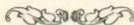


AUTOMATIC TELEPHONY
AS A CAREER

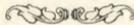


AUTOMATIC TELEPHONY
AS A CAREER



Bulletin 1030

April 1, 1930



AUTOMATIC ELECTRIC COMPANY
Formerly

Automatic Electric Inc.

1033 West Van Buren St.

Chicago, U. S. A.



The factories of Automatic Electric Inc., located on West Van Buren Street, Chicago, are devoted exclusively to the development, engineering and manufacture of automatic telephones, telephone central office equipment and allied products. The company is the originator of the automatic telephone {Strowger System} and has been for almost forty years its principal manufacturer in the United States.

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Opportunities in Automatic Telephony

The development, production and operation of dial telephone equipment has become one of the world's major essential industries. In this field of activity, Automatic Electric Inc. occupies a position of strategic importance. Almost forty years ago, its staff originated the Strowger system of automatic telephony, now in wide use throughout the world, and has since been the leader in its commercial and technical development.

The company's potential markets, always excellent, have been greatly expanded during the last few years, partly through aggressive commercial contacts abroad, and partly by pursuance of a judicious policy of development of new products for the broader fields of communication engineering.

With the rapid adoption of the dial system by telephone operating companies and administrations in all parts of the world, the field of opportunity for men thoroughly trained in this line has never been better than it is today. It is scarcely too much to say that no man can expect to enter the telephone business and make progress, without thoroughly familiarizing himself with automatic telephony in all its phases.

A large proportion of the automatic telephone experts in the world today have at one time or another been connected with Automatic Electric Inc. and have received special training through the company's special course in telephone engineering.

These men—the company's "graduates"—are engaged in technical and commercial work for telephone enterprises in nearly every part of the globe. Of course, the larger proportion of the men who have taken the course of training are still in

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the company's employ—as research workers, equipment engineers, sales engineers, heads of production departments, and installers and operating engineers. In fact, the majority of the important members of the organization, from the officials down, have entered the business as students, and have progressed steadily to positions of responsibility and profit.

These men are all engaged in a line of work which is intensely interesting and in which enthusiasm is sustained without effort. It is work which is of immeasurable importance in the promotion of world welfare, and which holds out reasonably large possibilities of personal success and advancement.

Automatic telephone work has always attracted a remarkably high class of men, and few leave it for other careers. It requires a high order of intelligence and intensive application, but there has been a high average of success. The future undoubtedly holds opportunities as attractive as in the past, if not more so, while the number of trained men needed will increase in constantly growing proportion.

The monetary reward, while not spectacular, is adequate and entirely comparable with that obtainable with other similar organizations. It may be expected eventually to enable the conscientious worker to attain a satisfactory livelihood, with a fair margin for savings and investment. The reward of personal satisfaction—the satisfaction of achievement—is infinitely more important and is limited only by the industry, application and intelligent effort put forth by the individual.

In this booklet are gathered together the more essential facts concerning the place of Automatic Electric Inc., in the world telephone picture, the company's history and commercial development, brief descriptions of its products, and an outline of its departmental organizations and activities. A brief summary of the course of training is also included. It is hoped that this information will be of assistance to those engineering graduates whose personal preferences and technical training indicate adaptability to a career in the telephone field.

The Telephone Business—A World Perspective

The "golden age of invention" has produced no marvel that has had a more pronounced or lasting effect on commercial and social life throughout the civilized world than the telephone. In its present high state of efficiency, combining as it does the manifold refinements of consummate electrical and mechanical engineering skill, it is an outstanding achievement of the highest type of inventive genius.

Like all great developments which have been instrumental in the bridging of time and space, telephone engineering progress deserves a high place among the world's civilizing influences. No nation can function at its highest when its cities and its people are isolated because of difficult communication. It is no mere coincidence that those countries which have the best communication systems, are also favored with the greatest industrial and commercial progress.

In this field of communication, the telephone is man's most intimate expression and most familiar tool. Those enterprises which are engaged in the various phases of telephone development, manufacture and operation render a service of constantly increasing importance to human welfare and progress—a service which is not merely useful and convenient, but one which, in the light of modern standards of social and business intercourse, may justly be classed as essential.

Like most of the great public utility enterprises, the telephone business is a constantly growing, constantly developing business. In the short space of a little over fifty years, the telephone has grown from a scientific toy to a utility of inestimable importance to modern business and industry.

But telephone progress is far from being at a standstill. Not so many years ago, it was a common thing to hear telephone people talk of the "saturation point" in telephone distribution. Now it is realized that there is no such thing. The services rendered by telephone operating companies are limited neither in extent nor in variety. Due largely to the ingenuity of telephone development engineers and to the liberal policies of the

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commercial departments of operating companies, telephone users are being served in scores of new ways not dreamed of a few years ago.

Here, in the United States, then, where there are already about twenty telephones to every hundred people, there is still a vast and fertile field for the ambitious and imaginative telephone worker. No other country in the world, however, is favored with this degree of development. Most of them are far behind in comparison. In other parts of the world, the use of the telephone began at a later date or has proceeded at a slower rate. Whatever the reason, the fact remains that the opportunities for development in foreign countries are virtually unlimited.

