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# STATISTICAL SUPPLEMENT 77

# "1977 STATISTICAL SUPPLEMENT To the Annual Report"

## The Public Employees' Retirement Association of Colorado"

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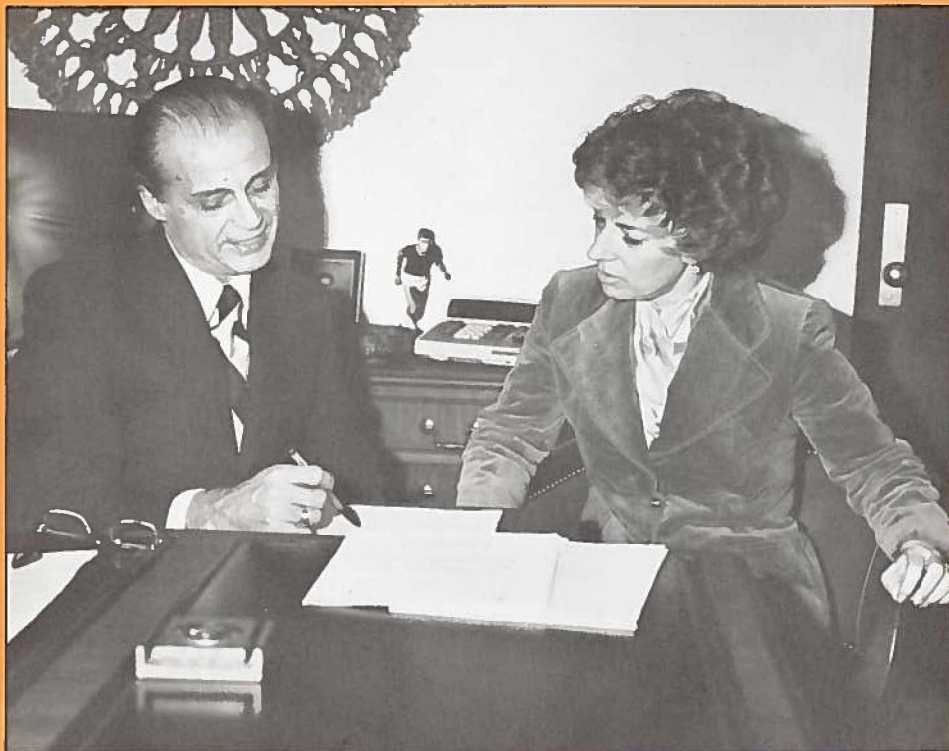
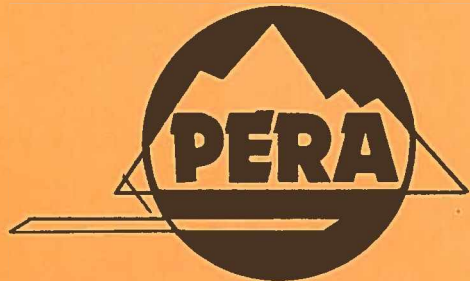
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January, 1978  
1300 Logan  
Denver, Colorado 80203



**PERA's Executive Secretary Joseph P. Natale, left, confers with Dr. Margaret Whilden, Board Chairperson.**



# Public Employees' Retirement Board

Margarett Whilden, Chairperson ..... Jefferson County Public Schools  
 Wilborn S. Whitehead, Vice Chairman ..... City of Arvada

Roberta J. Altenbern ..... Adams County District 14 Schools  
 Bernal Brooks ..... City of Colorado Springs  
 Eileen Burroughs ..... Jefferson County Public Schools  
 Walter Chilton ..... Retired  
 Robert Haggood ..... State Land Board  
 Ada Houck ..... Grand Junction Public Schools  
 Terry L. Lantry ..... Colorado State University  
 Thomas D. Lindquist ..... State Patrol  
 Edward W. Murrow ..... University of Colorado  
 Frank V. Taulli ..... Pueblo Public Schools

Roy Romer ..... State Treasurer  
 Bob Scott ..... State Auditor

## Administrative Staff

Joseph P. Natale ..... Executive Secretary  
 Kenneth E. Peterson ..... Assistant Secretary of Investments  
 Carl S. Wilkerson ..... Assistant Secretary of  
 Staff Support Service  
 James W. "Will" Wilson ..... Assistant Secretary of  
 Government and Member Relations

Dennis Blake ..... Director of Data Processing  
 Kent Carsten ..... Director of Office Services  
 Donald P. Clippinger, C.P.A. .... Director of Accounting  
 Ralph Doronzo ..... Director of Building Services  
 Allan L. Johnson ..... Director of Information Services  
 Jean Moretti ..... Director of Retirement Services  
 Paula Westerdahl ..... Director of Annuities

## Consulting Firms

Gabriel, Roeder, Smith & Company, Actuaries  
 Peat, Marwick, Mitchell & Co., Certified Public Accountants  
 Alliance Capital Management Corporation, Investment Counsel  
 A. G. Becker & Co., Incorporated, Funds Evaluation Service



# Introduction

1977 Supplement to the 1977 Annual Report

This Supplement to the 1977 Annual Report is divided into two major parts: a financial report and an actuarial report. The purpose of this supplement is to supply the interested member with detailed investment, financial, and actuarial information used by the Retirement Board in managing the Public Employees' Retirement Association.

In the financial report, the June 30, 1977, audited financial reports are presented with accompanying auditor's statement and notes. This section also deals with the growth and composition of the asset structure of the fund. Investments of the portfolio are listed as of June 30, 1977.

The actuarial report deals with the fundamental reality facing PERA—the growth of PERA, in terms of both people and dollar assets, and the growth of claims on the fund, accumulating over the years through a statutory promise to pay benefits at retirement.

The Public Employees' Retirement Association has four funds—the State Division, School Division, Municipal Division, and Judges Division. Much of the data in this booklet is consolidated for all four divisions although each fund is separated from the others and is only used to pay claims against that division. Actuarial facts for active members of the Association are listed as of December 31, 1976. Data on retired lives is listed as of June 30, 1977.

Members contribute 7% percent of salary paid. While this money is invested, the member's principal amount can only be used for the benefit of the individual member or his survivor. The employers' contributions vary according to Division. These contributions are determined on the basis of actuarial valuations to provide the amount of money needed, in addition to the employee's own contributions, to pay the allowances promised by the Association.

Explanatory materials including several graphs appear throughout to help explain the program. This is the fourth year that this Annual Statistical

Supplement has been published. We hope that this year's report will also be of interest to you and will be helpful in understanding and evaluating the program.

January, 1978

**Public Employees' Retirement  
Board of Colorado**

**1300 Logan  
Denver, Colorado 80203**

## How the Plan Operates

The PERA retirement plan was established in 1931, and began by covering only state employees. The plan has been greatly expanded since that time and now includes employees of the State of Colorado, of all school districts in the state except Denver, and the employees of several municipalities, public health departments, and other local governmental agencies.

This plan is recognized as among the best in existence. Its purpose is to provide income to members and their families when they need it most—at retirement or in case of death or disability.

The Public Employees' Retirement Association is a joint-contributory retirement plan, operating on an actuarial reserve basis.

**THE RETIREMENT ACT:** The law governing the Public Employees'

Retirement Association of Colorado is Article 51 of Title 24, Colorado Revised Statutes, 1973, as amended. The last amendatory legislation was enacted in 1977.

Complete copies of the law are available at the Retirement Office.

**ADMINISTRATION OF SYSTEM:** The administration and responsibility for the proper operation of the Association are vested in the Public Employees' Retirement Board of Colorado which is made up of fourteen members, as follows:

Five representatives elected by members from the School Division.

Four representatives elected by members from the State Division.

Two representatives elected by members from the Municipal Division.

One representative elected by those retired under PERA.

The State Treasurer and State Auditor.

The members of the Association elect employee group representatives to the Board for four-year terms by mail ballot.

The legal advisor of the Retirement Board is the State Attorney General. An executive secretary is appointed by the Retirement Board to be secretary and administrative officer of the Association. He, in turn, is responsible for the activities of the staff.

The Board also appoints an actuary who makes annual actuarial valuations to determine the adequacy of the funding of retirement benefit liabilities accrued under the retirement program. The PERA Board submits an annual actuarial valuation report to the Legislative Audit Committee and the Joint Budget Committee of the Colorado General Assembly.

A Medical Advisor is appointed by the Board to study and make recommendations regarding applications for disability retirements. The Board also appoints an advisory Investment Committee and Legislative Committee.

Administrative expenses of the Association are paid from the \$5 membership fees charged the employee upon employment and from a small portion of investment income.

**INVESTMENTS:** The funds of the retirement system are invested primarily in public utility and corporate bonds, common and preferred stock of top-rated companies, and in real estate mortgages insured and guaranteed by agencies of the United States Government.

The law charges the PERA Board with responsibility of investing the

funds in a prudent and discretionary manner and limits investments in common and preferred stocks to 30 percent of the portfolio.

**CONTRIBUTIONS BY MEMBERS:** Members of the State, School, and Municipal Divisions make deposits of 7¼% of salary paid including pay for overtime and additional duties but excluding reimbursement of expenses. Deposits are posted to individual accounts for each employee. The accumulated amount in each account will be used for the employee's benefit if he remains in service. If he leaves service, he may withdraw the amount of his contributions without interest, or he may, if he has five or more years of service, elect a deferred annuity providing a lifetime income at age 65 or in some cases earlier. If he dies before retirement and no other death benefits are payable, his beneficiary will receive his contributions.

**CONTRIBUTIONS BY EMPLOYER:** While members are saving for retirement, the employer—State of Colorado, school district, municipality, other political subdivision—will be making contributions on behalf of their employees. Rates for PERA Divisions differ.

The employer's contributions are determined on the basis of actuarial valuation and will provide the amount of money needed, in addition to the employee's own contributions, to provide the allowances promised by the Association. The average retired member pays only 15% of the amount he receives as an annuity. The remainder comes from the employer money and investment income.

Most State Division employers pay 10.64 percent of payroll. (Both employee and employer rates are greater than regular state rates for certain wildlife officers and for members of the Colorado State Patrol.) School Division employers pay 12.10 percent of payroll. Municipal Division employers pay 9.86 percent.

The employee rate for the Judges' Division is 7% of salary paid; the employer rate is 12% of payroll.

**WHERE TO WRITE FOR INFORMATION:** Any member who wishes information which is not given in this booklet may write for further information to:

**PUBLIC EMPLOYEES' RETIREMENT ASSOCIATION**  
Information Services Division  
1300 Logan  
Denver, Colorado 80203



# Summary of PERA Benefits

The following is a brief description of the benefits of the Public Employees' Retirement Association in the State, School, and Municipal Divisions. The reader is reminded that this is only a brief explanation; complete details of the benefits and other aspects of the program may be found in the Law and in the Rules and Regulations of the Retirement Board.

**Final Average Salary (FAS) is a frequently used term describing PERA benefits. It means the average of the highest five consecutive years of earnings within the period of service being considered, usually, but not necessarily the last five years.**

## If You Resign

You are entitled to a refund of your own deposits to PERA. In addition to this benefit, if you have five or more years of service, you may leave your money on deposit and without further payment you will be eligible for a monthly benefit payable for the rest of your life beginning when you are 60 to 65. This monthly benefit will be based on the amount of your PERA-covered service.

## If You Die

Your widow or widower will receive a monthly benefit until your youngest child is 18 years of age or until age 23 if the child is unmarried and in school. If you leave no eligible children or after benefits have been paid because of the children, your widow or widower will receive a monthly benefit beginning at his or her age of 60, earlier if you have more service. To be eligible for these survivor benefits you must have at least one year's service under PERA unless the death is service incurred in which case there is no service credit requirement. If you leave no eligible survivors for monthly benefits, your beneficiary will receive a refund of the amount of

money you have deposited with PERA.

## If You Are Permanently Disabled

Most members will receive a maximum of 50 percent FAS. This could be higher if you have more than 20 years covered service. One percent of FAS would be added for each year over 20. If you were hired after age 45, the percentage of FAS would be less than 50 percent.

