AIP annual report 1954

Submitted by the Director and accepted by the Governing Board of the American Institute of Physics as its annual report to the members of the AIP, March 12, 1955.

IN the death of Karl Taylor Compton on June 22nd, the American Institute of Physics, as well as the world at large, suffered a very great loss. Indeed, it is very doubtful whether the American Institute of Physics would ever have come into existence at all without his vision and initiative. He saw the need for reversing the then prevailing trend of physics to split into a number of unrelated societies, he gave leadership to the establishment of the AIP to bring these societies into federation without loss of autonomy, and he did much to join their strength through the Institute for the effective prosecution of common causes. He continued his active guidance of the newly launched Institute for seven years as Chairman of its Governing Board and then for several more years as a member of its Policy Committee. Until he died, he retained a lively interest in the Institute and made his time available for the consideration of its problems and opportunities.

In no way can we better express our indebtedness to Dr. Compton now than to take stock of ourselves. Are we living up to the goals he set and are we meeting the needs of physics in our present greatly altered world situation? This Institute, to which Dr. Compton made so essential a contribution, is now the strongest hand and voice of physics to the world beyond the ranks of its members. It is so regarded by the government and by the organizations of other fields of science and technology. It is a defect—and perhaps the only serious one—in our form of organization that members of the component societies often think no further than of the societies to which they belong. This is natural since these conduct their meetings, edit their journals, elect their officers, and set their dues. The advantages of our form of organization are, however, great and it still remains much as it was originally conceived. The defect mentioned can be overcome by alertness, by a high degree of cooperation between officers, and by a good use of our common medium of communication, *Physics Today*. Every member should always bear with him the consciousness of his larger group, just as a citizen of Texas is also a loyal American. If everyone will remember this, we can hope to gain for physics and for physicists the advantages and the good influence that we should have and fulfill the duties and obligations imposed on us by our consciences and by our fellow citizens in other walks of life.

The job of the Institute is to advance physics and diffuse knowledge thereof. It is properly a matter of concern to the Institute whether national security policies needlessly stand in the way of these objectives, whether impediments to international travel do likewise, and whether apparently harmless procedures governing the export of information are sure to remain harmless. Physicists should see in the Institute one means to reduce and nullify such perils.

But the main work of the Institute is positive. It is the publication of the results of research for all to read. Let anyone who questions this place the 103 issues of the nine journals published by the Institute in 1954 on a table and look at them! A new and interesting opportunity to disseminate knowledge of physics has come to the Institute in 1954 from the National Science Foundation. This is a project, as yet not fully embarked upon, to translate and issue periodically the results of physics research published only in the Russian language. We know that there is a great development of physics in the USSR and we in America have everything to gain by learning about it. Our study of the feasibility of this project has continued since the close of the year to the point where a firm, and we think reasonable, proposal can be made to the NSF.

In the spirit of self appraisal, the Executive Committee of the Institute invited, on October 8, a number of leaders of research in industry to have a look at the state of the organization of physics from their point of view and say what they thought should be different. As

Governing Board of the American Institute of Physics. *Front Row:* Mark W. Zemansky, Ralph A. Sawyer, Frederick Seitz (chairman), Deane B. Judd, Hugh S. Knowles. *Back Row:* Eric Rodgers, Allen V. Astin, Robert F. Bacher, J. W. Buchta, Henry D. Smyth, W. F. Meggers, Hans A. Bethe, W. H. Markwood, Jr., S. A. Goudsmit, R. F. Paton, Harry F. Olson, Philip M. Morse, William Shockley. (Brian O'Brien and J. H. Van Vleck are not included.)

background for their thinking, we were able to tell them from machine counts of the Physics Register punchcards that, of the first 10 000 of our 16 500 members to register, the percentages of physicists working for several kinds of employer are the following:

	1951	*1954*
Universities, colleges, and junior colleges	44.4%	42.0%
Private industry (incl. self-employed)	32.4	35.8
Federal government (incl. armed services)	15.1	14.5
Nonprofit foundations, research labs, etc.	5.0	3.6
Misc. or undetermined	3.1	4.1

