

THE WORK  
— of the —  
**Thomas Alva Edison**  
Technical and Industrial  
High School



1932

BOARD OF EDUCATION  
ROCHESTER, NEW YORK

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— of the —  
**Thomas Alva Edison**  
**Technical and Industrial**  
**High School**

The Thomas Alva Edison Technical and Industrial High School was designated as such on October 22, 1931, by the Rochester Board of Education. This school was formerly the Rochester Shop School, and the new name as given above should be substituted wherever the old title appears.

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## FOREWORD

**I**N a recent survey (1929) of the employment situation in Rochester, the Rochester Chamber of Commerce emphasized the large number of men between the ages of twenty and twenty-five who were untrained for any specific occupation. The Board of Education of Rochester is making a consistent effort to provide shop training, and to organize classes in the Thomas Alva Edison Technical and Industrial High School in response to specific industrial needs.

It is a well-known fact that the larger percentage of boys must earn their living in some manual occupation. In general, the remuneration that can be expected is in direct proportion to the amount of training taken. This in turn is largely controlled by a boy's desire, initiative, and ability to meet the situation, and the willingness of his parents to permit his choice of shop training as against a full program of academic work. If a boy who realizes that he will have to go to work at sixteen or eighteen can select a certain trade and receive training for it, his chance of success on the job is greater and his chance of happiness during non-working hours is improved.

The question is often asked, "Which is the best trade to learn?" There is no best trade when the wage scale is considered. A real mechanic, one who enjoys his work and does it well, is in demand in all lines of industry. The essential factor is that the individual must select work which he likes and for which he has some aptitude. Having discovered the trade for which he is best fitted, he should follow as long a course of training as possible, with real ambition to succeed.

In the following pages the opportunities for training in the Thomas Alva Edison Technical and Industrial High School are outlined. The curriculum makes possible an intelligent choice of occupations in the industrial field that pay good wages to properly trained men.

It has been a comparatively simple matter in the past to place most of the advanced class boys in jobs upon graduation. Industry recognizes the value of vocational training which this school is able to give and is glad to accept boys who have taken advanced training here. It is a well known fact that there are two ways to enter industry: one is the method used by most unskilled workers as indicated by the Chamber of Commerce report. These workers merely drift along and accept anything that a manufacturing concern has to offer with no idea of further training and no ultimate goal. The other method is to obtain certain elementary trade training in a school and to investigate the essential requirements and possible opportunities of a given trade so that upon entering industrial life there is a real chance of success. The purpose of the following pages is to assist boys in the choice of the right vocation and to stimulate their ambition so that through careful preparation and conscientious application they may be successful after leaving school.

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## BATTERY AND IGNITION WORK

NE year of the course in auto mechanics is spent in the battery and ignition shop. This shop is equipped with a complete outfit for testing and repairing all types of starters, generators, and ignition systems and for charging and repairing storage batteries.

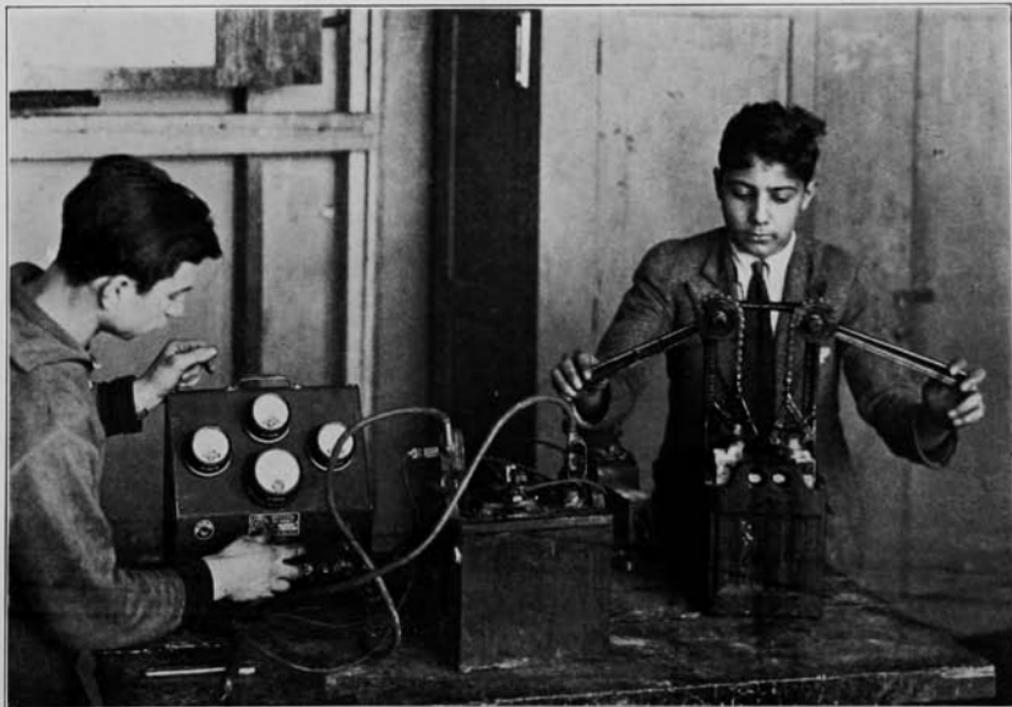
The fundamental principles of electricity as applied to automobiles are taught by individual and group instruction. Students learn to wire cars for lights and to locate wiring troubles on several makes of cars which are part of the shop equipment. Ignition systems and car timing are also studied on these cars.

Starters and generators are tested and repaired on special equipment for this work and the student is taught to locate armature and field troubles and to repair them. He also learns to make several tests of storage batteries to locate internal troubles and to make repairs to cables and starter connections on cars which are brought to the shops for service.

When a battery is found to be in need of repair, it is tested to locate the cells that are dead. The battery is then dismantled and examined to determine the cause of the trouble. If the plates are found to be in good condition, the battery is reassembled and put into service.

When new plates are needed, the student assembles them by means of the lead burning equipment. The battery is then assembled, sealed, charged, and returned to service. When it is necessary to perform any particular operation on a battery or ignition unit, operation sheets covering that job and indexed as such are used. If questions arise which must be answered before proceeding with the work, reference is made to the information topics which explain the nomenclature, the construction, and the action of the storage battery or ignition unit being studied or worked upon.

Unit instruction sheets are used throughout the work. These state in a brief and definite way the different steps in the performance of a unit operation, each operation being followed by the one that is deemed necessary in correct procedure from a technical standpoint. Questions follow each operation sheet and are intended to bring out the salient points of the operation.



BATTERY AND IGNITION

## CABINET-MAKING

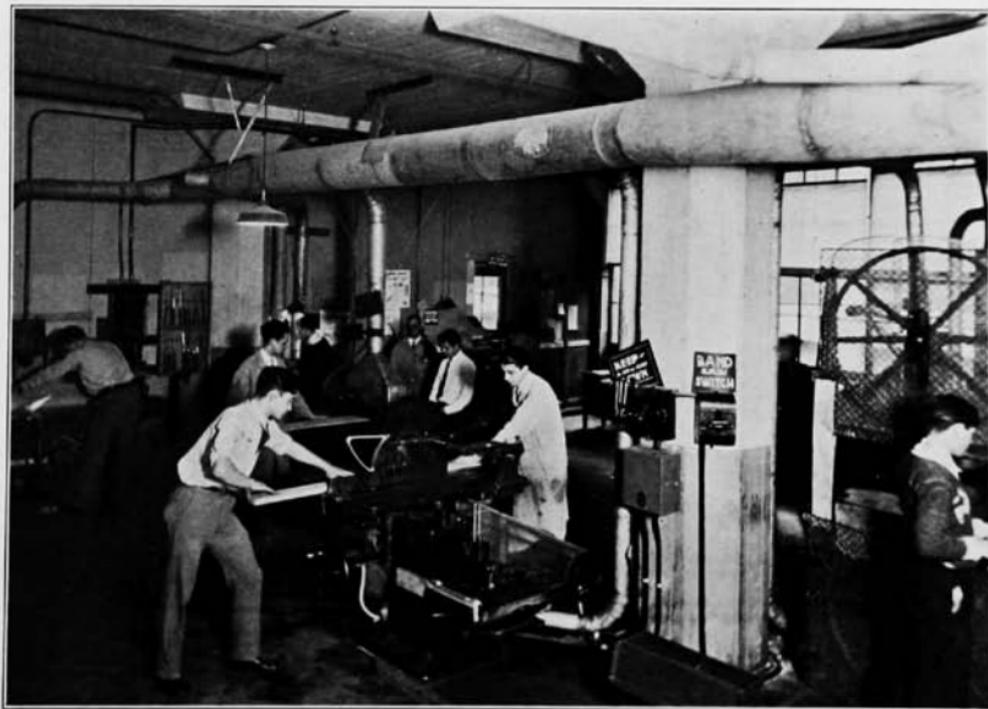
 CABINET-MAKING in the Rochester Shop School is taught to the students in accordance with factory processes since this is one of the co-operative courses. Much unnecessary work is omitted and both speed and quality receive emphasis. The factors which must be considered are number of operations, possible fatigue, variable position, and different materials. Judgment, accuracy and skill are always required. The course includes instruction in the running of machines, the use of hand tools, the sharpening of dull tools, and the laying out and construction of articles from blue prints or drawings. Different kinds of wood, such as white wood, pine, oak, gum, and bass wood are studied and the boys learn to figure out the number of board feet used in the project and to make a bill of materials before lumber is taken out to be sawed.