This benefit is payable for the rest of your life or until you recover from the disability. In order to qualify for this benefit, you must have had five years' of service credit under PERA since last date of employment.

## If You Retire

You can retire as early as age 55 provided you have at least 20 years of PERA service credit at that age, or at age 60 with as few as five years of PERA service credit.

Regular retirement without reductions are at age 55 with at least 30 years service, age 60 with at least 20 years service, and age 65 with at least five years service.

The formula used to compute your retirement benefits is:

2½% of Final Average Salary per year—1st 20 years of service.

1% of Final Average Salary—21-40 years of service.

(1% is only applied in full to service after July 1, 1969, under current law.)

Maximum-70%

This formula is reduced in certain cases of early retirement.



PEAT, MARWICK, MITCHELL & CO.

CERTIFIED PUBLIC ACCOUNTANTS

1600 BROADWAY

DENVER, COLORADO 80202

The Retirement Board  
Public Employees' Retirement  
Association of Colorado:

We have examined the combining balance sheet of the Public Employees' Retirement Association of Colorado (consisting of State Employees', School Employees', Municipal Employees', and Judges' Divisions and the Common Operating Fund) as of June 30, 1977 and the related combining statements of revenue and administrative expense and changes in reserve accounts for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the aforementioned combining financial statements present fairly the individual financial positions of the Public Employees' Retirement Association of Colorado (consisting of State Employees', School Employees', Municipal Employees', and Judges' Divisions and the Common Operating Fund) at June 30, 1977 and their individual transactions for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

We have reported separately under date of September 23, 1977 on the financial statements of each of the divisions and the Common Operating Fund for the years ended June 30, 1977 and 1976. The columns on the accompanying financial statements captioned "Combined total - Memorandum only" are not necessary for a fair presentation of the financial statements, but are presented as additional analytical data.

*Peat, Marwick, Mitchell & Co.*

September 23, 1977

# Combining Balance Sheet

June 30, 1977  
with comparative combined totals for 1976

Assets	Municipal Employees' Division	School Employees' Division	Judges' Division	State Employees' Division	Common Operating Fund	Combined total (Memorandum only)	
						1977	1976
Cash	\$ 199,850	755,431	76,316	692,274	36,307	1,760,178	2,269,906
Receivables:							
Member and employer contributions	732,030	7,385,140	96,450	7,022,796	—	15,236,416	12,826,822
Dividends and accrued interest on investments	918,513	10,420,177	155,138	8,308,517	2,620	19,804,965	17,056,220
Other	11,048	165,864	409	184,563	—	361,884	1,922,795
	<u>1,661,591</u>	<u>17,971,181</u>	<u>251,997</u>	<u>15,515,876</u>	<u>2,620</u>	<u>35,403,265</u>	<u>31,805,837</u>
Investments (note 3):							
Temporary investments, at cost	1,196,414	38,561,606	199,778	25,567,204	503,069	66,028,071	35,240,715
Corporate obligations, at amortized cost	33,342,897	382,584,474	5,327,826	305,119,097	—	726,374,294	694,146,933
Stocks, at cost	8,862,057	115,250,781	1,612,791	89,363,056	—	215,088,685	174,028,812
United States Government obligations, at amortized cost	6,519,542	91,241,561	715,764	68,943,023	590,075	168,009,965	82,460,216
First mortgages, at amortized cost	7,015,130	101,518,689	1,209,194	74,420,323	—	184,163,336	152,043,613
Total investments before unamortized yield adjustment	56,936,040	729,157,111	9,065,353	563,412,703	1,093,144	1,359,664,351	1,137,920,289
Unamortized yield adjustment	1,247,453	8,496,104	210,133	6,174,117	—	16,127,807	14,514,610
	<u>58,183,493</u>	<u>737,653,215</u>	<u>9,275,486</u>	<u>569,586,820</u>	<u>1,093,144</u>	<u>1,375,792,158</u>	<u>1,152,434,899</u>
Property and equipment, at cost:							
Land	—	—	—	—	180,000	180,000	180,000
Building	—	—	—	—	3,414,797	3,414,797	—
Equipment and fixtures	—	—	—	—	322,326	322,326	157,248
Construction in progress	—	—	—	—	—	—	2,504,359
	—	—	—	—	3,917,123	3,917,123	2,841,607
Less accumulated depreciation	—	—	—	—	141,749	141,749	95,552
Net property and equipment	—	—	—	—	3,775,374	3,775,374	2,746,055
Total real assets	60,044,934	756,379,827	9,603,799	585,794,970	4,907,445	1,416,730,975	1,189,256,697
Estimated obligation of employers for prior service (contra)	27,561,064	419,978,130	2,191,047	366,380,252	—	816,110,493	671,556,652
	<u>\$ 87,605,998</u>	<u>1,176,357,957</u>	<u>11,794,846</u>	<u>952,175,222</u>	<u>4,907,445</u>	<u>2,232,841,468</u>	<u>1,860,813,349</u>



## Liabilities and Reserves

	Municipal Employees' Division	School Employees' Division	Judges' Division	State Employees' Division	Common Operating Fund	Combined total (Memorandum only)	
						1977	1976
Refunds and other liabilities payable . . . . . \$	135,517	839,205	1,538	898,928	326,756	2,201,944	2,718,876
Reserve accounts:							
Contributions:							
Members' deposits . . . . .	17,528,915	206,938,157	2,204,101	172,226,332	—	398,897,505	345,112,857
Employers':							
Accumulation . . . . .	21,113,967	296,334,721	3,470,522	131,963,456	—	452,882,666	354,782,127
Actuarial requirements (contra) . . . . .	27,561,064	419,978,130	2,191,047	366,380,252	—	816,110,493	671,556,652
	<u>66,203,946</u>	<u>923,251,008</u>	<u>7,865,670</u>	<u>670,570,040</u>	<u>—</u>	<u>1,667,890,664</u>	<u>1,371,451,636</u>
Annuity:							
Annuitants' retirement . . . . .	19,312,572	238,698,012	3,223,411	262,499,256	—	523,733,251	451,561,167
Survivors' benefit . . . . .	1,525,004	7,226,732	633,862	12,327,436	—	21,713,034	19,396,501
Deferred annuitants' . . . . .	273,528	5,863,578	70,365	4,972,655	—	11,180,126	9,918,347
Deferred survivors' benefit . . . . .	155,431	479,422	—	906,907	—	1,541,760	1,456,449
	<u>21,266,535</u>	<u>252,267,744</u>	<u>3,927,638</u>	<u>280,706,254</u>	<u>—</u>	<u>558,168,171</u>	<u>482,332,464</u>
Insurance dividend reserve (note 4) . . . . .	—	—	—	—	4,580,689	4,580,689	4,310,373
Total reserve accounts . . . . .	87,470,481	1,175,518,752	11,793,308	951,276,294	4,580,689	2,230,639,524	1,858,094,473
Commitments (note 5)							
	<u>\$ 87,605,998</u>	<u>1,176,357,957</u>	<u>11,794,846</u>	<u>952,175,222</u>	<u>4,907,445</u>	<u>2,232,841,468</u>	<u>1,860,813,349</u>

See accompanying notes to combining financial statements.



# Combining Statement of Revenue and Administrative Expenses

Year ended June 30, 1977  
with comparative combined totals for 1976

	Municipal Employees' Division	School Employees' Division	Judges' Division	State Employees' Division	Common Operating Fund	Combined total (Memorandum only)	
						1977	1976
<b>Revenue:</b>							
Interest income:							
Corporate obligations	\$ 2,515,165	29,282,485	401,966	23,415,177	—	55,614,793	50,599,625
United States Government obligations	338,411	4,746,077	53,299	3,603,515	11,782	8,753,084	3,816,832
First mortgages	449,801	5,996,111	75,084	4,461,773	—	10,982,769	7,591,920
Temporary investments	82,240	1,384,086	10,741	1,093,621	24,905	2,595,593	1,892,333
Dividend income	276,781	3,747,642	52,882	2,905,091	—	6,982,396	5,586,298
Gain on sale of investments, net	111,958	1,532,007	29,265	1,401,310	—	3,074,540	779,061
Amortization of premiums and discounts							
on investments, net	153,994	1,313,353	31,154	1,065,476	—	2,563,977	2,509,338
Membership fees	4,840	41,590	75	30,378	—	76,883	78,285
Income allocated to insurance							
dividend reserve (note 2)	—	—	—	(129,311)	129,311	—	—
Other, net	8,392	173,870	45	72,699	21,923	276,929	251,649
	3,941,582	48,217,221	654,511	37,919,729	187,921	90,920,964	73,105,341
Less amortization of yield adjustment	97,297	466,355	17,112	383,559	—	964,323	955,665
	3,844,285	47,750,866	637,399	37,536,170	187,921	89,956,641	72,149,676
<b>Administrative expenses:</b>							
Personnel	—	—	—	—	925,817	925,817	833,760
Professional services	—	—	—	—	184,647	184,647	166,576
Building and equipment	—	—	—	—	167,763	167,763	168,132
Supplies	—	—	—	—	122,751	122,751	117,391
Depreciation	—	—	—	—	58,123	58,123	19,814
Other, net	—	—	—	—	87,283	87,283	64,335
Allocations to divisions	83,645	881,318	4,379	652,803	(1,622,145)	—	—
	83,645	881,318	4,379	652,803	(75,761)	1,546,384	1,370,008
<b>Excess of revenue over expenses</b>							
distributed to reserve accounts	\$ 3,760,640	46,869,548	633,020	36,883,367	263,682	88,410,257	70,779,668

See accompanying notes to combining financial statements.



# Combining Statement of Changes in Reserve Accounts

Year ended June 30, 1977  
with comparative combined totals for 1976

	Municipal	School	Judges'	State	Common	Combined total	
	Employees' Division	Employees' Division	Division	Employees' Division	Operating Fund	(Memorandum only) 1977	1976
Contributions:							
Members	\$ 4,153,269	41,195,858	419,818	36,070,894	—	81,839,839	72,964,699
Employers	5,267,088	63,890,857	708,850	49,287,090	—	119,153,885	104,014,229
	<u>9,420,357</u>	<u>105,086,715</u>	<u>1,128,668</u>	<u>85,357,984</u>	<u>—</u>	<u>200,993,724</u>	<u>176,978,928</u>
Excess of revenue over expenses	3,760,640	46,869,548	633,020	36,883,367	263,682	88,410,257	70,779,668
Cost of living adjustments appropriated by the Colorado State Legislature	83,113	1,058,181	—	1,674,615	—	2,815,909	1,737,610
Transfers for split annuities:							
From School Employees' Division to State Employees' Division	—	(600,558)	—	600,558	—	—	—
From Municipal Employees' Division to State Employees' Division	(115,773)	—	—	115,773	—	—	—
From State Employees' Division to School Employees' Division	—	5,966	—	(5,966)	—	—	—
From School Employees' Division to Municipal Employees' Division	7,404	(7,404)	—	—	—	—	—
Refunds due to withdrawal of participating members	(880,148)	(7,596,087)	(16,220)	(7,130,711)	—	(15,623,166)	(13,167,865)
Benefits paid to annuitants	(1,815,413)	(22,192,120)	(341,068)	(24,263,547)	—	(48,612,148)	(41,442,452)
Increase in estimated obligation of employers for prior service, adjusted to actuaries' certificate	2,850,113	95,097,248	1,044,342	45,562,138	—	144,553,841	89,046,985
Insurance dividends received, net	—	—	—	—	291,886	291,886	533,935
Paid-up life insurance purchased	—	—	—	—	(285,252)	(285,252)	(198,959)
<b>Net increase for the year</b>	<b><u>13,310,293</u></b>	<b><u>217,721,489</u></b>	<b><u>2,448,742</u></b>	<b><u>138,794,211</u></b>	<b><u>270,316</u></b>	<b><u>372,545,051</u></b>	<b><u>284,267,850</u></b>
Balance, beginning of year:							
As previously reported	74,160,188	957,797,263	9,344,566	816,792,456	—	1,858,094,473	1,573,826,623
Adjustment (note 2)	—	—	—	(4,310,373)	4,310,373	—	—
As restated	<u>74,160,188</u>	<u>957,797,263</u>	<u>9,344,566</u>	<u>812,482,083</u>	<u>4,310,373</u>	<u>1,858,094,473</u>	<u>1,573,826,623</u>
<b>Balance, end of year</b>	<b><u>\$ 87,470,481</u></b>	<b><u>1,175,518,752</u></b>	<b><u>11,793,308</u></b>	<b><u>951,276,294</u></b>	<b><u>4,580,689</u></b>	<b><u>2,230,639,524</u></b>	<b><u>1,858,094,473</u></b>

See accompanying notes to  
financial statements.