We told them that the kind of work physicists do is:

	Primarily	*Secondarily*
Research, development, or field exploration	54.1%	18.2%
Teaching	18.7	8.9
Management or administration	12.9	14.2
Consulting, eng. econ., evaluation	3.2	8.4
Design	2.0	8.5
Inspection, analysis, testing, process control	1.5	2.3
Production, operation, construction, maintenance	1.2	2.7
Writing, patents, library work	0.9	7.0
Technical marketing and purchasing	0.5	.7
No report	5.0	29.1

and that the physicists in industry work on:

Commmunication and related products	21.9%
Special and consulting labs	15.6
Instruments	11.5
Electrical equipment	7.7
Atomic energy	7.4
Petroleum and coal products	5.0
Aircraft and parts	4.9
Chemicals	4.6
Machinery	3.6
Photographic equipment and supplies	3.0
Ordnance and accessories	2.9
Stone, clay, and glass	2.0
Misc. nonmanufacturing	1.8
Textile mill products	1.4
Rubber products	1.2
Primary metals	1.0
Misc. manufacturing, n.e.c.	0.9
Motor vehicles and equipment	0.9
Fabricated metal products	0.7
Plastics	0.6
Food products	0.4
Utilities	0.3
Biological products	0.3
Mining	0.2
Transportation and equipment	0.2

As further background, a statement had been prepared outlining the work of the Institute under the headings: Publishing; Services to Members, Employers, and Others; Cooperation with Other Scientific Societies; Cooperation with Government; Public Information; and Improvement of Facilities and Methods. The contents of this statement covered much the same ground as has been covered in this and earlier annual reports.

The Institute's guests did not, however, appear greatly concerned about any functioning of the Institute beyond what might be done to meet educational problems. The need for more and better trained physicists dominated their thinking and was strongly expressed. It was suggested that the Institute and the Member Societies take steps to publicize this need, to improve the vocational information available, to arrange talks to high school students, to encourage campus physics organizations, to foster programs for the up-grading of high school teaching, and to inquire whether current state emphasis on "education psychology" was not in fact harming the development of science and technology in the United States.

The Executive Committee, within the limits of available funds, desires to forward such steps. Some are already under way, as, for example, our Student Section program, our participation in the Scientific Manpower Commission which is attacking such problems, and our cooperation in various projects of the National Science Foundation. During 1954 we took part, by representation, in a study of nuclear physics in engineering education sponsored by the NSF, we gave informal assistance to the Foundation in its planning for teacher institutes for the summer of 1955, and we prepared a proposal for a thorough study of the general role of physics in engineering education. The latter has since been supported by an NSF grant of $13 600 and a strong committee has the work in hand. The Institute is also cosponsoring, with the Division of Physical Sci-

ences of the National Research Council, a conference early in 1955 on "The Production of Physicists". Those taking part will report a wide range of activities directed to this end including the provision of more and better trained high school teachers, a critique of teaching objectives, the improvement of equipment and facilities, programs for teacher improvement, etc. The aim of the conference will be to make such programs more effective and to bring about a good coordination between the efforts of government, industry, education, and the professional societies.

Much needs to be done. Individual physicists and local groups can contribute greatly on their own initiative to a healthy high-school attitude toward physics as a career.

The Institute has joined with the principal organizations in other fields of science and technology, primarily through the Scientific Manpower Commission, in an attempt to improve national manpower policies as these affect scientists and engineers. It becomes increasingly clear that the security of the western world against communist dictatorships depends greatly if not mainly on technological superiority, especially since the west is heavily outnumbered in potentially available military manpower. In the very real sense that the cold war has developed into technological war, the training of qualified young men for work in science and engineering has clearly become more important than the training of such men for straight military service. If the cold war becomes hot, men of such qualifications will not long serve as regular soldiers, sailors, and airmen. They will be too badly needed in production, in the laboratory, or in special liaison work with forces in the field. It is high time that a way be found to devote their training entirely to the special kinds of service they will be called upon to render.