The students are taught to make many kinds of joints and wood cuts; to glue or dowel pieces together when stock is not wide enough; and to apply hardware, such as hinges, locks and knobs, and trimmings in the proper way. They learn to fit the several parts together after the milling and to assemble either by gluing, screwing, nailing, or wedging. As a last step the project is cleaned and touched up with sand paper, and is then ready for the finish.

In this department a course in finishing is also given. When the project is ready it is taken to a room that has a temperature of 10 degrees and is free from dust. This room is called a finishing room. Here, the students are shown the correct way to apply the different coats,—filler, stain, shellac, and varnish. When the project has nail or small knot holes or other marks and checks, putty must be mixed to the exact shade of the finished wood. In many cases, after each coat, the project must be sanded, rubbed, or polished.

Some problems in carpentry are given, such as laying out rafters, stairs and braces, hanging doors, framing and inside trim.

The students in the cabinet-making department have the satisfaction that comes from construction. From the raw material, finished articles such as desks, tables, chairs, book cases, drawing boards and tables, filing and other cabinets, are made that will bear close inspection for good workmanship.



CABINET MAKING

## COMMERCIAL ART

**C**OMMERCIAL art is a field of work demanding training and ability. The successful commercial artist must have a good art background, originality in ideas and in their expression, and great skill in execution.

There are various specializations possible in the work. Show card writing is one of the recently developed trades. When merchants first began to use display cards, sign painters were the only men equipped to do the work. When it became apparent that the lettering of these display cards would prove rather a profitable trade in itself, many sign painters began to specialize in this branch of applied art. Then show card writing became a distinctive trade with characteristics and requirements of its own. Show card writing at the present time has little or no connection with sign painting. The student's first task is to learn the fundamental strokes which compose lettering in general. He must know the different characters and styles of lettering and also the fundamentals of advertising appeal and the essential requirements in producing attractive cards wherein color contrasts and combinations play a silent but important part.

There is no field of applied art at present that offers more possibilities than advertising. The reason for this is the variation of subjects used in the advertising field and the vast sums of money spent each year for advertising. Advertising art offers splendid opportunities for the amateur artist. While the general public is slow to recognize merit in such fields as portraiture, landscape painting, and illustration, a young artist in advertising art finds a good market for his work if he has even moderate ability.

In general, the course for the student desirous of entering this field includes: composition, chiaroscuro, lettering, color, and advertising psychology.

The student is taught the fundamentals of color, color mixture, and the construction of color charts. He constantly reviews and applies the principles of composition and design. Free hand perspective, life drawing, and painting, complete the course of study for the art student. A student is then prepared to enter the commercial field or to continue his work in a school of applied and fine arts.



COMMERCIAL ART

## DRAFTING

**D**RAFTING, mechanical or architectural, is an art. The artist in either one of these lines is classed as a professional man. We say professional without reservations, owing to the relatively high grade education and training necessary to attain a position as a real draftsman. To create on paper those things that are to assume a tangible form—a machine, highly efficient in its operation, or a structure housing thousands of human beings—demands not only a high order of creative intelligence but also a developed imagination that can see and understand all that must be built into the finished unit, and all the scientific workings of the elements that form the whole. The draftsman must further have the realization that when the finished article leaves his hands it then belongs to the community and should prove efficient in the life of the community.

Drafting in the Rochester Shop School is taught with one major goal in view—the preparation of the student, as far as he can be prepared in the short school period that is allotted, to enter a concern as an apprentice draftsman, to do work that is given him to do in an efficient manner, and to have some appreciation of the draftsman's service to society.

Until recently only a few students studied drafting as a vocation. All who entered the Shop School were required to study mechanical drawings at least forty-five minutes each day, taking drafting related to their major shop as far as it was possible. Today, the number of students regularly enrolled in the drafting shop of the school is a fair percentage of the total school enrollment. This speaks well for the art as a desirable vocation with good placement possibilities.

When he enters the school and enrolls in the drafting department, a boy is required to familiarize himself with the elementary fundamentals of drafting. Gradually he is given work consistent with his ability to bring it to successful completion and he is allowed to proceed as fast as it is possible for him to work and still understand all that has gone before. The elements of technique must be mastered before the mind is left free to think of constructive problems. When technique has become habitual, details of construction are assigned.

At the end of a two-year period, the student is assumed to have acquired the necessary fundamentals and constructive



DRAFTING

detail to enable him to enter and hold a place in industry. The student who takes the full four-year course is almost certain to prove of value to those who employ him. He not only has two more years of practice, but into those two years of study have gone his best efforts. He is older and can the more readily discern the value of the work. He is given practical things to design and to construct; he draws machines that are to be made and used in the other shops of the school; he designs houses that are to be built. This practical application of his efforts proves to him his ability to create and to give material form to the creations of his thought and imagination.

The carrying through of a project to successful termination, no matter how dry and uninteresting, proclaims the real artist, and the student learns through effort the joy of accomplishment.

Drafting is far from being a dry, uninteresting subject of study. The same thing is seldom made twice. From the fundamentals to the completed assembly, all is new, and the artist in drafting takes pride when myriad dots, dashes, lines and arcs assume form and meaning as construction follows his plan. All that we as laymen see with our eyes, the draftsman first saw in his imagination: the building, the dress, the airplane, the roadway, the bridge, the ship, the machine, the monument. All that is here about us is the effort of the draftsman in its working. Without him all would be crudity and formlessness. We are glad to assume the responsibility of making good draftsmen and when the majority of those who are now drudging along take their place among those already in the drafting profession, we can be assured that the great tradition of service to the community will be carried on.

## PATTERN MAKING

**T**HE first question that comes to the mind of a person when pattern-making is mentioned is: "What is pattern-making?" It is an art, the art of making a model or form from which a mold can be made in damp sand. This mold when filled with molten metal gives the same shape as the pattern, and is known as a casting. The exterior form of an ordinary pattern corresponds to the shape of the casting to be produced, except for the holes or interior passages which are required in the casting. The pattern is provided with projections, known as core-prints, which give it a different appearance from the casting reproduced in the mold.

The information regarding the size and shape of the various patterns to be made is given to the pattern-maker in the form of a blue print or sketch. From this blue print, the pattern-maker shapes the wood into the desired form.

The materials for making patterns include wood, metal, and plaster. The kinds of wood used are white pine, mahogany, cherry, walnut, and white wood, which should be well seasoned. White pine is considered superior to all other woods, because it is easily worked, readily takes glue and varnish, and is fairly durable. Mahogany is preferred where the patterns are small and are to be extensively used. Among the metals used for patterns are brass, cast iron, and aluminum. Metal patterns are used where a great number of castings are to be made, because they are durable and superior in retaining the required shape.

Of the various ways of making patterns, the one-piece or solid pattern is the simplest. As the term indicates, the pattern is in one piece, but it may be constructed of several pieces of wood which are fastened together permanently. Patterns are also split, the two parts being held in their proper relation by dowel pins.

