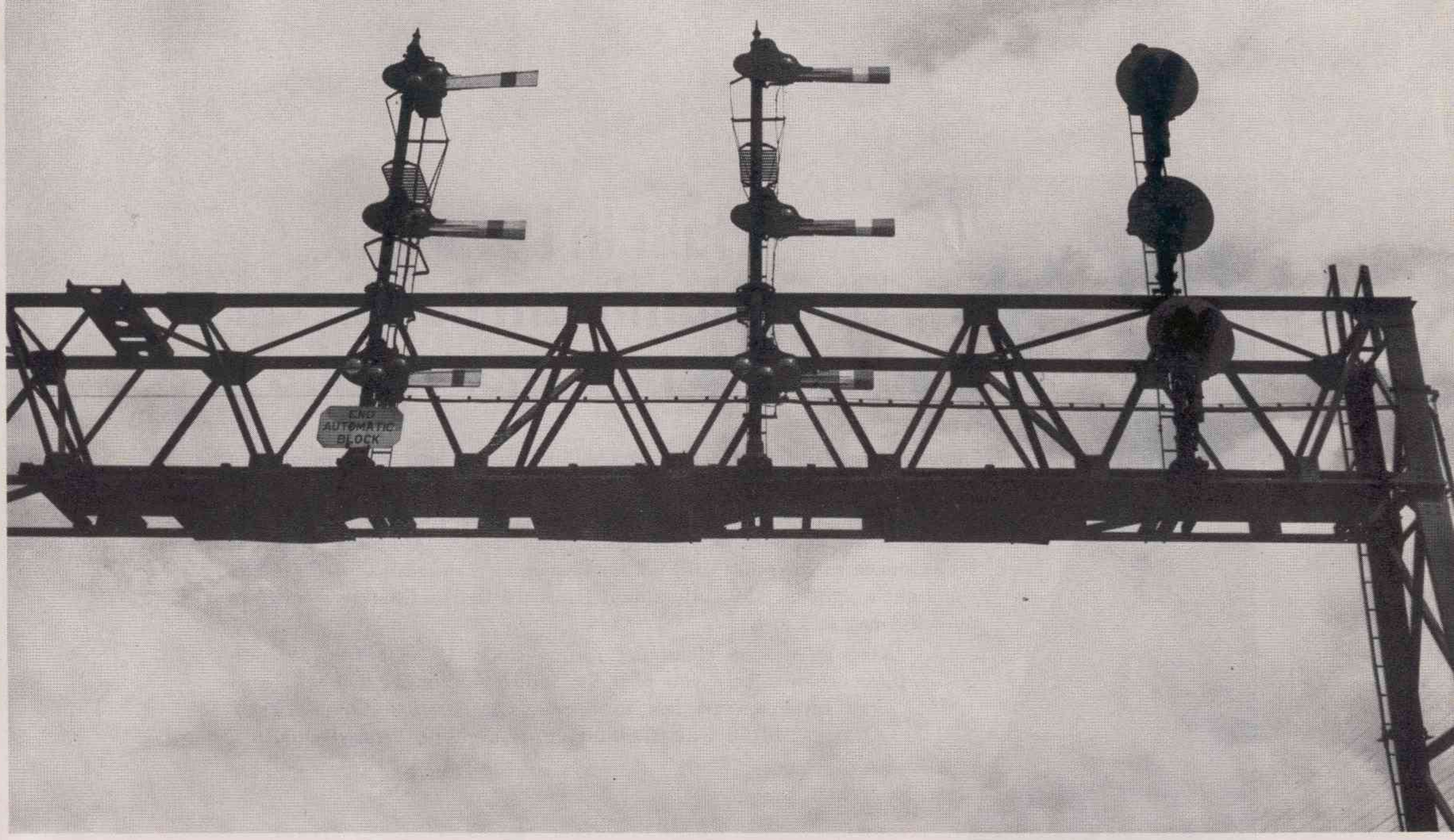

INTERLOCKER signals at Marion, Ohio. Although semaphore, color-light and position-light signals are in use, searchlight type is standard for new installations.

