)
Retirement for other reasons	Less than 10 years	Return of contributions
	10 years or more but less than 20 years	At option of contributor, return of contributions or deferred annuity
	20 years or more but less than 25 years	Immediate reduced annuity
	25 years or more	Officer contributor - immediate reduced annuity Other than officer contributor - immediate annuity
Death leaving no widow or eligible children under age 25 (Note 8)	Any length	Return of contributions
Death leaving widow and/or eligible children under age 25	Less than 10 years	Return of contributions or an amount equal to one month's pay of the deceased contributor for each year of pensionable service to his credit, whichever is the greater
	10 years or more	Annual allowance (Notes 9 & 10)

2. Former contributors who are receiving annuities or are entitled to deferred annuities

<u>Type of Termination</u>	<u>Benefit</u>
Death leaving no widow or eligible children under age 25	Return of excess contributions or excess cash termination allowance (Note 10)
Death leaving widow and/or eligible children under age 25	Annual allowance

G. Contributions

1. By Contributor

(a) Current Service

The rates of contribution for members of the forces covered by the Act are

(i) for males 6.5% of pay, and

(ii) for females 5.0% of pay,

reduced by the amount that the contributor would be required to contribute under the Canada Pension Plan in respect of pay received by him as a member of the forces. (For example, in 1972 the reduction was 1.8% of pay between \$600 and \$5,500 per annum.)

Contributions for current service cease when a contributor has to his credit 35 years of pensionable service.

(b) Prior Service

A contributor may elect to contribute in respect of any period of prior pensionable service as described on page 5 of this report.

In general, if the election to contribute for a period of prior pensionable service is made within one year of the member becoming a contributor, the amount that the member is required to contribute is equal to the total contributions that he would have had to make during that period of prior pensionable service if the contributions had been computed

- 1) for any period of service described in (a) and (b) of section I.D of this report according to the rate of pay applicable to the contributor on the most recent occasion on which he became a contributor under the Act and
- 2) for other service, according to the rate of pay authorized to be paid to him during that period,

and at rates of contribution of 6.0% for service prior to April 1, 1969, and 6.5% for male members and 5.0% for female members for service after that date, and with adjustment for integration with the Canada Pension Plan for any prior

pensionable service after 1965 for which the member elected to contribute. All contributions are increased by simple interest at the rate of 4% per annum from the middle of each fiscal year of prior service to the date of election.

There are a few minor exceptions to this general rule which it was considered unnecessary to give in detail in this report.

If a contributor fails to make an election in respect of a period of prior pensionable service within the prescribed time, he may make an election at any later time while he is still a member of the forces provided that he is in good health at date of election. However, the rate of pay used in determining the contributions for such prior service will be the rate of pay authorized to be paid to the contributor at the time he makes his election.

Contributions in respect of prior service may be paid in a lump sum, or by monthly instalments, payable for life, or for a period ceasing upon death or completion of a fixed number of years whichever is earlier. Monthly instalments are computed on the basis of the Canadian Life Table No. 2 (1941) Males or Females, as the case may be, and interest at 4% per annum.

2. By Government

The Government makes credits to the Account as follows:

- (a) in each quarter such amount in relation to the total amount paid into the said Account during the preceding quarter by way of contributions in respect of current services and past services rendered by contributors as is specified by the Minister of Finance. As of April 1, 1969, the amount was increased from $1 \frac{2}{3}$ to 1.8 times the amount of contributions by contributors;
- (b) in each fiscal year, an amount representing interest on the balance in the Account from time to time calculated at the interest rate assumed in the preceding actuarial valuation and at such supplementary rate as provided by regulation (more details relating to the supplementary interest credit are given in section III.B of this report);

(c) following authorization of any pay increase applicable to at least one per cent of the members of the forces, an amount representing, in the opinion of the Minister of Finance, the increase in the net liability for benefits resulting from that pay increase; (The amount so credited is charged to the Consolidated Revenue Fund in five equal annual instalments commencing in the fiscal year in which the pay increase was authorized.)

(d) following the laying before Parliament of any actuarial report an amount, as in the opinion of the Minister of Finance, together with the amount then to the credit of the said Account is required to meet the cost of the benefits payable under this Part. (The amount so credited is charged to the Consolidated Revenue Fund in five equal annual instalments commencing in the fiscal year in which the report is laid before Parliament.)

The Minister of Finance may apply the supplementary interest described in (b) above to reduce the instalments described in (c) and (d) above.

II. Membership Statistics

In the following tables are shown pertinent statistics concerning contributors to the Account during the five-year period from the date of the last valuation December 31, 1965, to the date of the current valuation, December 31, 1970. These figures were obtained from the computer tabulations supplied by the Department of National Defence.

A. Members of the Forces

<u>Class of Contributors</u>	<u>Contri-* butors on Jan.1/66</u>	<u>New Con- tributors Jan.1/66- Dec.31/70</u>	<u>Terminations during period Jan.1/66-Dec.31/70</u>				<u>Contri- butors on Dec.31/70</u>	
			<u>Type of Benefit</u>	<u>Type of Termination</u>				
				<u>Death**</u>	<u>Disability</u>	<u>Other***</u>	<u>Total</u>	
<u>Males:</u>								
Officers			Annuity	18	173	3,864	4,055	
			Lump Sum	55	96	3,625	3,776	
	15,803	5,572		73	269	7,489	7,831	13,544
Other Ranks			Annuity	99	2,387	10,070	12,556	
			Lump Sum	377	1,478	36,675	38,530	
	87,630	36,590		476	3,865	46,745	51,086	73,134
Total			Annuity	117	2,560	13,934	16,611	
			Lump Sum	432	1,574	40,300	42,306	
	103,433	42,162		549	4,134	54,234	58,917	86,678
<u>Females:</u>								
Officers			Annuity	-	1	61	62	
			Lump Sum	2	1	38	41	
	213	235		2	2	99	103	345
Other Ranks			Annuity	-	1	24	25	
			Lump Sum	4	26	930	960	
	639	1,398		4	27	954	985	1,052
Total			Annuity	-	2	85	87	
			Lump Sum	6	27	968	1,001	
	852	1,633		6	29	1,053	1,088	1,397
Grand Total			Annuity	117	2,562	14,019	16,697	
			Lump Sum	438	1,601	41,268	43,307	
	104,285	43,795		555	4,163	55,287	60,004	88,075

* In this column, cases of contributors who had other rank status on January 1, 1966, and who attained officer status at some time during the 1966-70 period are shown as officers rather than other ranks.

** The number of deaths is substantially understated by approximately 400. Errors were found in procedures for amending the records on death of a contributor and they have been corrected. However, it was impractical to revise the records for the period 1965-70. Compensating differences are to be found in the other figures.

*** Compulsory retirements because of age, promotion of economy or efficiency, misconduct, together with all retirements for other reasons.

B. Persons Entitled to Annuities or Annual Allowances

Retired Contributors

	Entitled on <u>Jan.1/66</u>	New Entitlements Jan. 1/66 to <u>Dec. 31/70</u>	Terminations Jan.1/66 to Dec. 31/70		Entitled on <u>Dec.31/70**</u>
			<u>Deaths</u>	<u>Other Term'ns*</u>	
<u>Males:</u>					
Retirement for reasons other than disability	9,417	13,934	590	1	22,760
Retirement because of disability	<u>2,331</u>	<u>2,560</u>	<u>229</u>	<u>1</u>	<u>4,661</u>
Total	11,748	16,494	819	2	27,421

Females:

Retirement for reasons other than disability	94	85	2	-	177
Retirement because of disability	<u>14</u>	<u>2</u>	<u>1</u>	-	<u>15</u>
Total	108	87	3		192

Widows

Entitled on <u>Jan.1/66</u>	New Entitlements Jan. 1/66 to <u>Dec. 31/70</u>	Terminations Jan. 1/66 to Dec. 31/70			Entitled on <u>Dec.31/70</u>
		<u>Deaths</u>	<u>Remarriages</u>	<u>Total</u>	
1,065	1,347	38	159	197	2,215

Children (excluding students ages 18 to 25)

<u>Entitled on Jan. 1/66</u>	<u>Entitled on Dec.31/70</u>
1,712	2,513

* Re-enrollments in the forces and transfers to other superannuation plans.