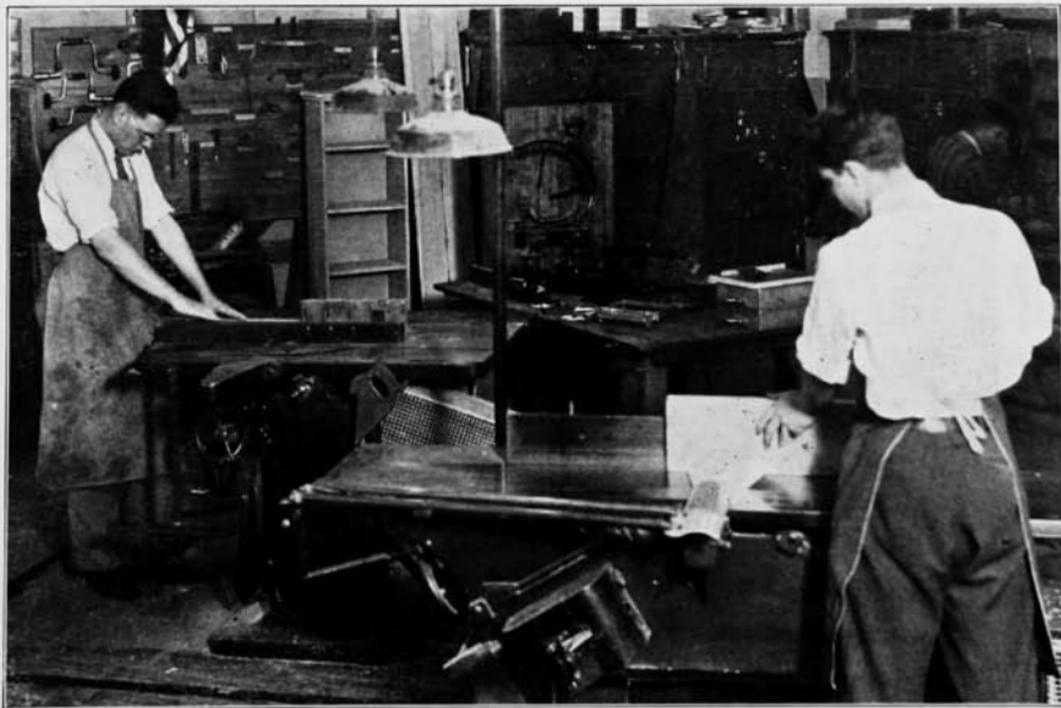
In the construction of patterns, special rules are used which are called shrink rules. The shrinkage allowance is made to compensate for the contraction of metals just before they solidify in cooling off. The amount of shrinkage allowed depends on the kind of metal used. Iron, for instance, shrinks 1/10 to 1/8 inch per foot; brass 3/16 inch per foot, etc.

Patterns are shellacked, varnished, or lacquered, for protection against moisture. Practically every shop has its own color scheme for patterns. This color scheme serves as a guide to the foundry-man.

The hand tools used in making patterns are of the best type of wood-working tools. The machines commonly used in pattern-making are the variety saw, jointer, band saw, planer, lathe, tool grinder, disc and spindle sander.

The pattern-maker's trade is not a seasonable occupation. It is dependent on general manufacturing conditions in the country, especially the condition of the steel and iron trade. The working day is usually eight hours in length or forty-four hours per week. Pattern-making stimulates interest and intelligence because of the variety of problems it presents.

The Shop School aims to teach not only the use of various tools involved in pattern-making and foundry practice but also the trade and technical knowledge required in successful workmanship.



PATTERN MAKING

## MACHINE PRACTICE

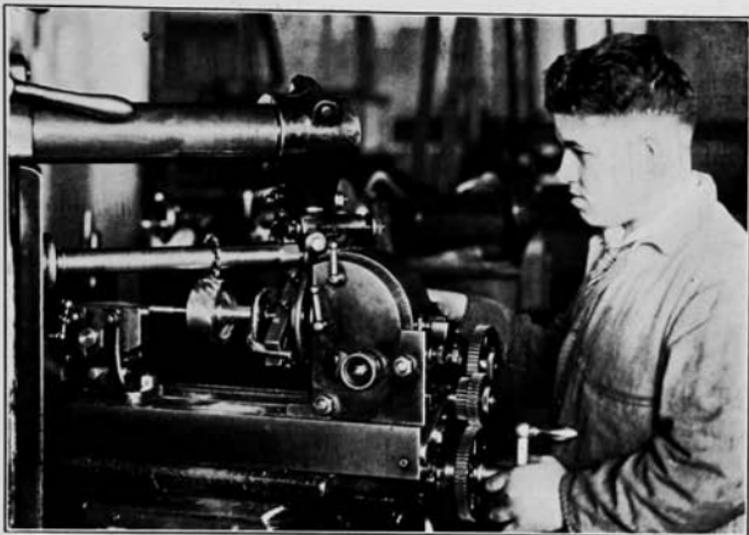
**A** KNOWLEDGE of the construction of machine tools and of the principles underlying their operation makes the essential difference between a machine operator and a machinist. The work of the machinist requires manual skill, a grounding in related technical information, and a familiarity with the different kinds of machine tools.

The course in machine shop practice given at the Rochester Shop School endeavors to give fundamental training to those who definitely purpose to learn the trade and who have the necessary ability and aptitude. The shop is equipped with all the standard machine tools, engine lathes, planer, shapers, plain and Universal milling machines, Universal grinding machine, cutter grinder, drilling machines, and other equipment of a modern machine shop. The tool crib is stocked with the necessary hand and measuring tools which are passed out to the boys as required. A check system is used to keep track of these tools.

The work done is of a practical nature, covering the production of machines, tools, and laboratory equipment for this school and other schools of the city. Some of the machines that have been built in the shop are 12" engine lathes, speed lathes, blue-printing machines, testing machine, jointers, and a variety of small tools and equipment for use in our own and other shops. On all jobs going through the shop, drawings or blue prints made in the school, are used to give the necessary details as to dimensions, finish, and shape of each part worked upon by the students. Until the learner has acquired some degree of skill and experience in the different processes of the trade and in the handling of machines and tools, use is made of instruction sheets which give the successive steps to be followed in the completion of the job. These sheets are used as an aid in teaching so that the student may get the utmost from the shop period.

As the learner gains experience and develops judgment, he is encouraged to study a drawing before beginning the job and then plan the steps to be taken. This requires thinking rather than following directions. In addition to actual shop practice, a certain amount of reading from standard text books on machine shop practice is required, and full use is made of reference books and hand books pertaining to the trade. Trade magazines are kept on file in the library, and the boys are encouraged to add to their knowledge and interest in the trade by reading these. In the work of the shop an effort is made to follow the best shop practice so far as time and equipment will permit.

The school does not turn out finished mechanics, but does offer a boy experience and training in the fundamentals of the



MACHINE PRACTICE

trade, that give him standing as an advanced apprentice when he enters the industrial shop.

A recent development in machine shop practice is a co-operative course. The boys are paired, spending alternate months in industry and in the school. While one is at work the other is in school. At the end of each month they change places. This course is open to boys who have completed at least one year of satisfactory work in the school shop, and have attained the age and physical condition required by state laws. At present, there are seven pairs of boys working in machine shops of the city under this system and the number will probably be increased in the near future.

## LITHOGRAPHING SHOP

**T**HE lithographing shop is the unique shop of the school in that it is the only shop of its kind in the schools of Rochester and one of the few in the schools of the United States.

Lithographing is interesting to most students because it is an applied art, and many of the projects can be left to the student's initiative, giving him frequent opportunity to develop his ideas. The graduates have unusual possibilities in this locality to work at the trade. Nine establishments doing this work make Rochester one of the largest centers for lithographed can labels and cartons in the country.

The lithographic process and fundamentals were discovered in the year 1796 by Alois Senefelder, a German composer. In the course of years the early processes have been improved and developed until at present highly artistic work can be produced. Our lithographing shop is equipped to start the student with the fundamental methods and gradually teach him all the present day processes, so that he will know what to expect in the trade.

The equipment includes the stone polishing trough where the limestones are polished before the drawings can be put on, the hand transfer press as used in all litho shops to make transfers for the press plate, an offset press where all the positive color work is proved, a plate grainer to prepare zinc and aluminum plates for transferring photo-litho work and hand drawings, a 20x20 camera with line screen for making positives and negatives, a plate whirler for coat plates for photo-litho work, and numerous materials and small pieces of equipment necessary for lithographing.

The progress of the student depends on his originality, ability, and patience, plus neatness and practice. A student completing the four-year course will have a thorough understanding of the different branches of the work, but ought to complete an apprenticeship in one of the modern litho plants to prepare himself for his life work.

### *1st Year*

History and principles of the trade  
 Stone polishing  
 Sketching of small blacks and whites  
 Gelatine tracings  
 Operating the hand press  
 Preparing the stone  
 Stippling  
 Designing of posters

### *2nd Year*

Operating the offset proving press  
 Stone engraving  
 Proving (color work)  
 Operating the camera  
 Use of process film  
 Making alterations  
 Ben Day and film tints  
 Pulling transfer impressions  
 Work on zinc and aluminum plates

### *3rd Year*

Wet plates  
 Sticking up transfers  
 Retouching negatives  
 Making positives  
 Different methods used in hand transferring such as gelatine tracings, reverses, rubber reductions, type, etc.