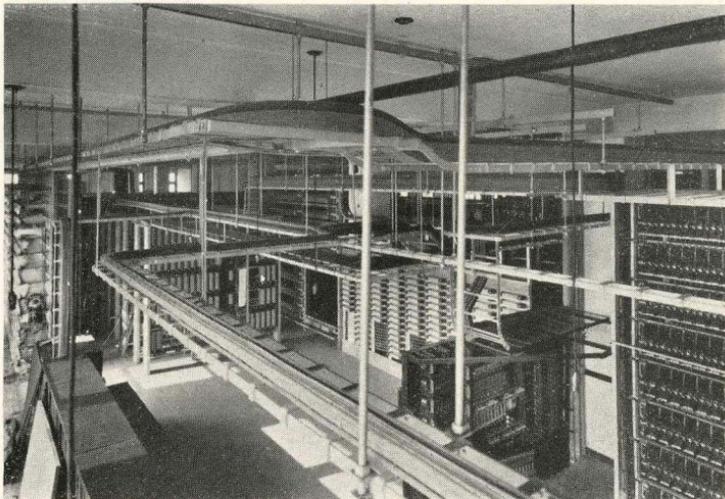
The current status of world telephone development is particularly favorable for American telephone manufacturing enterprise. The last few years have seen an awakening of telephone companies and government administrations in foreign countries to the necessity for improving and modernizing their telephone facilities. The United States, being the birthplace of the telephone itself, as well as that of most of the major developments of telephone history, including automatic switching, is being looked to, not only for engineering counsel, but also as a source of supply of all kinds of telephone products.

In this country, the telephone has become an indispensable adjunct to social and commercial intercourse. Sooner or later, in foreign countries, the standards of telephone service, and the extent to which the telephone is used, must follow the lead of the United States. A constantly increasing amount of foreign business is being handled by Automatic Electric Inc., because its technical resources and industrial facilities have proved highly valuable to the efficient conduct and healthy growth of the telephone business abroad.

The Company and Its Work

During the last ten years, the manufacture and installation of dial telephone systems has been a major feature of telephone development. The system made by Automatic Electric Inc.

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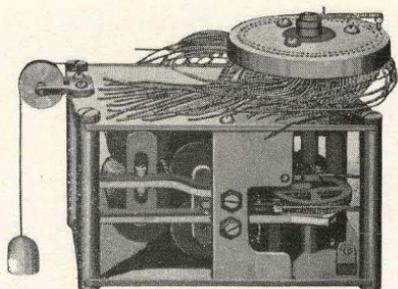
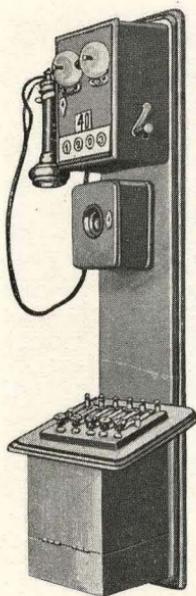


The installation of Strowger Automatic Telephone Equipment is an engineering project of the first magnitude. This shows one of the central office installations designed, constructed and erected for the Home Telephone and Telegraph Company, Fort Wayne, Indiana. It is typical of the many installations Automatic Electric Inc., has made in similar cities throughout the world.

and its licensees abroad is known as the Strowger System after its original inventor. In the United States the system is sometimes referred to as the step-by-step system, because of its use of ratchet stepping mechanisms in the selection of lines or trunks. A recent survey indicates that about 75% of the world's automatic telephones are of this general type, that is, they are connected to central offices which are equipped with Strowger apparatus or modifications based on the original Strowger design.

The story of the origin and development of the Strowger System of automatic telephony is an epic in the history of the telephone. In 1889, Almon B. Strowger was a Kansas City undertaker. One day, through some fancied oversight on the part of the local telephone operator, he lost a contract. The operator had inadvertently reported his line busy.

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This is the type of apparatus used in the first Strouger Automatic telephone system ever installed. Telephones and switches similar to these were placed in service in Laporte, Indiana, in 1892.

The incident set him to thinking. It was evident to him that as long as there were human operators, with their human failings, there would always be errors—that perfect telephone service required a system by which telephone connections could be secured mechanically instead of manually. Day by day he pondered the problem, and with a paper of pins, a pencil and an old collar box, he devised a crude model of a machine, which, if it could be perfected, would do the work of the operator, and more accurately than the human hand.

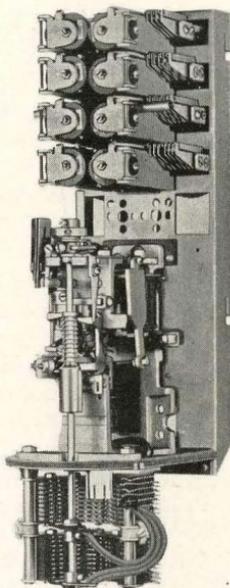
Men laughed—and tapped their foreheads significantly—but still the dreamer worked over his pins and pencil and collar box, and thought of the days when business would no longer be hampered by false busy signals and wrong numbers.

At last this visionary met the one man who could—and would—make his dream come true—Joseph Harris, a man of affairs—with vision. Young and daring, Mr. Harris examined

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This Monophone and connector switch represent the 1930 standards of the Strowger Automatic Telephone System.



the home-made model and did not laugh; he listened, and did not reply, "impossible."

Almost entirely through Mr. Harris' own efforts and based largely upon the esteem in which he himself was held, a company, known as the Strowger Automatic Telephone Exchange, was formed and active steps taken to make the idea a reality. Mr. Harris gathered about him other men of vision and enterprise, including a few with the necessary technical genius for practical development. Among the latter were numbered several who are still associated with the company's development department, notably T. G. Martin, now Vice-President and Chief Engineer.

Months of experimental work lengthened into years, but at last a great opportunity came to put the automatic telephone idea to a test. A franchise was obtained to install a system in

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La Porte, Indiana, and equipment for about 75 stations was made—largely by jewelers and instrument makers, for factory methods had not yet attempted any such accurate production.

On November 1, 1892, in the presence of a large and distinguished gathering of guests, the system was placed in operation. It was a momentous event. The dreams of these young adventurers were to be tested in actual service. Would the girl-less telephone actually work? This was the great question.

It did work, better than all but the most sanguine had hoped, and that event marked the beginning of the automatic telephone movement which today dominates the telephone industry, for no significant progress is now being made in the art which does not have for its purpose the lessening of the part played by the human factor.

