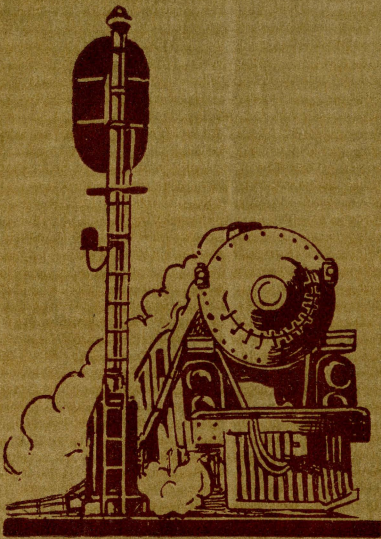


TRAINING COURSE IN RAILWAY SIGNAL ENGINEERING

Union Switch & Signal Co.
SWISSVALE, PA.



BULLETIN
No. 140



Paul M. Brannon
Nov '75

Training Course
In Railway Signal
Engineering

The Company and Its Products

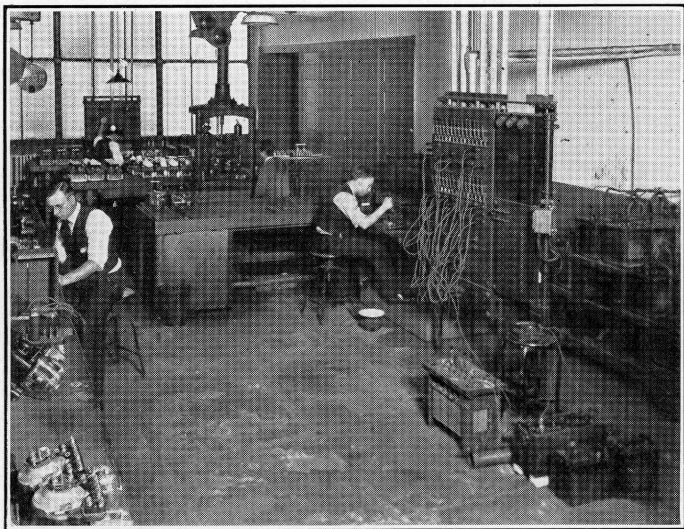
THE Union Switch & Signal Company was organized in 1881 and is now the largest designer, manufacturer and general constructor of railway signal systems in the world. The general offices are located at Swissvale, Pa. The plant occupies a site 60 acres in extent, and the large modern office and factory buildings enclose a floor space of over 20 acres. The personnel consists of over 5,000 employees. Sales offices are maintained in New York, Chicago, San Francisco, St. Louis, and Montreal. The Company's foreign business is handled by associated subsidiary companies and by agents.

For fully half a century, the Union Switch & Signal Company has specialized in the design and production of all kinds of high grade railway signal apparatus and signal systems. These include practically everything known to the art of railway signaling today.

Interlocking, automatic block, train control, dispatcher control, car retarder and crossing protective systems are all made up of many individual units. A number of these units are quite unknown outside of the signal field, but they have a very important part to play in the safe and economical operation of our railroads. To develop these systems and the apparatus composing them to the very high state of perfection to which they have been carried, has required



Direct Current and Light Signal Engineering Office



The Direct Current Engineering Laboratory

unlimited care and study on the part of the manufacturer's Research, Design and Production Departments.

Purpose of Training Course

The engineering training course, as conducted by the Union Switch & Signal Company is intended to train graduates of approved universities and technical schools in the profession of signal engineering.

The course is maintained primarily to recruit the personnel of the company's engineering department to meet the demands of growth, and, secondarily, to meet demands for trained men from other departments of our own organization and from customers.

Method of Training

The training course is under the general supervision of the Chief Engineer, the Company maintaining no specifically educational department.

