

Canadian Forces Superannuation Act

Report on Actuarial Examination
of the
Canadian Forces Superannuation Account
in the Consolidated Revenue Fund
as at December 31, 1960

The Canadian Forces Superannuation Act, hereinafter referred to as "the new Act" where it appears necessary, was assented to on July 8, 1959, and proclaimed in force on March 1, 1960. In most respects the provisions of the new Act continued the provisions of Part V of the Defence Services Pension Act, Chapter 63 of the Revised Statutes of Canada, 1952, hereinafter referred to as "the former Act". The Canadian Forces Superannuation Account, hereinafter referred to as "the Account," is a continuation under the new Act of the Permanent Services Pension Account which was established pursuant to Part V of the former Act.

In accordance with instructions, we have made an actuarial examination of the Account as at December 31, 1960, and have the honour to report thereon.

Terms of the Superannuation Plan

Membership

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 the date on which the new Act came into force,
 - (ii) not having been a member of the forces immediately before the date on which the new Act came into force, became a member of the forces on or subsequent to that date,
 - (iii) having been a member of the forces at the date on which the new Act came into force, 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 at the date on which the new Act came into force, elected to become a contributor under the new 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 at the date on which the new Act came into force, elected to become a contributor under the new 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 the date on which the new Act came into force, 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.

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 under the National Defence Act together with the allowances prescribed by the Canadian Forces Superannuation Regulations.

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,

- (a) a period of full-time, paid employment in the Public Service,
- (b) a period of service as a member of the Royal Canadian Mounted Police,
- (c) a period of service
 - (i) on active service during time of war in the naval, army or air forces of Her Majesty raised by Canada,
 - (ii) in the Canadian Army Special Force established in 1950,
 - (iii) of six months or more in the naval, army or air forces of Her Majesty raised by Canada, other than the forces, provided that such service was full-time and continuous,
 - (iv) in 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, was full-time service in the permanent forces, and

- (d) one-fourth of a period of service in the naval, army or air forces of Her Majesty raised by Canada, other than the forces, during which the contributor was liable to be called out for periodic training or duty otherwise than during an emergency.

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. 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.

Benefits

The benefit provisions of the new Act are summarized below:

Summary of Benefits

I. 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. | 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. | 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. | Annuity or reduced annuity (Note 5). |
| | 20 years or more. | Annuity. |

| <u>Type of Termination</u> | <u>Service in the Forces</u> | <u>Benefit</u> |
|--|--|---|
| Compulsory retirement because of inefficiency. | Less than 10 years. | Return of contributions. |
| | 10 years or more | Annuity or reduced annuity (Note 6). |
| Compulsory retirement because of misconduct. | Less than 10 years. | Return of contributions. |
| | 10 years or more. | Return of contributions or, in the discretion of the Treasury Board, annuity or reduced annuity (Note 7). |
| Voluntary retirement - officer contributors. | Less than 10 years. | Return of contributions. |
| | 10 years or more but less than 25 years. | Return of contributions or, in the discretion of the Treasury Board, reduced annuity (Note 8). |
| | 25 years or more. | Reduced annuity (Note 8). |
| Voluntary retirement - contributors other than officers. | Less than 10 years. | Return of contributions. |
| | 10 years or more but less than 20 years. | Return of contributions or, in the discretion of the Treasury Board, reduced annuity (Note 8). |
| | 20 years or more but less than 25 years. | Reduced annuity (Note 8). |
| | 25 years or more. | Annuity. |
| Death leaving no widow or children under age 18. | Any length. | Return of contributions. |
| Death leaving widow and/or children under age 18. | Less than 10 years. | Return of contributions or cash termination allowance, whichever is the greater. |
| | 10 years or more. | Annual allowances to dependants. (Notes 9 and 10). |

II. Contributors who are entitled to annuities (including reduced annuities)

| <u>Type of Termination</u> | <u>Benefit</u> |
|---|--|
| Death leaving no widow or children under age 18. | Return of excess contributions (Note 10). |
| Death leaving widow and/or children under age 18. | Annual allowances to dependants (Notes 10 and 11). |

- Note 1: "Retirement because of age" in this summary means ceasing to be a member of the forces at or after the prescribed retirement age applicable to the rank of the contributor for any reason other than disability, misconduct, or death.
- Note 2: "Return of contributions" means the return, without interest, of any amount paid by the contributor into the Account or paid into any other account or fund and transferred to the Account.
- Note 3: "Cash termination allowance" means an amount equal to one month's pay for each year of pensionable service at the rate of pay authorized to be paid to the contributor at the time he ceases to be a member of the forces.
- Note 4: An "annuity" is ordinarily payable in equal monthly instalments beginning at retirement and continuing until the end of the month in which the contributor dies. The annual amount of annuity is equal to 2% of average annual pay in respect of any selected six-year period of pensionable service multiplied by the number of years of pensionable service to the credit of the contributor up to a maximum of 35. The six-year period may consist of consecutive periods of pensionable service totalling six years.
- Note 5: A contributor who is compulsorily retired to promote economy or efficiency with 10 years or more but less than 20 years of service in the forces is entitled
- (a) in the case of a contributor who served on active service in World War II, who was not in the forces on June 1, 1944, and who became a member of the forces before 1949, to an annuity,
 - (b) in the case of any other contributor,
 - (i) if retirement is due to a reduction in the total number of members of the forces, to an annuity, reduced, until age 65, by 5% for each full year not exceeding six by which the period of his service in the forces is less than 20 years, and
 - (ii) if retirement is due to some other reason, to an annuity, reduced by one-third until age 65, or, in the discretion of the Treasury Board, to a reduced annuity as described in (i) above.
- Note 6: A contributor who is compulsorily retired because of inefficiency with 10 or more years of service in the forces is entitled to
- (i) an annuity, reduced by one-half until age 65, and thereafter by one-third, or

- (ii) in the discretion of the Treasury Board, the whole or any part of the annuity or reduced annuity to which he would have been entitled if he had been compulsorily retired from the forces to promote economy or efficiency due to a reduction in the total number of members of the forces, except that the amount of such annuity cannot be less than the amount of the annuity described in (i) above.

Note 7: A contributor who is compulsorily retired because of misconduct with 10 or more years of service in the forces may, in the discretion of the Treasury Board, be granted the whole or any part of the annuity or reduced annuity to which he would have been entitled if

- (i) in the case of a contributor who has reached retirement age, he were retired because of age, or
- (ii) in the case of a contributor who has not reached retirement age, he were compulsorily retired from the forces to promote economy or efficiency due to a reduction in the total number of members of the forces,

except that the capitalized value of such annuity cannot be less than the amount of a return of contributions. For this purpose, the capitalized value of an annuity is calculated in accordance with the $\alpha(f)$ and $\alpha(m)$ Ultimate tables of mortality and interest at 4% per annum.

Note 8: For a contributor who retires voluntarily, not having reached retirement age, "reduced annuity" means

- (a) in the case of an officer contributor with 10 or more years of service in the forces or in the case of a contributor other than an officer with 10 years or more but less than 20 years of service in the forces, an annuity, reduced by 5% for each full year by which his age at time of retirement is less than the retirement age applicable to his rank, and
- (b) in the case of a contributor other than an officer with 20 years or more but less than 25 years of service in the forces, an annuity, reduced by 5% for each full year by which the period of his service in the forces is less than 25 years.

Note 9: "Annual allowance" to the widow of a contributor means one-half of the annual amount of annuity computed as described in Note 4. This is termed the "basic allowance". If a widow remarries, her allowance is suspended. If the age of a contributor exceeds that of his widow by more than twenty years, the widow's allowance is reduced.

"Annual allowance" to each child of a deceased contributor means one-fifth of the basic allowance or, if there is no living widow

of the contributor; two-fifths of the basic allowance. The allowance is payable until the child attains age 18. The total amount of such annual allowances may not exceed four-fifths of the basic allowance, or, if there is no living widow, eight-fifths of the basic allowance.

In the event that a contributor dies within five years after his marriage, dependants' allowances are reduced if the Treasury Board is not satisfied that anticipation of impending death was not a consideration affecting the agreement to marry.