The present organization of Automatic Electric Inc. is the outgrowth of the work of this group of pioneers, who took Strowger's crude idea, and through years of perseverance and concentrated study, moulded it to fit the practical needs of modern world telephony. The present executive staff of the company is shown on the opposite page, with an indication of the time each has been associated with the company.

From the beginning, the development and installation of the system was a technical and commercial success. The advent of the world war, however, brought a new stimulus to its commercial possibilities, because of the shortage of operating personnel for manual telephone exchanges. Telephone operators not only became scarce, but the salaries which they could command became larger. Cost of operation of telephone exchanges became a factor of increasing seriousness.

Shortly after the close of the war, telephone operating companies and administrations in all parts of the world issued pronouncements committing themselves definitely to programs of conversion of telephone systems to automatic operation. In 1919, such a policy was announced publicly by the officials of the Bell System. In 1925, the Engineer-in-Chief of the British Post Office announced that the Strowger system was to be adopted for the London metropolitan area, as "*the most*

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Executive Staff of Automatic Electric Inc.



W. F. BENOIST
President
(21 Years)



GRANT PELTON
*Vice-Pres. in Charge of
Devel. and Mfg.*
(18 Years)



T. C. THOMPSON
*Vice-Pres. in Charge of
Sales and Equip. Eng.*
(27 Years)



T. G. MARTIN
Vice-Pres. & Chief Eng.
(37 Years)



R. C. GIFFORD
Works Manager
(28 Years)



W. I. PATTON
Secretary and Auditor
(26 Years)



E. R. NEIR
Asst. Chief Engineer
(27 Years)



B. D. WILLIS
Asst. Chief Engineer
(26 Years)



H. P. MAHONEY
Asst. Chief Engineer
(24 Years)

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practically suitable means of meeting the telephone needs of the next generation in that great and important area." Other world metropolitan areas followed suit in rapid succession.

The latter part of 1919 saw the beginning of a period of rapid expansion of engineering and manufacturing facilities on the part of Automatic Electric Inc.—a period of expansion which is still in some measure in process. The success of the automatic telephone idea during these ten years has been so pronounced that the dial telephone, rather than the manual type, has come to be the standard.

Here are some interesting facts concerning the present status of the Strowger Automatic System as it relates to general commercial telephone development.

1. Practically all of the larger city exchanges operated in the United States by independent telephone companies have already been converted to the Strowger system. A large proportion of the smaller cities are already using this equipment or are planning to do so as soon as their existing manual switchboards reach the end of their economic life, or, because of size or obsolescence, become inadequate. These independent telephone companies, of which, including the very small rural companies, there are about ten thousand, represent a large and continuous market for the products of Automatic Electric Inc., not only for new telephones and central office equipment, but also for additions to initial installations, as increased telephone growth makes such additions necessary.

2. As mentioned previously the Bell System, ten years ago, publicly entered upon a program of gradual conversion of all city exchanges to dial operation. They are now putting automatic service into an average of 40 or 50 telephone exchanges a year, all except those in the metropolitan cities being of the Strowger type. Automatic Electric Inc. is, and will be engaged in the supply of central office equipment for a substantial portion of this program by virtue of long term contracts which it holds with the Bell System.

3. The United States Government, and various projects and departments under governmental control, are users of Automatic Electric Inc.'s products to a large and continuously

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increasing degree. Its equipment is being installed in arsenals, navy yards, battleships, and in various military, naval, and coast guard stations. The Canal Zone telephone system has been equipped throughout by Automatic Electric Inc.

4. In foreign countries, the trend towards automatic telephony is no less pronounced. The first foreign installations of the Strowger system were made over twenty years ago, and for many years a constantly increasing part of the production program of Automatic Electric Inc. has been devoted to export business.

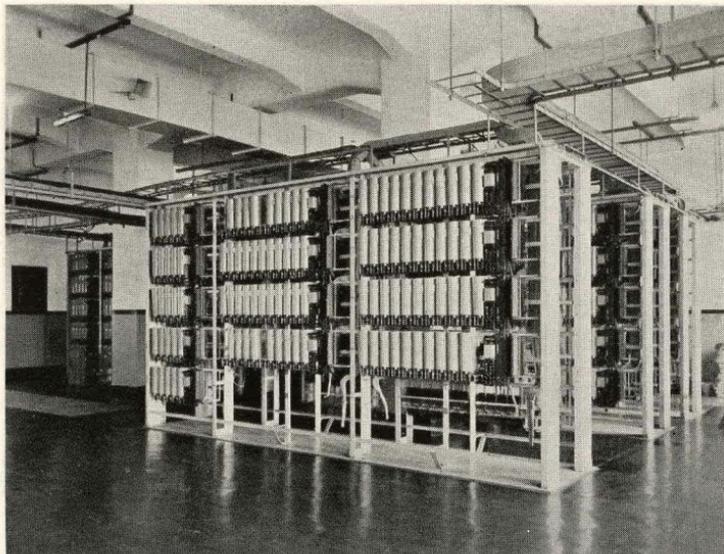
A number of factors enter into the adaptability of automatic equipment to the foreign field, which, to the casual observer, may not be immediately apparent. The development of transportation facilities has resulted in a great increase in travel, with the result that a greater number of languages are spoken in every foreign center than ever before. Even in those communities which do not receive many travelers, there is often a cosmopolitan population with its complex language problem. In one large city it was discovered that a switchboard operator, to render efficient service, would have to speak sixteen different languages. Obviously, the expense of securing and maintaining such an operating force would be out of the question. Experience has shown that this problem, which exists in scores of large foreign cities, can only be solved by the installation of automatic telephones. It is here that Automatic Electric Inc. is able to offer important and valuable services.

The Company's Products

The products manufactured by Automatic Electric Inc. fall into a number of classes, the most important of which may be grouped under the heading of automatic telephone central office equipment.