## (1) Summary of Significant Accounting Policies Valuation of Reserve Accounts

### Basis of Combining Financial Statements

The accompanying combining financial statements include the accounts of the State, School, Municipal Employees', and Judges' Divisions, and the Common Operating Fund. Each of their accounts are separately maintained and all actuarial determinations are made on the basis of each division's separate actuarial information.

### Employer Contributions

The effective statutory employer contribution rates ranged from 9.86% to 12.10% of active member payroll. The Association's actuary uses the "entry age normal" ("attained age normal" for Judges' Division) actuarial method to determine annuity liabilities and normal costs. As of December 31, 1976, after considering current cost contributions, the actuarially computed number of years necessary to accumulate assets to fund the actuarial liability for prior service ranged from 29 to 50 years. Such computations exclude the undistributed net income earned by the divisions for the period July 1 to December 31 of each year. The December 31, 1975 actuarial computation excludes December contribution not received until January, 1976.

The aggregate unfunded actuarial liability of \$816,110,493, computed as of December 31, 1976, is presented in the balance sheet as "estimated obligation of employers for prior service" and as an employer reserve titled "actuarial requirements."

### Members' Deposits

Members' contribution rates are established by state statute and are deducted from the members' salaries and remitted by the various participating agencies.

### Annuity and Deferred Annuity

Annuity and deferred annuity accounts are recorded at amounts sufficient to reflect the actuarially computed discounted accrued liability of each reserve.

### Investments

Temporary investments, consisting of corporate notes, are shown at purchased cost. Maturities are generally less than 30 days. Income is recognized when the notes are sold.

Stock investments, principally common stock, are recorded at purchased cost. Dividend income is recognized when dividends are payable. Gains or losses on stocks sold are recognized on the basis of the average cost of the aggregate stock being sold.

First mortgages are presented at amortized cost. Discounts recorded at the time of purchase are amortized on a straight-line basis for guaranteed purchase agreements covering a group of individual mortgages and by the use of the "scientific method" for other mortgages. Income is recognized on a monthly basis over the various lives of the respective mortgages.

Other investments, principally corporate obligations, are reflected at amortized cost. Premiums and discounts recorded at the time of bond purchases are amortized to the call date and maturity date, respectively. Income is recorded as earned over the life of the investment.

Unamortized yield adjustment on bond exchanges reflects the deferral of losses when bonds are exchanged for similar bonds to achieve a higher yield. These losses are amortized to the respective earliest maturity date of the new bond acquired or the old bond exchanged. Losses of \$2,577,518 and \$26,646 on bond exchanges were deferred during the years ended June 30, 1977 and 1976, respectively.

### Property and Equipment

Property and equipment are stated at cost. Depreciation is provided using the straight-line method in order to apportion the cost of the depreciable assets over the various useful lives of from 3 to 50 years.

### Administrative Activities

The Common Operating Fund accounts for all administrative activities which are common to the divisions (see note 2). Operating assets and liabilities, which are held for the benefit of all divisions, are recorded in the Fund. The expenses incurred by the Association are allocated to the various divisions on the basis of the relationship of the number of members in the division to the total membership in the Association.

The Retirement Board has established a policy that the Fund will receive net revenues from its own investments and allocations of revenue from the divisions in an amount equal to 6% of the average annual balance in the insurance dividend reserve.



## (2) Reorganization of Administrative Activities

The Common Operating Fund was established, effective July 1, 1976, by a transfer from the State Employees' Division of all assets,

liabilities, and the insurance dividend reserve which were held for the common benefit of all divisions. This Division also previously accounted for the administrative activities of all divisions.

For comparative purposes, the June 30, 1976 balances in the accompanying combining statement of changes in reserve accounts have been restated as if the transfer was effected at that date.

The portion of the revenues attributable to the insurance dividend reserve, prior to the actual date of transfer, has been recorded as an allocation from the State Division to the Common Operating Fund in the accompanying combining statement of revenue and administrative expenses.

## (3) Investments

A summary of investments as of June 30, 1976 with comparative combined totals is as follows:

	1977					Combined (Memorandum only)		1976 Combined (Memorandum only)	
	Municipal Employees' Division	School Employees' Division	Judges' Division	State Employees' Division	Common Operating Fund	Total	Market Value	Total	Market Value
Temporary investments, at cost:									
Face value	\$ 1,200,000	38,680,000	200,000	25,650,000	505,000	66,235,000		35,330,000	
Less discount	3,586	118,394	222	82,796	1,931	206,929		89,285	
	<u>\$ 1,196,414</u>	<u>38,561,606</u>	<u>199,778</u>	<u>25,567,204</u>	<u>503,069</u>	<u>66,028,071</u>	<u>66,028,071</u>	<u>35,240,715</u>	<u>35,240,715</u>
Corporate obligations, at amortized cost:									
Par value	\$35,395,753	397,332,962	5,647,151	316,663,198	—	755,039,064		724,150,785	
Less Discount, net	2,052,856	14,748,488	319,325	11,544,101	—	28,664,770		30,003,852	
	<u>\$33,342,897</u>	<u>382,584,474</u>	<u>5,327,826</u>	<u>305,119,097</u>	<u>—</u>	<u>726,374,294</u>	<u>709,401,301</u>	<u>694,146,933</u>	<u>633,003,523</u>
Stocks, at cost	\$ 8,862,057	115,250,781	1,612,791	89,363,056	—	215,088,685	221,316,106	174,028,812	194,639,308
United States Government obligations, at amortized cost:									
Par value	\$ 6,527,948	91,524,382	715,915	69,053,814	600,000	168,422,059		82,701,855	
Less discount, net	8,406	282,821	151	110,791	9,925	412,094		241,639	
	<u>\$ 6,519,542</u>	<u>91,241,561</u>	<u>715,764</u>	<u>68,943,023</u>	<u>590,075</u>	<u>168,009,965</u>	<u>165,642,253</u>	<u>82,460,216</u>	<u>75,316,395</u>
First Mortgages, at amortized cost:									
Face value	\$ 7,203,881	104,390,182	1,256,903	76,805,947	—	189,656,913		158,191,785	
Less discount, net	188,751	2,871,493	47,709	2,385,624	—	5,493,577		6,148,172	
	<u>\$ 7,015,130</u>	<u>101,518,689</u>	<u>1,209,194</u>	<u>74,420,323</u>	<u>—</u>	<u>184,163,336</u>	<u>169,468,080</u>	<u>152,043,613</u>	<u>141,844,341</u>



#### **(4) Insurance Dividend Reserve**

The insurance dividend reserve is a result of dividends paid by the insurance company as a return of the excess premiums paid by participating members. The reserve is used to purchase paid-up life insurance for eligible members when they retire and additional paid-up insurance for active insured members.

#### **(5) Commitments**

At June 30, 1977 the various divisions were committed to purchase investments at an aggregate cost of \$30,395,000.

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## **PERA Investment Policy**

### **Goal**

The fund is long-term in nature and the selection of investments is provide present and future retirement or survivor benefits for its members. In keeping with that function, the preservation of capital is of paramount importance. Every effort will be made to manage the portfolio so that benefits can be paid from regular income and not from contributions or anticipated appreciation of investments. A substantial improvement in the funds' rate of return over a reasonable period of time should allow consideration of reduction of unfunded accrued liabilities, improved benefits, or reduced contributions, maintaining a level contribution fund.

### **Policy**

The fund is long-term in nature and the selection of investments is regulated by (1) statutory limitations, (2) limits of acceptable risk and (3) the objective of a maximized total rate of return. Approval of all purchases and sales of investments is vested by law in the PERA Board. The Assistant Executive Secretary-Investments is authorized to execute investment transactions on behalf of the Board as permitted under these policy and procedures statements.

Investment decisions shall be made within the framework of the goal established for the rate of return, limits of acceptable risk and fund objectives. At any point in time, certain types of investments have greater

relative attractiveness than others. To maximize the realized rate of return, it is necessary to determine the relative values ascribed to differing types of investments within a given investment environment.

The Association believes that individual holdings should stand alone on merit as well as complement the entire group of holdings.

Diversification shall be considered as part of the effort to minimize liquidity risks, maximize total rate of return and limit exposure to unanticipated business risks. Since the portfolio is long term in nature and is constructed to avoid the necessity of liquidating holdings to meet benefits payments, liquidity is not a first consideration; however, every reasonable effort will be made to provide protection for the portfolio in future deteriorating markets.

No holding will be considered a "permanent" part of the portfolio. Any security can be sold at any time either to maximize gains or to minimize losses. The portfolio shall be continuously monitored in order to identify such instruments as over valued stocks or low yield bonds in order to take appropriate action.

Preference will be given to Colorado investments, all other things being equal.

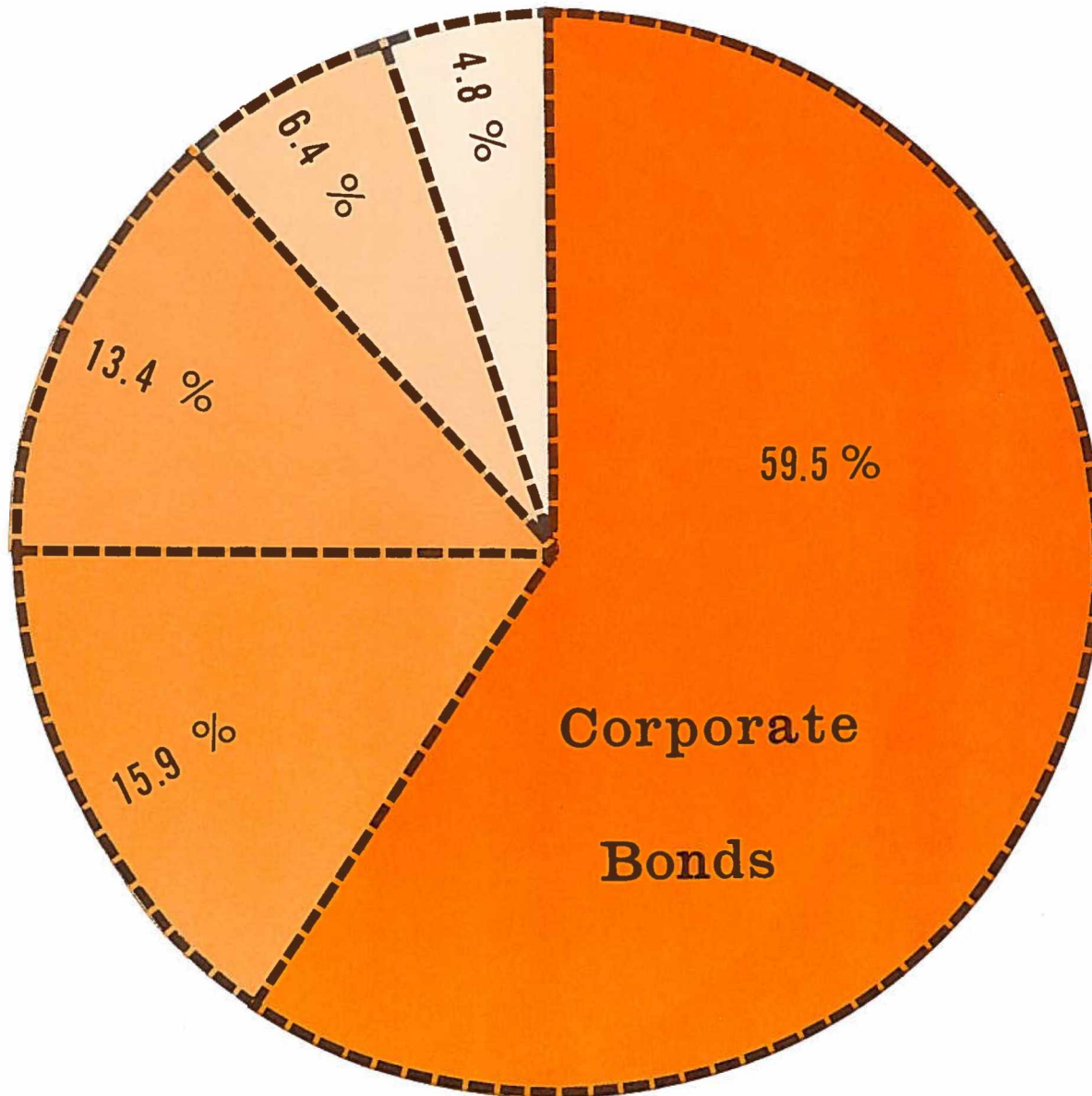
Investment in foreign securities shall not be considered. This will not be construed to mean that securities of American companies doing business in foreign countries will not be considered. However, the foregoing shall not be meant to exclude securities of the International Bank for Reconstruction and Development (World Bank).