** There were 831 "other than disability" and 16 "disability" cases whose annuities were wholly or partially suspended at December 31, 1970, because of employment in the Public Service, and three for other reasons.

III. Valuation Bases and Assumptions

A. General

Separate computer tabulations were provided for four groups of contributors, namely, male officers, male other ranks, female officers and female other ranks. In this report, the term "classes of active contributors" refers to these four groups.

As for recent examinations of the Account, the data exhibited significant differences in both salary and termination experience for the four classes of contributors. It was therefore considered desirable to continue to treat each class separately for valuation purposes.

A study of the data on contributors and ex-contributors at the time of the 1965 valuation revealed substantial differences between actual experiences during the five years 1961-65 and what was expected in accordance with the assumptions used for the 1960 valuation. In view of the integration of the armed forces which occurred during that period, it was considered that these results were unusual and therefore unsuitable for forecasting future experience. It was therefore deemed desirable to retain all the bases used in the 1960 valuation for the 1965 valuation.

For purposes of this valuation a further study was made of the actual experience during the period 1966-70 compared with the expected experience for salaries and terminations, based on the assumptions used in the 1965 valuation. Again it is believed that some of the difference was related to unusual circumstances, namely, the reduction in forces during this period, and therefore not suitable for forecasting future experience. Other differences however appear to reflect changes in policy and, in such cases, changes in assumptions for forecasting future experience are deemed necessary. These assumptions are explained in fuller detail under the respective headings.

B. Interest Rates

Until July 1, 1969, interest was credited to the Superannuation Account on the last day of each quarter in the fiscal year at the rate of

1% of the balance to the credit of the Account on the last day of the preceding quarter. This is a rate equivalent to approximately 4% per annum which is the rate that has been assumed in preceding actuarial valuations and has been retained for the current valuation.

As noted in section I of this report, the 1969 amendments to the Act made provision for crediting interest to the Account in excess of the rate used in the preceding actuarial valuation. The total rate at which interest is now credited changes every three months and is calculated as if the amounts not required for payment of benefits in each quarter had been invested on a basis similar to that applied under the Canada Pension Plan, i.e., in 20 year bonds having a yield equivalent to the average yield on Government of Canada bonds with 20 or more years to maturity outstanding at that time.

For the quarter ending December 31, 1970, the total rate of the interest credit was 1.3427%. The total annual rate of the interest credit has remained above 5% since the Act was changed and is likely to continue at that level for some time, given the current climate of higher interest rates. Since, under such circumstances the continued use of an assumed rate of 4% for the valuation may be questioned, the following observations seem in order.

An assumed rate of interest of 4% per annum is considered to constitute a reasonably safe allowance for the long-term effect of interest earnings into the indefinite future in the calculation of required rates of contribution. In this connection it is well to remember that while it may be difficult now to anticipate a return to the low levels of interest experienced from the 1930's to the 1950's, it appeared at least as difficult then to anticipate a return to the high levels of interest which have been experienced in recent years.

Moreover, although it is generally desirable to select each of the actuarial assumptions on its own merits, in order to judge the reasonableness of the results, it is also necessary to consider all the assumptions

together. In judging the reasonableness of the interest assumption in the valuation of pension plans such as the Canadian Forces Superannuation Plan where benefits are based on final average salaries, it is particularly relevant to have regard to the assumptions used for purposes of estimating future salaries.

For reasons which will be noted in the discussion of salary scales which follow, it was decided to continue the practice of including no provision for increases in general levels of salaries. It is consistent with this decision to guard as much as possible against over-optimistic assumptions regarding future interest earnings, so that possible interest earnings in excess of the assumed rate, which might be regarded as an approximation to a "natural" rate of interest, might provide at least some offset to the substantial effect of general pay increases on pension costs. As noted earlier, specific provision was made in the 1969 amendments for the application of interest earnings in excess of the valuation rate to the deficiencies arising from various sources of which increases in liabilities arising out of general pay revisions are by far the most important.

C. Salary Scales

Where used in this report, the term "salary scale" means the assumed pattern of future increases in pay for a member as his age increases year by year. It is essential to use such a scale for valuation purposes, because both benefits and contributions that become payable in the future depend on the rates of pay that will be earned by the contributors in the future.

There are two main forces that tend to generate increases in the pay of a member of the forces during his period of service. One, which we shall call the "promotional" force results from the experience that he gains through service and the new and improved skills that he acquires through training both of which normally earn him increased remuneration. The other, which we shall call the "economic" force is related to factors such as increased productivity and inflation which result in periodic revisions in the salaries of groups of employees. Increases in pay resulting from this second force are hereinafter referred to as "general" increases.

While the pattern of average promotional increases is fairly predictable on the basis of past experience, relatively little confidence can be placed in predictions of future increases in pay that depend on varying economic and social pressures.

If salary scales were constructed to include provision for general pay increases at the level that has been experienced in recent years, this would have the undesirable effect of reinforcing inflationary expectations. Moreover, since the long-term level of general pay increases could then be expected to turn out less than assumed (possibly as the result of controls or other forces), net liabilities and contribution rates might then be overestimated and overfunding might occur. However, this is rather unlikely, because it is usually recognized that the inclusion of inflationary elements in salary scales warrants the inclusion of similar elements in the assumed rate of interest. As a result, there is a danger that an overestimate of future inflation in the salary scale would be more than offset by an overestimate of investment earnings which would result in the value of pension liabilities and rates of contribution being underestimated.

Even if there were general agreement on what might be considered a reasonable long-term level of general pay increases and provision for it was reflected in the salary scales, prolonged cyclical variation would tend to undermine the credibility of the assumptions. There would likely be extended periods, such as in the recent past, when general salary levels would rise at rates substantially greater than assumed. During such periods, actuarial deficits arising out of general pay increases would continue to appear (although at lower levels than if no provision at all for such increases is made), and this would likely engender concern that costs were being underestimated. On the other hand, during periods when salaries rose at rates lower than assumed, unwarranted pressure for changes in the plan would build up on the premise that the long term level of government credits was generating surpluses which ought to be available for the benefit of the plan members.

Finally it might be reasoned that as a minimum the salary scale ought to make provision for annual increases in the general level of salaries of, say, $2\frac{1}{2}\%$ which on the basis of recent experience might be regarded as the non-inflationary or productivity-related element of general salary increases. However, under such circumstances, the objections discussed in the preceding paragraph would still apply. Moreover it was felt that in the rapidly evolving contemporary socio-economic environment it may be premature to assume general salary increases even at this level for the indefinite future.

The above considerations seem to suggest that it is not unreasonable to continue the practice of providing for increases in liabilities arising out of general salary increases as and when they materialize rather than attempting to provide for them as a normal contingency in the basic contribution rates. As stated earlier, the terms of the Canadian Forces Superannuation Act provide that the Account shall be credited with an amount estimated to be equal to the additional net liability created by a pay increase applicable to at least 1% of the members of the forces. Accordingly, in the current and preceding examination of the Canadian Forces Superannuation Account, the salary scales used for purposes of valuing the net liabilities in respect of current contributors and the required contribution rates in respect of new contributors have provided for promotional increases only.

Data relating to the rates of pay as at December 31, 1970, for each of the four classes of active contributors were compared with the salary scales used in the 1965 valuation. On the basis of this study it was considered desirable to construct new salary scales for the current valuation. The scales used are shown in Appendix 3 to this report.