Large Exchange Systems—The development, engineering, production and installation of automatic telephone equipment for use in cities of large and moderate size constitute the most important of the company's activities. Among such cities in the United States which have been already so equipped, either wholly or in part, are such representative places as Philadel-

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This installation, recently completed at Tokyo for the Department of Communications of the Japanese Government, is typical of the many installations of automatic telephone equipment being made for foreign cities.

phia, St. Paul, Minneapolis, Columbus and Dallas. Abroad, such cities as Sydney, Australia; Tokyo, Japan; Havana, Cuba; London, England and Manila, P. I., have been partly or wholly converted.

Small Exchange Systems—During the last few years, the company's engineers have made a comprehensive study of rural operating conditions with special reference to the economic adaptation of automatic equipment. The results have been most satisfactory and the possibilities of further progress are very encouraging. Plans have been worked out and put in successful practice, whereby groups of small exchanges have been replaced with small automatic units, displacing all operating labor entirely, toll service and all other services

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requiring human attention being centralized at a common point. This operating center may in some cases be the headquarters exchange of the network, or the economic center from the standpoint of toll line distribution. In the last five years, the number of such towns converted to dial operation has been more than tripled, although thousands of cities still remain to be equipped.

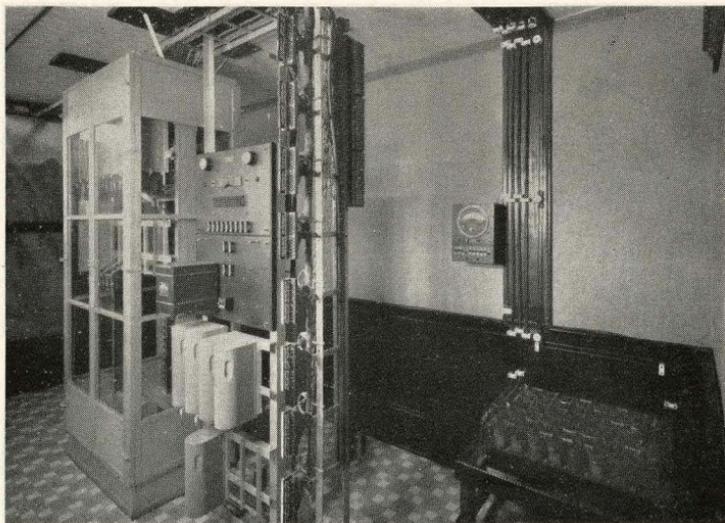
Semi-Automatic Systems—This type of equipment, recently developed, has proved highly successful in many small town networks and for rural lines terminating in the larger city exchanges. It is especially adaptable in those cases where it is technically impractical or commercially inexpedient to install full automatic apparatus.

Private Automatic Exchanges—The use of Strowger Automatic telephone equipment for private exchange service has proved to be of the utmost commercial importance. Almost two thousand private automatic exchange installations are in service in the United States alone, and there is a growing tendency for the users of private telephone equipment to supplement their branch exchange service with a separate automatic interior system, or to supplant their private telephone systems with branch exchanges. These systems are commercially known as Strowger P-A-X's.

Miscellaneous Telephone Equipment—It has always been the company's policy to manufacture completely in its own shops as much as possible of the vast variety of parts and equipment that enter into a complete automatic central office installation, and, in any event, to formulate its own specifications for the manufacture of equipment which it is obviously not equipped to produce. This is done so that the company may maintain control over both quality and production cost.

A complete telephone central office installation will consist, for example, not only of the automatic switchboard proper, but also of a power plant, including storage battery, charging machines and completely equipped power board. There will also be accessory equipment as distributing frames, wire chief's desks, test desks, toll switchboards, repair clerk's

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This is a 50-line automatic central office installation such as are being installed in small towns throughout the world. Telephone exchanges of this size represent an almost inexhaustible field for the industry and ingenuity of the Automatic Electric engineering staff.

desks, and other miscellaneous equipment essential to a complete installation. All of this apparatus, with the exception of the storage batteries and charging machines, is made in the company's own shops, and designed and specified by the company's own engineering staff.

Telephone Instruments—The Company's development staff has not confined its efforts to the perfection of central office equipment, but also has been instrumental in modernizing and beautifying telephone instruments. This same staff was the originator of the modern American handset telephone, known commercially as the Monophone. The demand for this type of telephone has been far greater than even the manufacturers had hoped. In fact, the present trend of development is such that there can be no longer any doubt that the Monophone

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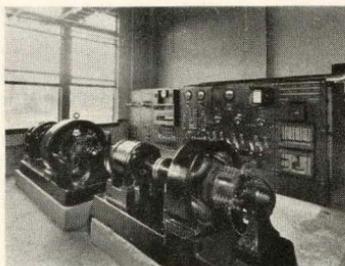


This is a typical Strowger P-A-X switchboard, installed for the Atlantic Refining Company, Philadelphia. Almost 2,000 systems similar to this are now in service throughout the United States, as well as hundreds of others abroad.

type of telephone will in time supplant all of the older types. A more recent development in connection with the Monophone has been the perfection of this telephone in colored moulded plastics. Telephone users may now select their telephones to harmonize in color and finish with the furnishings of their homes and offices.

Fire Alarm Systems—A few years ago the company made an exhaustive study of existing fire alarm systems, both industrial and municipal, and from a critical review of their defects and good qualities, decided that a fire alarm system of superior operating qualities and one that would be more economical to make and sell, could be devised, using automatic telephone switching equipment as the basis for the fire station central coding equipment. Such a system has now been developed and placed on the market, and several important installations are already in service.

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A complete automatic telephone installation includes not only the automatic switchboard proper, but such auxiliary equipment as storage batteries and power plants. These two illustrations show the power plant equipment installed at Fort Wayne, Indiana.