In making investment decisions the Association shall avail itself of the highest caliber advice obtainable both internally and externally.

Generally Accepted Accounting Principles (GAAP) will be followed in accounting for the portfolio; however, GAAP should not restrict investment decisions. The deferral and amortization method of losses will be used for bond exchange transactions. Securities will be recorded at adjusted cost; market values will be reported to the Board quarterly. The firm engaged for the annual audit shall be consulted when questions concerning accounting procedures arise.

An annual evaluation will be conducted by a performance evaluation service of the investment industry. In addition the annual external audit and the annual actuarial valuations shall be reviewed in conjunction with the evaluation of investment performance. All evaluations will be related to the Association's stated goals. Because these goals are long-term, cumulative performance results will be considered as more important than performance in any one year.

# Investment Portfolio Distribution



(At Cost)  
As of June 30, 1977

Corporate Bonds .....	59.5%
Corporate Stocks .....	15.9
Mortgages .....	13.4
U.S. Treas. Obligations .....	6.4
Other .....	4.8
Total .....	100.0%



# Portfolio Distribution

## Fixed Income Securities

	Par Value	Cost	Market Value June 30, 1977
<b>Short term investments—Less than 30 days</b> .....	\$ 65,730,000	\$ 65,525,002	\$ 65,525,002
<b>Corporate Obligations</b>			
<b>Bonds</b>			
Public Utilities—Telephone .....	101,807,000	91,785,083	79,994,207
Public Utilities—Electric & Gas .....	163,072,989	153,915,489	142,473,880
Public Utilities—Gas & Pipeline .....	9,350,000	9,112,203	8,946,938
Industrial .....	292,557,408	280,429,621	290,748,567
Transportation .....	76,119,553	75,651,089	74,752,291
Financial .....	193,904,173	190,993,650	190,458,131
<b>Total Corporate Obligations</b> .....	\$ 836,811,123	\$ 801,887,135	\$ 787,374,014
U.S. Treasury Obligations .....	85,800,000	85,634,601	86,855,896
<b>Other Debt Obligations</b>			
Mortgages, Contracts & Notes .....	189,432,975	180,585,853	169,256,891
<b>Total Fixed Income Securities</b> .....	<b>\$1,177,774,098</b>	<b>\$1,133,632,591</b>	<b>\$1,109,011,803</b>
<b>Convertible Securities</b>			
Convertible Bonds .....	\$ 250,000	\$ 250,000	\$ 218,750

## Common Stocks

### Science and Technology

	Shares Held	Cost	Market Value June 30, 1977
<b>Business Equipment</b>			
Burroughs Corporation .....	93,900	\$ 7,728,331	\$ 5,857,013
International Business Machines Corporation .....	40,000	9,656,090	10,560,000
Xerox Corporation .....	19,700	1,939,429	960,375
<b>Total Science and Technology</b> .....		<b>\$19,323,850</b>	<b>\$17,377,388</b>

## Consumer Products & Services

	Shares Held	Cost	Market Value June 30, 1977
<b>Automotive</b>			
Ford Motor Company . . . . .	114,500	\$ 5,757,427	\$ 5,367,187
General Motors Corporation . . . . .	82,000	6,205,102	5,688,750
		<u>\$11,962,529</u>	<u>\$11,055,937</u>
<b>Broadcasting</b>			
CBS Inc. . . . .	155,000	\$ 6,321,926	\$ 9,125,625
<b>Building and Building Products</b>			
Armstrong Cork Company . . . . .	122,600	\$ 3,484,185	\$ 2,712,525
<b>Drugs, Cosmetics and Hospital Supplies</b>			
American Home Products Corporation . . . . .	214,000	\$ 6,143,155	\$ 6,152,500
Avon Products Incorporated . . . . .	92,700	5,473,359	4,681,350
Bristol-Myers Company . . . . .	31,000	1,073,344	1,015,250
Johnson & Johnson . . . . .	46,600	4,114,215	3,291,125
Schering-Plough Corporation . . . . .	101,800	6,070,958	3,702,975
Warner-Lambert Company . . . . .	158,000	6,102,011	4,522,750
		<u>\$28,977,042</u>	<u>\$23,365,950</u>
<b>Food, Beverages and Tobacco</b>			
General Mills Incorporated . . . . .	142,000	\$ 3,912,543	\$ 4,189,000
Heublein Incorporated . . . . .	109,800	4,718,092	2,717,550
Philip Morris Incorporated . . . . .	104,500	4,076,321	5,825,875
Pillsbury Company . . . . .	100,500	3,645,465	3,844,125
Ralston Purina Company . . . . .	267,300	3,469,560	4,109,748
Reynolds (R. J.) Industries, Inc. . . . .	97,800	5,935,281	6,515,925
Royal Crown Cola Company . . . . .	94,200	2,701,363	1,507,200
		<u>\$28,458,625</u>	<u>\$28,709,413</u>
<b>Photography</b>			
Eastman Kodak Company . . . . .	114,300	\$ 9,032,827	\$ 6,800,850
<b>Restaurants &amp; Lodging</b>			
McDonalds Corporation . . . . .	45,400	\$ 2,017,600	\$ 2,088,400
<b>Retailing</b>			
Federated Department Stores, Inc. . . . .	100,600	\$ 4,266,371	\$ 3,722,200
K Mart Corporation . . . . .	54,900	2,011,341	1,564,650
Penney (J. C.) Company . . . . .	82,300	4,767,216	2,870,213



	Shares Held	Cost	Market Value June 30, 1977
Sears, Roebuck & Company .....	45,500	3,742,548	2,639,000
		<u>\$ 14,787,746</u>	<u>\$10,796,063</u>
<b>Total Consumer Products &amp; Services .....</b>		<b>\$105,042,210</b>	<b>\$94,654,763</b>

## Financial Services

### Banking & Credit

American Express Company .....	146,500	\$ 4,949,036	\$ 5,933,250
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### Insurance

Aetna Life and Casualty Company .....	181,600	\$ 4,098,212	\$ 6,764,600
Farmers Groups Incorporated .....	186,000	4,069,626	4,045,500
Travelers Corporation .....	181,600	3,802,320	6,219,800
		<u>\$ 11,970,158</u>	<u>\$17,029,900</u>

<b>Total Financial Services .....</b>		<b>\$ 16,919,194</b>	<b>\$22,963,150</b>
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## Basic Industries

### Aerospace

Boeing Company .....	70,000	\$ 3,639,075	\$ 4,051,250
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### Chemicals

Air Products and Chemicals, Incorporated .....	100,000	\$ 2,499,700	\$ 2,425,000
Dow Chemical Company .....	109,000	1,883,308	3,719,625
Nalco Chemical Company .....	97,200	2,321,362	3,256,200
		<u>\$ 6,704,370</u>	<u>\$ 9,400,825</u>

### Electrical Equipment

General Electric Company .....	108,300	\$ 5,815,896	\$ 6,118,950
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### Machinery

Caterpillar Tractor Company .....	151,500	\$ 7,032,806	\$ 8,749,125
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### Oil & Gas

Exxon Corporation .....	121,700	\$ 5,003,027	\$ 6,510,950
Kerr-McGee Corporation .....	33,500	1,899,899	2,194,250
Panhandle Eastern Pipeline Company .....	99,600	3,318,819	4,867,950
Phillips Petroleum Company .....	198,000	4,953,582	6,138,000
Standard Oil Company of Indiana .....	96,000	4,406,263	5,160,000
Standard Oil Company of Ohio .....	74,500	4,196,563	6,611,875
		<u>\$ 23,778,153</u>	<u>\$31,483,025</u>



	Shares Held	Cost	Market Value June 30, 1977
<b>Oil Services</b>			
Halliburton Company . . . . .	77,500	\$ 3,205,677	\$ 5,173,125
<b>Paper and Forest Products</b>			
Boise Cascade Corporation . . . . .	81,300	\$ 2,099,801	\$ 2,276,400
Georgia-Pacific Corporation . . . . .	155,272	4,930,751	4,852,250
International Paper Company . . . . .	46,400	3,112,723	2,389,600
Weyerhaeuser Company . . . . .	150,000	5,676,540	5,343,750
		<u>\$ 15,819,815</u>	<u>\$ 14,862,000</u>
<b>Total Basic Industries . . . . .</b>		<b>\$ 65,995,792</b>	<b>\$ 79,838,300</b>

## Public Utilities

### Electric & Gas

Florida Power & Light Company . . . . .	12,800	\$ 454,035	\$ 347,200
Gulf States Utilities Company . . . . .	68,000	1,508,419	926,500
Middle South Utilities Company . . . . .	12,000	294,198	198,000
Northern Indiana Public Service Company . . . . .	46,500	1,287,824	930,000
Public Service Company of Colorado . . . . .	9,200	242,931	182,850
Tampa Electric Company . . . . .	46,000	1,133,244	908,500
Texas Utilities Company . . . . .	46,600	1,315,392	1,001,900
		<u>\$ 6,236,043</u>	<u>\$ 4,494,950</u>

### Telephone

American Telephone & Telegraph Company . . . . .	31,300	\$ 1,571,644	\$ 1,987,550
<b>Total Public Utilities . . . . .</b>		<b>\$ 7,807,687</b>	<b>\$ 6,482,500</b>

**Total Common Stocks . . . . . \$215,088,733 \$221,316,101**

## Summary

	Cost	Market Value June 30, 1977
Short Term Investments . . . . .	\$ 65,525,002	\$ 65,525,002
Fixed Income Securities . . . . .	1,068,107,589	1,043,486,801
Convertible Securities . . . . .	250,000	218,750
Common Stocks . . . . .	215,088,733	221,316,101
<b>Total Investment Portfolio . . . . .</b>	<b>\$1,348,971,324</b>	<b>\$1,330,546,654</b>



# Becker Performance Evaluation

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A. G. Becker & Company is the largest and a highly respected portfolio evaluation service in the United States and has evaluated PERA fund's performance since 1969.

A summary of the PERA fund's performance results, along with a brief description of issues to be considered in interpreting the results follow. Since the purpose of the summary is to provide an overview, the reader is cautioned against forming conclusions that may be premature. A number of important details of performance evaluation are not addressed here.

These five exhibits are reprinted from the PERA report; together, they provide a profile of the PERA fund's performance.

**A. Deployment of Assets.** In concise form, this exhibit shows the dollar value of each investment category of the PERA fund at the end of the last fiscal year, as well as the percent of the fund invested in that category. The policy decision to determine the fund's commitment to equities also is addressed here. A greater commitment to equity investments can offer the fund a potentially higher return. The reader should keep in mind, however, that such an investment would be subject to characteristic fluctuations in the equities market.