Erie Signals Speed Traffic Flow

Longer blocks and use of traffic control systems have kept Erie signaling abreast of present-day operating conditions. Interlockers are modernized

BECAUSE it must contend with widely varying terrain and traffic densities along its 2300-odd miles of line, the Erie has had to make use of every modern operating technique in order to compete effectively for business under today's conditions. Together with diesel locomotives, well-maintained track, and radio communication, the Erie's modern signal system has been an important factor in maintaining the road's reputation for fast dependable freight transportation.

Across the flat lands at the western end of the Erie's main line, curves are gentle and grades are slight. Farther east, where traffic becomes heavier, operating problems become more difficult with heavier grades and many curves. Finally, near Jersey City, traffic problems become acute with many commuter trains on close headway added to the heavy freight traffic.

As a result of these problems, the Erie has had to apply many different types of signal systems to its various lines. The entire 1000-mile main line between Jersey City and Chicago, as well as the important branch lines, such as the 89-mile Cleveland to Pymatuning and the

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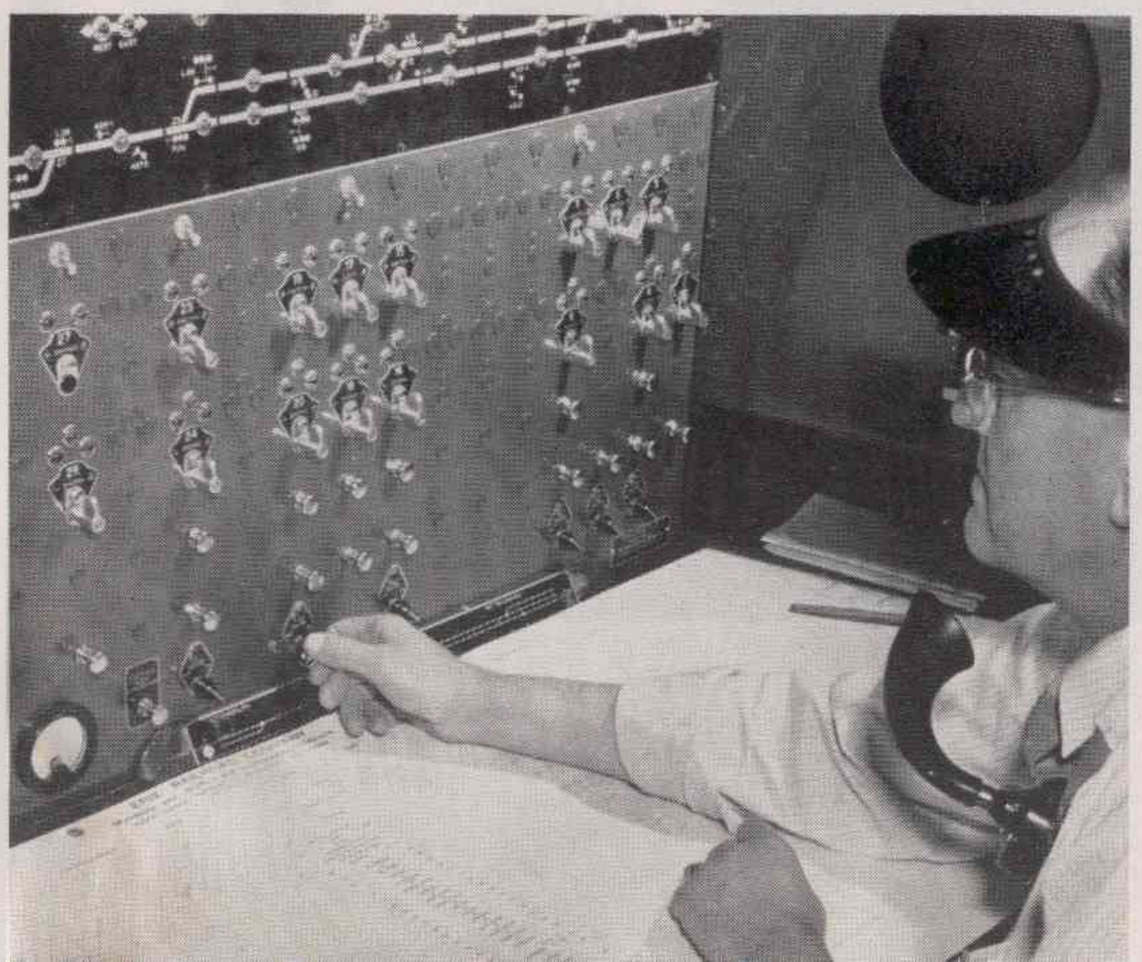
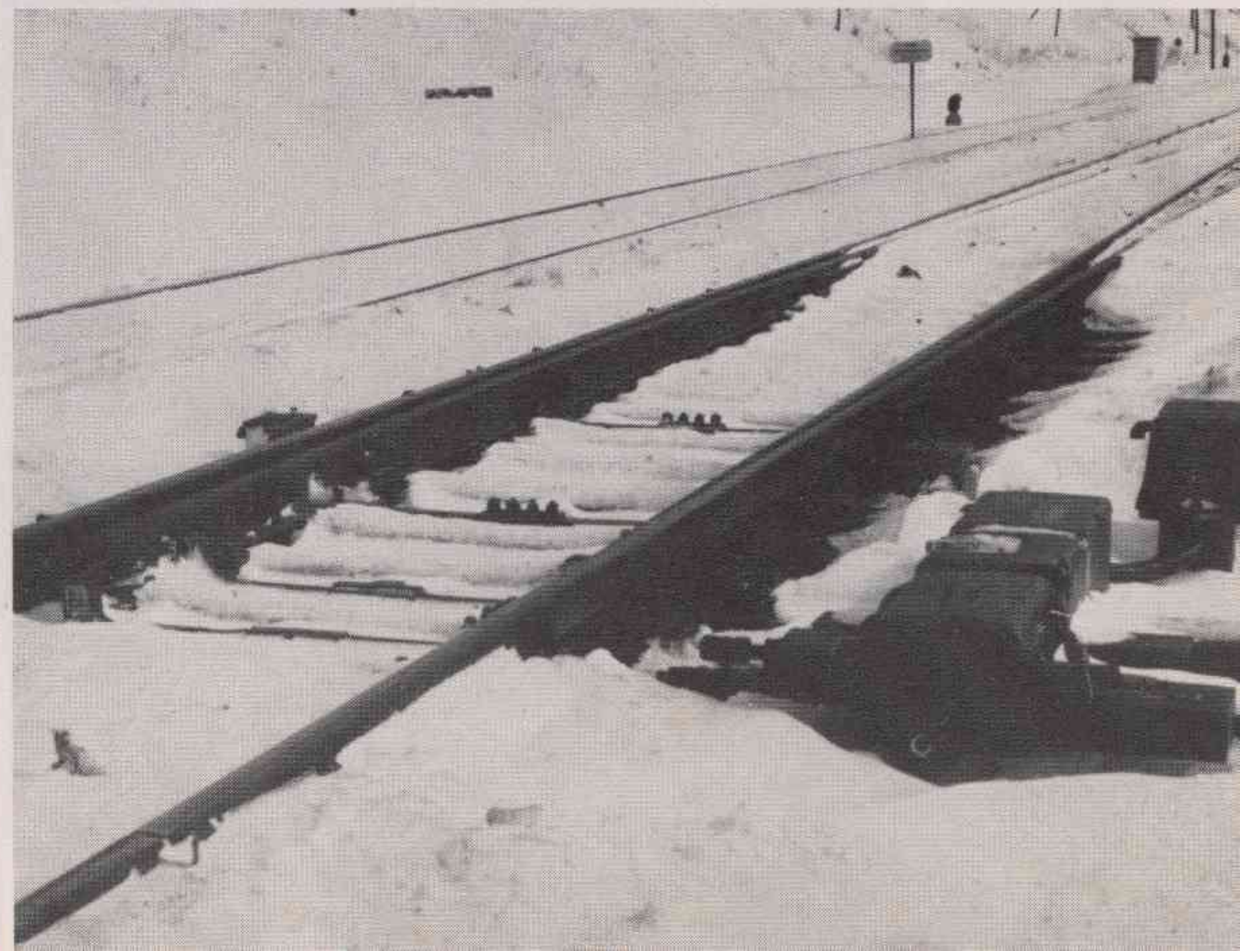
DISPATCHER turns a lever to operate one of the remote-control heaters which melt snow from switches. These heaters are used at important switches in 14 locations.