Actually at present the Selective Service System has forsaken selectivity and has become an agency to enforce "universal equality of sacrifice" beyond any realistic concept of what the nation's safety truly requires. There is hope that the Administration's proposed National Reserve legislation may offer an acceptable compromise under which a short period of basic training and other commitments may represent equality of sacrifice without undue loss of technological training time. The decisions of Congress on these proposals will be eagerly awaited.

It is pertinent to mention at this point that the AIP Placement Service is still besieged by employers offering positions much greater in number than there are physicists registering for positions. The end of the Korean conflict brought no change in this state of affairs, which has now continued for five years. In January 1955, more than 486 positions were offered and 234 applicants were registered. Of these registrants, 153 were already employed, 68 were students, 8 were unemployed, and 5 did not give their status.

It is also interesting to note the following percentages of the applicants who indicated their willingness to consider each of the listed types of employment:

Undergraduate teaching only	11%
Undergraduate teaching and research	42
Graduate teaching and research	32
Academic research only	23
Institutional research	24
Industrial development	23
Industrial research	44
Government research or civil service	15
Other	4

It will be understood, of course, that most applicants listed more than one acceptable field. The attractiveness of government service seems low but it is in line with the fraction (15%) of all physicists who are now employed by agencies of the Federal Government. As was abundantly demonstrated in the last war, any acute national emergency would find physicists ready to serve their country to whatever extent they are needed. They may be deficient in number but there is no occupational group of greater proven loyalty.

The biggest job in the Institute office is, as has been said, publishing. Mainly because of the rapid growth of *The Physical Review,* the nine journals published for the Member Societies and the Institute itself ran somewhat more total pages in 1954 than in 1953. The 1954 total was 17 050 pages, and our Publishing Department also handled 480 pages of meeting programs, making 17 530 pages in all. During 1954, the business management of *Acta Metallurgica* continued to be handled in the AIP office. Preparations were made for launching, with the January 1955 issue, the new journal *Noise Control,* owned and edited by the Acoustical Society.

Pressure for publication of research results in certain fields has again come to the point of severe strain on the financial resources available to those who have the responsibility and authority to deal with those fields. In the face of such situations when they have arisen in the past either effective steps have raised the income available, or large journals have shuffled off or otherwise lost parts of themselves, which parts then became specialized journals in their own right. The naturally preferable recourse of reducing costs has not been promising because as yet no technological improvement in the graphic arts has offered assured and sufficiently drastic economies, and meanwhile inflation of all costs goes on apace. There are other alternatives. For example, editors could get tougher in rejecting or in requiring condensation of submitted papers. Or it would be possible to establish a system in which generally circulated journals carried only digests of all papers, microreproductions of the complete papers being available by mail order. These would be unpopular recourses involving sacrifices and perhaps not lowering the total bill for the advancement of physics by an appreciable amount. The Institute stands ready to help study such problems and continually investigates proposed ways of reducing publishing costs.

The high quality of the American physics journals still continues undiminished. The Institute is fortunate that the recent need for new editors for two of its own journals has now been met. We welcome Robert L.

Sproull of Cornell as the new Editor of the *Journal of Applied Physics* and J. B. Horner Kuper of Brookhaven as the new Editor of *The Review of Scientific Instruments*. They have already amply demonstrated their ability to handle these important assignments.

The AIP *Handbook of Physics* for which we began to make plans in 1950 is now far along toward completion. It is expected that essentially all of the text will be ready early in 1955 and that the 1956 publication date will be met. The AIP is greatly indebted to the Editor, Dwight E. Gray, and to all others who have given much time and effort to the preparation of the *Handbook*'s contents. Particular mention should be made of the untiring section editors, who are:

Mathematics	A. A. Bennett
Mechanics	R. B. Lindsay
Acoustics	F. A. Firestone
Heat	M. W. Zemansky
Electricity and Magnetism	D. F. Bleil
Optics	B. H. Billings
Atomic and Molecular Physics	G. H. Dieke
Nuclear Physics	F. N. D. Kurie

Of less magnitude than publishing, but also very important is the Institute's job of caring for much of the external and internal business of physics. Mention was made of some of this business earlier. Recently a committee was appointed to consider what needs of physics are being neglected, either because of insufficient funds or preoccupation with other matters. Certainly we do little for our student sections and for public relations generally although such activities are accorded high priority in many fields of science and technology. No one can be at all satisfied with the adverse view of the loyalty, motives, and human comprehension of physicists which is apparently held in some circles today. With a good public relations program, we ought to be able to improve the public understanding of and confidence in the physicist as a man of peace, honor, competence, and responsibility. The report of the committee will be available for consideration early in 1955.