D. Rates of retirement with return of contributions

The experience with regard to contributors retiring during the period 1966-70 while entitled only to a return of contributions showed that such retirements were occurring earlier than expected according to the rates

assumed in the preceding valuation. It was thought that much of this difference was due to the policy of reducing the number of members in the forces, so that rates based on the 1966-70 experience would not be suitable for forecasting the number of terminations to be expected in the future.

The rates used in the 1965 valuation were deemed to be more suitable and were used again in this valuation. These rates are shown in Appendix 4.

E. Rates of retirement with entitlement to annuity or cash termination allowance for reasons other than disability

For all members of the forces, retirement ages according to rank are prescribed by regulations made under the National Defence Act. Effective February 1, 1968, new retirement ages were adopted for contributors who commenced service on or after that date, or who elected to come under the new regulations. These ages are as follows:

	<u>Officers</u>		
	<u>General Service</u>	<u>Specialist Service</u>	<u>Commissioned from Ranks</u>
Brigadier-General and above	55	60	55
Colonel	55	58	55
Lieutenant-Colonel	51	55	50
Major	47	55	50
Captain and Lieutenant	45	50	50
	<u>Other Ranks</u>		
Sergeant and above	50		
Corporal and below	44		

Notwithstanding the above prescribed ages for retirement, for purposes of voluntary retirement or compulsory retirement under certain conditions, the new regulations prescribe that retirement age will be deemed to have been reached upon completion of the following periods of full-time, paid service in any of Her Majesty's Forces if the resulting date of retirement is earlier.

Years of Service

Officers

Colonel and above	30
Lieutenant-Colonel and below	28

Other Ranks

Sergeant and above	30
Corporal and below	25

The data for the contributors retiring and entitled to a cash termination allowance or annuity during the 1966-70 period indicates that such retirements were made earlier and in larger numbers than expected according to the rates assumed in the 1965 valuation. Presumably some of this difference is due to the changes made in the ages of retirement stated above and may be expected in the future. Therefore, new rates of retirement that make some allowance for this experience were adopted for this valuation. They are shown in Appendix 5 of this report.

F. Rates of retirement with entitlement to an annuity or cash termination allowance because of disability

The number of contributors retired because of disability and with entitlement to a cash termination allowance or annuity was more than double that expected according to the rates assumed in the 1965 valuation. It may be assumed that as a result of the reorganization and the reduction in the number of members in the forces, the number of contributors classified as disabled and retired would be somewhat higher than normal. Therefore, until the experience demonstrates that there is a more permanent change in the rates of retirement due to disability it was considered desirable to retain the rates used in the 1965 valuation. They are shown in Appendix 6 to this report.

As stated earlier in the report, the Act provides for a reduction in the amount of an annuity payable on retirement because of disability if the contributor is entitled to a disability pension under the Canada Pension Plan. This disability pension is payable only if the person is classified as totally and permanently disabled under the provisions of the Canada Pension

Plan. In practice, the reduction in the annuity being paid to such contributor is only made when he advises that he is receiving a C.P.P. disability pension. To date, only a small number of contributors have advised that they are receiving a C.P.P. disability pension.

Therefore, to provide for the effect of the reduction in disability annuities on the Canadian Forces Superannuation Account when the C.P.P. pensions are payable it was assumed that no reductions will be made until the contributor reaches age 65 when he becomes entitled to the regular C.P.P. pension commencing at that age.

G. Rates of mortality and remarriage

For valuation purposes, mortality rates expected to be experienced in the future were required for the following groups:

- (i) the four classes of active contributors,
- (ii) contributors in receipt of annuities who were retired for reasons other than disability, males and females separately,
- (iii) contributors in receipt of annuities who were retired because of disability, males and females separately,
- (iv) widows of deceased contributors,
- (v) children of deceased contributors,

As widows' allowances are suspended on remarriage, rates of remarriage expected to be experienced in the future were also required for valuation of these benefits.

The bases used in the valuation for each of the above groups are as described in the following paragraphs:

(i) Active contributors

As stated earlier, the data for active contributors who died during the 1966-70 period was incomplete. From the information that was available, it would appear that the mortality rates used for the 1965 valuation for male

officers were reasonable. For male other ranks there is some evidence that the mortality in the ages under 25 was higher than expected but close to expected at other ages. It was not considered desirable, however, to base any changes in the mortality assumptions on incomplete data. The rates adopted for the 1965 valuation have therefore been used again for the current valuation. They are shown in Appendix 7 to this report.

(ii) Contributors entitled to annuities who were retired for reasons other than disability

The experience of the 1966-70 period indicated that for contributors retired for reasons other than disability and entitled to an annuity the mortality rates assumed in the 1965 valuation continue to be appropriate for those now entitled to an annuity and for those who would become entitled in the future. The rates are those of the a-1949 Table Projected 10 years.

The mortality rates from this table and annuity values based thereon are shown in Appendix 8 to this report.

(iii) Contributors entitled to annuities who were retired because of disability

For male contributors entitled to annuities because of disability, a comparison of actual deaths with the deaths expected in accordance with the assumptions used in the 1960 and 1965 valuations indicated these rates continue to be suitable for the valuation of benefits payable to those currently receiving them and those who may receive them in the future.

The rates for male lives are multiples of 300% in the first year of disability, of 200% in the second year of disability, and 100% thereafter of the male rates in the Canadian Life Table 1950-52. As the number of females receiving annuities because of disability at December 31, 1970, was only fifteen and only one death occurred in this group during the 1966-70 period, no study of the mortality experience was made. The rates of mortality used for the 1965 valuation, varying multiples of rates from the Canadian Life Table 1950-52, were retained for this valuation.

The mortality rates used in the valuation and annuity values based thereon are shown in Appendix 9 to this report.

(iv) Widows

The mortality rates used for the valuation of both present and future widows' allowances were those used in the 1965 valuation which were derived from the 1948-57 experience of widows receiving allowances under the Public Service Superannuation Plan. Experience during the 1966-70 period indicated that these rates continue to be appropriate.

The remarriage rates used were the select and ultimate remarriage rates derived from the 1940-57 experience of widows granted pensions under the Pension Act and previous government administrative orders from August 4, 1914 to December 31, 1957. While this table of remarriage rates was the most appropriate one available, recent experience has indicated that the select rates of the table at early durations are somewhat lower than corresponding actual rates for widows entitled to allowances under the Canadian Forces Superannuation Plan.

In Appendix 10 to this report are shown:

- (A) - select remarriage rates for quinquennial ages of commencement of widowhood 25 to 55 and specimen durations of widowhood
- (B) - ultimate remarriage rates and aggregate mortality rates for quinquennial ages commencing at age 39
- (C) - annuity values based on the probabilities of payments ceasing as a result of remarriage or death as stated in Appendices 10A and 10B, and for the same specimen ages and durations

(v) Children

Payments of allowances to children are payable up to age 18 in all circumstances and from age 18 up to age 25 if the child is unmarried and attending a school or university. As the mortality rates for children are quite low, it was considered suitable to ignore mortality amongst these annuitants.

H. Proportions of deceased male contributors leaving dependants and average age of widows corresponding to ages of contributors at death

To determine the value of future benefits payable on the death of contributors who are members of the forces or entitled to annuities at death, proportions of deceased contributors leaving dependants and average ages of widows corresponding to ages of contributors at death were required.

The proportions used in the two preceding valuations were based on the combined experience of all male lives, active and retired, during the 1956-60 period. These proportions were considered appropriate for the current valuation. There appears to be a slow trend towards a reduction in the differences between the ages of husbands and wives according to the experience for the two periods 1961-65 and 1966-70. As the change is slight, however, the table of average ages of widows corresponding to ages of husbands at death used for the 1965 valuation was retained.