### *4th Year*

Care of and operations on the offset press including washing up, mixing inks, adjusting plates, etc.  
 Covering rollers  
 Making color separations  
 Use of the line screen  
 Laying out  
 Operation and principles of the step and repeat machine

Costs



LITHOGRAPHY

## PRINTING

**P**RINTING trades,—type composition, and press work,—require concentrated effort to attain proficiency in an art which has been termed “the art preservative of all arts” and the “mother of progress”.

The printing department in this school has a good working and teaching equipment, namely: one 10x15 C. & P. Gordon Press with motor equipment; one 14x22 C. & P. Gordon Press with individual motor and rheostat speed regulation; one 30-inch paper cutter (hand power) with safety guards throughout; one steel top imposing stone; a good supply of type consisting of four complete series in double and triple fonts of Century Old Style and Century Old Style Italic, Bold, and Bold Italic, in sizes from 6 point to 72 point; a complete series of Old English Text and plain Gothic type, used for dainty card work and school commencements and announcements.

An extra supply of 10 point type, used as body type, gives the student an opportunity to acquire hand skill in composition which is only attained by practice in the correct methods. A series of about 30 lessons constitutes the student's first year in hand composition.

A course in related work is given several hours each week. The use of the text “Lessons in Printing”, is part of this course. The text presents nine units of ten lessons each and the content of this series has become one of the essentials required by employers when hiring apprentices. This work is study work to be done at home and checked up and discussed by the class and instructor during the class periods.

Students in printing study the early history and development of printing, technical terms, printers' arithmetic, methods of display, punctuation, spelling, and figuring the amount and cost of composition. The course covers five years and guarantees that the graduate student will be a skillful, finished compositor capable of handling anything in the composing room from printing an ordinary business card to estimating prices and advising customers in their printing problems.

The second and third years show active practice in setting bill heads and stationery of all kinds. Catalog and display book work, lessons in stone work imposition, and lock up forms from a 2 pp. folder to a 32 pp. booklet prepare the apprentice for intricate lay-out work in a modern printing establishment.

As the student becomes proficient in type work, he is given an opportunity to feed jobs on the platen presses and later he is instructed in the selection of inks for certain kinds of jobs, the several methods of make-ready, underlay and overlay, patching,



PRINTING

location of gage pins, watching color, use of reducers and driers, drying rack, jogging stock, and cutting stock with a minimum amount of waste. The work is pleasant and healthful and gives employment to highly skilled workmen in considerable numbers.

## SHEET METAL

**T**HE sheet metal industry is a growing one. One of our large manufacturing companies is now boastfully notifying the public that it has been successful in manufacturing an all steel refrigerator. A superior grade of sheet metal and improved welding methods are largely responsible for this achievement. The all-metal aeroplane has made its appearance and is bound to grow in popularity because of its fire-resisting qualities and durability. The wood automobile body has been entirely replaced by a body of sheet metal, the framework and supports of which are of pressed sheet metal. Roofing, skylight work, suction and blow pipe work, heating and ventilating as well as other branches of the sheet metal trade have made great progress in the past years. Many parts in modern machinery that were formerly castings are now fabricated of sheet metal.

The growth of the industry has created a great demand for workers who are acquainted with the fundamentals of the sheet metal trade. The demand has exceeded the supply, and the industry has been handicapped by a lack of skilled workers. A large field is open to the young metal worker. The wages paid will be found to compare favorably with those of the other skilled trades and the work is healthful, interesting, and pleasant.

The sheet metal course in the Rochester Shop School offers training in all branches of the sheet metal trade, since the course has been organized from an analysis of the trade. The various branches of the sheet metal trade were first listed. These were then divided into operations and presented to the students in a systematic manner by the unit instruction sheet method. Each instruction sheet contains information which helps the student to carry out a single project or job involving one or more operations. The operations are of course presented in the order of difficulty. Under this method, each student moves through the course at his best rate of speed. He waits for no one and is personally assisted by the instructor.

The shop equipment is complete and will compare favorably with that found in an up-to-date shop. The following list indicates part of the equipment: cornice brake, squaring shears, bench groover, power drill, electric drill, power grinder, bench punches, forming machines, folding machines, wiring machines, beading and crimping machine, turning and burring machines, double seaming machine, and a variety of hand tools.



SHEET METAL

The course aims to make clear the various branches of the sheet metal trade; to acquaint students with the kinds of metal worked by sheet metal workers; to teach students the operations of the sheet metal trade, thus laying a firm foundation on which to build when they leave school; to develop in students a skill which will be of benefit to their employer and which will give them compensation for their faithful work in school; to teach them to be trustworthy with regard to time, materials, and quality of work.

Students who complete the course will have developed considerable skill in working sheet metal, and will be able to gain immediate access to the sheet metal industry. The wages these trained workers receive when they enter industry more than compensate them for the time spent in school.

## WOODWORKING

**T**HIS is one of the oldest trades and one which has now developed into several specialized fields—carpentry, cabinet-making, mill work, joinery, pattern-making, and general woodwork.

The woodworking course teaches the fundamentals necessary to progress along any one line. It teaches squaring-up stock which is vital to all wood trades, and the use of such lay-out tools as rule, square, marking gauge, dividers, and compass. Next comes instruction in the use and care of cutting tools such as planes, chisels, saws, gauges, bits, and drills. Finally the common wood joints are taught as incorporated into models or projects. Mechanical drawings are required and design is emphasized to enhance the beauty of models.

The work calls for good tool manipulation and visualization of the completed piece of work. Sometimes long tedious hours of repetition are unavoidable if the principles of wood construction are to be adequately mastered.

Group instruction procedures are used with much demonstration. Working directions are obtained from blue prints and from job sheets which bring in blue print reading.

The well trained woodworker has every possibility of advancing to the highest branches of his trade. Health conditions in this work are excellent and it is clean and not fatiguing. It gives satisfaction in the form of finished work which is the pride of all craftsmen. Opportunity is afforded for much originality in design and architecture.

## LIBRARY

HE library is primarily and once for all a Shop School institution. Its furniture which seems to have stepped out of a library supply catalog was all made in our own shops. The students do not look upon the library as a place which inspires awe; they have a personal interest in it which is directly shown in the constant use of its books and periodicals.

The library is divided into three sections: technical books, periodicals, and fiction. All three of these branches are in popular use. It is particularly interesting to notice the demand for technical books. Perhaps nowhere does the library have an opportunity to offer so much help through reference materials as in a technical high school. Here are to be found boys delving deeply into the most exacting problems with the keenest interest.

A boy, for example, is working out a diagram for an electrical circuit. He has a concrete problem. It is his responsibility to find a solution. After he has solved the problem, he will then have an opportunity to put it into practice. Again, here is a boy, who, while performing an electrical experiment, has noticed a strange phenomenon. He tries it again. The same phenomenon appears. Not understanding the reason for this, he comes to the library to delve into books on the subject in order to get a satisfactory solution. Into the library come the boys from all the shops in search of reference material to aid them in their work. The magazines are scanned for new ideas. The library offers a broadening and educative program, and under such conditions its influence is felt and its existence in the school is justified.

## MATHEMATICS

**A**LL pupils in the Rochester Shop School are required to take a course in mathematics with a time allotment of three periods per week through the entire four years. This course serves two objectives: (1) the practical application of mathematics to shop work; and (2) required preparation for higher technical schools.

The work of the first and second years is shop mathematics. This part of the course gives the student an opportunity to develop skill in using the problems of arithmetic, simple algebra, and intuitive geometry for the solution of industrial problems. Lessons are organized in the form of unit jobs and, since in real situations mathematics deals with material things, there has been provided a comprehensive equipment of charts, tools, and technical instruments with sufficient duplication to permit several pupils to work on the same problem.

In the preparation of this course of study, teachers in the various shops contributed typical problems and processes requiring the application of mathematics in their respective fields, and these form the basis of the mathematical training offered. Cooperation between shop and classroom has thus produced a related course in mathematics which has valuable training possibilities.

During class periods the activities of pupils and instructor are those of the laboratory. Under the teacher's guidance the laboratory method helps pupils to discover for themselves the essential part that mathematics plays in industrial life. The pupil is further trained through having to procure for himself the necessary data rather than through finding it contained in a stated problem. The work is largely individual and each pupil's progress is determined by his ability and his application.

In the third and fourth years, formal mathematics of the textbook type is prescribed in order that students may learn the principles of elementary mathematics that are basic to junior engineering and that also constitute entrance requirements in advanced technical schools. In these two years the students cover the New York State syllabus in algebra, geometry and trigonometry.



MATHEMATICS

## HEALTH EDUCATION

**M**ODERN industrial life makes constant demands on the neuro-muscular system of the human body, and the health of the worker is a vital concern to himself and to society. As a result, health education has an important function in an industrial high school. Rochester Shop School provides for this through a program of health protection, health teaching, and health development.