Representative additional activities of the Institute during 1954 were many. A symposium on temperature was held in Washington, October 28–30 in cooperation with the National Bureau of Standards and the Office of Ordnance Research which provided funds. 344 registrants heard 25 excellent papers which are now being edited for a book to be published by the Reinhold Publishing Corporation. The Institute also is assisting in the publication arrangements of a symposium on photoconductivity held in Atlantic City November 4–6. This was sponsored by the University of Pennsylvania, the Radio Corporation of America, and the Office of Naval Research. John Wiley & Sons will publish the book.

September 13–24, the Institute cooperated in the First International Instrument Congress & Exposition of the Instrument Society of America, held in Philadelphia. Under the Chairmanship of Park H. Miller, Jr., a program of 7 papers was presented and the AIP took charge of the physics section of the Instrument Exhibition. Through a leave of absence, the Institute made it possible for the Director to take part in the London Assembly of the International Union of Pure and Applied Physics held July 7–10, 1954. The Institute assists the Union with secretarial work and *Physics Today* publishes news of its doings.

The AIP sent two communications designed for the attention of President Eisenhower, one on manpower policies and the other to nominate certain physicists for the Board of the National Science Foundation. The Institute also nominated, at the request of Director A. V. Astin of the National Bureau of Standards, an Advisory Committee on Physics for the Bureau. This action carried out a recommendation made by the Kelly committee to the Secretary of Commerce.

The Institute must respond each year to a vast volume of inquiring letters. "Give me material to interest high-school students in physics careers." "Give me figures to prove there is a shortage of physicists." "Where can I sell some valuable letters of Madame Curie?" "How can I get a physics job in America?" "What is the religious and racial breakdown of your membership?" (Fortunately, we have no way of knowing!) Thousands of reprints, pamphlets, and books are sent to the Institute each year and we have no room for a library, no pay for a librarian, and no systematic reference and information service. These are, of course, minor evidences of the growing stature of our field of endeavor and we must cope with our responsibilities as well as we can.

During 1954, negotiations were completed with the Member Societies to revise and generalize the uniform contracts governing specific services rendered by the Institute for them. The new contracts will be signed early in 1955. They replace contracts still in force at the end of 1954 which cover only the publishing operations of the Society-owned journals. The new contracts establish a basis for any services the Societies may wish, including journal publication. They go into detail on journal publication, but leave other types of services to be covered by supplemental agreements within the terms and limitations of the general contracts. No major changes of intent have been introduced except that (a) hereafter advertising revenue from a Society-owned journal will all be the property of the Society, the Institute only receiving a commission, (b) more frequent financial reports will be rendered, and (c) provision for modification of the contracts short of termination has been introduced.

Supplemental agreements for services other than publishing will be arrived at in 1955. Such services to the Societies have again increased in 1954, especially in the case of the American Physical Society. We now collect dues and handle much clerical work for that Society as

well as for the Acoustical Society, the Association of Physics Teachers, and the Society of Rheology.

All societies, as they grow older and larger, necessarily depend increasingly on professional as contrasted with voluntary staff work. Our Member Societies have the facilities of their own Institute to call upon. Their demands on the Institute, of course, grow along with the growth in their membership and the number of pages they publish. The growth of the Institute's services to the Societies, the growth of the Institute's own publications and the growth of project work already mentioned have combined to make our housing problem more acute. Interior improvements in our building were made in 1954, effectively adding working space for several departments, but we are again crowded and we no longer have a room free for the use of committees. We cannot long delay the decision whether to buy or build, or perhaps temporarily to rent, additional quarters.