Note 10: At the time that

- (a) a contributor dies leaving no widow or children entitled to an annual allowance, or
- (b) a contributor's last dependant to whom an annual allowance is payable dies or otherwise ceases to be entitled thereto,

any amount by which the amount of a return of contributions exceeds the aggregate of all amounts that have been paid to the contributor, his widow and his children, is paid to the contributor's estate.

Note 11: The annual allowances to which dependants become entitled on the death of a person entitled to an annuity payable out of the Account are computed in the manner and subject to the conditions described in Note 9. However, a widow who married a person of age 60 or over after he became entitled to an annuity payable out of the Account is not entitled to an annual allowance unless such person subsequently became a member of the forces. Also, a child who was born to, adopted by, or became the stepchild of a person of age 60 or over after he became entitled to an annuity payable out of the Account is not entitled to an annual allowance unless

- (a) such person subsequently became a member of the forces, or
- (b) in the case of a child born to such person, the child was conceived before that person attained age 60 or ceased to be a member of the forces, whichever is the later.

Contributions

By Contributor -

(a) Current Service

The rate of contribution for all contributors is 6% of pay. Contributions cease after 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 pensionable service served prior to becoming a contributor.

In general, where a contributor makes an election in respect of a period of pensionable prior service within one year after he becomes a contributor, the amount of contributions required is equal to the total contributions that would have been made during that period of service at the rate of 6% of pay together with simple interest at 4% per annum to the date of election. There are a number of exceptions to this general rule. For example, in respect of periods of elective service under the new Act that could have been counted for pension purposes under Parts I to III of the former Act, no interest is charged on the contributions required to be paid therefor and, for any part of such period served prior to October 1, 1946, the rate of contribution required is 5% of pay instead of 6% of pay.

If a contributor fails to make an election in respect of a period of pensionable prior service within the time prescribed therefor, he may make election at any time before he ceases to be a member of the forces provided that he is in good health at date of election. However, the amount of contributions required in respect of such period of service is computed on the basis of pay at the rate authorized to be paid to the contributor at the time he makes election.

Contributions in respect of prior service may be paid in a lump sum or by monthly instalments for life, or for a period of years or life, whichever is the shorter. 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.

By Government -

The Act and the relevant regulations provide that, at the end of each calendar quarter, there shall be credited to the Account

- (a) an amount, representing interest, equal to 1% of the balance to the credit of the Account at the end of the preceding quarter, and
- (b) an amount related to the current service and prior service contributions paid by contributors during the preceding quarter as is specified by the Minister of Finance (since the Account was established in 1946, credits have been made at the rate of one and two-thirds of total contributions paid by contributors).

The Act also provides that, after any pay increase of general application to the forces, there shall be credited to the Account such amount as the Minister of Finance deems necessary to provide for the excess of the value of the increase in benefits over the value of the increase in contributions resulting from the pay increase.

Changes in the plan effected by the new Act

The more significant changes are as follows:

1. The new Act re-opened admission to the plan, on election, for members of the forces who had been members of the forces at the effective date of Part V of the former Act but who did not elect to become contributors under that Part.

2. Under the new Act, an officer contributor may voluntarily retire with entitlement to a reduced annuity after 25 years of service in the forces or, in the discretion of the Treasury Board, after 10 years of such service. Under Part V of the former Act, the only benefit that could be granted to an officer contributor on voluntary retirement was a return of contributions, regardless of the length of his service.

3. Under the new Act, a contributor other than an officer who voluntarily retires with 10 years or more but less than 20 years of service in the forces may, in the discretion of the Treasury Board, become entitled to a reduced annuity. Under Part V of the former Act, the only benefit that could be granted to such contributor was a return of contributions.

4. Under the new Act, the amount of an annuity or annual allowance depends on the average annual pay received by a contributor during any selected six-year period of pensionable service. This period, of course, is always the one that produces the highest average annual pay. Under Part V of the former Act, the amount of pension was based on average annual pay and allowances received by a contributor during his last six years of service. However, a refund of contributions was made in respect of pay and allowances received by a contributor during any six-year period of his pensionable service in excess of the pay and allowances received by him during the last six years of service.

5. The new Act provides for increased maximum annual allowances to children. Under Part V of the former Act, the amount of annual allowance payable to an eligible child was equal to 20% of the widow's allowance if there was a living widow or 40% of the widow's allowance if there was no living widow. These amounts also apply under the new Act. However, under Part V of the former Act, each child's allowance could not exceed \$300 per annum if there was a living widow or \$600 per annum if there was no living widow. These limitations were not carried over to the new Act. Also, under Part V of the former Act, total annual allowances payable to children were limited to 50% of the widow's allowance if there was a living widow or 100% of the widow's allowance if there was no living widow. The corresponding limits under the new Act are 80% and 160% of the widow's allowance.

6. The new Act and the relevant regulations provide that an election to pay for a period of pensionable prior service may be revoked by a contributor if he received erroneous information as to the amount of contributions required to be paid for such service or if continued payments in respect of such service would cause him undue financial hardship. Part V of the former Act did not provide for revocation of an election by a contributor under any circumstances.

7. Under the new Act, the rate of contribution for current service is 6% of pay for all contributors. Under Part V of the former Act, the rates of contribution were 5%, 5½% or 6%, depending on the level of pay and allowances of the contributor.

8. The new Act provides that, as soon as possible after any pay increase of general application to the forces, there shall be credited to the Account such amount as the Minister of Finance deems necessary to provide for the increase in cost resulting therefrom. There was no similar provision under Part V of the former Act.

Data

Data for contributors who were members of the forces on December 31, 1960, or who had ceased to be members of the forces during the period from January 1, 1956, to December 31, 1960, were provided on punched cards by the pension sections of the three services - Navy, Army and Air Force. Data for persons entitled to annuities or annual allowances payable out of the Account on December 31, 1960, or for persons who ceased to be so entitled during the period from January 1, 1956, to December 31, 1960, were provided by the pension section of the Treasury Office staff attached to the Department of National Defence. All calculations, sortings and tabulations of the punched card data that were required for the valuation of benefits and contributions and for ancillary investigations were made by No. 1 Army Pay Ledger Unit on IBM 650 electronic data processing equipment. At all stages, the preparation of the data was under the control of the Pension Sub-committee of the Inter-service Pay Committee of the Department of National Defence.

In the following table are shown pertinent membership and termination statistics for the period from January 1, 1956, to December 31, 1960:

I. Members of the forces

| Class of Contributors | Contributors on Jan.1/56 | New Contributors Jan.1/56-Dec.31/60 | Terminations during period Jan.1/56-Dec.31/60 | | | | | Contributors on Dec.31/60 |
|-----------------------|--------------------------|-------------------------------------|---|---------------------|-----------------------|---------------------------|---------------------------|---------------------------|
| | | | Type of Benefit | Death | Type of Termination | | Total | |
| | | | | | Disability | Other** | | |
| <u>Males:</u> | | | | | | | | |
| Officers | 13,670 | 5,574 | Annuity Lump sum | 77 115 192 | 58 80 138 | 668 2,711 3,379 | 803 2,906 3,709 | 15,535 |
| Other ranks | 93,575 | 59,752 | Annuity Lump sum | 175 636 811 | 306 1,562 1,868 | 1,605 55,332 56,937 | 2,086 57,530 59,616 | 93,711 |
| Total | 107,245 | 65,326 | Annuity Lump sum | 252 751 1,003 | 364 1,642 2,006 | 2,273 58,043 60,316 | 2,889 60,436 63,325 | 109,246 |
| <u>Females:</u> | | | | | | | | |
| Officers | 308 | 121 | Annuity Lump sum | - - - | 2 1 3 | 18 121 139 | 20 122 142 | 287 |
| Other ranks | 2,712 | 5,575 | Annuity Lump sum | - 5 5 | 2 81 83 | 2 5,488 5,490 | 4 5,574 5,578 | 2,709 |
| Total | 3,020 | 5,696 | Annuity Lump sum | - 5 5 | 4 82 86 | 20 5,609 5,629 | 24 5,696 5,720 | 2,996 |
| Grand Total | 110,265 | 71,022 | Annuity Lump sum | 252 756 1,008 | 368 1,724 2,092 | 2,293 63,652 65,945 | 2,913 66,132 69,045 | 112,242 |

* The number of male officers was inflated to include 1201 cases of contributors who had other rank status on January 1, 1956, and who attained officer status at some time during the 1956-60 period and the number of male other ranks was correspondingly reduced; a similar transfer of 46 cases was made in respect of females.