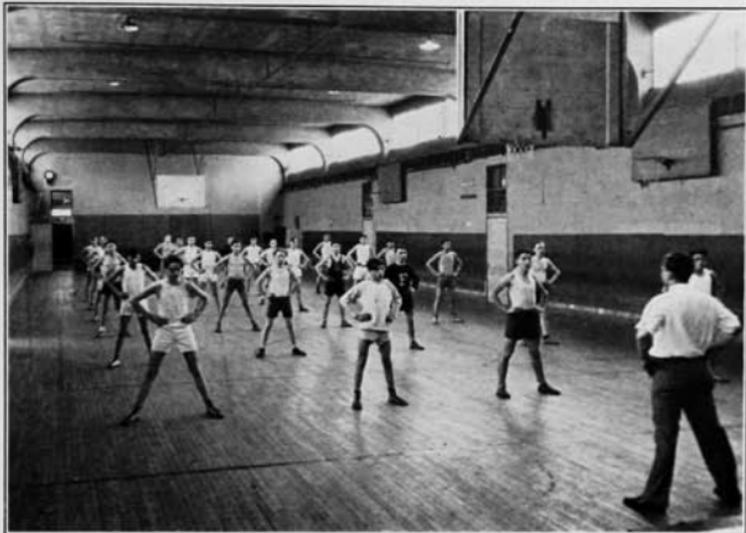
Students are given medical and dental inspections yearly under the supervision of the City Health Bureau and the Rochester Dental Dispensary. Classroom and shop teachers co-operate in maintaining a health standard by reporting immediately any extraordinary condition to the school nurse. Twice a year, weight-height surveys are conducted by the health education teachers.

Accident prevention measures are taught through a Shop Safety Council which is made up of two representatives from each shop. Meetings are held once a week and reports are made by the students concerning the safety conditions in their shops. Student ideas derived from this source are often instrumental in bringing about improvements.

The health education department teaches health habits by informal weekly gym talks. The science department supplements this work by formal instruction in hygiene and physiology. At times, assembly programs are devoted to special health topics.

The health development program furnishes the activities necessary for physical fitness, through gymnasium classes and after-school athletics and recreation. While the present twice-a-week gymnasium class program is arranged for the average boy, the school administration meets the need for individual prescription in physical education by providing optional corrective classes after school hours for the physically handicapped (spinal curvature, under-weight, poor musculature, etc.) and special assignments in leadership for the physically superior students. A sample tenth grade gymnasium program would consist of an informal period and a formal period each week. During the informal period, the students engage in basketball, baseball, tumbling and stunts, relay games, and optional class games. During the formal gymnasium period, the boys have marching tactics, maze-running, calisthenics, and gymnastic rhythms.

The after-school athletics and recreation program is two-sided, inter-school and intra-school. Rochester Shop School is a member of the N. Y. S. Public High School Athletic Association and is represented by capable teams in all activities carried on by the Rochester P. H. S. A. Leagues. The inter-school sports



GYMNASIUM

include reserve and freshman teams in soccer, basketball, and baseball, and school teams in cross-country, wrestling, hockey, track, tennis, and golf.

Additional athletic and recreational activities are supplied by inter-shop contests in cross-country, soccer, basketball, volleyball, and baseball. Individual school championship tournaments are held in wrestling, handball, and tennis.

Over sixty-five per cent of the students of Rochester Shop School took part in after-school activities during 1928-29. Competent adult leadership is provided for all activities.

Some of the educational objectives of this work are: detection and correction of remediable physical defects; control of communicable disease; development of health habits; acquisition of health knowledge; development of organic power, vitality, good posture, and neuro-muscular skills and co-ordinations; development of specific skills designed to advance recreational activities; development of such personality traits as courage, perseverance, co-operation, loyalty, and honesty.

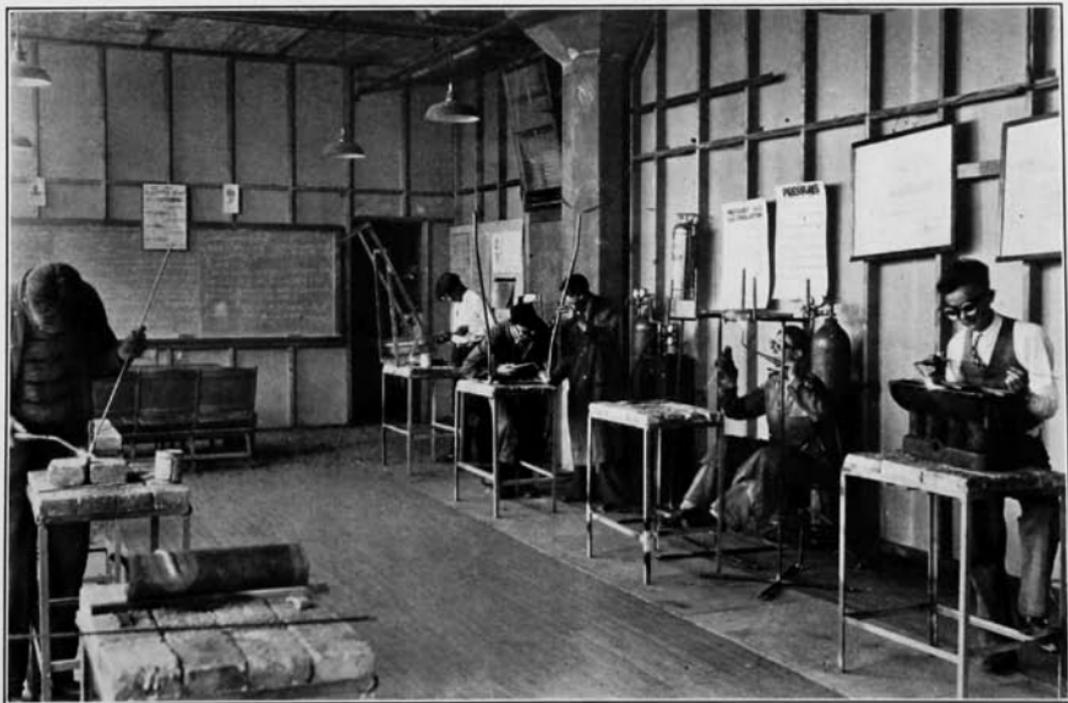
## WELDING

**T**HE welding course at Rochester Shop School has two objectives: (1) It gives the students an understanding of welding processes and their possibilities. This implies a thorough knowledge of the principles of physics and metallurgy involved in making a good weld; a knowledge of every unit of the apparatus used; complete information concerning the common metals, their composition, their properties, and the methods of identifying and welding them; and a knowledge of the limitations of the processes. (2) It aims to develop the necessary skills and abilities. These are: skill in handling the apparatus with confidence and with proper regard for safety considerations; skill in making minor repairs and adjustments; ability to recognize different metals and select the right procedure for welding them; ability to plan and carry out each job with the least possible expenditure of time and material; ability to secure perfect fusion and thorough penetration on every weld; ability to test work, recognize defects, and overcome them; ability to dispose work and apparatus in order to weld with maximum comfort and efficiency.

Within the past twenty years, welding has advanced so rapidly that today there is hardly an industry using machinery that does not use welding for repairing.

Railroads were the pioneers in repair welding and today continue to be one of the largest users of the welding processes. Chemical plants also maintain welders for repair and replacement. In the manufacturing field, welding has revolutionized many industries and helped others to grow rapidly. Welded bridges and buildings are replacing the riveted type. Pipe-lines of all descriptions, automobile bodies and parts of the machinery, the fusilages and tanks of ninety per cent of all airplanes today are welded. Metal furniture, boilers, tanks, boats, barrels and other products use welding in manufacture. In fact the uses of welding have developed so rapidly that industry is unprepared, in many cases, to take advantage of the opportunities it offers.

The welding course in the Rochester Shop School, including electric and oxy-acetylene welding, covers 1000 clock hours. Eight hundred hours are spent on practical work and 200 on theory. The school equipment consists of ten oxy-acetylene units and five electric welding units. Practical work is given with all the common metals. At a certain stage of the boy's advancement, he is placed in the trade on the co-operative plan, thus giving him an opportunity to become familiar with actual shop conditions.



WELDING

## AMERICAN HISTORY

**A**MERICAN history is a vital and interesting part of the Rochester Shop School curriculum. Its value lies in helping young men to appreciate the heritage of civilization which is theirs as American citizens, and to meet the obligations of their generation to preserve and promote the general welfare.