**B. Total Fund Cumulative Annual Rate of Return.** This exhibit shows how the PERA fund performed over multi-year periods compared with other funds of similar asset size. The boxes on the graph represent the range of performance results earned by all funds in the group. The PERA fund is highlighted by a diamond  $\diamond$ . The longest time period, 1968-1977, is displayed at the left. At the right, the reader can see performance results for last year only. The fund's return is tabulated under the graph, along with a segmentation of the group's results. Percent rank indicates what proportion of the group outperformed the fund; a low percent indicates a relatively higher return. With this exhibit, the reader can choose a time period of

particular interest and examine the return the PERA fund earned for that period. In the past, a market cycle has generally covered a four-year period. For any time period one chooses to examine, the median serves as an effective standard for determining what a "reasonable" return for that period would have been. (The median is that return which outranked 50 percent of the funds in the group and which was outranked by 50 percent of the funds.)

**C. Total Fund Annual Rate of Return.** The main purpose of this exhibit is to show which years have had the greatest impact on the multi-year performance of the PERA fund. Another purpose for displaying returns for individual years is to demonstrate how different securities markets affect fund performance. The variation of the median can be explained, in part, by rising and falling securities markets.

## **D. Equities Cumulative Annual Rate of Return and**

**E. Fixed Income Cumulative Annual Rate of Return.** These exhibits show how the equity and debt portions of the PERA fund performed over multi-year periods. Since the fund's total return is comprised of equity and fixed income rates of return, both have been included so that one can see the impact of their return on the entire fund's performance.

This summary should be regarded only as an introduction to evaluating the PERA fund's performance results. Nevertheless, it is hoped that this brief overview will be of some assistance.

**Definitions:** Percent Rank refers to the percent of funds with assets in excess of 50 million dollars evaluated by A. G. Becker which out-performed PERA. The number of funds evaluated as of June 30, 1977, in this category was about 750.

The total number of funds evaluated as of June 30, 1977, by Becker was 3500.

MARKET VALUE OF INVESTMENTS (\$000'S)  
AS OF JUNE 30, 1977

IN THOUSANDS OF DOLLARS

TOTAL FUND  
\$1,332,270

EQUITIES  
\$221,316  
16.6 %

FIXED INCOME  
\$1,109,230  
83.3 %

BONDS  
\$874,230  
65.6 %

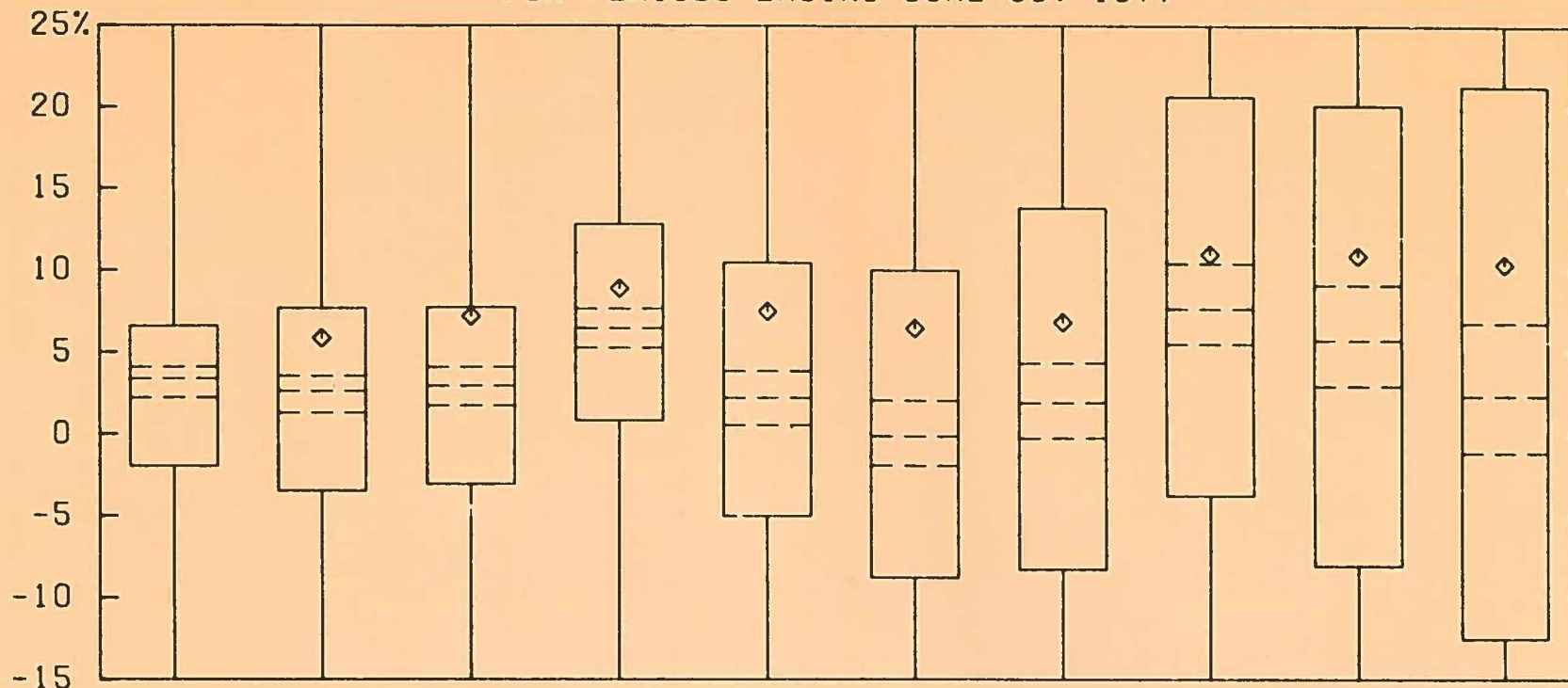
CASH EQUIVALENTS  
\$65,525  
4.9 %

CONVERTIBLES  
\$219  
0.0 %

PRIVATE PLACEMENTS  
\$169,257  
12.7 %



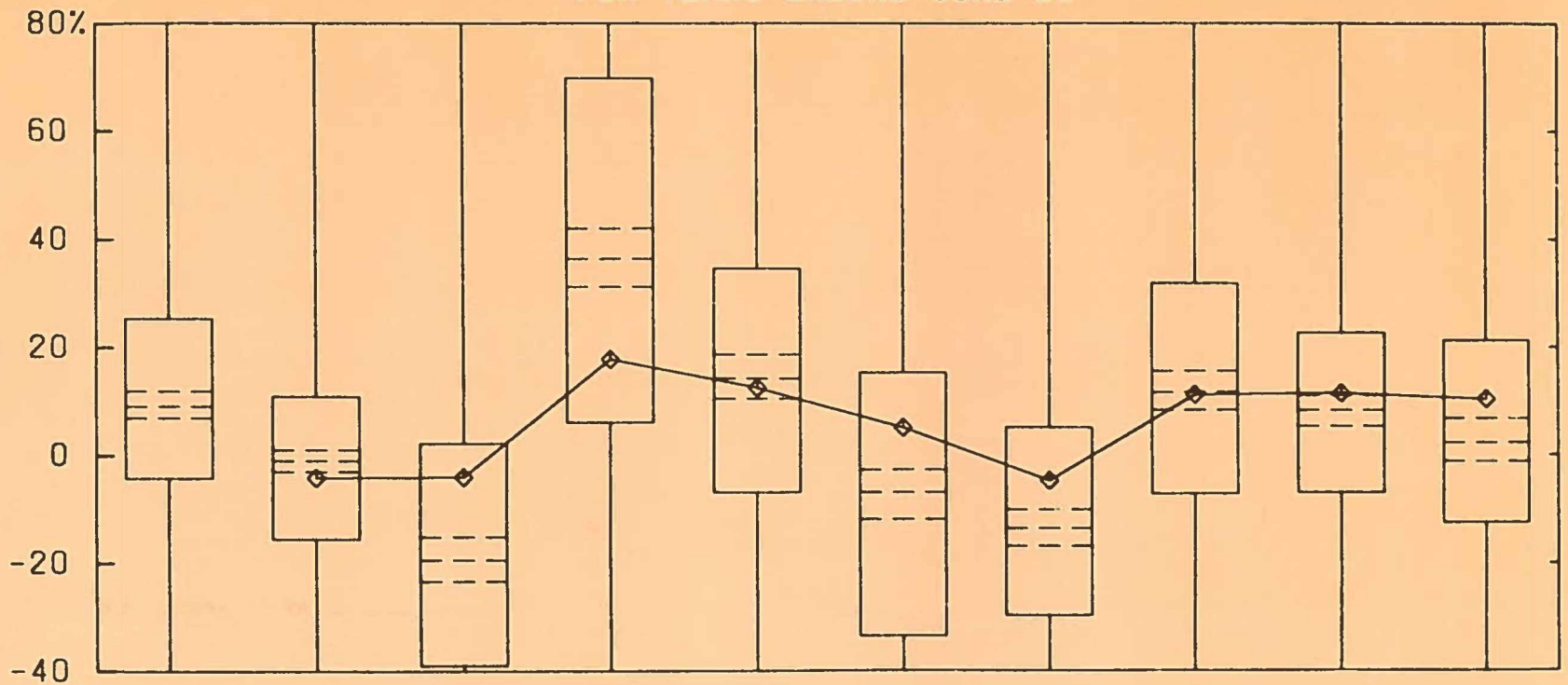
TOTAL FUND: ANNUALIZED RATES OF RETURN  
FOR PERIODS ENDING JUNE 30, 1977



	1968-77	1969-77	1970-77	1971-77	1972-77	1973-77	1974-77	1975-77	1976-77	1977
MAXIMUM	6.6	7.7	7.7	12.8	10.4	10.0	13.8	20.6	20.1	21.3
FIRST QUARTILE	4.1	3.6	4.1	7.6	3.8	2.1	4.4	10.4	9.1	6.8
MEDIAN	3.4	2.6	2.9	6.5	2.2	-0.1	1.9	7.7	5.7	2.3
THIRD QUARTILE	2.2	1.3	1.7	5.3	0.5	-1.9	-0.2	5.5	3.0	-1.1
MINIMUM	-2.0	-3.5	-3.1	0.8	-5.0	-8.8	-8.2	-3.8	-8.1	-12.5
YOUR FUND		5.9	7.2	8.9	7.5	6.5	6.9	11.0	10.9	10.4
PERCENT RANK		4	1	10	3	4	10	21	14	12

# TOTAL FUND: RATES OF RETURN

FOR YEARS ENDING JUNE 30

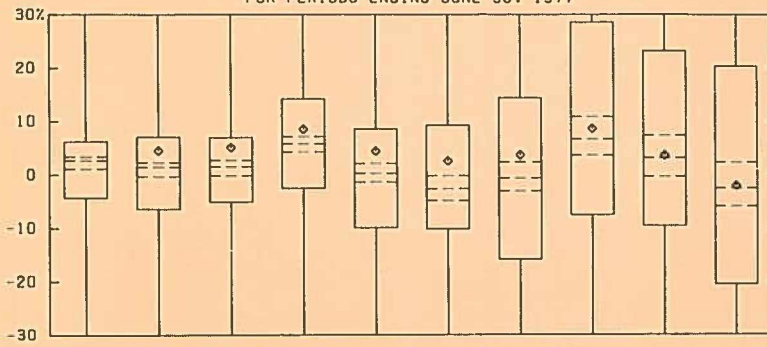


	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
MAXIMUM	25.3	10.9	2.2	69.7	34.6	15.3	5.1	31.8	22.6	21.3
FIRST QUARTILE	11.9	1.1	-15.1	42.0	18.7	-2.7	-10.0	15.6	11.1	6.8
MEDIAN	9.1	-1.0	-19.4	36.4	14.2	-6.8	-13.5	11.7	8.4	2.3
THIRD QUARTILE	7.0	-3.0	-23.4	31.2	10.5	-11.8	-16.8	8.4	5.4	-1.1
MINIMUM	-4.2	-15.5	-38.9	6.1	-6.8	-33.5	-29.7	-7.1	-6.9	-12.5
YOUR FUND		-4.1	-4.0	17.8	12.5	5.1	-4.7	11.2	11.5	10.4
PERCENT RANK		83	2	97	61	2	7	55	23	12