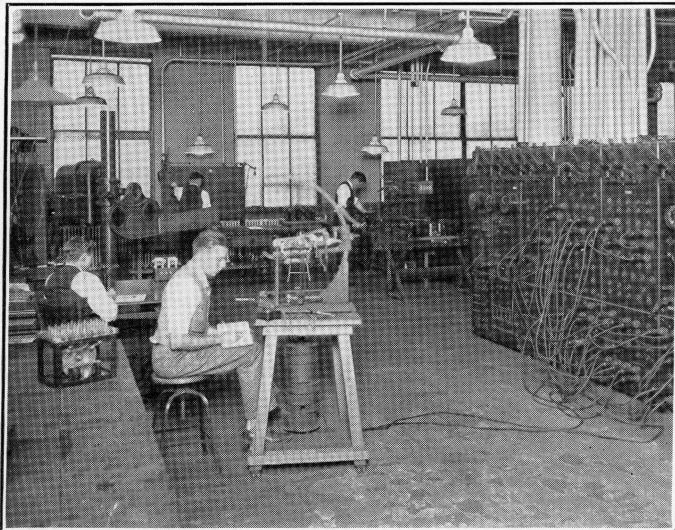
The man in training is given opportunities to become familiar with the design, production, installation and operation of railway signaling and automatic train control apparatus.

Design and production include the design of apparatus, the tests and experiments conducted to determine the fitness of design, the process of manufacture, and the inspection and test of apparatus before shipment.

Installation and operation include the erection and testing of signaling systems and apparatus in the field. In such work the young



Another Portion of Electrical Engineering Office; Alternating Current, Power Calculation and Rectifier Sections



The Alternating Current Engineering Laboratory

engineer is often the Company's representative, looking after the installation of the apparatus and training of the railroad men in the proper method of operating and maintaining the system.

A prescribed schedule is followed as closely as practicable as regards the matter of time spent in each department, but this schedule can be only approximate, as it must vary according to the work at hand.

The major portion of the work of the man in training is in the engineering offices and laboratories. There is no shop work included in the course but an effort is made to give the man an opportunity to spend some time in the erection and testing of signaling systems and apparatus in the field.

In the office and laboratory work the man is assigned for specified periods of time to the following departments:

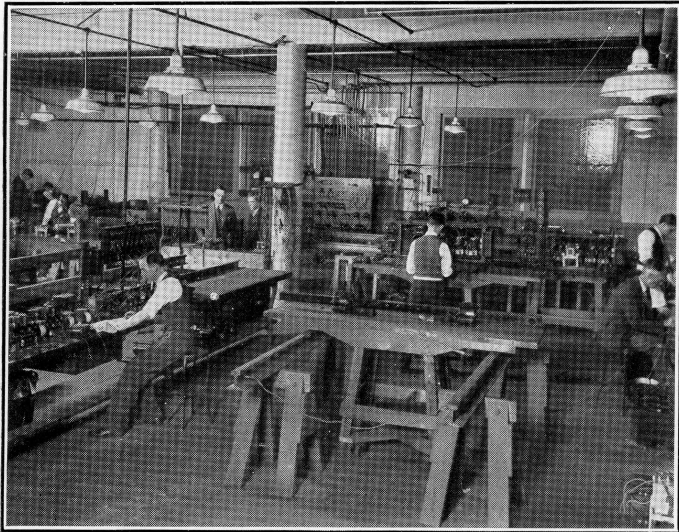
Direct Current Engineering, dealing with design, development and application of all kinds of d-c. signal apparatus and light signals. A thorough knowledge of the principles of d-c. magnetic and electric circuits is required for this work. An understanding of the principles of optics is also essential.

Alternating Current Engineering, dealing with the design, development and application of all kinds of a-c. signal apparatus having moving parts. A thorough knowledge of the fundamental principles of alternating currents is essential to the successful handling of this work.

Power Calculation and Transformer Engineering, dealing with the design of reactors, trans-



The Office where Train Control Systems are Designed



The Train Control Engineering Laboratory

formers and rectifiers and the calculation of track circuits and transmission lines in connection with signaling and train control systems.

Train Control Engineering, dealing with the development of train control systems and apparatus. A knowledge of the theory and characteristics of tuned circuits and thermionic tubes is essential in this work.

Dispatcher Control Engineering, dealing with the development of systems of selective control of remote switches and signals.