Railroad Telephone Equipment—For years, the leading railroads of the country have been enthusiastic users of Strowger private automatic telephone systems for terminals, yards and shops. A survey of the telephone requirements of the telephone and telegraph departments of several roads indicated that there was room for improvement in much of the equipment then available, and that Strowger apparatus was economically and technically adaptable to many of the devices in common use. A substantial list of products has already been perfected and approved by the American Railway Association, while a number of others which promise merit are in process of development.

Miscellaneous Telephone and Signal Accessories—The small relays and multi-point switches used in Strowger Automatic Telephone systems have attracted the attention of industrial engineers and designers of electrical and mechanical equipment, because of their reliability and endurance characteristics. The use of these relays and switches in various industrial devices is increasing rapidly, and technical studies are being constantly made to expand this field. In cases where the ultimate requirements seem to justify such action, special designs of various signal or telephone accessories are developed to meet the specifications of the company's customers.

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Departmental Divisions of the Company

Automatic telephone work is not the narrow field of activity that the casual reader might infer from the title of this booklet. The technical graduate who enters the employ of the company will find as wide a variety of opportunity as in almost any other major industry. The activities range all the way from pure research, through the various engineering stages, to the more practical problems of mass production, sales and installation. In the following paragraphs are summarized briefly the types of work in which the departments are variously engaged.

Installation—As explained in subsequent pages of this booklet, installation work forms a regular part of the company's course of training. It is a very essential part. In no other way can so thorough a knowledge of the company's equipment be acquired in so short a time. Practically all of the company's engineers and those holding positions of a supervisory character in other departments have at one time or another been engaged in installation work.

In this sense the Installation Department may be regarded as a clearing house for supervisory personnel. A large proportion of installers, however, prefer to stay in that department for a number of years. For those who prefer to do so, and who are able to measure up to the standards of ability and personality required, there is no better way of achieving, not only a thorough knowledge of the equipment, but also high qualities of self-reliance, and good judgment.

The conscientious student of installation methods may expect, after a year or so as assistant installer, to assume charge of complete installations—the less important ones at first, such as private automatic exchanges or small rural exchanges, progressing then to installations of medium size, until finally he is capable of representing the Company's interests in the handling of the installation of complete multi-office networks. Work of this character requires the willingness to travel, in

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A corner of the equipment engineering department of Automatic Electric Inc.

many cases to other countries, and the capacity to measure up to high standards of ability, self-reliance, initiative and sound business judgment. He must also be possessed of a personality which will permit him to deal with all classes of people on a footing of dignity and assurance. Very frequently, he is the only point of contact between the Company and its customer, and it is very necessary that he help to maintain the Company's high standing wherever he may be.

Equipment Engineering—The work of the equipment engineer comes as an intermediate step between that of the sales engineer and that of the production departments. The equipment engineer takes the ideas and apparatus perfected by the Development Department and correlates them with the specifications furnished by the customer through the Sales Department.

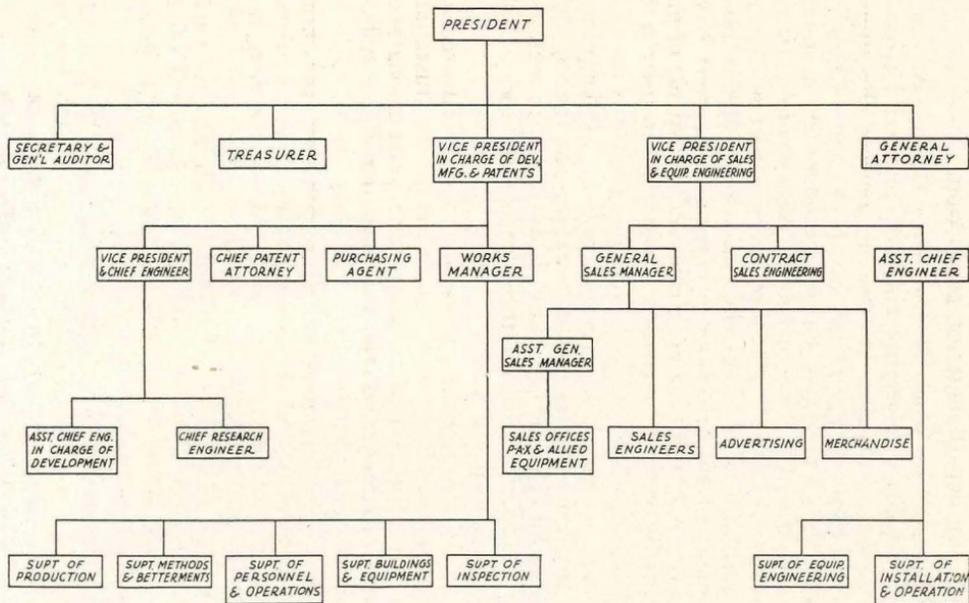
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While the development engineer is concerned primarily with the circuits and mechanical designs of the various elements of apparatus, the equipment engineer is responsible for the practical and economic adaptation of these elements to specific practical conditions. The former is interested in the perfection of electrical and mechanical performance; the latter must be capable of planning the assembly of the completed installation. The equipment engineer must have such genius for minutiae of detail that the production and installation departments will be capable of following the instructions contained in his specifications without doubt or question. He must also have sufficient breadth of vision to be capable of visualizing the final project, soundly planned, carefully constructed and smoothly operating.

While the equipment engineering department of Automatic Electric Inc. is necessarily highly coordinated in its functions and personnel, it is found convenient to divide the activities into a number of groups. The members of each group, while in a sense specialists in their own particular line, must have a fairly complete picture of each project to which they are assigned, and must otherwise conform to the requirements indicated above.