The proportions and average ages used in the valuation are shown in Appendix 11 to this report.

I. Capitalized Value of Benefits

The values of benefits as at date of commencement of benefit are shown in Appendix 12 for each \$1.00 of annuity emerging

- (a) at retirement with entitlement to an annuity for a reason other than disability
- (b) at retirement with entitlement to an annuity because of disability, and
- (c) at death leaving dependants entitled to an annual allowance.

For retirements, the values shown for male contributors include provision for the prospective annual allowance to a widow and children, and for the "minimum return" of an aggregate amount of benefit equal to the contributor's total contributions without interest; the values shown for female contributors include provision for the "minimum return" benefit.

For deaths, values are shown separately for the annual allowance benefits to the widow and the children and for the "minimum return" benefit.

J. Proportion of contributors whose pay is less than the contributory earnings upper limit of the Canada Pension Plan; and Ratios of the average pay of such contributors to the contributory earnings upper limit

These proportions and ratios were required for the purpose of determining the effect that the integration of the Canadian Forces Superannuation Act with the Canada Pension Plan has on the present value of benefits and contributions.

The factors used were developed from the data submitted on salaries of contributors showing the numbers at each age earning less than the Canada Pension Plan contributory earnings upper limit and their average salary.

The factors used are shown in Appendix 13.

IV. Contribution Rates and Government Credits to the Account

As stated earlier, in 1969 the rates of contribution for current service were changed from 6% to $6\frac{1}{2}$ % of pay for male contributors and to 5% of pay for female contributors, less in all cases the amount of contributions required to be paid to the Canada Pension Plan. Contributions for prior service are based on the contribution rates and pay in effect during such periods.

In 1969, government credits to the account were increased from $1\frac{2}{3}$ to 1.8 times the amount of contributions by contributors.

As part of the review of the Account, the total rates of contribution and credits required to be made in respect of new contributors to provide for the benefits under the Act were calculated using the same assumptions concerning future salaries and other factors as were used for the valuation of benefits and contributions payable in the future in respect of contributors who were members of the forces on December 31, 1970. The salary scale used makes allowance for promotional increases in salaries only.

The following table shows the estimated rates at which contributions are made and government credits are required in respect of new contributors for each of the four classes and for all classes combined. The average rates for each class and all classes combined were determined by weighting the rates for each age by the product of the number of new entrants at such ages during the 1966-70 period and the present value of the salaries of new entrants at December 31, 1970, for such ages. The distribution of new members by age is shown in Appendix 14.

Average Rates of Contribution and Required Credits
(as percentages of total pay)

	Contributions (net of C.P.P. contributions)	Required Government Credits	Ratio of Credits to Contributions (2)÷(1)
	(1) %	(2) %	(3)
<u>Officers</u>			
Males	5.78	16.17	2.80
Females	4.14	8.37	2.02
<u>Other Ranks</u>			
Males	5.36	6.68	1.25
Females	3.61	0.24	0.07
<u>All Contributors</u>	5.50	9.78	1.78

The ratio of required government credits to contributions from contributors, estimated at 1.78 for all contributors combined, is only slightly less than the ratio of 1.8 which has been in use since April 1, 1969. In view of this very slight margin it suggests itself that the use of the ratio of 1.8 be continued.

In addition to the regular credit stated above, the government is required to credit to the Account following authorization of any pay increase applicable to at least one per cent of the members of the forces, an amount representing the net increase in liabilities for benefits resulting from that pay increase. A calculation has been made of the factors to be applied to the total annual increase in pay authorized to determine the amount of credit required based on the assumptions used in this valuation.

Officers	5.1
Other Ranks	3.0
All Contributors	3.5

These factors are lower for officers, higher for other ranks, and higher for all contributors combined than the factors calculated in connection with the actuarial examination as at December 31, 1965, as a result of the changes in valuation assumptions.

If the valuation assumptions were amended to provide for a rate of interest of 5% in the period prior to commencement of pensions and 4% thereafter and general pay increases averaging $3\frac{1}{2}\%$ per year in addition to the promotional increases provided by the salary scale, the estimated additional credits required to be made to the Account would be approximately 4.33% of the total pay each year, and the required ratio of government credits to contributions would be 2.57.

V. Valuation Balance Sheet and Observations

The results of the valuation based on the assumptions described earlier in this report are summarized in the form of a balance sheet showing the financial status of the Account as at December 31, 1970.

In determining the present value of future contributions from contributors and future government credits it has been assumed that the contributions will continue to be paid at the rates currently in use and stated earlier in this report and that government will continue to credit the Account with 1.8 times the net contributions paid by contributors.

Valuation Balance Sheet as at December 31, 1970

Assets

Balance of Account			\$3,527,361,000
Outstanding credits from Government			22,103,000
Outstanding contributions from contributors			1,410,000
Present value of future contributions from contributors:			
<u>Members of the forces</u>			
<u>Current service</u>			
Males - Officers	\$ 87,122,000		
- Other Ranks	221,655,000		
Females - Officers	848,000		
- Other Ranks	<u>734,000</u>	\$310,359,000	
<u>Prior Service</u>			
Males - Officers	1,476,000		
- Other Ranks	4,217,000		
Females - Officers	52,000		
- Other Ranks	<u>12,000</u>	5,757,000	
<u>Retired contributors</u>			
Males	5,924,000		
Females	<u>23,000</u>	<u>5,947,000</u>	322,063,000
Present value of future credits from Government (assumed equal to 1.8 times contributions from contributors)			<u>579,713,000</u>
Total Assets			\$4,452,650,000
Deficit			<u>356,510,000</u>
			<u>\$4,809,160,000</u>

Liabilities

Present value of prospective benefits to contributors who are members of the forces:			
Males - Officers		\$1,086,411,000	
- Other Ranks		2,284,729,000	
Females - Officers		12,669,000	
- Other Ranks		<u>4,592,000</u>	\$3,388,401,000
Present value of future benefits to persons entitled to an annuity or annual allowance:			
Retired contributors: - Males		1,370,377,000	
- Females		7,821,000	
Widows		38,827,000	
Children		<u>2,983,000</u>	1,420,008,000
Amounts due to retired contributors or to the dependants or estates of contributors			<u>751,000</u>
Total Liabilities			<u>\$4,809,160,000</u>

The balance sheet indicates that there was an estimated deficit in the Account as at December 31, 1970, of \$356.51 million. An analysis of the experience of the Account during the 1966-70 period indicates that three main factors combined to produce a total deficiency of \$360.7 million which was reduced to \$356.5 million by net effect of a number of smaller gains and losses. The three major deficiencies arose as follows:

- (a) An estimated \$155.4 million is due to increases in pay in excess of (i) normal promotional increases provided by contributions and normal government credits and (ii) general increases in pay provided for by special government credits of \$654.2 million for the five years ending December 31, 1970;
- (b) An estimated \$105.1 million is due to the difference between actual and expected experience relating to rates of retirement (of all types); and
- (c) Approximately \$100.2 million is due to the increase in net liabilities resulting from the changes in valuation assumptions.

As indicated on page 11 of this report it has been the practice in recent years to credit the Account with any deficit estimated to exist at the time an actuarial report is laid before Parliament and to charge such deficit to the Consolidated Revenue Account in five equal annual instalments. It seems appropriate to draw attention to the fact that, in contrast to the provisions of this Act, the funding regulations pursuant to the Pension Benefits Standards Act permit a longer amortization period (i.e. fifteen years or to September 1992 if longer) in respect of actuarial deficits attributable to amendments of a pension or to changes in actuarial methods or assumptions. Clearly, the loss of \$100.2 million attributable to changes in valuation bases would fall into this category. Moreover, the \$105.1 million attributable to the difference between actual and expected retirement rates might for practical purposes be deemed to be attributable to new retirement policies effective February 1, 1968, which were tantamount to an amendment to the Superannuation Plan.