The Institute's financial condition at December 31, 1954, is shown on the accompanying Balance Sheet. Current assets (cash in bank and on hand, and accounts receivable from Member Societies and others) are higher than a year previous by some $28 000, which is offset by an increase of the same amount, shown on the liability side of the Balance Sheet, in subscriptions for future years. Our investment portfolio remained unchanged during the year with the exception of the sale of 12 shares of Normany Farms, Inc. common stock. As this item has been carried on the books at a nominal value of $1.00, income from investments shows an increase of $1200 from this source.

Accounts receivable from Member Societies reflect the unpaid portion of expenses incurred in publishing the Societies' journals and for miscellaneous services performed for them during 1954, but not billed until 1955. Accounts payable to Member Societies show the net amounts due to those Societies for the collection of dues on their behalf less expenses for publication and miscellaneous services. During the year, the Society of Rheology turned over its entire funds to the Institute to manage. Disbursements from these funds are made only upon authorization of the President or the Secretary-Treasurer of the Society.

The Institute's surplus was increased by $1751.11, which was the net income from Institute operations for the year.

The accompanying summary statement of income and expense for the year ended December 31, 1954, shows, in the second column, the operations for which the Institute is itself financially responsible and, in the third column, those for which it is agent to the Societies and for which they are financially responsible. Subscription income and net income from publication charges and reprints were up $8000 and $7500 respectively. Net income from the sale of back numbers was less by approximately $2400.

Net income from advertising decreased approximately $7000. However the Advertising Department managed the Institute's participation in the International Instruments Exhibit on which a net profit of about this amount was realized.

The increase of $60 000 in special projects handled reflects the larger number of special projects which the Institute carried on during the year, most of which have been referred to previously.

Receipts for accounts of Member Societies shows an increase of $120 000 which is largely attributable to the fact that 1954 was the first year the Institute had handled the collection of dues for the American Physical Society for an entire year. For the first time, the Institute received and disbursed more than a million dollars in one year.

The Institute's gratitude is due for the services of the following members of the Governing Board who now retire after serving for the periods indicated:

K. K. Darrow	1953–1955
C. C. Lauritsen	1953–1955
G. B. Pegram	1931–1955
R. M. Sutton	1953–1955

The Institute now welcomes to membership on the Board Messrs. A. V. Astin, Hans A. Bethe, R. F. Paton, and H. D. Smyth.

Respectfully submitted,
Henry A. Barton
Director

AMERICAN INSTITUTE OF PHYSICS, INC.

Balance Sheet, December 31, 1954

Assets

Current Assets:			
Cash in bank		$196 498.52	
Petty cash funds		525.00	
Investments—United States Government securities		151 999.47	
Due from member societies:			
American Physical Society	$ 39 167.26		
Optical Society of America	4 290.04		
Acoustical Society of America	2 743.42	46 200.72	
Accounts receivable—sundry:			
Publication charges	$ 20 948.40		
Reprints	6 592.84		
Advertising	11 117.42		
Employees	312.76		
Miscellaneous	8 242.43	47 213.85	$442 437.56
Fixed Assets:			
Land and building—nominal value		$ 1.00	
Furniture and fixtures—nominal value		1.00	2.00
Deferred charges:			
Engraving costs applicable to 1955 issues		$ 8 774.31	
Noise Control costs applicable to 1955 issues		5 025.23	
Prepaid insurance		2 300.73	
Contribution to employees retirement plan applicable to 1954		9 002.32	
Expenditures in re Physics Handbook		63.71	25 166.30
			$467 605.86

Liabilities and Capital

Current Liabilities:			
Trade accounts payable		$ 85 902.23	
Commissions payable — advertising		2 162.30	
Due to member societies:			
American Association of Physics Teachers	$ 9 022.17		
Society of Rheology	4 013.50	13 035.67	
Sundry creditors		19 482.42	$120 582.62
Reserves:			
Building repairs and improvements		$ 1 818.84	
For purchases of furniture and fixtures		204.03	2 022.87
Deferred credits:			
Subscriptions for future years		$157 953.44	
Dues for 1955		6 617.64	
Receipts in re Placement Bureau—1955 meeting		50.00	
Receipts in re Book Exhibit 1955 meeting		2 047.06	166 668.14
Surplus			178 332.23
			$467 605.86

AMERICAN INSTITUTE OF PHYSICS, INC.