** Compulsory retirements because of age, promotion of economy or efficiency, inefficiency and misconduct together with all voluntary retirements.

II. Persons entitled to annuities or annual allowances

Retired Contributors

| | Entitled on Jan. 1/56 | | New Entitlements Jan. 1/56 to Dec. 31/60 | | Terminations Jan. 1/56 to Dec. 31/60 | | Entitled on Dec. 31/60** | |
|--|-----------------------|--------------|--|--------------|--------------------------------------|----------------|--------------------------|--------------|
| | No. | Av. Am't | No. | Av. Am't | Deaths | Other Term'ns* | No. | Av. Am't |
| <u>Males</u> | | | | | | | | |
| Retirement for reasons other than disability | 324 | \$1,155 | 2,273 | \$1,896 | 55 | 31 | 2,511 | \$1,815 |
| Retirement because of disability | <u>119</u> | <u>1,019</u> | <u>364</u> | <u>1,553</u> | <u>19</u> | <u>1</u> | <u>463</u> | <u>1,432</u> |
| Total | 443 | \$1,119 | 2,637 | \$1,849 | 74 | 32 | 2,974 | \$1,756 |
| <u>Females</u> | | | | | | | | |
| Retirement for reasons other than disability | 2 | \$1,241 | 20 | \$1,752 | 0 | 0 | 22 | \$1,706 |
| Retirement because of disability | <u>2</u> | <u>1,088</u> | <u>4</u> | <u>1,858</u> | <u>0</u> | <u>0</u> | <u>6</u> | <u>1,601</u> |
| Total | 4 | \$1,164 | 24 | \$1,770 | 0 | 0 | 28 | \$1,683 |

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

** There were 64 "other than disability" and 4 "disability" cases whose annuities were wholly or partially suspended at December 31, 1960, because of employment in the Public Service; for these cases, the average amount of annuity payable, assuming no suspension, was \$2,370, of which 45% was suspended. The average amounts shown in the schedule include "suspended" and all other reduced annuities at the full amounts ultimately payable.

Widows

| Entitled on Jan. 1/56 | | New Entitlements Jan. 1/56 to Dec. 31/60 | | Terminations Jan. 1/56 to Dec. 31/60 | | | Entitled on Dec. 31/60 | |
|-----------------------|----------|--|----------|--------------------------------------|-------------|-------|------------------------|----------|
| No. | Av. Am't | No. | Av. Am't | Deaths | Remarriages | Total | No. | Av. Am't |
| 67 | \$546 | 316 | \$873 | 4 | 31 | 35 | 348 | \$827 |

Children

| Entitled on Jan. 1/56 | | Entitled on Dec. 31/60 | |
|-----------------------|----------|------------------------|----------|
| No. | Av. Am't | No. | Av. Am't |
| 124 | \$98 | 678 | \$138 |

Valuation Bases and Assumptions

General

Valuation tabulations for contributors who were members of the forces at the date of the current valuation and for contributors who had ceased to be members of the forces during the preceding five year period were provided, separately, for male officers, male other ranks, female officers and female other ranks. Throughout the remainder of this report, the term "classes of active contributors" refers to these four groups.

As for the valuation of the plan as at December 31, 1955, preliminary examination of the data showed significant differences in both salary and termination experience for the four classes of active contributors. It was therefore considered advisable to treat each class separately for valuation purposes. For the two classes of male contributors, actual experience during the inter-valuation period was considerably different, as respects both salary increase patterns and rates of termination, from expected experience in accordance with the bases used for the 1955 valuation. As a result, several of the bases used for male contributors were changed for the current valuation. For the two classes of female contributors, the experience of the inter-valuation period indicated that, except for salary scales, all bases used for the 1955 valuation continued to be suitable for the current valuation.

Valuation tabulations for persons entitled to annuities or annual allowances at the date of the current valuation and for persons who had ceased to be so entitled during the preceding five-year period were provided, separately, for retired male contributors, retired female contributors, widows and children. Most of the mortality bases used for the 1955 valuation were considered to be appropriate for use in the current valuation. Other bases were changed to some extent to reflect the experience of the 1956-60 period.

Interest

The Canadian Forces Superannuation Regulations provide that interest shall be credited to the Account at the rate of 1% quarterly, that is, at the rate of 4% per annum, approximately. The interest basis for the valuation was therefore taken as 4% per annum.

It may also be mentioned that, where an interest basis is necessary for calculations under the Act, the Regulations prescribe such basis to be 4% per annum.

Salary scales

The term "salary scale," as used in this report, denotes the predicted pattern of increase in pay from age to age over future years. Such prediction is necessary for valuation purposes because

- (a) annuity and annual allowance benefits depend on the average pay received during a selected six-year period of pensionable service (ordinarily, the period selected is the last six years of service),
- (b) the cash termination allowance benefit depends on the rate of pay authorized at termination of service, and
- (c) future current service contributions depend on pay received during future years of service.

There are two main forces that tend to generate increases in the pay of an individual during his working lifetime. The first may be thought of as a "promotional" force. As an employee gains experience and attains new or higher skills in his work, he is normally rewarded by promotion or at least by periodic increases in his pay. Such increases are hereinafter referred to as "promotional" increases. The second force stems from economic and sociological pressures such as increased productivity, inflation and collective bargaining. Increases in the general level of pay resulting from this force are hereinafter referred to as "economic" increases.

The pattern of average promotional increases in pay in most stable employment areas is fairly predictable on the basis of past experience. Much less confidence can be placed on predictions of future increases in pay that depend on economic and sociological pressures. It is therefore usual in the valuation of pension plans under which pensions are determined as a percentage of pay to take account only of promotional increases in the development of salary scales and in the consequent calculations of the net liability in respect of current contributors and of contribution rates required in respect of new contributors. The result of this practice is that, assuming economic increases in pay between the dates of consecutive valuations, each valuation of a pension plan shows the creation of a new net liability in the inter-valuation period unless there are offsetting gains to the pension fund from other sources.

As noted earlier in this report, the Act provides that an amount estimated to be equal to the additional net liability created by a general pay increase shall be credited to the Account as soon as possible after the increase. The implication in this provision is that the Government, as employer, has assumed responsibility for the additional net liabilities created under the plan as a result of general pay increases and acknowledges this responsibility by making required credits to the Account at the time of such increases. In the development of the "basic" salary scales for this valuation, therefore, only promotional increases in pay were taken into account.

Over the decade that ended on December 31, 1960, the date of the current examination of the Account, the level of average pay increased by about 60% for all four classes of contributors. This aggregate increase was equivalent to an average increase rate of more than $4\frac{1}{2}\%$ per annum over the ten year period. Because of the substantial cost arising from such economic increases in pay, it seemed appropriate to investigate what the state of the Account would have been as at December 31, 1960, and what average contribution rate would be required in respect of new contributors if future economic increases in pay, at some conservative rate, were taken into account and if no special credits were to be made to the Account from time to time as a result of general pay increases. For this purpose, "supplementary" salary scales were constructed in accordance with the assumptions that promotional increases in pay from age to age would follow the increase ratios of the basic salary scales and that, by reason of economic increases, the general level of pay would rise throughout the future at the rate of $2\frac{1}{2}\%$ per annum.

The valuation data included the rate of pay authorized to be paid to each contributor on December 31, 1960. These data were classified in such manner that the average increase in pay from age to age could be studied for all contributors of the same age at beginning of pensionable service. From these and other relevant data, including similar tabulations for the valuation made as at December 31, 1955, salary scales were determined for the four classes of active contributors.

For both male and female other ranks, the basic salary scales developed for use in the current valuation were much steeper than the salary scales used for the 1955 valuation. In other words, for these two classes, the predicted rates of promotional increases in pay from age to age over future years were much higher than those that had been judged appropriate at the time of the 1955 valuation on the basis of the experience from the inception of the plan in 1946 to December 31, 1955. For example, for male other ranks, the average rate of increase from age to age in the basic salary scale developed for use in the current valuation was 1.6% for the age range 35 to 50 whereas the average rate of increase for the same age range in the salary scale used for the 1955 valuation was 0.6%; the corresponding average rates of increase in the salary scales for female other ranks were 1.1% and 0.7%, respectively.