One group will develop and design the most economical and practical forms of mountings and frameworks on which the apparatus will eventually be placed. Another group will lay out floor plans and other structural specifications for particular installations. Another group will analyse the traffic figures furnished by the sales engineer, and from them will compute the quantities of switches and trunks necessary for each part of the exchange switchboard. Still another group will analyse the power requirements for the complete exchange and will prepare manufacturing and installation specifications accordingly. Similarly with the various manual and special service desks.

The heads of these various groups are in constant contact with one another, to insure coordination of effort, and, in turn, report severally to the Superintendent of Equipment



General Organization Chart of Automatic Electric Inc.

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Engineering, who is responsible for the adequacy and correctness of the complete engineering job as it is turned over to the manufacturing departments for production.

Sales Engineering—Work in the Sales Department of the Company requires engineering ability, a natural instinct for social contacts, a personality which reflects the dignity, policies and conservatism of the Company, and a knowledge of the Company's products and of the telephone business in general which will bear the most searching scrutiny. It is not sufficient that the salesman be a technical expert with respect to the equipment he is selling; he must also be able to talk in the language of the telephone operating man, must have a natural sympathy with his problems, and be capable of meeting him halfway in an endeavor to solve them to their mutual satisfaction.

The company maintains sales offices in all of the principal cities in the United States, while its export distributing agent, The Automatic Electric Company, Ltd., has sales representatives in practically all countries for which the company furnishes equipment.

Men for sales engineering work are usually recruited from the ranks of the Equipment Engineering and Installation Departments, although for certain types of promotional work, satisfactory completion of the training course is a sufficient prerequisite.

Production—The manufacture of a complex and highly specialized product such as automatic telephone equipment cannot be accomplished by the mere assembly of men, materials and machines. It has required almost forty years to develop and create the present staff which is guiding the various processes involved in the production of the thousands of parts and assemblies which enter into the assembly of a complete installation.

The improvements which have been made in production efficiency and production methods during the last few years are amazing. Undoubtedly there will always be room for further work in the way of lowered costs, improved methods and higher working efficiency. The graduate engineer whose

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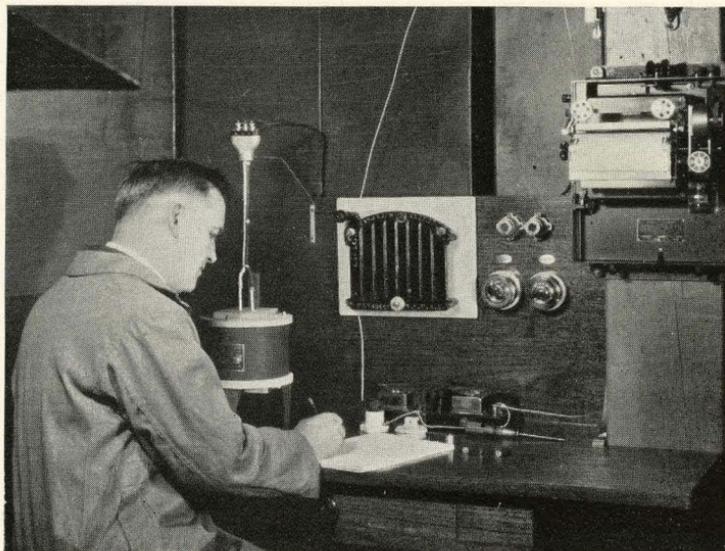
natural leanings are towards production supervision or shop problems will find in the company's manufacturing departments ample opportunity for the exercise of his talents.

Technical Writing and Advertising—The ability to write clearly, logically, and in good style is a valuable attribute in any engineer, even though he may never have occasion to spend much of his time in that work. Very often he will be required to prepare reports or articles concerning work with which he has been associated, and his work will frequently be judged in some measure by the clearness and conciseness with which he is able to present facts on paper.

The company's printed promotional work consists largely of the publication and distribution of technical information. The Company's customers and prospects are largely technically-minded, and are eager for printed material descriptive of technical products and methods. To this end, the company's advertising department includes a technical publications staff which is in constant contact with the technical departments so that information regarding new products or improvements may be issued in bulletin form as soon as it is deemed expedient. The Company is always glad to confer with any technical student who is especially interested in this line of work, either as a career or to supplement engineering activities.

Development and Research—The Company maintains extensive laboratory facilities both for pure physical research and for practical development of telephone products. Most of the development workers are mature telephone men of life-long experience, and have therefore a thorough knowledge of telephone development history, and of the current status of development of all branches of modern telephone engineering. New members of this group are usually selected from one of the other technical departments. In the Research Group, physicists who have performed experimental work in technical schools or elsewhere are occasionally required to conduct work of an investigational character, and which has some reference to telephone problems encountered by the Company or its customers.

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The Research and Development Department offers many opportunities and complete facilities for electrical and physical research. This illustration shows the use of a transformation point recorder especially devised for the company's use in testing magnetic materials.

The Development Department also includes a well-equipped mechanical laboratory, in which improvements in mechanical design are initiated and perfected; an Engineering Inspection Department, which establishes standards of dimensions and adjustments for the purpose of maintaining control of quality and high standards of performance in operation.

Operating Engineering—The Company also maintains an extensive service organization, known as the Operating Department, where its customers may obtain advice and assistance on operating or maintenance problems encountered in the operation of automatic telephone equipment. Members of this department are, for the most part, former installers who have

AUTOMATIC TELEPHONY AS A CAREER

shown particular aptitude towards telephone operating work, or who have had previous experience with operating companies.

Opportunities With Operating Companies—When a telephone company converts its exchanges to the automatic system, it is seldom necessary to displace the old staff—superintendent, wire chief, rackman, etc. With proper training, these men almost always prove themselves able to handle the new equipment in a very satisfactory manner. But in systems of large size, it usually happens that one or more specially trained or experienced operating men are employed, and the Company is constantly being called upon for men of this type. If they prove themselves competent, such men are in line for promotion to positions as superintendents, equipment engineers, district managers, etc.