Becker

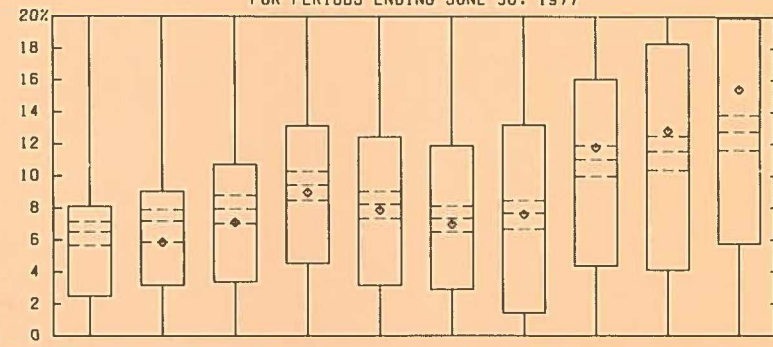


EQUITIES: ANNUALIZED RATES OF RETURN  
FOR PERIODS ENDING JUNE 30, 1977



	1968-77	1969-77	1970-77	1971-77	1972-77	1973-77	1974-77	1975-77	1976-77	1977
MAXIMUM	6.2	7.0	7.0	14.1	8.5	9.2	14.3	28.5	23.2	20.2
FIRST QUARTILE	3.4	2.3	2.7	7.1	2.1	-0.2	2.3	10.8	7.3	2.3
MEDIAN	2.7	1.4	1.5	5.7	0.2	-2.7	-0.7	6.6	3.1	-2.6
THIRD QUARTILE	1.1	-0.3	-0.1	4.3	-1.4	-4.9	-3.1	3.6	-0.3	-5.9
MINIMUM	-4.3	-6.4	-5.1	-2.6	-9.9	-10.2	-15.8	-7.6	-9.6	-20.5
YOUR FUND		4.5	5.1	8.5	4.4	2.5	3.6	8.6	3.6	-2.1
PERCENT RANK		3	2	11	8	9	17	37	45	47

BONDS: ANNUALIZED RATES OF RETURN  
FOR PERIODS ENDING JUNE 30, 1977



	1968-77	1969-77	1970-77	1971-77	1972-77	1973-77	1974-77	1975-77	1976-77	1977
MAXIMUM	8.1	9.0	10.7	13.1	12.4	11.9	13.2	16.0	18.3	19.9
FIRST QUARTILE	7.1	7.9	8.8	10.3	9.0	8.1	8.5	11.9	12.5	13.8
MEDIAN	6.5	7.2	7.9	9.4	8.2	7.4	7.7	11.0	11.5	12.8
THIRD QUARTILE	5.7	5.9	7.0	8.5	7.4	6.5	6.7	10.0	10.4	11.6
MINIMUM	2.5	3.2	3.4	4.6	3.2	2.9	1.4	4.4	4.1	5.8
YOUR FUND		5.9	7.1	9.0	7.9	7.0	7.6	11.8	12.8	15.4
PERCENT RANK		75	74	63	61	62	53	28	20	8

# Retirement Statistics

Retirement annuities have been approved by the Retirement Board payable to retired members during the fiscal year as follows:

	State	School	Municipal
20 or more years service at age 55 (Patrol, Wildlife)	3		
30 or more years service at age 55	16		1
20 or more years service at age 60	150	203	20
5 or more years service at age 65 (Fractional)	197	169	21
General disability after 5 years of service	174	92	12
Termination of service: Retained membership (Sec. 9)	21	16	
Survivor Benefits: Automatic	4		
Deferred (Age 60 or Age 65)	10	18	
20 or more years service at age 55 (reduced)	34	32	9
5 or more years service at age 60 (reduced)	117	132	
<b>TOTAL RETIRED DURING FISCAL YEAR</b>	<b>727</b>	<b>662</b>	<b>63</b>
Total number receiving retirement annuities 6/30/1976	6236	6036	516
Total number receiving retirement annuities during fiscal year	6963	6698	579
Co-beneficiaries continued upon the death of annuitant	63	29	2
Less: Retired members deceased during fiscal year	228	177	12
<b>TOTAL NUMBER RECEIVING RETIREMENT ANNUITIES 6/30/1977</b>	<b>6798</b>	<b>6550</b>	<b>569</b>
Average monthly rate 6/30/1977	\$ 255	\$ 244	\$ 225
Total paid in annuities 7/1/1976 to 6/30/1977 (12 months)	\$21,601,634	\$20,460,230	\$1,569,350
Average monthly rate for annuitants retired during year	\$ 364	\$ 339	\$ 309
Survivor Benefits added to rolls during fiscal year	49	31	6
Total Survivor Benefits 6/30/1977	405	263	70
Total paid in Survivor Benefits 7/1/1976 to 6/30/1977 (12 months)	\$ 1,062,322	\$ 714,356	\$ 165,769
Retirement annuities Deferred (Future at age 60 or 65)	503	808	39
Total future liability (annually)	\$ 1,308,803	\$ 1,581,316	\$ 79,431
Survivor Benefits (Future)	35	22	4
Total future liability (annually)	\$ 54,611	\$ 29,211	\$ 6,880



# Annuitant Rolls Increase

The number of persons receiving retirement annuities has grown steadily in relation to active membership, as shown in the table below. Since PERA has not yet reached maturity as a retirement plan, this trend is natural. The trend will continue, and the annuitants on rolls will increase rapidly, until members enrolled near the beginning of the plan reach retirement age and attrition begins among the annuitants, a relatively young group at present.

The level-cost financing principle assures that deduction rates will not have to be raised to meet the benefit load. The current percentages of pay will be sufficient to meet the increasing annuity payroll, if the benefit provisions contained in state law are not changed.

The steep growth in the dollar amount of the annuitant payroll is shown in the right-hand column of the table.

Year	Number of retired members on 6/30	Number of active members on 6/30	Retired members as % of active members on 6/30	Total annuities paid-yr. ending 6/30
1940	93	3,715	2.5%	\$ 72,588
1945	171	5,585	3.1	137,442
1950	280	11,853	2.4	237,866
1955	747	21,185	3.5	745,679
1960	1,775	33,068	5.4	2,055,139
1965	3,631	49,701	7.3	5,486,225
1970	6,308	65,586	9.6	12,366,658
1975	11,650	84,781	13.7	32,242,456
1976	12,788	87,605	14.6	37,837,649
1977	13,917	89,604	15.5	43,631,214

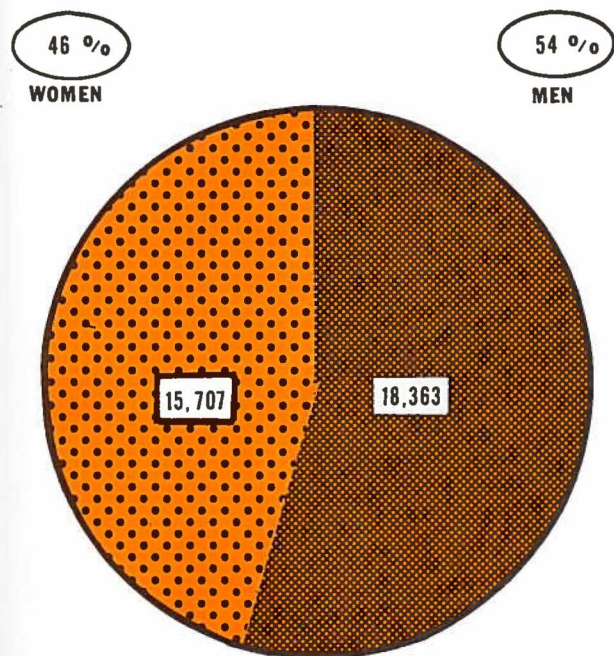
## Membership Statistics

	CONSOLIDATED TOTALS	STATE DIVISION	SCHOOL DIVISION	MUNICIPAL DIVISION
<b>TOTAL MEMBERSHIP MAY 31, 1977</b>	<b>104,656</b>	<b>42,658</b>	<b>56,505</b>	<b>5,493</b>
<i>Active Members</i>	89,997	35,455	49,687	4,855
<i>Annuitants and Survivor Benefit Members</i>	14,659	7,203	6,818	638
New Members Accepted				
June 1, 1976 to May 31, 1977	16,080	6,755	8,359	966
Less: Members Deceased	(72)	(35)	(37)	(0)
Members Accounts Withdrawn	(11,628)	(4,944)	(5,964)	(720)
Total Withdrawals	(11,700)	(4,979)	(6,001)	(720)
<b>NET GAIN IN MEMBERSHIP</b>	<b>4,380</b>	<b>1,776</b>	<b>2,358</b>	<b>246</b>

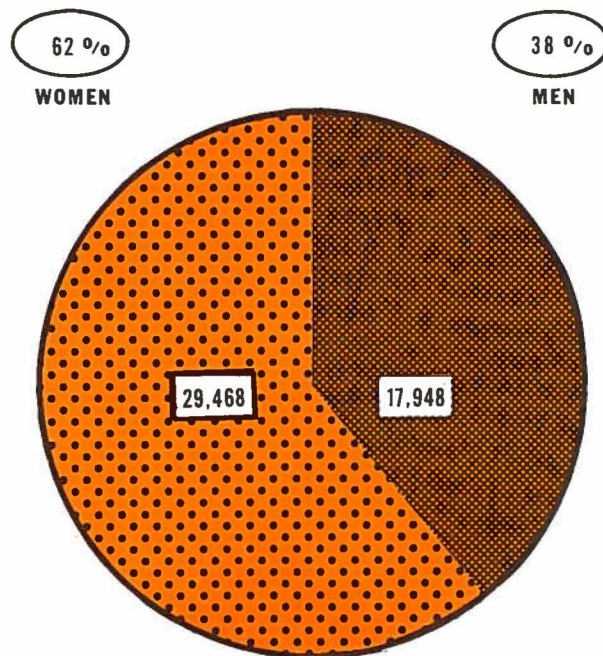
# NUMBERS OF ACTIVE MEMBERS BY DIVISION 12-31-76

*(Further Distribution According to Sex)*

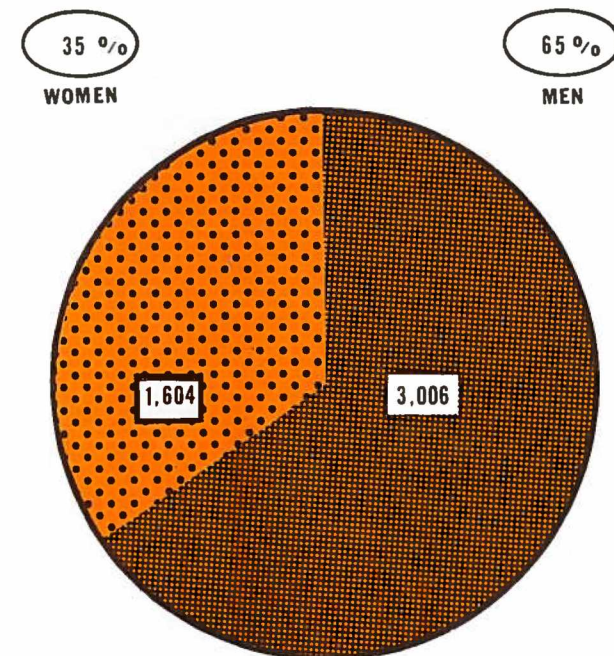
## State Division



## School Division



## Municipal Division



   
WOMEN      MEN



# State Division

## Active Members in Valuation By Attained Age Groups & Years of Credited Service—12-31-76

Active members included in the STATE DIVISION valuation totaled 34,070, involving monthly salaries totaling \$38,564,720 (\$462,776,640 annually).