The change to a steeper salary scale for male other ranks, particularly at the higher ages, has the effect of increasing the estimated total net liability in respect of current contributors very significantly. The reason for this is that male other ranks constitute the bulk of the membership in the plan and a substantial proportion of these contributors stay in service long enough to become entitled to annuities, the size and value of which are, in the usual case, directly related to pay received during the final years of service in the forces. On the other hand, the change to a steeper salary scale for female other ranks cannot affect the total net liability significantly because the membership of this class is relatively small and only a small proportion of these contributors stay in service long enough to become entitled to annuities. For both classes, the change to steeper salary scales has the effect of increasing the contribution rates estimated to be required to provide for benefits in respect of new contributors.

The basic and supplementary salary scales used in the current valuation are shown in Appendix 1 and Appendix 2, respectively.

Rates of mortality and remarriage

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

- (a) the four classes of active contributors;
- (b) retired contributors entitled to annuities for reasons other than disability, males and females separately;
- (c) retired contributors entitled to annuities because of disability, males and females separately;
- (d) widows of deceased contributors;
- (e) children of deceased contributors.

Widows' allowances are suspended on remarriage. Thus, rates of remarriage were needed for their valuation.

The bases used in the valuation are described in the following paragraphs:

(a) Active contributors

For male officers and male other ranks, the mortality rates used in the current valuation were developed from the experience of the 1956-60 period. While these mortality rates exhibited the same pattern as the rates developed from the experience of the 1946-55 period and used in the valuation made as at December 31, 1955, the emphasis on the "hump" in the series of rates at the younger ages had changed for both classes of contributors.

In general, the "hump" feature in the mortality experience of male members of the forces may be attributed to a relatively high number of deaths at the younger ages resulting from accidents in training and casualties in disturbed areas. For male officers, the "hump" was much more pronounced in the experience of the 1956-60 period than in that of the 1946-55 period, perhaps partly as a result of training with more advanced equipment and partly as a result of Canada's active participation in the provision of officers for "peace" commissions in disturbed areas. For male other ranks, the "hump" was more pronounced in the earlier period, perhaps as a result of losses by the Special Force that saw action in Korea.

For female officers and female other ranks, the mortality basis used for the 1955 valuation, namely, the female rates of the α -1949 Table Projected 10 Years, was again used for the current valuation. There was no indication from the experience of the 1956-60 period that any other basis would be more suitable.

The male and female rates used in the valuation are shown in Appendix 3.

(b) Contributors entitled to annuities for reasons other than disability

The mortality rates used in the current valuation both for contributors entitled to annuities for reasons other than disability at the date of valuation and for those who would become so entitled after that date were the male and female rates, as applicable, of the α -1949 Table Projected 10 Years.

Except in the case of male contributors entitled to annuities at the date of valuation, the bases specified above had also been used for the 1955 valuation. For the group excepted, the rates used in the 1955 valuation were the male rates of the α -1949 Table, without projection. In view of the fact that the rates used in the 1955 valuation were very little lower than the rates experienced by males entitled to annuities over the period from the inception of the plan in 1946 to the date of the current valuation and the fact that there is a continuing trend to lighter mortality among annuitants, it was considered appropriate to strengthen the valuation basis for the current valuation.

The male and female rates of the α -1949 Table Projected 10 Years and annuity values based thereon are shown in Appendix 4.

(c) Contributors entitled to annuities because of disability

At the time of the 1955 valuation, there were so few contributors entitled to annuities because of disability that mortality bases had to be chosen arbitrarily for valuation purposes. The bases chosen were simple modifications of the male and female rates, as applicable, of the Canadian Life Table, 1951, without specific regard for time elapsed from date of retirement.

For the current valuation, a preliminary study of the experience of male contributors who had become entitled to annuities because of disability from the inception of the plan in 1946 to the date of the current valuation indicated that the mortality of male "disability" annuitants for this plan is relatively heavy during the first two years after retirement and is fairly normal thereafter. Further studies indicated that, as respects both male contributors entitled to annuities because of disability

at the date of valuation and those who would become so entitled after that date, the mortality of contributors who survive at least two years after date of retirement may be suitably represented for valuation purposes by the male rates of the Canadian Life Table, 1951, and the mortality of contributors within the first and second years after date of retirement may be suitably represented by 300% and 200%, respectively, of those basic rates. The valuation rates applicable during the first year after date of retirement, those applicable after at least 2 years have elapsed from date of retirement, annuity values applicable at date of retirement and annuity values applicable after at least 2 years have elapsed from date of retirement are all shown in Appendix 5.

For the whole 1946-60 period, only six females became entitled to annuities because of disability and no deaths occurred among this group. Since, clearly, a mortality basis to represent future mortality had to be arbitrarily chosen, it was considered reasonable to use the same basis for the current valuation as that used for the 1955 valuation as respects both female contributors entitled to annuities because of disability at the date of valuation and those who would become so entitled after that date. The rates used and annuity values based thereon are shown in Appendix 5.

(d) Widows

The mortality basis chosen for the current valuation of both present and prospective widows' allowances was a table of aggregate mortality rates derived from the 1948-57 experience of widows entitled to allowances under the Public Service Superannuation Plan. The remarriage basis chosen was a table of select and ultimate remarriage rates derived from the 1940-57 experience of widows awarded pensions under the Pension Act and previous Government administrative orders from August 4, 1914, to December 31, 1957. While this remarriage table was the most appropriate one available, tests indicated that the select rates of the table at the early durations are somewhat lower than corresponding actual rates for widows entitled to allowances under the Canadian Forces Superannuation Plan.

In Appendix 6 are shown

- (i) select remarriage rates for quinquennial ages at widowhood 25 to 55 and specimen durations from widowhood,
- (ii) ultimate remarriage rates and aggregate mortality rates for quinquennial ages commencing at age 39, and
- (iii) annuity values based on the probabilities of payments ceasing as a result of remarriage or death for the ages and durations noted in (i) and (ii) above.

(e) Children

Payments of allowances to children cease at age 18. Since the mortality of children under age 18 is very low, it was deemed suitable to value children's allowances without taking account of mortality.

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

For all members of the forces, retirement ages according to rank, covering the age ranges 45 to 55 for officers and 50 to 55 for other ranks, are prescribed by regulations made under the National Defence Act. For purposes of illustration, the "compulsory release ages" for Army ranks are as follows:

| | <u>Rank</u> | <u>Age</u> |
|--------------------|--------------------------|------------|
| <u>Officers</u> | Brigadier and above | 55 |
| | Colonel | 53 |
| | Lieutenant-Colonel | 51 |
| | Major | 49 |
| | Captain | 47 |
| | Lieutenant | 45 |
| <u>Other Ranks</u> | Warrant Officer, class 1 | 55 |
| | Warrant Officer, class 2 | 52 |
| | Staff Sergeant and below | 50 |

During the 1946-55 experience period, a relatively large number of extensions beyond the prescribed retirement ages were granted for both male officers and male other ranks. With this in mind, the rates of retirement chosen for the 1955 valuation for the age ranges covering the prescribed retirement ages were based on what was considered to be "normal" retirement patterns rather than on the statistical experience of the 1946-55 period.

For male officers, the level of the rates experienced during the 1956-60 period for ages 45 and above was somewhat lower than that assumed for the 1955 valuation, again at least partly because of extensions of service beyond the prescribed retirement ages. Also, the incidence of the experience rates of the 1956-60 period for this age range was considerably different from that assumed for the 1955 valuation; as might be expected, the experience rates were relatively high for the odd numbered ages, that is, for the prescribed retirement ages, and relatively low for the even numbered ages. For ages below 45, the feature of relatively high retirements for ages 24 to 28 continued throughout the 1956-60 period. For the current valuation, the rates settled upon as being representative of expected future experience for male officers closely followed the experience rates of the 1956-60 period for ages under 45 and conformed to the serrated experience pattern of rates for ages 45 and above but the level of the valuation rates for the latter age range was taken to be a little higher than that of the experience rates.

For male other ranks, the considerations mentioned in the preceding paragraph as respects male officers were also applicable, although to a lesser degree. For ages 50 and above, the level of the rates experienced during the 1956-60 period was somewhat lower than that assumed for the 1955 valuation and the pattern of rates for this age range was serrated in a manner similar to that of the male officer rates for ages 45 and above and for the same reason. Accordingly, the series of rates used for male other ranks in the current valuation was constructed along the lines described above for male officers.