Summary Statement of Operations
Including Activities Carried on for Account of Member Societies

Year Ended December 31, 1954

	Total	*American Institute of Physics, Inc.*	*For Account of Member Societies*
Income:			
Subscriptions to journals	$ 334 528.96	$177 543.81	$156 985.15
Publication charges and reprint sales	189 760.11	61 555.82	128 204.29
Back number sales	40 266.15	18 046.57	22 219.58
Advertising	123 061.91	109 836.47	13 225.44
Special projects	73 379.89	73 379.89	
Contributions from member societies	20 037.87	20 037.87	
Dues from associates and sustaining members and corporations	6 043.00	6 043.00	
Miscellaneous income	672.73	672.73	
Income from investments	6 141.17	6 141.17	
Receipts for account of member societies	263 559.97		263 559.97
Total income	$1 057 451.76	$473 257.33	$584 194.43
Expenses:			
Printing, engraving, and mailing of journals	$ 510 309.79	$184 213.50	$326 096.29
Printing and mailing of reprints	37 255.89	14 171.42	23 084.47
Handling publication charges and reprint sales	12 020.58	4 598.74	7 421.84
Back number handling and distribution	14 206.82	6 020.15	8 186.67
Advertising printing, distribution, and sales	68 638.89	58 105.20	10 533.69
Administrative and organizational services	53 790.69	53 790.69	
Editorial and editorial mechanics	93 783.70	63 812.37	29 971.33
Circulation handling	43 060.68	22 837.27	20 223.41
Special projects	63 956.88	63 956.88	
Disbursements for account of member societies	25 355.76		25 355.76
Total expense	$ 922 379.68	$471 506.22	$450 873.46
Net paid to member societies to balance accounts	133 320.97	—	133,320.97
	$1 055 700.65	$471 506.22	$584 194.43
Net income	$ 1 751.11	$ 1 751.11	$ —

Books

College Textbook of Physics (Sixth Revised Edition). By Arthur L. Kimball. Revised by Alan T. Waterman. 942 pp. Henry Holt and Company, New York, 1954. $7.95. *Reviewed by E. R. Cohen, North American Aviation, Inc.*

When a new edition of a textbook which is more than forty years old appears, it usually can be interpreted as an indication that little change has occurred in the science in that span of time. Physics today would hardly seem to be in such a position! As Dr. Waterman points out in his preface, however, the fundamentals and, more important, the logical concepts which lie at the basis of physics have not changed. One may be tempted here to draw fine distinctions between classical physics and modern physics and to point out that vast changes have occurred in the foundation and philosophy of physics since Kimball first appeared in 1911. This is true, but a first year course in physics is too soon to differentiate, and modern physical theories become hopeless hieroglyphics without a firm understanding of the classical concepts upon which they are based. Kimball's *Physics* stands today as an example of a well-constructed, well-integrated introduction to the subject, just as it did forty years ago.

Dr. Waterman, in this revision, has kept Kimball's lucid presentation of physical concepts and has maintained the general outline and structure of the original. The figures have been redrawn for clarity and the problem sets have been revised and expanded. Illustrative problems have been added to the text in several places, and as a reflection of the present day emphasis, the section, "Electric Currents of Electrodynamics", has been expanded at the expense of "Electrostatics". The last section of the book is devoted to "Modern Physics", which includes quantum theory, photoelectric effect, radioactivity, nuclear structure and mesons in a well-balanced descriptive survey; the book concludes with a discussion of high-energy accelerators and nuclear reactors. Although this section is, by its nature, isolated from the major body of the text, it should serve well as supplementary reading for students who are interested in understanding the general picture of the present frontier.

The book is unfortunately marred by occasional errors. Although these are trivial and obvious, some occur in the illustrative calculations in the text, where an arithmetical error can only confuse the student and nullify the pedagogical effect. Also, in at least two places Avogadro's number is given as 6.06×10^{23}, while