Duration of the Course

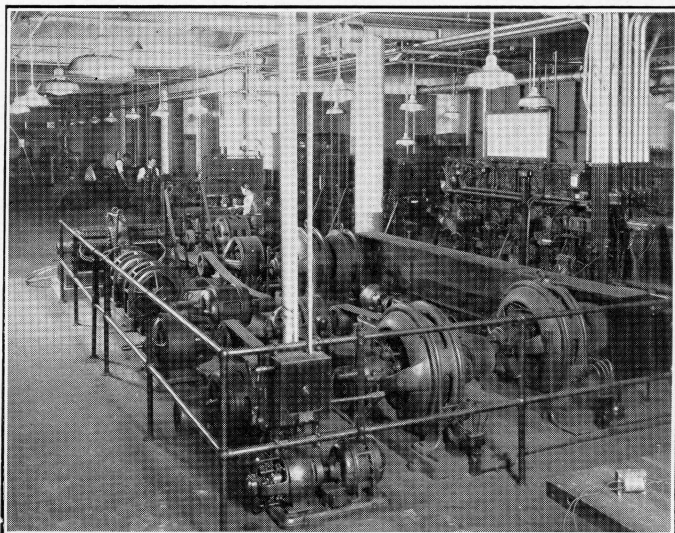
The term of course covers a period of eighteen months. The Company reserves the right to discharge a student on thirty days' notice, at any time for misbehavior, inattention to duty, or, if in the opinion of the Company he is not qualified to pursue successfully the work undertaken.

Compensation

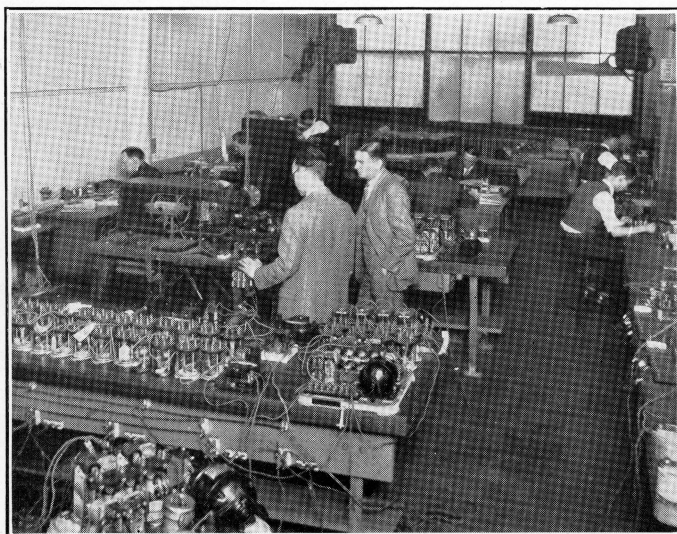
Men in training are paid \$125.00 per month for the first year and \$150.00 per month for the remaining six months of the course. The Company will pay the entrance fee and one year's annual dues, including gymnasium fee, for those men on the course who care to join the Westinghouse Club. Thereafter dues must be paid by the men themselves.

Rules

Men in training will be required to observe faithfully all rules in force and be subject to the



Section of Engineering Laboratory. Power in wide range of voltages and frequencies can be generated here and distributed to test benches and separated laboratories



The Dispatcher Control Engineering Laboratory

orders of heads of departments or foremen to whom they may be assigned.

Working Hours

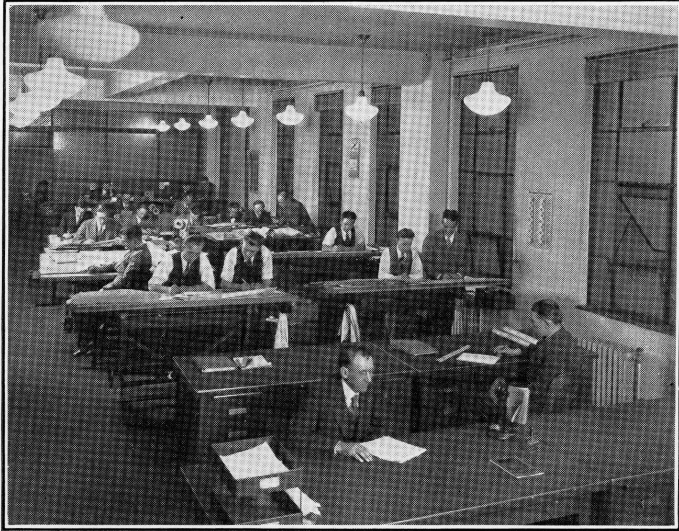
The working hours of the men in training will be those of the department in which he may be employed. Should it become necessary to call upon a man to work overtime, he will be expected to do so without receiving any extra compensation. This is expected of all salaried employees.