For female officers, there was no indication that the rates used in the 1955 valuation were unsuitable in any respect and these rates were again used in the current valuation.

For female other ranks, during the 1956-60 period the actual number of retirements for all ages was almost double the number of retirements expected in accordance with the rates used in the 1955 valuation. However, out of the 52 actual retirements during the 1956-60 period, only 2 had become entitled to an annuity. Also, at the date of the current valuation, out of 2,709 female other ranks, only 22 were of age 40 or above and only 7 were of age 45 or above. From a financial standpoint, therefore, the relatively high number of retirements during the 1956-60 period was not unfavourable to the Account and it seems unlikely that any future excess of actual over expected retirements would have an unfavourable effect for many years to come. Because of the financial aspect just described together with the impossibility of reliable prediction of future rates of retirement of this type for such a young and relatively small group of lives, the rates used in the 1955 valuation were considered satisfactory for use in the current valuation.

The rates used for the four classes of active contributors in the current valuation are shown in Appendix 7.

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

For male officers, the experience rates of the 1956-60 period for ages 15 to 29 were very much higher than the rates developed from the 1946-55 experience for use in the 1955 valuation but for ages 30 and above the experience rates of the 1956-60 period and of the 1946-55 period were very nearly the same. The rates developed for use in the current valuation were based on the experience of the 1956-60 period.

For male other ranks, the experience rates of the 1956-60 period were substantially lower, except for ages under 20, than the rates developed from the 1946-55 experience for use in the 1955 valuation. With respect to the 1946-55 experience, an exceptional feature noted was a decided "hump" in the series of rates at ages in the early twenties. Whether or not this feature was a result of war injuries suffered during the Korean action, the same feature was not present in the experience rates of the 1956-60 period. The rates developed for use in the current valuation were based on the experience of the 1956-60 period.

For female officers and female other ranks, the experience of the 1956-60 period indicated that the rates of retirement used for the 1955 valuation continued to be suitable for the current valuation.

The rates used for the four classes of active contributors in the current valuation are shown in Appendix 8.

Rates of retirement with return of contributions

For male officers, the experience rates of the 1956-60 period for ages 15 to 34 were substantially higher than the rates used in the 1955 valuation. Because the pattern and level of retirements of this type over short periods are influenced by the state of the Canadian economy and by the current situation in world affairs, the rates developed for use in the current valuation were based on the average experience of the whole 1946-60 period.

For male other ranks, the experience rates of the 1956-60 period for ages 15 to 24 were considerably higher than the rates used in the 1955 valuation. For the reason mentioned above in respect of male officers, the rates developed for use in the current valuation were based on the experience of the whole 1946-60 period.

For female officers, the experience rates of the 1956-60 period closely followed the rates used in the 1955 valuation for all ages and these rates were again used in the current valuation.

For female other ranks, the experience rates of the 1956-60 period were considerably higher for the age range 15 to 34 than the rates used in the 1955 valuation. However, because of the possibility of extreme fluctuations in number of retirements of this type, it was considered that the seemingly conservative rates used in the 1955 valuation were satisfactory for use in the current valuation.

The rates used for the four classes of active contributors in the current valuation are shown in Appendix 9.

Proportions of male contributors leaving dependants at death

These proportions were needed in the valuation of prospective benefits to dependants who become entitled to an annual allowance on the death of active or retired contributors.

For the 1955 valuation, separate series of proportions were developed for the active contributor classes of male officers and male other ranks and for male retired contributors. However, the experience of the 1956-60 period indicated that, for valuation purposes, the same proportions may be used for all three male classes. Accordingly, the proportions used in the current valuation were based on the combined experience of the three classes during the 1956-60 period. They are shown in Appendix 10.

Average ages of widows corresponding to ages of contributors at death

These average ages were needed in the valuation of prospective benefits to widows who become entitled to an annual allowance on the death of their contributor husbands, whether active or retired.

In keeping with the general trend to smaller differences between the ages of husbands and wives, under this Superannuation plan the average differences between the ages of contributors who died during the 1956-60 period and their widows were slightly less than the corresponding age differences for the 1946-55 period. The average ages used in the current valuation were based on the experience of the 1956-60 period. They are shown in Appendix 10.

Capitalized values of benefits

In Appendix 11 are shown the values of benefits, per \$1.00 of "earned" annuity, emerging

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

For retirements, the values shown for male contributors include provision for prospective annual allowances 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.

Contribution Rates

In accordance with the provisions of the Act, contributions payable by contributors for current service are equal to 6% of pay and contributions for periods of prior service are, in the usual case, based on 6% of the pay received by electing contributors during such periods. Also, from commencement of the plan in 1946, credits equal to one and two-thirds of total current service and prior service contributions by contributors have been made to the Account on behalf of the Government. Thus, total credits to the Account are ordinarily made at the rate of 16% of pay received by contributors during any period of pensionable service.

As indicated earlier in this report, it was deemed appropriate to estimate the contribution rates required in respect of new contributors to provide for the benefits under the Act

- (a) taking into account only promotional increases in pay, and
- (b) taking into account both promotional increases and certain assumed economic increases in pay.

Accordingly, the rates shown below in Schedule I were calculated using the basic salary scales which give effect to promotional increases only and those shown in Schedule II were calculated using the supplementary salary scales which give effect both to promotional increases and to economic increases at the rate of $2\frac{1}{2}\%$ per annum.

The contribution rates shown in the schedules are the rates estimated to be required in respect of persons becoming contributors at ages 20, 25 and 30 and the average rates estimated to be required in respect of new contributors for each of the four classes of active contributors and for all classes combined. The average rates for each class of contributors were calculated by weighting the rates for individual ages by factors that involved the number, pay and pertinent annuity value of persons who became contributors of that class during the period from January 1, 1956, to December 31, 1960 (in Appendix 12 is shown the distribution of new contributors by age and class); the average rates for all contributors were calculated by applying similar weighting factors to the average rates for the four classes of contributors. Also shown in the schedules, as respects male contributors, are breakdowns of the total rates into the component rates required to provide benefits payable to the contributor or his estate and to the dependants of the contributor.

Contribution Rates required in respect of New Contributors
(percentages of pay)

| | Schedule I (Promotional Increases Only) | | | Weighted Average |
|-------------------------|--|-----------|-----------|---------------------|
| | Age at Becoming Contributor | | | |
| | <u>20</u> | <u>25</u> | <u>30</u> | |
| <u>Male Officers</u> | | | | |
| Contributor | 20.47% | 20.54% | 22.18% | 20.9% |
| Dependants | 2.45 | 2.46 | 2.63 | 2.5 |
| Total | 22.92 | 23.00 | 24.81 | 23.4 |
| <u>Male Other Ranks</u> | | | | |
| Contributor | 11.76 | 14.46 | 17.29 | 12.4 |
| Dependants | 1.18 | 1.65 | 2.07 | 1.3 |
| Total | 12.94 | 16.11 | 19.36 | 13.7 |
| Female Officers | 11.43 | 14.83 | 18.96 | 18.6 |
| Female Other Ranks | 5.92 | 6.88 | 9.81 | 6.0 |

For all classes combined, the average contribution rate estimated to be required to provide for the benefits under the Act in respect of new contributors is 15.3%.

| | Schedule II (Promotional and Economic Increases) | | | Weighted Average |
|-------------------------|---|-----------|-----------|---------------------|
| | Age at Becoming Contributor | | | |
| | <u>20</u> | <u>25</u> | <u>30</u> | |
| <u>Male Officers</u> | | | | |
| Contributor | 27.18% | 26.11% | 26.48% | 26.6% |
| Dependants | 3.25 | 3.12 | 3.12 | 3.2 |
| Total | 30.43 | 29.23 | 29.60 | 29.8 |
| <u>Male Other Ranks</u> | | | | |
| Contributor | 16.03 | 18.83 | 21.15 | 16.6 |
| Dependants | 1.75 | 2.21 | 2.55 | 1.8 |
| Total | 17.78 | 21.04 | 23.70 | 18.4 |
| Female Officers | 15.16 | 18.87 | 22.72 | 21.7 |
| Female Other Ranks | 6.26 | 7.81 | 11.71 | 6.3 |

For all classes combined, the average contribution rate estimated to be required to provide for the benefits under the Act in respect of new contributors is 20.4%.