VI. Conclusion

On the basis of this actuarial examination of the Account it is recommended that the credits to the Account by the government be continued at the rate of 1.8 times the amount of contributions paid into the Account by contributors.

We wish to acknowledge the co-operation of the various sections of the Department of National Defence which supplied us with the data and processed them for us in a very satisfactory manner.

Respectfully submitted,

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April 24, 1973.

VII. Appendices

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2. Description of Supplementary Retirement Benefits
3. Salary Scales
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Appendix 1

Explanatory Notes to Summary of Benefits on pages 7 and 8 of this Report

Note 1

"Retirement because of age" in this report means ceasing to be a member of the forces at or after the retirement age prescribed for the rank of the contributor for any reason other than disability, misconduct, or death. The prescribed retirement ages are listed in section III E of this Report.

Note 2

"Return of contributions" means the return, without interest, of any amount paid by the contributor into the Canadian Forces Superannuation Account or paid into any other superannuation account or pension fund and transferred to the Account.

Note 3

"Cash termination allowance" means an amount equal to one month's pay at the rate authorized to be paid to the contributor at date of termination multiplied by the number of years of pensionable service to the credit of the contributor minus the total reduction in basic contributions as a result of integration of the Plan with the Canada Pension Plan.

Note 4

"Immediate annuity" means an annuity that becomes payable immediately upon retirement. The annual amount of the annuity is equal to 2% of the contributor's average annual pay in respect of any selected six-year period of pensionable service multiplied by his number of years of pensionable service not exceeding 35. If a contributor has reached age 65 and ceased to be a member of the forces, or if he is entitled to a disability pension under the Canada Pension Plan, the amount of the annuity to which he is entitled

under the Act is reduced by 0.7% of his average annual pay used in determining the amount of the annuity, not exceeding the "Average Maximum Pensionable Earnings" multiplied by the number of years of pensionable service after 1965 or after he attained age 18, whichever is later, but not exceeding 35 years. "Average Maximum Pensionable Earnings" is the average of the Year's Maximum Pensionable Earnings, as defined in the Canada Pension Plan, during the contributor's last 3 years of service.

All annuities are normally payable in equal monthly instalments in arrears until the end of the month in which the contributor dies.

Note 5

"Deferred annuity" means an annuity that becomes payable upon attainment of age 60. The annual payment is determined on the same basis as for an immediate annuity.

If a former contributor under the age of 60 eligible for a deferred annuity under the Act becomes disabled and receives a pension under the terms of the Canada Pension Plan his annuity is converted to an immediate annuity. If he later ceases to be entitled to a disability pension and has not reached age 60, his immediate annuity reverts to a deferred annuity.

Note 6

"Immediate reduced annuity" means an immediate annuity where the annual amount of the annuity as determined in Note 4 is reduced as stated below.

If a contributor is compulsorily retired to promote economy or efficiency, and has ten or more years but less than twenty years of service, he may choose with the consent of the Treasury Board an immediate annuity reduced until such time as he reaches age 65 but not thereafter, by 5% for each full year not exceeding six by which

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- (A) the period of his service in the forces is less than 20 years, or
- (B) his age at the time of his retirement is less than the retirement age applicable to his rank,

whichever is the lesser.

A contributor who, not having reached retirement age, ceases to be a member of the forces for any reason other than disability, to promote economy or efficiency, or misconduct, is entitled

1) if he is an officer and has served in the forces for 20 years or more to an immediate annuity reduced by 5% for each full year by which his age at the time of his retirement is less than the retirement age applicable to his rank

2) if he is other than an officer and has served in the forces for 20 years or more but less than 25 years to an immediate annuity reduced by 5% for each full year by which

(A) the period of his service in the forces is less than 25 years, or

(B) his age at the time of his retirement is less than the retirement age applicable to his rank

whichever is the lesser.

Note 7

In the case of compulsory retirement because of misconduct, the contributor is entitled to a return of contributions, or if he has served in the forces for 10 or more years, with the consent of the Treasury Board, the whole or any part specified by the Treasury Board of any annuity to which he would have been entitled had he, at the time of his retirement, been compulsorily retired to promote economy or efficiency, except that in no case shall the capitalized value of any reduced benefit (based by Regulation on the a(f) and a(m) ultimate mortality table and an interest rate of 4%) be less than the return of contributions.

Note 8

"Eligible children under age 25" includes all children of the contributor under age 18, and any child of the contributor over age 18 and under age 25, unmarried, and in full-time attendance at a school or university, having been in such attendance substantially without interruption since he or she reached age 18 or the contributor died, whichever occurred later.

Note 9

"Annual allowances" to a widow and children of a contributor means annuities that become payable immediately upon the death of the contributor. The amount of the allowances are determined with reference to a basic allowance and are ordinarily payable in equal monthly instalments.

The basic allowance is equal to 1% of the average annual pay of the deceased contributor in respect of any selected six-year period of his pensionable service multiplied by his number of years of pensionable service not exceeding 35.

A widow is entitled to an annual allowance equal to the basic allowance except under the following circumstances:

(a) if the age of the contributor exceeded that of his widow by 20 or more years the allowance is reduced as prescribed by regulation,

(b) if the contributor dies within one year after his marriage, no allowance is payable to his widow if the Minister of National Defence is not satisfied that the contributor was at the time of his marriage in such a condition of health as to justify him in having an expectation of surviving for at least one year thereafter,

(c) if a widow remarries, the payment of any allowance is suspended but is resumed in the event of dissolution or annulment of that marriage or the death of her husband by that marriage. In lieu of any further claim to

the payment of the allowance, an amount equal to the return of contributions less the total amount of benefit payments made to the contributor and to his widow and children may be paid to the widow at any time before the dissolution or annulment of that marriage or the death of her husband by that marriage, if there is no child of the contributor entitled to an allowance.

(d) if a member of the forces marries after age 60, his widow is not entitled to any annual allowance, unless after marriage the member became or continued to be a contributor.

The "Annual allowance" for an eligible child is equal to 20% of the basic allowance, or if the contributor died leaving no widow or the widow is dead, 40% of the basic allowance provided that the total amount of allowances to children shall not exceed 80% of the basic allowance, or if the contributor died without leaving a widow or the widow is dead, 160% of the basic allowance. Allowances are not payable to children of a widow who is not entitled to an allowance as the result of death of a contributor within one year of marriage under the circumstances stated in the previous paragraph. Except as provided by regulation, allowances are not payable to a child who was born, adopted or became a stepchild of a member of the forces when he was over 60 years of age unless he became or continued to be a contributor after he was 60 years of age.

Note 10

If upon the death of a contributor there is no person to whom an allowance provided under the terms of the Act may be paid, or if the persons to whom such allowances may be paid, die or cease to be entitled thereto and no other amount may be paid to them, there is paid to the estate of the contributor

(1) any amount by which the amount of return of contributions exceeds the aggregate of all amounts paid to those persons and to the contributor,
or

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(2) if the contributor was retired and entitled to an immediate annuity from which a deduction had been made as a result of integration with the Canada Pension Plan, any amount by which the cash termination allowance exceeds the aggregate of all amounts paid to those persons and to the contributor.

Appendix 2

Supplementary Retirement Benefits

In 1970, the Supplementary Retirement Benefits Act was passed to provide supplementary benefits for persons in receipt of pensions payable out of the Consolidated Revenue Fund. This Act applies to former contributors to the Canadian Forces Superannuation Account and their dependants who are entitled to annuities or annual allowances.