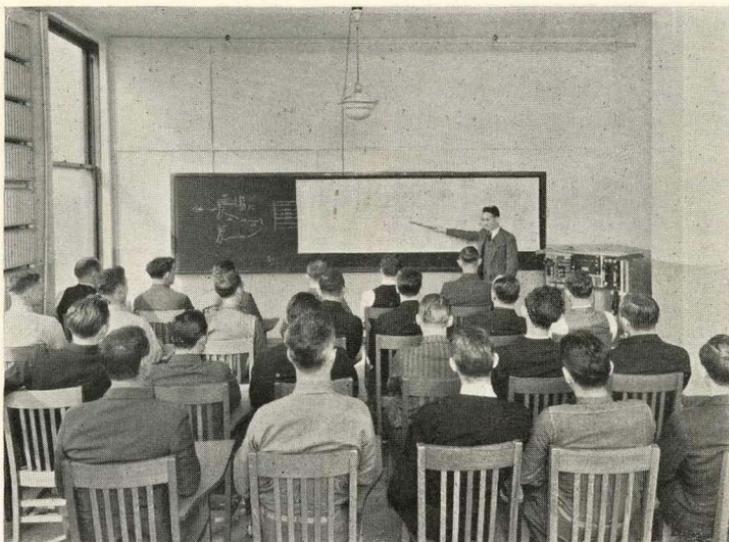
The Company's Training Program

Telephone engineering requires technical talent of an exceptionally high order. It is not, as many engineering students are prone to consider, a study involving electrical and mechanical designs of only a very simple character. The apparatus itself constitutes one of the finest and most splendid creations of electrical history. Its designs involve circuits and electrical and mechanical elements of a highly involved nature; its scientific ramifications are endless.

For these reasons, the engineering graduate must not consider himself a ready made telephone engineer, designer or salesman. His college career is the finest possible foundation for the specific training he will receive in industry, but at best it is only a foundation. The Training School conducted by Automatic Electric Inc. has been designed to make the best possible use of the fundamental training the student has already had.

The Training Course is a careful blending of theoretic and practical work. The principles of the equipment and its

AUTOMATIC TELEPHONY AS A CAREER

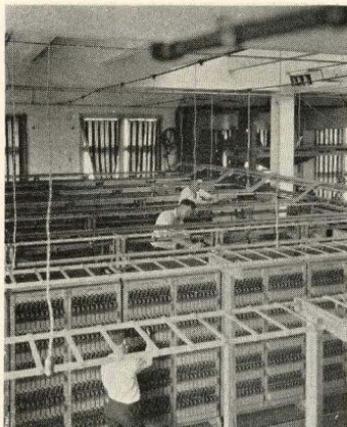


The training course conducted by Automatic Electric Inc., includes thorough instruction in circuits, traffic calculations and other theoretical studies. This group of students includes several members of the U. S. Signal Corps.

mechanical and electrical design, are outlined in detail by means of illustrated lectures given by men accustomed to teaching, and by means of recitations, quizzes and demonstrations by the students.

In the earlier part of the course, particular emphasis is placed on the fundamentals of telephone systems as a whole, that is, without particular reference to types of switching equipment, but including a large amount of information on general telephone plant design. This forms the groundwork later for a study of the circuits and mechanisms of the Strowger system, as well as the design of the many special types of switchboard apparatus used in connection with the conversion

AUTOMATIC TELEPHONY AS A CAREER



Installation and testing forms an important part of the instruction given engineering graduates in their training for automatic telephony.

of large metropolitan networks, such as Director Equipment, Call Indicator Systems, Cordless "B" Boards, etc.

The practical work consists of assembly, adjustment and testing of various types of apparatus. The entire course in the training school takes approximately four months, after which the student is usually assigned to installation work. During this time his work is watched closely for indications as to his ability and the particular trends of his interest. His subsequent assignments and progress depend on the results of these observations. The following schedule shows the subjects covered in the Training School and the approximate time devoted to each one.

AUTOMATIC TELEPHONY AS A CAREER

- C. Connectors
 - 1. Individual Line
 - 2. Rotary
 - 3. 10-party {Harmonic Ringing
Code Ringing }
 - D. Impulse Repeaters
 - E. Power, Supervisory Schemes
 - F. Reverting Call Switches
 - G. Test Apparatus
 - H. P-A-X Circuits
 - I. Rural Exchange Apparatus
 - J. Toll Circuits {Automatic
Manual }
- II *Engineering*
- A. Traffic Calculations
 - B. Automatic Equipment Requirements
 - C. Power Requirements
 - D. Metropolitan Networks

Company Benefit Plans

The Company maintains a liberal plan of disability and death benefits, as well as arrangements whereby group life insurance may be purchased at a very low rate. Full details of these plans are furnished each student at the time of entering the Company's employ.

Applications

The interested student may obtain further information on and application blanks by addressing:

*Supervisor of Personnel Training
Automatic Electric Inc.,
1033 West Van Buren Street,
Chicago, Ill.*

AUTOMATIC TELEPHONY AS A CAREER

Some of the Engineering Graduates in the Employ of Automatic Electric, Inc.