Attained Age Groups	Number with Indicated Years of Credited Service							Totals	Monthly Salaries
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up		
Under 20	157							157	\$ 78,973
20-24	2,503	39						2,542	1,718,813
25-29	4,787	671	15					5,473	4,910,728
30-34	3,434	1,400	361	18				5,213	5,783,771
35-39	1,957	1,292	663	148	10			4,070	5,042,151
40-44	1,501	989	667	286	93	1		3,537	4,484,233
45-49	1,288	1,030	702	383	258	68	2	3,731	4,781,721
50-54	1,061	988	744	424	278	194	26	3,715	4,768,067
55-59	752	875	718	442	311	174	82	3,354	4,243,255
60	97	139	106	79	62	27	16	526	641,985
61	79	108	103	93	35	29	16	463	561,036
62	55	87	114	67	31	16	16	386	469,611
63	46	102	101	63	18	17	10	357	431,530
64	29	74	84	53	21	10	11	282	333,880
65	24	59	42	26	15	14	11	191	230,073
66	7	11	6	2	5		2	33	38,999
67		7	3	3	1			14	15,592
68	5	3	2		1			11	12,500
69	2	3	2	1				8	8,013
70 & over	1	2	1	1	1		1	7	9,789
<b>Totals</b>	<b>17,785</b>	<b>7,879</b>	<b>4,434</b>	<b>2,089</b>	<b>1,140</b>	<b>550</b>	<b>193</b>	<b>34,070</b>	<b>\$38,564,720</b>

The median attained age for State Division members was 39.5 years, and the median service was 4.8 years. This assumes even distribution throughout the median interval.



# School Division

## Active Members in Valuation By Attained Age Groups & Years of Credited Service—12-31-76

Active members included in the SCHOOL DIVISION valuation totaled 47,416, involving monthly salaries totaling \$43,291,176 (\$519,494,112 annually).

Attained Age Groups	Number with Indicated Years of Credited Service							Totals	Monthly Salaries
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up		
Under 20	126							126	\$ 51,908
20-24	2,751	16						2,767	1,776,399
25-29	7,657	1,088	2					8,747	7,227,533
30-34	4,877	2,688	406					7,971	7,479,348
35-39	3,409	1,766	1,283	235				6,693	6,409,640
40-44	2,647	1,503	991	818	85	1		6,045	5,873,611
45-49	1,813	1,429	889	675	349	38		5,193	5,077,013
50-54	1,184	981	847	543	402	150	13	4,120	4,029,637
55-59	817	737	657	575	389	131	28	3,334	3,119,898
60	124	96	81	109	52	19	15	496	458,399
61	104	102	104	88	54	23	7	482	447,089
62	83	109	84	80	45	26	7	434	401,997
63	52	81	66	89	45	22	6	361	343,399
64	42	58	71	51	56	15	7	300	291,176
65	34	36	41	50	28	15	3	207	207,157
66	14	14	4	9	2	1		44	30,587
67	5	8	9	4	6			32	24,778
68	5	6	4	3	1			19	12,235
69	2	5		2		1		10	6,685
70 & over	7	12	6	4	4	2		35	22,687
<b>Totals</b>	<b>25,753</b>	<b>10,735</b>	<b>5,545</b>	<b>3,335</b>	<b>1,518</b>	<b>444</b>	<b>86</b>	<b>47,146</b>	<b>\$43,291,176</b>

The median attained age for School Division members was 38.1 years and the median service was 4.6 years. This assumes even distribution through the median interval.



# Municipal Division

## Active Members in Valuation By Attained Age Groups & Years of Credited Service—12-31-76

Active members included in the Municipal Division valuation totaled 4,613, involving monthly salaries totaling \$4,470,775 (\$53,649,300 annually).

Attained Age Groups	Number with Indicated Years of Credited Service							Totals	Monthly Salaries
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up		
Under 20	33							33	\$ 16,982
20-24	488	12						500	363,455
25-29	740	152						892	798,572
30-34	491	184	60	2				737	759,803
35-39	257	135	82	12	2			488	517,699
40-44	228	116	78	32	18	1		473	492,656
45-49	175	148	54	29	26	10		442	448,877
50-54	143	129	41	34	24	16	4	391	399,972
55-59	102	98	76	42	40	14	11	383	398,380
60	10	13	16	3	5	4		51	47,538
61	12	21	11	5	3	2		54	51,620
62	9	10	6	3	4	2		34	34,858
63	9	9	15	6	5	1	1	46	48,426
64	5	14	10	7	5	1		42	42,786
65	5	7	9	2	4	1		28	32,542
66		3	1	2		1		7	6,529
67		1	1					2	1,757
68	2	1						3	2,526
69			1	1				2	3,218
70 & over	1	2	2					5	2,579
<b>Totals</b>	<b>2,710</b>	<b>1,055</b>	<b>463</b>	<b>180</b>	<b>136</b>	<b>53</b>	<b>16</b>	<b>4,613</b>	<b>\$4,470,775</b>

The median attained age for Municipal Division members was 36.5 years, and the median service was 4.3 years. This assumes even distribution throughout the median interval.

# Judges Division

## Active Members in Valuation By Attained Age Groups & Years of Credited Service—12-31-76

Active members included in the JUDGES DIVISION valuation totaled 220, involving monthly salaries totaling \$536,309 (\$6,435,708 annually).

Attained Age Groups	Number with Indicated Years of Credited Service							Totals	Monthly Salaries
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up		
25-29	3							3	\$ 4,313
30-34	6	1						7	10,436
35-39	15	7						22	49,488
40-44	12	8	4					24	53,953
45-49	11	4	8					23	54,564
50-54	13	11	14	2				40	107,946
55-59	5	9	18	4		1		37	100,168
60	2		4					6	15,671
61	3	1	2		1			7	16,250
62		4	4		1			9	25,083
63		3	3	2	2			10	23,147
64		2		2	1			5	11,666
65	2		2					4	15,500
66	2	4	1					7	12,381
67		2		1				3	7,750
68		1	1		1			3	8,250
69	1	2	2					5	11,243
70 & Over		3	1				1	5	8,500
<b>Totals</b>	<b>75</b>	<b>62</b>	<b>64</b>	<b>11</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>220</b>	<b>\$536,309</b>

The median attained age for Judges' Division members was 53.9 years, and the median service was 7.8 years. This assumes even distribution throughout the median interval.



# Per Capita Reserves

## Fiscal Years 1973-1977

		Present Retired Reserve	Members' Deposits	Future Retired Reserve
STATE DIVISION	June 30, 1973	\$30,203	\$3,128	\$1,404
	June 30, 1974	30,933	3,477	1,924
	June 30, 1975	33,502	3,800	2,219
	June 30, 1976	35,930	4,300	2,932
	June 30, 1977	38,614	4,875	3,735
SCHOOL DIVISION	June 30, 1973	\$29,893	\$2,743	\$2,972
	June 30, 1974	30,228	3,003	3,530
	June 30, 1975	32,333	3,349	4,088
	June 30, 1976	34,508	3,717	4,856
	June 30, 1977	36,442	4,190	6,000
MUNICIPAL DIVISION	June 30, 1973	\$25,442	\$2,084	\$1,980
	June 30, 1974	27,854	2,256	2,192
	June 30, 1975	29,920	2,537	2,585
	June 30, 1976	32,236	3,136	3,446
	June 30, 1977	33,941	3,591	4,328

The table above shows some important facts about the three main reserves in the PERA financial structure—reserves for presently retired, members' deposits, and the reserves for future retirees.

Using the State Division as an example on 6-30-77, if you divide the reserve established for those already receiving retirement annuities by the total number of those recipients, you end up with \$38,614 per retiree. If you divide the total individual deposits by the total active membership, the result is \$4,875 per active member. The reserve for future retired is used with active members' own deposits to finance the retirement of each retiring member. This reserve divided by the number of active members nets \$3,735 per member.

PERA annuities are fully funded. This means that once a member retires, there is enough money set aside to pay his annuity for the rest of his life without additional member or employer deductions. The Present Retired Reserve is the largest of the three on a per capita basis. Its growth in each division from year to year indicates the higher retirement amounts

being paid.

The member's personal deposits are only used for the member's own benefit or his survivor's benefit.

The Future Retired Reserve is a pooled fund containing employer deductions and interest within each division. It helps fund benefits earned by active members over their careers. When an individual is granted a benefit at retirement, which is determined according to the provisions of State Law, a portion of the Future Retired Reserve is combined with the members' deposits and placed in the Present Retired Reserve to pay his benefit.

While PERA retirees' benefits are fully funded, benefits that have been earned but are not yet payable to actively-employed members are not presently fully funded. This means that assets in Members' Deposits and the Future Retired Reserve total less than the liabilities for service active members have already rendered. This shortfall is called the unfunded accrued liability. State Law requires, and PERA is following, a schedule to amortize the unfunded liability over a period not exceeding 60 years.

# Actuarial Principles

**Promises Made, and Eventually Paid.** As each year is completed, PERA in effect hands an "IOU" to each member then acquiring a year of service credit—the "IOU" says: "The Public Employees' Retirement Association of Colorado owes you one year's worth of retirement benefits, payments in cash commencing when you qualify for retirement."

The related key financial questions are:

Which generation of taxpayers contributes the money to cover the IOU?

The present taxpayers, who receive the benefit of the member's present year of service?

Or the future taxpayers, who happen to be in Colorado at the time the IOU becomes a cash demand?

The law governing PERA financing intends that this year's taxpayers contribute the money to cover the IOUs being handed out this year. By following this principle, **the employer contribution rate will remain approximately level from generation to generation**—our children and our grandchildren will contribute the same percents of active payroll we contribute now.

(There are systems which have a design for deferring contributions to future taxpayers, lured by a lower contribution rate now and putting aside the consequence that the contribution rate must then relentlessly grow much greater over decades of time—consume now, and let your children face your financial pollution after you retire.) See chart on next page.

An inevitable by-product of the level-cost design is the accumulation of reserve assets, for decades, and the income produced when the assets are invested. Invested assets are a by-product and not the objective. Investment income becomes in effect the 3rd contributor for benefits to employees, and is directly related to the contribution amounts required from employees and employers.

Translated to actuarial terminology, this level-cost objective means that

the contribution rates must total at least the following:

Current cost (the cost of members' service being rendered this year).  
... plus ...

Interest on Unfunded Accrued Liabilities (unfunded accrued liabilities are the difference between: liabilities for members' service already rendered; and the accrued assets of PERA).

**Computing Contributions to Support Fund Benefits.** From a given schedule of benefits and from the employee data and asset data furnished him, the actuary determines the contribution rates to support the benefits, by means of **an actuarial valuation and a funding method.**

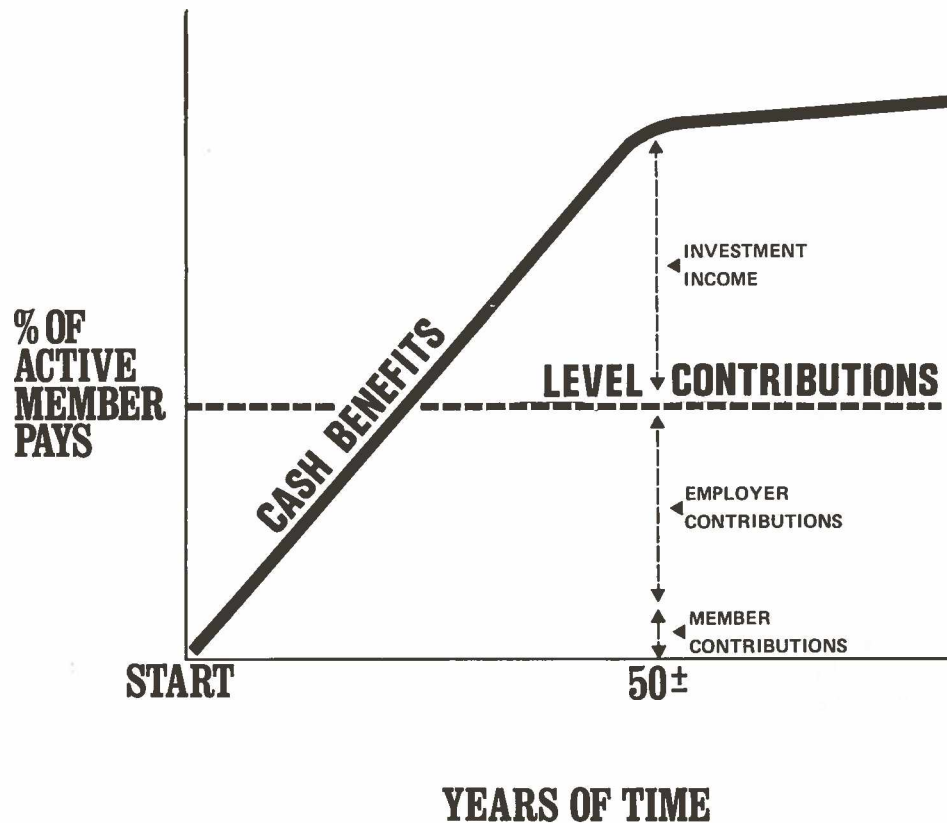
An actuarial valuation has a number of ingredients such as: the rate of investment income which plan assets will earn; the rates of withdrawal of active members who leave covered employment before qualifying for any monthly benefit; the rates of mortality; the rates of disability; the rates of salary increases; and the assumed age or ages at actual retirement.