In the course in American history three objectives are kept in mind. The pupil should acquire:—(1) an understanding of the determining influence of past efforts and events upon our modern, national ideals and institutions; (2) a stimulation to improvement in character through the study of the lives of America's leaders; and (3) a desire to find wholesome recreation in reading biographies, current events, historical tales, and accounts of historical events.

The first objective—an understanding of the influence of the past upon present day problems and their just solution—involves considerable emphasis on the economic and social phases of American history, and the political ideals of the American people. Much class time is devoted to a study of our history in the twentieth century.

The method of study involves the use of both textbooks and supplementary references. Class discussions and independent thinking are strongly encouraged. The natural interests of young men are utilized in stimulating greater interest in the life of today as related to that of the past, and the enthusiastic discussions of modern social problems by practical-minded students indicate that modern youth is alert to political, economic, and social conditions and is eager to improve them.

To attain the second objective—the improvement of character by the study of admirable qualities of great Americans—pupils engage in a study of biographies which are later discussed in class with reference to commendable human qualities and the wise influence which great men have exerted upon events. Preceding the formation of good habits in personal and civic affairs, there must come a strong desire to form such habits, a desire which shall make their formation easy. A nation, created out of the travail of war and wilderness, building out of forests great cities, and out of the prairies prosperous farms, has inevitably produced strong men, the record of whose work will inspire other men forever.

The third objective is the opening of a field of recreation in the permanent habit of reading biography, current events, and history. This recognizes the fact that many men will not read classic literature in the years after graduation. On the other hand, they will read an interesting biography, a current event, or an historical account. What man cannot find interesting the adventurous life story of Andrew Jackson? What man cannot find some quality to emulate and follow in the life of Abraham

AMERICAN HISTORY



Lincoln? The large amount of space devoted to such material in the most popular magazines and newspapers indicates a natural interest in such subjects which, properly nurtured and encouraged, can be made a wholesome and inspirational source of pleasure to most adults; a type of reading far superior to that now followed by the masses, as shown by any news stand.

The enthusiastic response and interest of the students in the course in American history gives fair promise of the achievement of these three aims.

## SOCIAL SCIENCE

**S**Ocial science involves that body of information which deals with the social, political, and economic relationships of individuals and groups. The Rochester Shop High School offers four subjects that come under the classification of the social sciences. Two of these subjects are civics and industrial geography, to each one of which the student devotes one semester of four periods per week in the tenth grade. The other two subjects are commercial law and American history, studied for a full year in the eleventh and twelfth grades respectively.

The teaching of civics has a fundamental objective the enlightenment of the individual with regard to his social and political environment. In this respect, it is highly important that obligations to society individually and collectively, as well as privileges, shall be thoroughly understood. As civilized life becomes more and more complex, it is imperative for youth to grasp the Biblical idea that no man liveth to himself alone. The subject of civics, therefore, involves a survey of the individual in relation to family life and to the group life of the school, the church, and the local community. In the field of government, the following topics form the basis of recitation and discussion: the principles underlying the nature of government; its structure or form; types; chief functions.

While some time is devoted to governments in general and our federal government in particular, most emphasis is placed on state and local government. The protection and service rendered by political institutions, local and national, are vital concepts that all students should grasp. In this connection the purpose and function of such departments as public health, police, fire, playgrounds, and parks receive attention. Of even more direct concern and importance is the treatment of the individual's relationship to the industrial world which lies ahead of him. An elementary survey covers such topics as production and exchange of goods in an industrial society, modern transportation and communication, capital and labor.

Industrial geography involves all of the important branches of industry, including agriculture, mining, manufacturing, trading, and transportation. The primary objective of the course is not the memorization of locations and products but an understanding of production problems in relation to a highly complex civilization. With this in view, instruction aims to secure the application to the economic framework of reason and judgment based on a knowledge of facts.

Introductory matter concerning physical and climatic conditions of the United States in particular forms the basis for the specific treatment of the world's resources. Considerable atten-



SOCIAL SCIENCE

tion is devoted to the location and importance of the natural resources of the United States, to the regional growth and development of manufacturing and its dependence on abundant natural and agricultural products, and to numerous additional factors—efficient transportation and communication facilities, progressive government, intelligent labor—that contribute to the well-being and prosperity of the people. In like manner the student surveys the outstanding economic contributions and progress of all the important countries of the world, major emphasis being placed on the Eastern Hemispheres and Europe.

## ELEMENTARY ELECTRICAL COURSE

**T**HE electrical wiring course is designed to offer a working knowledge of the fundamental processes and related science common to the wiring branch of the electrical trades; also a basic knowledge for more advanced work in electricity. Most of the lessons require the installation of representative circuits, arranged in successive steps and graduated in difficulty from the simplest to the most complex. Others are experiments in electrical science for the purpose of demonstrating important principles taught by the teachers of related work.

The various branches of electrical wiring have been divided into units forming a systematic course. These units are composed of individual instruction sheets, each with a definite objective, and the student progresses according to his own ability and speed. The instruction sheets contain references to standard text books, informational material related to the problem at hand, and an electric circuit to be drawn, installed, and approved.

The first unit is signal wiring and consists of twenty instruction sheets on low voltage wiring. The students begin their work by connecting cells in series and parallel and wiring circuits using various types of bells and push buttons, annunciators, relays, door openers, and other low voltage wiring devices. The construction and uses of the electro-magnet, spark coil and bell ringing transformer are also demonstrated and studied.

Unit No. 2 deals with the splicing and joining of conductors as used in wiring. Soldering and taping are included under this heading, with the use of the blow torch and soldering iron. The student is taught to tin wires, sweat on lugs, and become familiar with the different solderless fittings and their application.

Open wiring, Unit No. 3, is that method of wiring where the conductors are supported on knobs or cleats and exposed to view. Here 110 volt current is used and the installations in general are lighting circuits controlled by different types of surface switches. Experiments at this point consist of the measurement of power distribution in two and three-wire systems, investigation of the relation of the voltage, current, resistance of both series and parallel combinations, and measurements of resistance.

The entire second term is devoted to conduit wiring, Unit No. 4. There are five sub-divisions under this heading: exposed conduit wiring, concealed conduit wiring, flexible conduit wiring, armored cable, and fixtures. Here, especially, effort is made to present to the student, practical everyday problems under actual working conditions. Cutting, threading, and binding rigid



ELECTRICAL

conduit, meter service installations, multiple location control, electrolier switch circuit, and a master switch are a few of the thirty problems of this unit. The experiments include an efficiency test of both a direct and alternating current arc lamp, measurement of line loss, resistance of wire and fuses, insulation resistance and power measurement with a watt-hour meter.

Standard practices are used throughout the course with due regard to efficiency and safety. All installations must meet the requirements of the National Board of Fire Underwriters. The shop is adequately equipped with tools and materials to offer the student abundant practice in the above phases of wiring, and with meters and equipment for experimental work.

## ENGLISH

**E**NGLISH instruction has as its fundamental objective the effective cultivation of better comprehension in reading, of greater self-confidence and correctness in speaking, and of greater ease and facility in writing. With this in view, the school provides a four-year program in English. Each pupil devotes five periods (forty-five minutes each) per week in the first year and four periods per week in the last three years to its formal study. Composition and literature receive practically proportionate time and attention.

In the field of composition, attention is given to both writing and speaking. As an aid to individual improvement, grammar, punctuation, and spelling are taught. The general purpose of written composition is to teach pupils to write simple, coherent English according to accepted standards; the purpose of oral composition is to cultivate the ability to speak before a group without hesitation or trepidation in a clear and orderly way on a prepared subject, and to listen attentively and intelligently. That some standard of speech is requisite is daily attested by the infinite variety of jargon audible about us.

In the realm of literature, there is a wide selection of standard works. The study of various types—fiction, drama, poetry, biography, essays, and speeches—opens new fields of human thought and endeavor. In each type of literature, it is possible and feasible to progress from the simple to the more difficult. The general aims are to cultivate an interest and enjoyment in good literature, to broaden the individual's horizon through information and observation, to stimulate an intelligent, sympathetic consideration of human motives and acts, and to develop an ability to interpret, judge, and appreciate good literature by contact with it.