Men in training are allowed a vacation of two weeks each year, with full pay, subject to the rules of the Company in regard to vacations.

Social Advantages and Living Conditions Swissvale-Wilkinsburg

The works of the Union Switch & Signal Company are located at Swissvale, a suburb of Pittsburgh, on the main line of the Pennsylvania Railroad, eight miles from the heart of Pittsburgh and one and one-half miles from Wilkinsburg. Swissvale is readily accessible to both Pittsburgh and Wilkinsburg through adequate train and street car service. It is within easy walking distance of Wilkinsburg with paved streets and sidewalks all the way.

Wilkinsburg is the home of the Westinghouse Club. It is situated on the P. R. R. six and one-half miles from "down town" Pittsburgh and is one of the most desirable residential sections of the Pittsburgh district.



Mechanical Engineering Section of the Engineering Department



The Drafting Room, with its Associated Departments occupies an entire floor of the main office building

Board and rooms are readily available in both of these boroughs.

The Westinghouse Club

The Westinghouse Club, situated in Wilkinsburg, one and one-half miles west of Swissvale, was established to aid in the development of men employed in the various Westinghouse industries. In the well-equipped club rooms, men meet after the day's work to relax over games, read, write or talk over their experiences. Opportunities to meet the engineers and older men of the various companies in a social way are presented, thus enabling a man to build up a wide and valuable acquaintance.

The social life of the club consists of smokers, dances, and entertainments. These afford many pleasurable evenings and give abundant opportunity for originality.

Lectures of both a general and technical nature, delivered by men of prominence, are given in the club auditorium at regular periods.

Educational courses or study groups, along many lines, are also conducted during the winter months. These enable one not only to do additional studying along the particular line he may be working, but also to familiarize himself with other lines of the electrical industry with which he might not otherwise come in contact.

There is a large and well-equipped gymnasium in the club building and this, in connection with the outdoor activities, such as tennis, base ball, track athletics, etc., furnishes a means for keeping in good physical condition.

All club members receive the Electric Journal a monthly magazine devoted to electrical engineering, without extra charge.

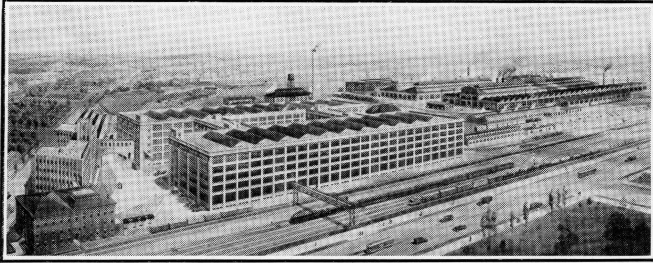
Other Advantages

The Pittsburgh district offers many advantages for recreation and culture. The University of Pittsburgh and the Carnegie Institute of Technology afford opportunities for advanced studies in their day and night courses in engineering, economics, accounting and many other subjects.

The annual exhibit of paintings at the Carnegie Institute is second to none and through the winter months many opportunities are afforded to hear music by the best musicians and singers.

Cost of Living

The average cost of board and room is approximately fifty to sixty dollars a month.



Union Switch & Signal Company

GENERAL OFFICE AND WORKS: SWISSVALE, PENNA.

Floor Space: Over 1,000,000 Square Feet

Designers, Manufacturers and Engineer-Constructors of Electro-Pneumatic, Electric, Electro-Mechanical and Mechanical Railway Signal and Interlocking Appliances

Automatic, Semi-Automatic, and Manually-Operated Block Signals.
Continuously Controlled Cab Signal System.

Electro-Pneumatic, Electric, Electro-Mechanical, and Mechanical Interlockings Automatic Train Control, Car Retarder, Highway Crossing Protection, and Dispatcher Control Equipment.

Railroad, Automobile, and General Forgings and Castings.

Commercial and Engineering Departments Prepared to Handle all Problems Arising in the Field of Signal Engineering.

Plans and Estimates on Application.

DISTRICT OFFICES

New York..... Westinghouse Building
Chicago..... Peoples Gas Building
St. Louis..... Railway Exchange Building
San Francisco..... Matson Building
Montreal..... Dominion Square Building

Represented in Argentina and South Africa by the International General Electric Company. Represented in Australia by the McKenzie & Holland (Australia) Pty. Ltd., Melbourne and Brisbane.