In making an actuarial valuation assumptions must be made as to what the above rates will be for the next year and for decades in the future. Only the subsequent actual experience of the plan can indicate the degree of accuracy of the assumptions.

**Reconciling Differences between Assumed Experience and Actual Experience.** Once actual experience has occurred and been observed, it will not coincide exactly with assumed experience, regardless of the wisdom of the assumptions or the skill of the actuary and the millions of calculations he made. The future can be predicted with considerable precision, except inflation, but not 100 percent precision.

PERA copes with these continually changing differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is **continuing adjustments in financial position.**





**Cash Benefits Line.** This relentlessly increasing line is the fundamental reality of retirement plan financing. As the ratio of retired to active, working members rises, the benefits paid rise as a percent of payroll.

The line increases over time even if new benefits aren't added. It increases regardless of the financing method being followed.

**Level Contribution Line.** Determining the level contribution line requires detailed assumptions concerning experiences in future decades, including:

- Rate of withdrawal of active members (turnover);
- Rates of mortality;
- Rates of disability;
- Ages at actual retirement;
- Rates of pay increase;
- Investment income;
- Change in active member group size.

# Assumptions Used By Actuary

(For State, School, and Municipal Divisions Only)

1. The interest rate used in making the valuation was six percent per annum, compounded annually.

2. The mortality table, for post-retirement mortality, used in evaluating annuities to be paid, was the 1960 Group Annuity Mortality Table, set back no years for men and set back five years for women as shown below.

## Single Life Retirement Values

Based on 1960 Group Annuity Mortality & 6% Interest

Sample Attained Ages	Present Value of \$1.00 Monthly for Life		Present Value of \$1.00 Mo. the First Year Increasing \$.03 Yearly		Future Life Expectancy (Years)	
	Men	Women	Men	Women	Men	Women
40	\$172.11	\$179.59	\$229.21	\$243.31	35.48	40.21
45	162.79	172.11	212.69	229.21	30.85	35.48
50	151.92	162.79	194.33	212.69	26.44	30.85
55	139.60	151.92	174.49	194.33	22.30	26.44
60	125.60	139.60	153.11	174.49	18.43	22.30
65	109.70	125.60	130.23	153.11	18.00	18.43
70	92.95	109.70	107.39	130.23	11.58	14.80
75	75.97	92.95	85.47	107.39	8.79	11.58
80	60.20	75.97	66.11	85.47	6.54	8.79
85	47.51	60.20	51.11	66.11	4.98	6.54

3. The salary scale, showing present salary assumed to result in a salary of \$1,000 at age 60.

Sample Ages	Present Salary Resulting in Salary of \$1,000 at Age 60
20	\$ 138
25	191
30	255
35	336
40	\$ 435
45	557
50	694
55	843
60	1,000



4. **The probabilities of age and service retirement** for members eligible to retire. Eligibility for superannuation retirement was assumed to be age 55 and 30 years of service, age 60 with 20 or more years of service, or age 65 with 5 or more years of service.

**Percent of Eligible Active Members**

**Retiring Within Next Year—By Division**

Retirement Ages	State	School	Municipal
55.....	10%	15%	10%
56.....	10	15	10
57.....	10	15	10
58.....	10	15	10
59.....	10	15	10
60.....	10	15	10
61.....	10	15	10
62.....	10	15	10
63.....	10	15	10
64.....	15	25	15
65.....	80	60	40
66.....	30	30	30
67.....	40	40	40
68.....	50	50	50
69.....	90	60	90
70.....	100	100	100

5. **The probabilities of separating from service** due to death or withdrawal. In the State and Municipal Divisions, vesting was assumed to occur after age 40 with 10 or more years of accrued service. For the State Division it was assumed that 50 percent of vested annuities, and for the Municipal Division 20 percent of vested annuities, will be forfeited by the withdrawal of member deductions.

For School Division members vesting was assumed to occur after completion of 10 years of accrued service and that 10 percent of vested annuities will be forfeited by the withdrawal of member deductions.

**Percent of Active Participants Separating Within Next Year**

Sample	State		School		Municipal	
	Men	Women	Men	Women	Men	Women
20	31.31%	38.33%	30.63%	39.07%	31.31%	38.33%
25	16.53	34.10	16.11	30.81	16.53	34.10
30	12.10	21.04	11.83	22.75	12.10	21.04
35	8.48	11.27	8.58	14.31	8.48	11.27
40	6.46	7.76	6.00	10.65	6.46	7.76
45	4.18	5.86	5.14	6.86	4.18	5.86
50	4.48	4.85	4.52	5.56	4.48	4.85
55	4.04	3.78	4.17	4.25	4.04	3.78
60	3.98	3.83	3.94	3.55	3.98	3.83

6. The entry age normal cost method of valuation was used in determining superannuation annuity liabilities and normal cost.

7. In financing unfunded accrued liabilities, active member payroll was assumed to increase three percent a year.

## Actuarial Assumptions for Judges Division

1. The interest rate used in making the valuation was six percent per annum, compounded annually.

2. The mortality table, for post-retirement mortality, used in evaluating annuities to be paid, was the 1960 Group Annuity Mortality Table, set back no years for men and set back five years for women.

**Single Life Retirement Values  
Based on 1960 Group Annuity Mortality & 6% Interest**

Sample Attained Ages	Present Value \$1.00 Monthly for Life		Present Value of \$1.00 Mo. the First Year Increasing \$.015 Yearly		Future Life Expectancy (years)	
	Men	Women	Men	Women	Men	Women
40	\$172.11	\$179.59	\$200.66	\$211.45	35.48	40.21
45	162.79	172.11	187.74	200.66	30.85	35.48
50	151.92	162.79	173.13	187.74	26.44	30.85
55	139.60	151.92	157.05	173.13	22.30	26.44
60	125.60	139.60	139.35	157.05	18.43	22.30
65	109.70	125.60	119.97	139.35	14.80	18.43
70	92.95	109.70	100.17	119.97	11.58	14.80
75	75.97	92.95	80.72	100.17	8.79	11.58
80	60.20	75.97	63.16	70.72	6.54	8.79
85	47.51	60.20	49.31	63.16	4.98	6.54



3. The salary scale, showing present salary assumed to result in a salary of \$1,000 at age 65.

Sample Ages	Present Salary Resulting in	
	Salary of \$1,000 at Age 65	
25.....	\$ 164	45..... 479
30.....	220	50..... 597
35.....	289	55..... 725
40.....	375	60..... 861
		65..... 1,000

4. The probabilities of age and service retirement for members eligible to retire. Eligibility for superannuation retirement was assumed to be age 65 with 10 or more years of service.

Retirement Ages	Percent of Eligible Active Members Retiring Within Next Year	
	65.....	40%
66.....	20	69..... 25
67.....	15	70..... 100

5. The probabilities of separating from service due to death or withdrawal. Vesting was assumed to occur after completion of 10 years of accrued service.

Sample Ages	Percent of Active Members Separating Within the Next Year	
	Men	Women
25.....	7.79%	7.78%
30.....	7.31	7.29
35.....	6.40	6.36
40.....	5.33	5.27
45.....	4.29	4.15
50.....	3.14	2.88
55.....	1.87	1.52
60.....	1.48	1.02
65.....	2.18	1.39

6. The attained age normal cost method of valuation was used in determining superannuation annuity liabilities and normal cost.

7. In financing unfunded accrued liabilities, active member payroll was assumed to increase three percent a year.

# Computed Employer Contribution Rate

## Expressed as Percents of Active Member Payroll

	State	School	Municipal	Judges
Contributions for Current Cost:				
Superannuation annuities .....	9.70%	10.82%	9.76%	14.70%
Disability annuities .....	1.05	0.85	1.20	0.50
Survivor annuities .....	<u>0.60</u>	<u>0.60</u>	<u>0.80</u>	<u>1.50</u>
Total .....	11.35	12.27	11.76	16.70
Member current contributions .....	7.75%	7.75%	7.75%	7.00%
(Future refunds) .....	(3.55)	(3.34)	(3.41)	(0.99)
Available for annuities .....	<u>4.20</u>	<u>4.41</u>	<u>4.34</u>	<u>6.01</u>
Employer Current Cost .....	7.15	7.86	7.42	10.69
Unfunded Accrued Liabilities .....	3.50	4.24	2.44	1.31
(Amortization period) .....	(38 years)	(29 years)	(34 years)	(50 years)
<b>TOTAL COMPUTED EMPLOYER CONTRIBUTION RATE .....</b>	<b>10.65%</b>	<b>12.10%</b>	<b>9.86%</b>	<b>12.00%</b>
<b>STATUTORY RATE .....</b>	<b>10.65%</b>	<b>12.10%</b>	<b>9.86%</b>	<b>12.00%</b>

Dec. 31, 1976



# Glossary

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**Actuarial Reserve.** A fund for the purpose of paying benefits which will not be paid in the very near future but which have already been earned. An actuarial reserve retirement system sets aside money for benefits earned before the benefits will actually have to be paid.

**Actuarial Valuation.** An examination by an actuary of a group of people, with regard to certain characteristics of the people in that group. Some of the characteristics are age, service, salaries, rate of turnover by death or termination. The actuary can then determine whether contributions are sufficient to fund liabilities earned. An annual valuation of PERA members and annuitants is conducted by PERA's actuary.

**Amortize.** To pay off through regular contributions or adjustments over a specified period.

**Annuity.** A series of regular payments to the annuitant for life.

**Audit.** An examination by someone or some firm outside an organization of accounting records developed by the staff of the organization. Recommendations and suggestions for better record-keeping and management are often part of an audit.

**Corporate Obligation.** An investment in a corporation with specified payments of principal and interest over a definite period of time.

**Current Cost.** The cost of members' service being rendered this year, expressed as a percentage of payroll. Current cost is a part of the total contribution rate.

**Diversification.** The practice of investing in several different business industries and companies within the industries in order to minimize total portfolio risks.

**Level-Cost Financing.** A method of financing a retirement system in which contributions, as a percentage of payroll, remain level from generation to generation, if benefit provisions are not changed.

**Portfolio.** The total of investments held, (by PERA, for example).

**Risk.** The possibility that the expected rate of return may not be attained for the total portfolio or for specific securities.

**Temporary Investment.** An investment in highly liquid money market instruments usually maturing within one year.

**Total Rate of Return.** Cash income plus capital appreciation, less capital depreciation, realized and unrealized, adjusted for capital contributions and withdrawals expressed as a percentage on an annual basis.

**Unfunded Accrued Liability.** The difference between liabilities for members' service already rendered, and the assets of the system, measured as of any particular date.