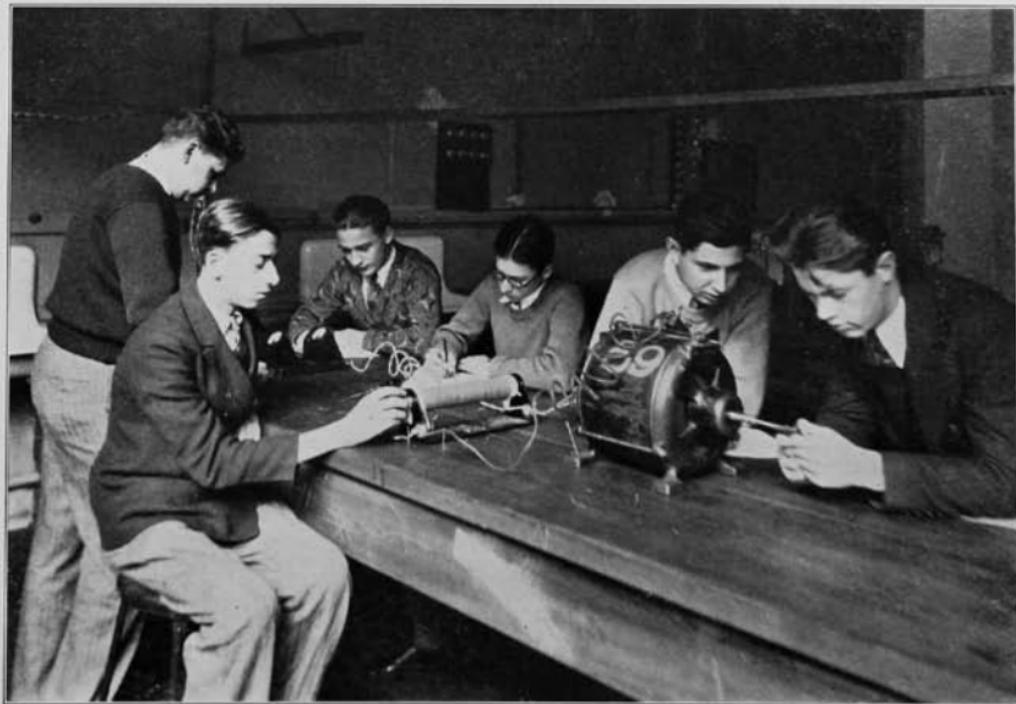


ENGLISH

## RELATED SCIENCE

**A**S part of every student's related training, there is provided a four-year course in related science. After a background of scientific principles has been developed training is concentrated on the aspects of science which apply to each individual's trade requirements. In this concentration decided emphasis is placed on knowing how to use the scientific facts involved in the trade work and also how to use any new facts to be learned later on in one's trade.

Separate courses are developed for each trade through cooperation with the respective shop teachers, and correlation is maintained by continued contact between the science department and shop teachers. For example, when students need a knowledge of "simple machines" and their application in machine shop practice, the necessary principles of physics are taught. The machines common to each trade are studied by actual contact with them, both in the laboratory and in the shop. As the course in one's trade develops, there is found a need for knowledge of the properties of materials and this becomes part of the science course through the study and testing of materials used in shops. As individual problems that need further investigation arise in the shop, the facilities of the science department are made available for the necessary research.



RELATED SCIENCE

## ADVANCED ELECTRICAL COURSE

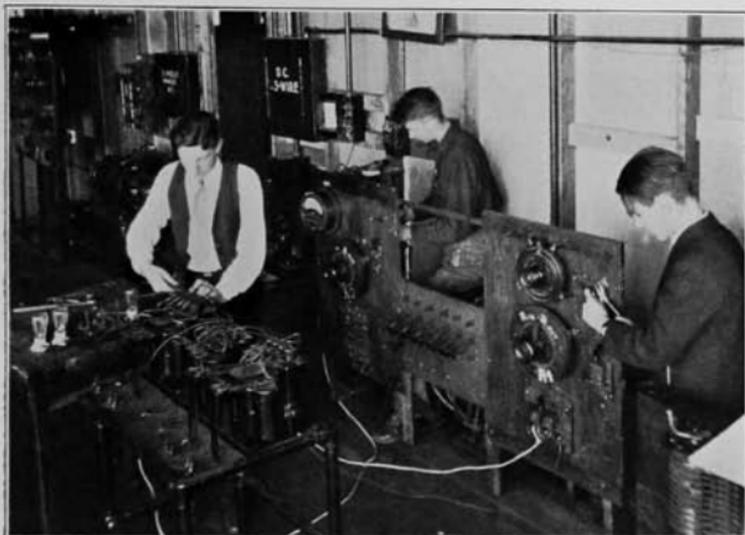
**E**LECTRICITY holds a fascination and an appeal that few can resist, even though they know but little about the subject. With the experienced man who knows the workings and the mysteries of this great force, the fascination still remains.

New developments, new projects, and new uses for electrical energy are creating more and more openings for trained men every day. Thomas Edison recently said, "The greatest handicap to electrical progress today is the lack of trained men."

The knowledge gained as the student in the electrical shop progresses through elementary circuits and house wiring prepares him for work on generators, motors, controllers, and switchboard wiring. The work covered by this division includes wiring, testing, operating, repairing, and reconditioning of motors, generators, transformers, and switchboard equipment. It also includes a practical study of all the different mechanisms connected with the development and control of electricity. Because of its relative simplicity, direct current is studied first. This work is followed by alternating current, which is one of the most rapidly developing branches of electricity. The successful maintenance of the type of machinery used with the alternating current calls for a large force of skilled workmen to make repairs, readjustments, and replacements caused by constant wear and tear. Here theory and practice go hand in hand as the student proceeds through the course.

Armature winding is another branch of this course. It consists of replacing old windings with new in the proper manner, connecting the coils, replacing the parts in the machine, and testing for accuracy. Accuracy is very important in the construction of electrical machinery, for the usefulness of the apparatus depends entirely upon its correct assemblage.

Many of the motors used in the electrical shop have been wound by the boys themselves. The smaller motors that are rewound may be purchased by them at the cost of the material. Testing these machines with meters after rewinding teaches the student how to detect and remedy any of the common troubles quickly.



ADVANCED ELECTRICAL

As the student advances, of course, the work becomes more difficult, but because he has learned one step after another, and because the knowledge and training received on one job is applicable to the next, he gradually gets into very difficult work without realizing any gap. Running throughout the entire course are lectures covering shop rules and shop methods, and through these are taught the so-called "trade secrets" which are known to the leaders of the electrical trades.

Occasionally trips of inspection are made to some of the large electrical plants in the city. These bring the boys into direct contact with industry and enable them to see the different kinds of apparatus in operation.

## JUNIOR HIGH SCHOOL AUTO MECHANICS

**T**HE course in elementary auto mechanics at the Rochester Shop School has for its objective the teaching of the fundamentals of the automobile engine, clutch, transmission, and steering gear, together with a knowledge of the materials, tools, and equipment used in the trade.

All boys entering this class are of junior high school grade, ranging in age from fourteen to sixteen years, with no previous mechanical experience.

The class is conducted as closely as possible in correspondence with shop environment although no emphasis is laid upon production as an end.

All tools are kept in a tool crib and are given out to the boys through a check system. Each boy takes his turn in taking charge of the crib and when acting in this capacity is also required to keep all cutting tools, such as chisels and drills, sharp and in serviceable condition.

The boys in this class learn through practical operations how to take up lost motion due to wear on all types of clutches and steering gears, how to disassemble engines, clean carbon, grind valves, fit piston pins and piston rings, take up and scrape in connecting rods and main bearings, how to put time valves in the proper relation to the piston, and other work of this nature. Some knowledge of blue print reading is acquired by the pupils through following wiring diagrams when wiring motors. Some of these jobs are accompanied by a unit instruction sheet which gives the course of procedure. At the bottom of this instruction sheet are a number of questions which are related to the work being done and which must be answered by the pupil and handed in to the instructor before another job is given to him.

A bulletin board is situated in a convenient place in the classroom, and all the boys are asked to bring in and post any pictures they may see that are related to the subject being taught. This encourages the pupils to read mechanical magazines. A weekly mark is given the boys on what they have contributed to the class in this way.

At the end of each day, each boy makes out a card stating what he has done during the time he has spent in class. He turns this in to the instructor who gives him his rating and files the card in a filing cabinet. This is a handy reference system for the instructor, as he can see just what jobs each pupil has satisfactorily completed.



JUNIOR HIGH AUTO MECHANICS

# THE HIGH SCHOOL COURSE IN AUTO MECHANICS

(Years I and II)

**T**HE demand today for trained men in the automotive trade—men who are thoroughly familiar with the underlying principles which are common to all cars,—has made a four-year course in automobile repairing none too long. To give the boy familiarity with the tools of the trade, different types of engines, clutches, transmissions, final drives, and front axles, an elementary course of one year is given.

A shop to handle this type of work must be well equipped and stocked. In the elementary shop all engines, clutches, transmissions, rear axles, etc., are mounted on stands. These stands are arranged to give the boy the maximum amount of light while working. The tools are hung in a convenient space and in such a way that the boy soon learns their names and uses.