Examination of the rates in the two schedules clearly reveals the significance of economic increases in pay on the cost of benefits under the plan. Specifically, it may be seen from Schedule II that, if

- (a) future economic increases in pay should average $2\frac{1}{2}\%$ per annum,
- (b) the contribution rate of contributors should remain at 6% of pay, and
- (c) special lump sum credits should not be made to the Account in respect of general pay increases,

the credits to the Account on behalf of the Government that would be necessary to provide for benefits in respect of new contributors would equal about $14\frac{1}{2}\%$ of pay.

General Pay Increases

At the present time, increases in benefits resulting from economic increases in pay are not provided for in advance by contributions payable by contributors and Government credits to the Account based on such contributions. Thus, any increase in the general level of pay creates an additional net liability in respect of active contributors because the increase in the value of future benefits resulting from a pay increase is greater in amount than the corresponding increase in the value of future contributions by contributors and of Government credits based thereon.

There were three general pay increases for members of the forces during the period from January 1, 1956, to December 31, 1960. The first such increase, effective April 1, 1956, raised the average level of pay by about 7.1% for officer contributors and 8.7% for other rank contributors; the second, effective May 1, 1957, raised the average level of pay by about 8.0% for officer contributors and 6.2% for other rank contributors; the third, effective October 1, 1960, raised the average level of pay by about 10.8% for officer contributors and 6.8% for other rank contributors. At the effective dates of the three pay increases, the net liabilities estimated to have been created thereby were \$41.8 million, \$45.0 million and \$88.1 million, respectively.

In June, 1958, the Government credited \$326.3 million to the Account, this amount being the sum of the values, accumulated to March 31, 1958, of the estimated \$214.6 million deficit in the Account as at December 31, 1955, and the estimated net liabilities created by the 1956 and 1957 pay increases as noted in the preceding paragraph. At the same time, a balancing asset item of \$326.3 million, entitled "Unamortized portion of actuarial deficiency in the Permanent Services Pension Account" was set up as a deferred charge in the Government balance sheet. To the date of this report no credit has been made to the Account in respect of the 1960 pay increase.

Valuation Summary

The first balance sheet set out below summarizes the results of the valuation and shows the financial status of the Account as at December 31, 1960, when only promotional increases in pay were taken into account in determining the present values of benefits and contributions. In the construction of this balance sheet it was assumed that current service contributions of contributors would continue at a rate of 6% of pay and that credits to the Account on behalf of the Government would equal one and two-thirds of total contributions by contributors on a continuing basis. Implicit in this approach is the assumption that, in the event of general pay increases, credits equal to the net liabilities created thereby would be made to the Account on behalf of the Government at the time of such increases.

The second balance sheet summarizes the results of the valuation and shows the financial status of the Account as at December 31, 1960, when both promotional increases in pay and economic increases in pay at the rate of $2\frac{1}{2}\%$ per annum were taken into account in determining the present values of benefits and contributions. In the construction of this balance sheet it was assumed that current service contributions of contributors would continue at a rate of 6% of pay and that credits to the Account on behalf of the Government would equal the sum of

- (a) one and two-thirds of prior service contributions by contributors, and
- (b) $14\frac{1}{2}\%$ of pay of contributors in respect of current service.

With this approach, if economic increases in pay were to average $2\frac{1}{2}\%$ per annum throughout the future and if Government credits in respect of current service both for contributors who were members of the forces at the date of valuation and for persons becoming contributors after that date were to be made to the Account at a rate of $14\frac{1}{2}\%$ of pay, this balance sheet would properly show the state of the Account as at December 31, 1960, benefits in respect of new contributors would be adequately provided for by the sum of current contributions by contributors and current Government credits and no special lump sum credits would be required in respect of future general pay increases.

Valuation Balance Sheets as at December 31, 1960

I. Promotional Increases Only

| <u>Assets</u> | | | |
|--|------------------|------------------|------------------------|
| Balance of Account | | | \$1,125,316,000 |
| Outstanding credits from Government | | | 14,180,000 |
| Outstanding contributions from contributors | | | 11,000 |
| Present value of future contributions from contributors: | | | |
| <u>Members of the forces</u> | | | |
| <u>Current service</u> | | | |
| Males:-Officers | \$ 60,800,000 | | |
| Other ranks | 200,173,000 | | |
| Females:-Officers | 638,000 | | |
| Other ranks | <u>1,539,000</u> | \$263,150,000 | |
| <u>Prior service</u> | | | |
| Males:-Officers | 3,499,000 | | |
| Other ranks | 8,980,000 | | |
| Females:-Officers | 41,000 | | |
| Other ranks | <u>11,000</u> | 12,531,000 | |
| <u>Retired contributors</u> | | | |
| Males | 1,646,000 | | |
| Females | <u>1,000</u> | <u>1,647,000</u> | 277,328,000 |
| Present value of future credits from Government | | | <u>462,213,000</u> |
| Total Assets | | | \$1,879,048,000 |
| Deficit | | | <u>181,541,000</u> |
| | | | <u>\$2,060,589,000</u> |

Liabilities

| | | | |
|---|------------------|-----------------|------------------------|
| Present value of prospective benefits to contributors who are members of the forces: | | | |
| Males:-Officers | \$ 677,809,000 | | |
| Other ranks | 1,279,099,000 | | |
| Females:-Officers | 6,806,000 | | |
| Other ranks | <u>3,236,000</u> | \$1,966,950,000 | |
| Present value of future benefits to persons entitled to an annuity or annual allowance: | | | |
| Retired contributors:-Males | 86,914,000 | | |
| Females | 790,000 | | |
| Widows | 4,482,000 | | |
| Children | <u>557,000</u> | 92,743,000 | |
| Amounts due to retired contributors or to the dependants or estates of contributors | | | <u>896,000</u> |
| Total Liabilities | | | <u>\$2,060,589,000</u> |

II. Promotional and Economic Increases

Assets

| | | | |
|--|------------------|------------------|------------------------|
| Balance of Account | | | \$1,125,316,000 |
| Outstanding credits from Government | | | 14,180,000 |
| Outstanding contributions from contributors | | | 11,000 |
| Present value of future contributions from contributors: | | | |
| <u>Members of the forces</u> | | | |
| <u>Current service</u> | | | |
| Males:-Officers | \$ 73,658,000 | | |
| Other ranks | 243,647,000 | | |
| Females:-Officers | 730,000 | | |
| Other ranks | <u>1,691,000</u> | \$319,726,000 | |
| <u>Prior service</u> | | | |
| Males:-Officers | 3,499,000 | | |
| Other ranks | 8,980,000 | | |
| Females:-Officers | 41,000 | | |
| Other ranks | <u>11,000</u> | 12,531,000 | |
| <u>Retired contributors</u> | | | |
| Males | 1,646,000 | | |
| Females | <u>1,000</u> | <u>1,647,000</u> | 333,904,000 |
| Present value of future credits from Government | | | <u>796,301,000</u> |
| | Total Assets | | \$2,269,712,000 |
| Deficit | | | <u>380,536,000</u> |
| | | | <u>\$2,650,248,000</u> |

Liabilities

| | | | |
|---|-------------------|-----------------|------------------------|
| Present value of prospective benefits to contributors who are members of the forces: | | | |
| Males:-Officers | \$ 837,698,000 | | |
| Other ranks | 1,707,396,000 | | |
| Females:-Officers | 7,777,000 | | |
| Other ranks | <u>3,738,000</u> | \$2,556,609,000 | |
| Present value of future benefits to persons entitled to an annuity or annual allowance: | | | |
| Retired contributors:-Males | 86,914,000 | | |
| Females | 790,000 | | |
| Widows | 4,482,000 | | |
| Children | <u>557,000</u> | 92,743,000 | |
| Amounts due to retired contributors or to the dependants or estates of contributors | | | <u>896,000</u> |
| | Total Liabilities | | <u>\$2,650,248,000</u> |

State of the Account

From the first balance sheet it may be seen that, when only promotional increases in pay were taken into account, there was an estimated deficit of \$181.5 million in the Account as at December 31, 1960. Almost all of this deficit resulted from three sets of circumstances, namely,

- (a) the pay increase effective October 1, 1960,
- (b) the movement of a substantial number of contributors from other rank to officer status, and
- (c) a change in the valuation salary scales for male and female other ranks.