<i>Name</i>	<i>School and Class</i>	<i>Degree</i>	<i>Position</i>
P. Bakker	S. Dak. St. Coll. '27	B.S. in E.E.	Inspection Engineer
C. T. Birkbeck	Notre Dame U. '24	B.S. in E.E.	Power Engineer
G. Bos	Univ. of Iowa, '06	B.S. in E.E.	Man. Engineer
F. A. Brand	Iowa St. Coll., '29	B.S. in E.E.	Student Installer
F. T. Braver	Univ. of Ill., '29	B.S. in E.E.	Insp. Engineer
F. Calhoun	Iowa St. Coll., '26	B.S. in E.E.	Insp. Engineer
C. P. Clare	Univ. of Idaho, '27	B.S. in E.E.	Insp. Engineer
I. W. Cox	U. of Chicago, '29	Ph.D.	Physicist
Thos. F. Crocker	Iowa St. Coll., '03	B.S. in C.E.	Develop Engineer
L. A. Cutshall	Univ. of Neb., '05	B.S. in E.E.	Sales Engineer
R. R. Fowler	Univ. of Neb., '28	B.S. in E.E.	Insp. Engineer
L. B. Garrison	Univ. of Penn., '09	B.S. in C.E.	Patent Engineer
O. D. Grandstuff	Purdue Univ., '29	B.S. in E.E.	Insp. Engineer
J. W. Graves	Univ. of Mo., '26	B.S. in B.A.	Tech. Pub. Staff
H. H. Harbecke	Kans. St. Ag. C., '11	B.S. in E.E.	Power Engineer
H. E. Hershey	Kans. St. Coll., '10	Ph.D.	Develop. Engineer
A. Hiel	Purdue Univ., '10	B.S. in E.E.	Equip. Design Eng.
E. H. Holt	Iowa S. Coll., '27	B.S. in E.E.	Insp. Engineer
G. L. Homer	Univ. of Illinois, '29	B.S. in B.A.	Student Installer
C. H. Hou	Purdue Univ., '29	B.S. in E.E.	
		and B.S. in M.E.	Student Installer
O. C. Hovland	Iowa St. Coll., '01	B.S. in E.E.	Equip. Engineer
W. C. Howard	Iowa St. Coll., '25	B.S. in E.E.	Analysis Eng.
H. H. Hulse	Iowa St. Coll., '25	B.S. in E.E.	Patent Engineer
Z. Y. Hwang	Purdue Univ., '29	B.S. in E.E.	
		and M.S. in E.E.	Student Installer
H. Irwin	Miami Univ., '22	A.B.	Insp. Engineer
W. E. James	Purdue Univ., '29	B.S. in E.E.	Insp. Engineer
M. A. Johnson	Univ. of Neb., '25	B.S. in M.E.	Insp. Engineer
A. F. Krehbiel	Univ. of Iowa, '24	B.S. in E.E.	Off. Mgr. Fact. Acct.
C. I. Kuppinger	Iowa St. Coll., '21	B.S. in E.E.	Asst. Adv. Manager
O. C. Levy	Univ. of Illinois, '26	B.S. in E.E.	Devel. Engineer
G. H. Lyle	Iowa St. Coll., '26	B.S. in E.E.	Aut. Engineer
T. A. Logan	Yale University, '26	B.S. in E.E.	Insp. Engineer
H. B. McElyea	Iowa St. Coll., '09	B.S. in E.E.	
		and M.S. in E.E.	Equip. Design Eng.
F. W. Maier	Iowa St. Coll., '26	B.S. in E.E.	Research Eng.
W. D. Miller	Iowa St. Coll., '26	B.S. in E.E.	Equip. Design Eng.
E. R. Neir	Case School of Applied Science, '03	B.S.	
C. E. Peterson	Tri-State Coll., '24	B.S. in E.E.	Asst. Chief Eng.
J. B. Peterson	Iowa St. Coll., '29	B.S. in E.E.	Man. Engineer Student Installer

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<i>Name</i>	<i>School and Class</i>	<i>Degree</i>	<i>Position</i>
W. C. Phebus	Ohio State U., '24	Ph.D.	Physicist
E. W. Plagge	Iowa St. Coll., '20	B.S. in E.E.	Asst. Sales Manager The Automatic Tel. Co., Ltd.
J. C. Pond	Iowa St. Coll., '29	B.S.	Student Installer
J. F. Probst	Ohio State U., '08	M.E. in E.E.	Sales Engineer
W. G. Quist	Gustavus Adolphus College, '25	A.B.	Devel. Engineer
E. M. Raymond	Dartmouth Coll. '28	B.S.	Student Installer
R. P. Reighard	Iowa St. Coll., '25	B.S. in E.E.	Analysis Eng.
R. G. Richardson	Kent C. of Law, '20	B.L.	Asst. Pat. Attorney
L. L. Ruggles	Purdue Univ., '18	B.S. in E.E.	Supr. of Personnel Training
L. K. Slugostyki	Armour Institute of Tech., '26	B.S. in E.E.	Insp. Engineer
A. B. Smith	N. W. Univ., '26	Ph.D.	Chief Res. Engineer
H. H. Smith	Univ. of Illinois, '25	B.S. in E.E.	Devel. Engineer
C. R. Snowden	Armour Institute of Tech., '05	B.S. in E.E.	Private Exch. Eng.
W. J. Stanton	Cornell College, '02	B.S. in C.E.	
B. C. Strimble	U. of Chicago, '04	B.S. in E.E.	Sales Engineer
E. B. Sutherland	Ohio St. Univ., '28	B.S. in B.A.	Time Study
	Purdue Univ., '29		
F. H. Tillorson	Purdue Univ., '05	B.S. in E.E.	Res. Engineer
H. H. Wagner	Iowa St. Coll., '26	B.S. in E.E.	Manual Engineer
R. A. Welch	U. of Michigan, '05	B.S. in E.E.	Equip. Design Eng.
John Wicks	U. of Minnesota, '04	E.E.	Manual Engineer
C. E. Wilcox	Univ. of Neb., '23	E.E.	Toll Devel. Eng.
B. D. Willis	Univ. of Neb., '23	B.S. in M.E.	Insp. Engineer
E. J. Wood	Univ. of Iowa, '01	E.E.	Asst. Chief Engineer
A. E. Woodruff	Cornell Univ., '13	M.E.	Mgr. Factory Acct.
H. B. Wright	U. of Chicago, '24	Ph.D.	Physicist
	Univ. of Neb., '13	B.S. in C.E.	Supr. of Production

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