The simple operation of removing and replacing a cylinder head is the first job of the entering pupil. A demonstration is conducted by the instructor. The boy is thus taught the proper use of the simple tools, and is allowed to attempt the operation himself. After he has become thoroughly proficient in this job, he is taught the removal of valves. In conjunction with this operation he learns the theory of opening and closing valves and the relation of piston to the valves. He is then ready to learn to grind the valves, studying at the same time the principle of the four-cycle motor. Jobs become more difficult as the term proceeds, each one being designed to give a boy not only a knowledge of the job, but also of the use of the different tools required to perform the operation properly.

Frequent demonstrations together with careful checking of the jobs performed prepare the student for the practical work which follows in the advanced shop.

Lectures cover the principle of operation of the motor and the designs of the engines in use today. Textbooks are used further to help the boy in this phase of his work. Short tests are given to check knowledge of theory.

In the second semester the pupil studies the various types of transmissions and clutches and of semi-, three-quarter, and full-floating axles; this is followed by practice in dismantling and assembly of parts. The simple adjustments are taught. Then the front axle is studied in the same manner. Lectures and demonstrations are given at frequent intervals to explain the principle of operation of the different types.

## THE HIGH SCHOOL COURSE IN AUTOMOBILE MECHANICS

*(Advanced Class)*

**T**HE aim of the advanced class in automobile mechanics at the Rochester Shop School is to fit the boys who elect this work for intelligent apprenticeship in the trade and for useful citizenship in the community. To assist in carrying out this aim the shop is equipped with up-to-date tools and equipment and the instructor is a tradesman of long experience who specializes in the subject he teaches. All shop classes in the Rochester Shop School are operated on the basis of three hours a day.

Under such conditions it is only reasonable to suppose that normally intelligent boys, who have completed the eight grades of the elementary school and who have special fitness for the trade will graduate from the school well prepared to give satisfactory service in this field. We feel that we can back our boys as far as this claim goes, but placing them in jobs where their training will function to the best advantage of all concerned is a matter in which the school and the prospective employers have responsibilities in common.

The requirements for a boy who wishes to enter the advanced class in auto mechanics is graduation from grammar school, plus two years training in the elementary auto mechanics shop. Throughout their first year of training, the boys perform a certain number of jobs on practice engines, do routine shop work, and hear lectures explanatory of all they are doing. Adherence to this system insures all around development in theory and practice.

If at the end of the first year the boy has satisfactorily completed all his required jobs and bookwork, he will be advanced to the second year's work which conforms as nearly as possible to the routine of the mechanic in an up-to-date service station.

The boy enters his shop in the morning, goes to his regularly appointed seat and stays until roll has been called. He is then given a work sheet and a job card. The work sheet explains the kind of jobs to be done on the car. The job card is a record card on which the boy writes his name and check number, the time he starts the job, and the time he either finishes or leaves the job. The card is then turned in to the instructor who checks over the jobs done and marks the card. When the report cards come out, the daily marks are averaged and the boy gets whatever rating he has earned.

The student receives all kinds of job assignments, such as grinding valves, fitting bearings, honing cylinders, overhauling any type clutch that might come into the shop, overhauling rear



AUTO MECHANICS (Advanced)

axles, removing fly wheel to install new starter ring, fitting pistons, fitting piston pins, and fitting piston rings. The boy thus gets a wealth of varied experience.

The Rochester Shop School also has a co-operative course for which second year boys may sign up if they meet the standard set for the course. The boy is placed on a job in a garage where he does regular garage work. He stays on the job four weeks, and at the end of that time, he returns to the school shop, and another boy takes his place in the garage for the next four weeks. Then after four weeks the boys change again. During the time the boys work in the shop, they are paid wages ranging from \$14 to \$22 per week. When the boy finishes this course of training and graduates from the school, he has had both school and garage training, and he is ready to take his place in industry and become self-supporting.

Running throughout the entire two-year course are lectures covering shop rules and practices and the so-called trade secrets known to leaders in the automotive trade.

## THE CO-OPERATIVE COURSE

**T**HE co-operative group, at present, is composed of about twenty teams of boys who alternate monthly between school and factory or shop. There are representatives of the Auto-Mechanics, Commercial Art, Drafting, Electrical, Lithographing, Machine Shop, and Pattern-Making Departments. Such representative firms as Bausch and Lomb, General Railway Signal, Taylor Instrument Company, and Stecher Lithographing Company are co-operating in this plan.

The co-operative system of industrial education claims the following advantages:

1. It serves to keep in school boys who would otherwise be forced to leave for financial reasons.
2. Actual industrial experience often acts as an incentive to continue education.
3. It affords definite exploratory experience which brings out the actual "feel" of the job, its advantages and disadvantages for the individual.
4. It gives a background of experience and contacts which proves valuable in final placement in industry.

A record of the boy's performance on the job is kept in each case. In some factories the boys undergo tests covering their experience. Personal interviews with employers show that satisfaction with the plan is prevalent.

In school the shop activities are, of course, continued. The related work comprises English, mathematics, commercial law, and science. The main objectives are as follows:

1. To give the basic related information necessary to efficiency on the job.
2. To give such industrial knowledge as will aid in advancement or act as an incentive to advancement.
3. To develop a background which will aid the individual to see the worthwhile content of his job and of all jobs and thus to enjoy work.

To achieve these ends the groups are organized along corporation lines with the Engineering, Sales, Finance, Production, and

Purchasing Departments and appropriate offices in each. The progress of an order through a factory from the customer's contract to final shipment is followed in its general routine. Particularly valuable are those experiences in which laxity at some point, such as inaccurate dimensions on a drawing, failure to give the production order to the proper shop, etc., throw the whole organization out of order. Last year our purchasing agent substituted the word "holder" for "holding" with the result that an entirely different piece of apparatus was received from the shipper, giving a lesson to the whole class.

Among the projects now under operation is the management of the book store and of the school bank. A typical related project is the writing of a suggestion to the management according to a standard form which has been worked out, bringing in the question of raw material, tools, machinery, and labor, finding the cost per piece from time-study standards and job analysis, and the saving per year based on production records.

## PHOTOGRAPHY

**H**IS course is designed to give the student a practical knowledge of the various branches of the photographic art. A knowledge of photography should be a help to the boy in cultivating his powers of observation, accuracy, cleanliness and attention to detail not only in photographic work but in every-day life as well.

As photography is based on the sciences of chemistry and optics, called photochemistry, some knowledge of these subjects is necessary to help him to more fully understand what takes place in his camera and dark room. The action of light on sensitive emulsions and the chemical changes that take place in the dark room are included in this course.

The pupil begins his training by making a camera himself, taking pictures with it and developing and printing his own film. He is then taught the various kinds of lenses and shutters, the type of work they are best suited to and how to use them under varying light conditions. The shop equipment includes several 5"x7" view cameras which the boys use for group work, shop views, street scenes and copying. The more advanced students are allowed trips to the parks to study landscape composition so that they may become more proficient in the use of the camera. The equipment also includes an enlarging camera capable of making enlargements up to 17"x20".

There is a broad field for men who have a knowledge of photography in the industrial plants of Rochester where it is being used in the advertising field, for magazine illustration, by real estate companies, insurance companies, salesmen, X-Ray, identification and in the motion picture industry where skilled men are always in demand.

It is not the purpose of this course to teach the boy how to "press the button" and let someone else do the rest but to study the "how and why" of photography. Our aim is to teach the theory and let the boy practice what he learns and solve his own problems as they appear. Only in this way can we hope to train boys who will be able to take their place in the industrial world as successful workers.

## INDUSTRIAL CHEMISTRY

**T**HE manufacturers are coming to realize the important part a chemist plays in the manufacture of their products.

The importance of the chemist was first realized in this country when the foreign trade was cut off during the World War.

The courses in chemistry at the Thomas Alva Edison Technical and Industrial High School are primarily to train the student to be a useful laboratory assistant. This course extends over a period of four years.

During the first year, a course in General Inorganic Chemistry is offered. This is a fundamental course giving special attention to the fundamental laws and principles with their application to certain non-metallic elements and their more important, industrially, compounds; also, the application of the principles leading to elementary analysis. The solving of problems is an essential part of this work.

The second year consists of work in Qualitative Analysis. This is a course devoting special attention to the theory and fundamental principles as applied to qualitative chemistry.

In the third year course in Quantitative Analysis, the work is devoted to the development of laboratory technique and methods of recognized standard practice in quantitative analysis including the preparation of standard solutions and volumetric and gravimetric determinations. It also includes a systematic classification of the study of the physical and chemical properties of each class. It gives the pupil a foundation in the fundamental principles of organic chemistry including the preparation of alcohols, ketones, aldehydes, halogen, derivatives and other compounds.



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