The manner in which and the extent to which the Account was affected by these three factors are considered in the following paragraphs:

(a) Pay increase effective October 1, 1960

At the time of any increase in the general level of pay an uncovered net liability, or deficit, is created in the Account because the increase in the value of future benefits resulting from the pay increase is greater than the corresponding increase in the value of future contributions. The net liability created by the 1960 pay increase was estimated to be \$88.1 million as at the effective date of the increase, and its value as at the date of valuation, with interest at 4% per annum, was \$89.0 million. Thus, almost one-half of the \$181.5 million deficit appearing in the balance sheet arose from this one source.

(b) Promotion of other rank contributors to officer ranks

During the 1956-60 period about 1,250 contributors who had other rank status on January 1, 1956, were promoted to officer ranks. On each such promotion a net liability was created in the Account because the average net liability required to be held in the Account for an officer contributor is substantially greater than the average net liability so required for an other rank contributor of the same age. For instance, the average net liability for male officers aged 35 at December 31, 1960, was about \$30,000 whereas the corresponding average net liability for male other ranks was about \$13,000.

The reason why the average net liability for an officer contributor is greater than that for an other rank contributor of the same age may perhaps be understood by examining the specimen contribution rates required in respect of new contributors as shown in the schedule on page 21 of this report. From that schedule, it will be noticed that the required average contribution rates for officers are much higher than the corresponding rates for other ranks which simply means that a higher proportion of pay is required to provide for the relatively higher future benefits of officers. Since actual contributions by contributors and credits from Government are based on the same percentage of pay for both officers and other ranks, the net liability at any point in time (that is, the difference between the value of future benefits and the value of future contributions at that point) must be greater for an officer contributor than for an other rank contributor of the same age and length of pensionable service.

The portion of the deficit shown in the balance sheet that arose from this source was estimated to be \$19 million.

(c) Change in valuation salary scales

For male and female other rank contributors, the average rates of increase in pay from age to age developed from the statistics provided for the current valuation of the plan were much higher than the corresponding rates of increase inherent in the salary scales used for the 1955 valuation. Two possible reasons for such difference may be advanced, namely,

- (i) in the late 1940's, promotion from rank to rank was slow because of the reduction in the total number of members of the forces and, at the same time, the retention of a relatively large number of members of the higher ranks; in the early 1950's the establishment of the forces was increased very substantially with the result that the rate of promotion likely quickened in order to provide the numbers of higher rank personnel required by the new establishment; perhaps all of the effect of the increased frequency of promotion at the higher ages that obtained during most of the 1951-60 decade showed up in the average rates of increase in pay from age to age developed from the statistics of the 1956-60 period whereas the slower rate of promotion that obtained during several years of the preceding decade depressed the average rates of increase determined for the whole of that period, and
- (ii) as respects the more recent general pay increases, the increases have been proportionately greater for the higher ranks than for the lower ranks, thus causing an increase in the average rates of increase in pay from age to age, particularly at the higher ages.

In any case, it seemed probable that future experience would be most likely to follow the increase patterns developed from the statistics pertaining to the 1956-60 period and, in consequence, the salary scales used for the current valuation were based thereon.

As explained on page 14 of this report, the change to the new salary scales, especially for male other ranks, affected the net liability very significantly. It is estimated that the portion of the deficit shown in the balance sheet that arose from this source was \$69 million.

The part of the balance sheet deficit not accounted for in the above paragraphs, namely, \$4.5 million, was the net result of many relatively small gains and losses in the operation of the plan over the 1956-60 period and of certain changes in valuation bases that had a relatively minor effect on the total liability.

The second balance sheet, constructed in the manner and in accordance with the assumptions described on page 23 of this report, illustrates the effect of future general pay increases on the liability pertaining to current contributors.

Summary

1. When no account is taken of possible future increases in the general level of pay, the average contribution rate estimated to be required to provide for benefits in respect of new contributors of all classes is, for contributors and Government combined, 15.3% of pay.

If increases in the general level of pay were to take place throughout the future at an average rate of $2\frac{1}{2}\%$ per annum and no special credits were to be made to the Account in respect of such increases, the average contribution rate estimated to be required to provide for benefits in respect of new contributors of all classes would be, for contributors and Government combined, 20.4% of pay.

2. If the rate of contribution for all contributors remains at 6% of pay and the Government continues to credit the Account with

- (a) amounts equal to one and two-thirds of total current service and prior service contributions paid by contributors, and
- (b) special lump sum amounts representing the additional net liabilities created by general pay increases,

the estimated deficit in the Account as at December 31, 1960, was \$181.5 million.

In conclusion, it is a pleasure to acknowledge the cooperation and assistance of the several contributing agencies of the Department of National Defence throughout this examination.

Respectfully submitted,



Chief Actuary

Department of Insurance,
Ottawa, Canada
July 26, 1962

A P P E N D I C E S

Salary Scales

Tables of Rates

Tables of Values

Distribution of New Contributors
by Age and Class

A P P E N D I X 1

Basic 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 | .195 | .335 | .343 | .340 |
| 16 | .195 | .340 | .343 | .346 |
| 17 | .195 | .346 | .343 | .353 |
| 18 | .196 | .354 | .344 | .362 |
| 19 | .198 | .366 | .347 | .375 |
| 20 | .203 | .384 | .351 | .394 |
| 21 | .216 | .409 | .357 | .421 |
| 22 | .262 | .448 | .365 | .456 |
| 23 | .385 | .491 | .375 | .495 |
| 24 | .488 | .531 | .387 | .536 |
| 25 | .547 | .566 | .402 | .577 |
| 26 | .583 | .596 | .422 | .616 |
| 27 | .610 | .621 | .448 | .651 |
| 28 | .633 | .643 | .480 | .682 |
| 29 | .655 | .664 | .519 | .709 |
| 30 | .676 | .684 | .561 | .733 |
| 31 | .696 | .702 | .602 | .755 |
| 32 | .715 | .719 | .639 | .776 |
| 33 | .733 | .735 | .672 | .796 |
| 34 | .750 | .750 | .701 | .815 |
| 35 | .766 | .764 | .727 | .833 |
| 36 | .781 | .778 | .750 | .849 |
| 37 | .796 | .792 | .771 | .863 |
| 38 | .810 | .806 | .790 | .876 |
| 39 | .824 | .819 | .808 | .888 |
| 40 | .838 | .831 | .825 | .899 |
| 41 | .851 | .843 | .841 | .909 |
| 42 | .864 | .855 | .856 | .918 |
| 43 | .876 | .867 | .870 | .927 |
| 44 | .888 | .879 | .883 | .935 |
| 45 | .900 | .891 | .895 | .942 |
| 46 | .911 | .902 | .907 | .949 |
| 47 | .922 | .913 | .919 | .956 |
| 48 | .932 | .924 | .930 | .962 |
| 49 | .942 | .935 | .941 | .968 |
| 50 | .952 | .946 | .952 | .974 |
| 51 | .962 | .957 | .962 | .980 |
| 52 | .972 | .968 | .972 | .985 |
| 53 | .982 | .979 | .982 | .990 |
| 54 | .991 | .990 | .991 | .995 |
| 55 | 1.000 | 1.000 | 1.000 | 1.000 |