The supplementary benefit is calculated by multiplying the amount of the annuity or annual allowance to which the person is entitled from the Canadian Forces Superannuation Account by the ratio of the Benefit Index for the year of payment to the Benefit Index for the year in which the person to whom or the person in respect of whose service the pension is payable ceased to hold office and subtracting the amount of the annuity or annual allowance. The Benefit Index for the years prior to 1971 are shown in a Schedule in the Act. The Benefit Index for any year after 1970 is equal to the Benefit Index for the preceding year increased in proportion to the increase in the Pension Index as defined in the Canada Pension Plan, as it read on January 1, 1970.

The Canadian Forces Superannuation Act was amended in 1970, by the addition of Part III, to require that contributors pay 0.5% of their salaries to the Supplementary Retirement Benefits Account in addition to their contributions to the Superannuation Account. The liabilities of the Superannuation Account are not affected by these contributions to or the benefits payable from the Supplementary Retirement Benefits Account.

Appendix 3

Salary Scales

<u>Age</u>	<u>Males</u>		<u>Females</u>	
	<u>Officers</u>	<u>Other Ranks</u>	<u>Officers</u>	<u>Other Ranks</u>
15	.156	.298	.394	.352
16	.156	.298	.394	.352
17	.156	.298	.394	.352
18	.156	.298	.394	.352
19	.161	.312	.398	.367
20	.167	.333	.403	.398
21	.180	.365	.411	.433
22	.214	.418	.420	.471
23	.356	.482	.431	.514
24	.473	.523	.445	.559
25	.529	.553	.462	.601
26	.564	.576	.485	.639
27	.591	.595	.515	.671
28	.613	.612	.552	.696
29	.633	.628	.590	.718
30	.649	.641	.623	.736
31	.666	.654	.651	.752
32	.681	.665	.675	.766
33	.695	.676	.696	.781
34	.707	.687	.714	.794
35	.719	.697	.730	.806
36	.730	.706	.744	.816
37	.741	.716	.758	.827
38	.751	.727	.771	.836
39	.761	.737	.784	.844
40	.772	.747	.796	.852
41	.781	.757	.809	.860
42	.791	.768	.822	.867
43	.801	.780	.835	.874
44	.811	.792	.849	.881
45	.822	.806	.864	.887
46	.834	.821	.883	.894
47	.848	.837	.901	.902
48	.867	.854	.917	.908
49	.891	.872	.930	.916
50	.917	.892	.942	.923
51	.936	.911	.952	.930
52	.950	.928	.961	.937
53	.961	.943	.971	.945
54	.970	.957	.977	.953
55	.978	.967	.984	.961
56	.984	.977	.989	.971
57	.990	.985	.993	.982
58	.993	.994	.996	.990
59	.997	.997	.998	.995
60	1.000	1.000	1.000	1.000
61	1.000	1.000	1.000	1.000

Appendix 4

Rates of Retirement assumed for contributors
with entitlement to a return of contributions

<u>Age at Retirement</u>	<u>Males</u>		<u>Females</u>	
	<u>Officers</u>	<u>Other Ranks</u>	<u>Officers</u>	<u>Other Ranks</u>
15	.1400	.0648	.0120	.0405
16	.1386	.0852	.0155	.0570
17	.1364	.1040	.0220	.0835
18	.1331	.1212	.0295	.1205
19	.1280	.1357	.0395	.1980
20	.1200	.1455	.0510	.2720
21	.1066	.1510	.0650	.2975
22	.0891	.1522	.0825	.3075
23	.0723	.1493	.1045	.3080
24	.0584	.1424	.1275	.3020
25	.0475	.1320	.1495	.2945
26	.0391	.1200	.1640	.2860
27	.0324	.1074	.1700	.2765
28	.0271	.0955	.1670	.2660
29	.0229	.0852	.1580	.2550
30	.0196	.0764	.1440	.2430
31	.0171	.0688	.1275	.2310
32	.0151	.0621	.1110	.2185
33	.0133	.0562	.0975	.2065
34	.0117	.0510	.0870	.1945
35	.0103	.0464	.0780	.1825
36	.0091	.0423	.0705	.1705
37	.0080	.0387	.0630	.1580
38	.0071	.0354	.0565	.1460
39	.0063	.0324	.0510	.1335
40	.0056	.0298	.0460	.1215
41	.0049	.0275	.0410	.1090
42	.0043	.0255	.0360	.0965
43	.0037	.0237	.0315	.0840
44	.0032	.0221	.0270	.0720
45	.0027	.0207	.0225	.0600
46	.0022	.0194	.0180	.0480
47	.0017	.0182	.0135	.0350
48	.0012	.0172	.0090	.0230
49	.0006	.0163	.0040	.0120
50	.0000	.0000	.0000	.0000

Appendix 5

Rates of Retirement assumed for contributors with entitlement to an annuity or cash termination allowance for reasons other than disability

<u>Age at Retirement</u>	<u>Males</u>		<u>Females</u>	
	<u>Officers</u>	<u>Other Ranks</u>	<u>Officers</u>	<u>Other Ranks</u>
18	.00025	.00070	.00025	.00130
19	.00060	.00075	.00060	.00390
20	.00100	.00078	.00100	.00670
21	.00152	.00080	.00152	.00990
22	.00215	.00081	.00215	.01350
23	.00294	.00083	.00294	.01760
24	.00396	.00088	.00396	.02190
25	.00541	.00092	.00541	.02570
26	.00820	.00100	.00820	.02870
27	.00595	.00115	.00595	.03100
28	.00477	.00130	.00477	.03260
29	.00390	.00150	.00390	.03350
30	.00325	.00174	.00325	.03400
31	.00277	.00208	.00277	.03410
32	.00242	.00250	.00242	.03380
33	.00217	.00300	.00217	.03290
34	.00202	.00363	.00202	.03140
35	.00198	.00442	.00198	.02900
36	.00203	.00536	.00203	.02530
37	.00218	.00648	.00218	.01970
38	.00241	.00782	.00241	.01340
39	.00273	.00939	.00273	.00770
40	.00314	.01119	.00314	.00470
41	.00358	.01322	.00380	.00510
42	.01255	.03064	.00420	.00560
43	.02132	.04377	.00470	.00610
44	.04684	.06024	.00520	.00660
45	.09549	.05125	.10000	.00720
46	.07506	.05472	.10000	.00780
47	.22655	.06101	.20000	.00840
48	.13629	.06718	.20000	.00910
49	.39489	.11638	.40000	.01000
50	.27779	.69559	.40000	.70000
51	.35832	.20616	.50000	.60000
52	.19799	.54952	.50000	.50000
53	.31311	.15308	.50000	.50000
54	.25792	.17315	.50000	.50000
55	.77932	.82056	1.00000	1.00000
56	.53397	.49084		
57	.27083	.40840		
58	.37241	.19524		
59	.47727	.34849		
60	1.00000	1.00000		

Appendix 6

Rates of Retirement assumed for contributors with entitlement to
an annuity or cash termination allowance because of disability

<u>Age at Retirement</u>	<u>Males</u>		<u>Females</u>	
	<u>Officers</u>	<u>Other Ranks</u>	<u>Officers</u>	<u>Other Ranks</u>
15	.0034	.0052	.0012	.0000
16	.0034	.0052	.0012	.0000
17	.0034	.0052	.0013	.0005
18	.0034	.0051	.0013	.0022
19	.0034	.0050	.0014	.0039
20	.0033	.0048	.0015	.0048
21	.0032	.0046	.0015	.0054
22	.0030	.0043	.0016	.0057
23	.0028	.0040	.0017	.0058
24	.0026	.0037	.0018	.0056
25	.0024	.0034	.0019	.0053
26	.0022	.0032	.0020	.0049
27	.0019	.0030	.0021	.0041
28	.0017	.0029	.0022	.0035
29	.0015	.0028	.0023	.0032
30	.0013	.0028	.0024	.0031
31	.0012	.0028	.0025	.0030
32	.0011	.0028	.0027	.0031
33	.0010	.0028	.0029	.0031
34	.0010	.0029	.0031	.0032
35	.0010	.0030	.0033	.0034
36	.0010	.0031	.0035	.0035
37	.0011	.0033	.0037	.0037
38	.0012	.0035	.0039	.0039
39	.0014	.0037	.0041	.0041
40	.0016	.0039	.0044	.0044
41	.0019	.0042	.0047	.0047
42	.0022	.0046	.0050	.0050
43	.0025	.0051	.0054	.0054
44	.0028	.0056	.0058	.0058
45	.0032	.0061	.0062	.0062
46	.0036	.0067	.0067	.0067
47	.0041	.0074	.0073	.0073
48	.0046	.0081	.0079	.0079
49	.0052	.0088	.0085	.0085
50	.0058	.0095	.0092	.0092
51	.0065	.0102	.0100	.0100
52	.0072	.0110	.0108	.0108
53	.0080	.0118	.0117	.0117
54	.0088	.0126	.0126	.0126
55	.0096	.0134	.0136	.0136

Appendix 7

Rates of Mortality assumed for active contributors

<u>Age</u>	<u>Males</u>		<u>Females</u>
	<u>Officers</u>	<u>Other Ranks</u>	<u>(Officers and Other Ranks)</u>
15	.00049	.00049	.00025
16	.00065	.00065	.00026
17	.00083	.00084	.00028
18	.00104	.00104	.00030
19	.00128	.00122	.00031
20	.00154	.00136	.00033
21	.00183	.00145	.00035
22	.00215	.00151	.00037
23	.00248	.00153	.00039
24	.00279	.00151	.00042
25	.00304	.00147	.00044
26	.00320	.00141	.00047
27	.00326	.00134	.00050
28	.00321	.00128	.00053
29	.00307	.00124	.00056
30	.00284	.00122	.00060
31	.00255	.00121	.00064
32	.00221	.00121	.00068
33	.00192	.00122	.00073
34	.00168	.00125	.00078
35	.00152	.00129	.00083
36	.00145	.00134	.00089
37	.00145	.00141	.00096
38	.00151	.00151	.00103
39	.00162	.00163	.00111
40	.00178	.00178	.00120
41	.00198	.00198	.00129
42	.00222	.00222	.00140
43	.00250	.00250	.00151
44	.00282	.00282	.00164
45	.00318	.00318	.00178
46	.00360	.00360	.00194
47	.00407	.00407	.00211
48	.00459	.00459	.00230
49	.00516	.00516	.00251
50	.00577	.00577	.00274
51	.00642	.00642	.00296
52	.00711	.00711	.00321
53	.00782	.00782	.00349
54	.00855	.00855	.00380
55	.00931	.00931	.00415

Appendix 8

A. Rates of Mortality assumed for contributors retired
for reasons other than disability

B. Annuity Values based thereon

<u>Age at Retirement</u>	<u>(A)</u> <u>Mortality Rate</u>		<u>(B)</u> <u>Value of Annuity of \$1.00</u> <u>per annum</u> <u>(interest at 4% per annum)</u>	
	<u>Males</u>	<u>Females</u>	<u>Males</u>	<u>Females</u>
45	.00320	.00178	\$17.205	\$18.658
46	.00363	.00194	16.929	18.418
47	.00411	.00211	16.649	18.171
48	.00463	.00230	16.364	17.917
49	.00519	.00251	16.075	17.655
50	.00578	.00274	15.782	17.386
51	.00642	.00296	15.486	17.110
52	.00709	.00321	15.186	16.826
53	.00780	.00349	14.883	16.533
54	.00854	.00380	14.576	16.233
55	.00932	.00415	14.265	15.925
56	.01013	.00454	13.950	15.609
57	.01099	.00497	13.631	15.285
58	.01188	.00546	13.308	14.953
59	.01282	.00601	12.980	14.613
60	.01383	.00662	12.648	14.267
61	.01493	.00732	12.311	13.913
62	.01615	.00811	11.970	13.552
63	.01750	.00899	11.625	13.185
64	.01899	.00998	11.276	12.812
65	.02065	.01110	10.924	12.434
66	.02248	.01235	10.569	12.051
67	.02451	.01376	10.213	11.663
68	.02676	.01534	9.855	11.271
69	.02924	.01712	9.497	10.877
70	.03199	.01911	9.138	10.480
71	.03503	.02135	8.781	10.081
72	.03840	.02386	8.425	9.682
73	.04211	.02667	8.071	9.282
74	.04621	.02983	7.720	8.884
75	.05074	.03336	7.372	8.487
76	.05574	.03732	7.029	8.094
77	.06126	.04176	6.691	7.704
78	.06734	.04672	6.359	7.318
79	.07404	.05227	6.034	6.938
80	.08141	.05847	5.715	6.565
81	.08952	.06540	5.404	6.199
82	.09843	.07313	5.102	5.842
83	.10821	.08175	4.809	5.494
84	.11893	.09134	4.525	5.156
85	.13068	.10202	4.251	4.830
86	.14352	.11387	3.987	4.514
87	.15755	.12701	3.734	4.211
88	.17282	.14153	3.492	3.921
89	.18936	.15751	3.262	3.645
90	.20721	.17502	3.044	3.382

Appendix 9

**A. Rates of Mortality assumed for contributors retired because of disability
and
B. Annuity Values based thereon**

<u>Age</u>	<u>(A)</u> <u>Mortality Rate</u>		<u>(B)</u> <u>Value of Annuity of \$1.00</u> <u>per annum</u> <u>(interest at 4% per annum)</u>			
	<u>Males</u>	<u>Females</u>	<u>Males</u>	<u>Females</u>		
	<u>Applicable during 1st year after retirement</u>	<u>Applicable after at least 2 years have elapsed from date of retirement</u>	<u>At date of retirement</u>	<u>After at least 2 years have elapsed from date of retirement</u>		
25	.00546	.00182	.00583	\$20.465	\$20.574	\$18.859
26	.00537	.00179	.00589	20.308	20.415	18.705
27	.00534	.00178	.00594	20.143	20.248	18.545
28	.00543	.00181	.00608	19.968	20.075	18.379
29	.00552	.00184	.00627	19.787	19.895	18.208
30	.00567	.00189	.00645	19.598	19.708	18.033
31	.00588	.00196	.00666	19.402	19.514	17.852
32	.00609	.00203	.00691	19.198	19.313	17.667
33	.00630	.00210	.00724	18.988	19.106	17.478
34	.00654	.00218	.00759	18.769	18.891	17.286
35	.00681	.00227	.00797	18.543	18.668	17.091
36	.00720	.00240	.00836	18.307	18.438	16.893
37	.00768	.00256	.00882	18.061	18.200	16.693
38	.00831	.00277	.00928	17.808	17.955	16.491
39	.00900	.00300	.00976	17.546	17.704	16.286
40	.00984	.00328	.01028	17.276	17.446	16.079
41	.01077	.00359	.01084	16.999	17.182	15.871
42	.01182	.00394	.01144	16.713	16.912	15.661
43	.01302	.00434	.01210	16.421	16.636	15.449
44	.01431	.00477	.01282	16.123	16.354	15.238
45	.01572	.00524	.01355	15.818	16.067	15.026
46	.01734	.00578	.01428	15.506	15.775	14.815
47	.01914	.00638	.01498	15.187	15.479	14.603
48	.02112	.00704	.01562	14.863	15.178	14.390
49	.02325	.00775	.01621	14.534	14.873	14.175
50	.02559	.00853	.01680	14.200	14.565	13.956
51	.02814	.00938	.01746	13.861	14.253	13.734
52	.03093	.01031	.01823	13.519	13.939	13.508
53	.03390	.01130	.01909	13.172	13.622	13.279
54	.03705	.01235	.01994	12.823	13.303	13.049
55	.04044	.01348	.02085	12.472	12.981	12.817
60		.02071	.02616		11.354	11.629
65		.03004	.03060		9.710	10.356
70		.04435	.03308		8.027	8.793
75		.06938	.05567		6.393	6.975
80		.10846	.09222		4.948	5.351
85		.16353	.14637		3.756	3.999
90		.23667	.22183		2.814	2.931