A P P E N D I X 2

Supplementary 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 | .073 | .125 | .128 | .127 |
| 16 | .074 | .130 | .131 | .132 |
| 17 | .076 | .136 | .134 | .138 |
| 18 | .079 | .142 | .138 | .145 |
| 19 | .082 | .150 | .143 | .154 |
| 20 | .086 | .162 | .148 | .166 |
| 21 | .093 | .177 | .154 | .182 |
| 22 | .116 | .199 | .162 | .202 |
| 23 | .175 | .223 | .170 | .225 |
| 24 | .227 | .247 | .180 | .249 |
| 25 | .261 | .270 | .192 | .275 |
| 26 | .285 | .291 | .206 | .301 |
| 27 | .305 | .311 | .225 | .326 |
| 28 | .325 | .330 | .247 | .350 |
| 29 | .345 | .349 | .273 | .373 |
| 30 | .365 | .369 | .302 | .396 |
| 31 | .385 | .388 | .333 | .418 |
| 32 | .405 | .407 | .362 | .440 |
| 33 | .426 | .427 | .390 | .462 |
| 34 | .447 | .447 | .418 | .485 |
| 35 | .467 | .466 | .444 | .508 |
| 36 | .489 | .487 | .469 | .531 |
| 37 | .510 | .508 | .494 | .553 |
| 38 | .532 | .530 | .519 | .576 |
| 39 | .555 | .552 | .544 | .598 |
| 40 | .579 | .574 | .570 | .621 |
| 41 | .602 | .597 | .595 | .643 |
| 42 | .627 | .620 | .621 | .666 |
| 43 | .651 | .645 | .647 | .689 |
| 44 | .677 | .670 | .673 | .712 |
| 45 | .703 | .696 | .699 | .736 |
| 46 | .730 | .722 | .726 | .760 |
| 47 | .757 | .749 | .754 | .785 |
| 48 | .784 | .777 | .782 | .809 |
| 49 | .812 | .806 | .812 | .835 |
| 50 | .841 | .836 | .841 | .861 |
| 51 | .872 | .867 | .872 | .888 |
| 52 | .903 | .899 | .903 | .915 |
| 53 | .935 | .932 | .935 | .942 |
| 54 | .967 | .966 | .967 | .971 |
| 55 | 1.000 | 1.000 | 1.000 | 1.000 |

A P P E N D I X 3

Rates of Mortality 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 4

Rates of Mortality for contributors retired
for reasons other than disability
and
Annuity Values based thereon

| <u>Age at Retirement</u> | <u>Mortality Rate</u> | | <u>Value of Annuity of \$1.00 per annum (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 |

A P P E N D I X 5

Rates of Mortality for contributors retired
because of disability
and
Annuity Values based thereon

| Age | Mortality Rate | | Value of Annuity of \$1.00 per annum (interest at 4% per annum) | | | |
|-----|--|---|---|--|----------------|----------|
| | <u>Males</u> | <u>Females</u> | <u>Males</u> | <u>Females</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 |

A P P E N D I X 6

Rates of Remarriage and Mortality for widows

| <u>Age at Widowhood</u> | <u>Remarriage Rate</u> | | | | | <u>Attained Age</u> | <u>Mortality Rate</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 |

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 |

A P P E N D I X 7

Rates of Retirement 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 | .0006 | .0037 | .0010 | .0015 |
| 19 | .0010 | .0032 | .0010 | .0015 |
| 20 | .0016 | .0029 | .0011 | .0016 |
| 21 | .0023 | .0026 | .0012 | .0016 |
| 22 | .0033 | .0024 | .0013 | .0016 |
| 23 | .0047 | .0022 | .0014 | .0017 |
| 24 | .0067 | .0021 | .0015 | .0017 |
| 25 | .0095 | .0020 | .0016 | .0018 |
| 26 | .0130 | .0020 | .0016 | .0019 |
| 27 | .0107 | .0020 | .0017 | .0020 |
| 28 | .0085 | .0020 | .0018 | .0021 |
| 29 | .0068 | .0020 | .0019 | .0023 |
| 30 | .0055 | .0021 | .0020 | .0024 |
| 31 | .0046 | .0022 | .0021 | .0025 |
| 32 | .0039 | .0023 | .0022 | .0026 |
| 33 | .0034 | .0024 | .0023 | .0028 |
| 34 | .0030 | .0026 | .0024 | .0030 |
| 35 | .0027 | .0028 | .0025 | .0032 |
| 36 | .0024 | .0031 | .0026 | .0034 |
| 37 | .0022 | .0034 | .0028 | .0037 |
| 38 | .0020 | .0037 | .0030 | .0040 |
| 39 | .0018 | .0040 | .0032 | .0043 |
| 40 | .0017 | .0044 | .0035 | .0047 |
| 41 | .0016 | .0049 | .0038 | .0051 |
| 42 | .0015 | .0054 | .0042 | .0056 |
| 43 | .0015 | .0059 | .0047 | .0061 |
| 44 | .0014 | .0065 | .0052 | .0066 |
| 45 | .1000 | .0071 | .1000 | .0072 |
| 46 | .0500 | .0078 | .1000 | .0078 |
| 47 | .2000 | .0085 | .2000 | .0084 |
| 48 | .1500 | .0093 | .2000 | .0091 |
| 49 | .4000 | .0101 | .4000 | .0100 |
| 50 | .3000 | .7000 | .4000 | .7000 |
| 51 | .5000 | .4000 | .5000 | .6000 |
| 52 | .3000 | .6000 | .5000 | .5000 |
| 53 | .4000 | .4000 | .5000 | .5000 |
| 54 | .3500 | .5000 | .5000 | .5000 |
| 55 | 1.000 | 1.000 | 1.000 | 1.000 |

A P P E N D I X 8

Rates of Retirement 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 |

A P P E N D I X 9

Rates of Retirement with 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 |

A P P E N D I X 10

Proportions of Male Contributors leaving dependants at death
and
Average Ages of Widows corresponding to ages of
contributors at death

| <u>Age of Contributor at Death</u> | <u>Proportion of Male Contributors Leaving Dependents</u> | <u>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 |

A P P E N D I X 11

Capitalized Values of benefits per \$1.00 "earned" annuity
of contributor at retirement or death
(interest at 4% per annum)

On 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 |

On 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 |

On 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 | \$2.501 | \$.041 | \$6.566 |
| 30 | 5.668 | 2.427 | .029 | 8.124 |
| 35 | 7.070 | 2.241 | .022 | 9.333 |
| 40 | 7.940 | 1.733 | .025 | 9.698 |
| 45 | 8.326 | 1.002 | .036 | 9.364 |
| 50 | 8.297 | .568 | .051 | 8.916 |
| 55 | 7.978 | .255 | .070 | 8.303 |
| 60 | 7.469 | .003 | - | 7.472 |
| 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 |

A P P E N D I X 12

Number of members of the forces who became contributors
during the period from January 1, 1956, to December 31, 1960,
distributed by age and class

| <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 | 2 | 0 | 0 |
| 16 | 15 | 1,170 | 0 | 1 |
| 17 | 385 | 12,005 | 1 | 6 |
| 18 | 1,132 | 13,435 | 1 | 1,994 |
| 19 | 993 | 9,056 | 0 | 1,663 |
| 20 | 542 | 5,162 | 0 | 771 |
| 21 | 279 | 3,778 | 0 | 393 |
| 22 | 181 | 2,993 | 8 | 263 |
| 23 | 182 | 2,396 | 3 | 138 |
| 24 | 223 | 1,979 | 8 | 82 |
| 25 | 210 | 1,616 | 3 | 78 |
| 26 | 209 | 1,229 | 5 | 48 |
| 27 | 155 | 997 | 5 | 39 |
| 28 | 132 | 781 | 4 | 31 |
| 29 | 116 | 636 | 4 | 24 |
| 30 | 81 | 545 | 8 | 17 |
| 31 | 78 | 423 | 8 | 8 |
| 32 | 76 | 328 | 3 | 2 |
| 33 | 95 | 277 | 6 | 7 |
| 34 | 111 | 238 | 16 | 1 |
| 35 | 100 | 224 | 9 | 6 |
| 36 | 78 | 159 | 9 | 0 |
| 37 | 59 | 133 | 2 | 0 |
| 38 | 50 | 76 | 3 | 0 |
| 39 | 34 | 57 | 3 | 0 |
| 40 | 28 | 34 | 3 | 1 |
| 41 | 7 | 8 | 4 | 2 |
| 42 | 5 | 2 | 4 | 0 |
| 43 | 2 | 5 | 0 | 0 |
| 44 | 5 | 4 | 1 | 0 |
| 45 | 1 | 1 | 0 | 0 |
| 46 | 2 | 2 | 0 | 0 |
| 47 | 1 | 0 | 0 | 0 |
| 48 | 1 | 1 | 0 | 0 |
| 49 | 3 | 0 | 0 | 0 |
| 50 | 1 | 0 | 0 | 0 |
| 51 | 2 | 0 | 0 | 0 |
| Total | 5,574 | 59,752 | 121 | 5,575 |