Appendix 10

- A. Rates of Remarriage assumed for widows
 B. Rates of Mortality assumed for widows
 C. Annuity Values based on A & B

<u>Age at Widowhood</u>	<u>(A) Remarriage Rates</u>					<u>Attained Age</u>	<u>(B) Mortality Rates</u>
	<u>Year of Widowhood</u>						
	<u>1st yr.</u>	<u>3rd yr.</u>	<u>5th yr.</u>	<u>10th yr.</u>	<u>Ultimate</u>		
25	.050	.148	.132	.060	.028	39	.0022
30	.029	.086	.076	.035	.016	44	.0026
35	.018	.048	.042	.019	.009	49	.0033
40	.011	.027	.023	.010	.004	54	.0050
45	.006	.015	.012	.005	.002	59	.0083
50	.004	.008	.006	.002	.001	64	.0141
55	.002	.004	.003	.001	0	69	.0232
						74	.0367
						79	.0559
						84	.0822
						89	.1180

(C)
 Value of Annuity of \$1.00 per annum payable
 to remarriage or death of widow
 (interest at 4% per annum)

<u>Age at Widowhood</u>	<u>Year of Widowhood</u>					<u>Attained Age</u>
	<u>1st yr.</u>	<u>3rd yr.</u>	<u>5th yr.</u>	<u>10th yr.</u>	<u>Ultimate</u>	
25	\$ 8.393	\$ 8.687	\$10.453	\$14.731	\$16.465	39
30	11.992	12.306	13.644	16.232	16.854	44
35	14.821	14.954	15.692	16.759	16.423	49
40	16.326	16.249	16.494	16.407	15.429	54
45	16.717	16.421	16.279	15.414	14.013	59
50	16.209	15.757	15.349	14.013	12.386	64
55	15.142	14.553	13.977	12.386	10.681	69
					9.008	74
					7.447	79
					6.040	84
					4.789	89

Appendix 11

- A. Proportions of deceased male contributors leaving dependants and
 and
 B. Average ages of widows corresponding to age of contributor
 at time of death

<u>Age of Contributor at Death</u>	<u>(A) Proportion of Male Contributors Leaving Dependants</u>	<u>(B) Average Age of Widow</u>
25½	.439	25.0
26½	.542	25.9
27½	.648	26.8
28½	.721	27.7
29½	.773	28.6
30½	.811	29.5
31½	.842	30.4
32½	.867	31.3
33½	.888	32.2
34½	.905	33.1
35½	.919	34.0
36½	.931	34.9
37½	.942	35.8
38½	.952	36.7
39½	.960	37.6
40½	.967	38.5
41½	.972	39.4
42½	.976	40.3
43½	.979	41.2
44½	.981	42.1
45½	.983	43.0
46½	.984	43.9
47½	.984	44.7
48½	.983	45.6
49½	.982	46.5
50½	.980	47.4
51½	.977	48.3
52½	.972	49.2
53½	.967	50.1
54½	.961	51.0
55½	.954	51.8
60½	.907	56.2
65½	.840	60.5
70½	.751	64.7
75½	.640	68.7
80½	.513	72.6
85½	.379	76.1
90½	.250	78.8

Appendix 12

Capitalized Value of Benefits per \$1.00 "earned" annuity of contributor

A. At retirement with entitlement to an annuity
for a reason other than disability

<u>Age of Contributor at Retirement</u>	<u>Males</u>	<u>Females</u>
35	\$20.748	\$20.719
40	19.807	19.793
45	18.697	18.707
50	17.431	17.448
55	16.012	16.003

B. At retirement with entitlement to an annuity
because of disability

<u>Age of Contributor at Retirement</u>	<u>Males</u>	<u>Females</u>
25	\$21.572	\$18.860
30	20.919	18.035
35	20.089	17.094
40	19.065	16.084
45	17.852	15.033
50	16.459	13.966

C. At death leaving dependants entitled to annual allowances

<u>Age of Contributor at Death</u>	<u>Widow's Allowance</u>	<u>Children's Allowances</u>	<u>Minimum Return Benefit</u>	<u>All Benefits</u>
25	\$4.024	\$5.37	\$.041	\$9.435
30	5.668	3.92	.029	9.617
35	7.070	2.80	.022	9.892
40	7.940	1.94	.025	9.905
45	8.326	1.32	.036	9.682
50	8.297	.82	.051	9.168
55	7.978	.44	.070	8.488
60	7.469	.18	-	7.649
65	6.839	-	-	6.839
70	6.149	-	-	6.149
75	5.454	-	-	5.454
80	4.802	-	-	4.802
85	4.228	-	-	4.228
90	3.787	-	-	3.787

Appendix 13

(A)
 Proportion of contributors whose pay
 is below the Contributory Earnings
 Upper Limit of the Canada Pension
 Plan

(B)
 Ratio of Average Pay of
 contributors in A. to
 the Contributory Earnings
 Upper Limit

<u>Age</u>	<u>Males</u>		<u>Females</u>	<u>Males and Females</u>	
	<u>Officers</u>	<u>Other Ranks</u>	<u>Other Ranks</u>	<u>Officers</u>	<u>Other Ranks</u>
15	1.000	1.000	1.000	.304	.401
16	1.000	1.000	1.000	.315	.408
17	1.000	1.000	1.000	.327	.420
18	1.000	1.000	1.000	.340	.466
19	1.000	1.000	1.000	.354	.514
20	1.000	1.000	1.000	.370	.565
21	.884	.861	1.000	.390	.618
22	.565	.606	.998	.414	.677
23	.217	.390	.885	.444	.741
24	.061	.210	.727	.492	.796
25	.036	.110	.574	.626	.838
26	.020	.047	.377	.786	.868
27	.007	.024	.235	.860	.889
28		.014	.131	.906	.903
29		.009	.092	.943	.913
30		.005	.071	.974	.921
31		.003	.055	1.000	.926
32		.001	.042		.930
33			.032		.932
34			.023		.934
35			.014		.935
36			.005		.935
37					
38					
39					

Appendix 14

Age distribution of members of the forces who became contributors during the period from January 1, 1966 to December 31, 1970

<u>Age at Becoming Contributor</u>	<u>Males</u>		<u>Females</u>	
	<u>Officers</u>	<u>Other Ranks</u>	<u>Officers</u>	<u>Other Ranks</u>
15	0	1	0	0
16	9	48	0	0
17	410	6,261	0	0
18	1,080	10,604	0	228
19	862	8,086	1	512
20	405	4,858	1	328
21	375	2,528	35	159
22	555	1,408	45	66
23	511	747	47	34
24	297	484	14	20
25	196	318	10	17
26	142	223	10	9
27	125	204	7	8
28	104	187	6	6
29	83	137	10	5
30	73	113	3	2
31	57	103	3	1
32	44	61	5	0
33	49	53	4	0
34	39	35	6	0
35	31	32	2	0
36	40	23	5	0
37	21	15	1	1
38	17	23	4	0
39	15	6	4	0
40	14	4	3	0
41	5	7	4	1
42	2	4	2	0
43	2	2	2	0
44	2	2	0	1
45	2	1	0	0
46	1	3	1	0
47	1	0	0	0
48	1	2	0	0
49	0	2	0	0
50	1	1	0	0
51	0	1	0	0
52	0	2	0	0
53	0	0	0	0
54	1	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0
60	0	1	0	0
Total	5,572	36,590	235	1,398
Average Age	21.8	19.3	26.0	19.9