PROPANE gas, stored in nearby tanks, is fuel for switch heaters. Line code from dispatcher's office energizes solenoid valve and ignition system to start a heater.



ERIE SIGNALS *Continued*

92-mile Buffalo to Hornell lines, are equipped with automatic block signals. In some locations where they are particularly applicable, traffic control systems and automatic train stop are used. The commuter branches around Jersey City are also signaled. Manual block systems are used on some of the less-important branch lines.

The automatic block signal installations total 2390 track miles, with approximately 2400 signals in use. Both searchlight and semaphore signals are employed, with the former being standard for new installations.

In the area of extremely dense traffic around Jersey City, as many as four tracks are signaled for operation in both directions. Here also interlocking plants and crossovers are spaced to give maximum flexibility in handling the heavy traffic load, including the large number of commuter trains operating close together during the rush hours.

Signals Have Been Extensively Respaced

Very little new automatic block signaling has been installed in recent years, since the entire main line and the more important branches have been signaled for 20 years or more. An extensive job of respacing has been done, however, in order to handle the heavier trains being operated since the advent of the diesel locomotive.

For example, on the Kent division, between Marion and Kent, Ohio, the signal spacing has been increased to about 10,000 ft., as compared with the original one-mile interval which applied when the line was first signaled around 1914. Similar adjustments in the signal spacings have been made on other divisions.

On the Delaware and Susquehanna divisions between Port Jervis and Hornell, N. Y., the many curves and frequent severe fog conditions have prompted installation of an intermittent train-stop system. Eighty-three steam and 60 diesel locomotives have been equipped for operation in this 242-mile territory.

On its double track lines the Erie makes extensive use of "telephone train order" signals controlled by tower operators or dispatchers. These signals, located at the entrances to passing tracks and occasionally at crossovers, virtually eliminate the use of written messages or orders. When displaying a clear aspect they indicate hold the main track regardless of following superior trains. Other aspects indicate to the engineman that he is to head into the siding or communicate with the dispatcher. Thus these signals expedite the movement of traffic by permitting freight trains to keep moving instead of taking siding when a superior train becomes due, if the latter has "fallen down" for any reason.

Various types of traffic control setups are in use on 159 miles of road. On some of these installations the entire section is controlled by a single operator; in others control is divided among two or more operators. On the few sections of the main line which are single track, a traffic control system keeps the trains moving with a minimum of delay.

Many of the traffic control system layouts on single track portions of the Erie are being modernized for greater flexibility and economy of operation. For example, a 20.65-mile section of track between Stony Point and Buchanan Jct., Pa., was formerly controlled by an operator at the center of the section, working with two other operators near either end. To obtain more economical and flexible operation the control machine was transferred to Buchanan Jct., which is at the east end, and altered to control the entire section.

At present, work is in progress on an installation of a traffic control system between Buffalo and Portage, N. Y. This territory has long been double tracked and equipped with ABS; but the elimination of passenger service and the increase in freight train length due to the use of diesel locomotives has reduced the total number of trains operated to the point where one track can be retired. Parts of the second track will be retained to form the two long passing sidings in the 60-mile territory. Although trains will operate by signal indication, electric locked switches at the entering ends of sidings, and spring switches at the leaving ends, will be used.

This arrangement will eliminate the costly expense of maintaining the second track and the benefits of train operation by signal indication will be obtained at minimum cost.

The entire job is costing about $500,000, but when it is completed, almost this amount will be recovered in salvage of the unused rail and ties. Substantial recurring savings in reduced maintenance, at from $80,000 to $100,000 annually, will also accrue, according to President P. W. Johnston.

The Erie maintains a total of 107 interlockings, of which 56 are electric. There are also four electro-pneumatic plants and 46 electro-mechanical and mechanical plants in service. The latter are rapidly being replaced by the more efficient electric types.

In many cases, interlocking plants have been consolidated and con-

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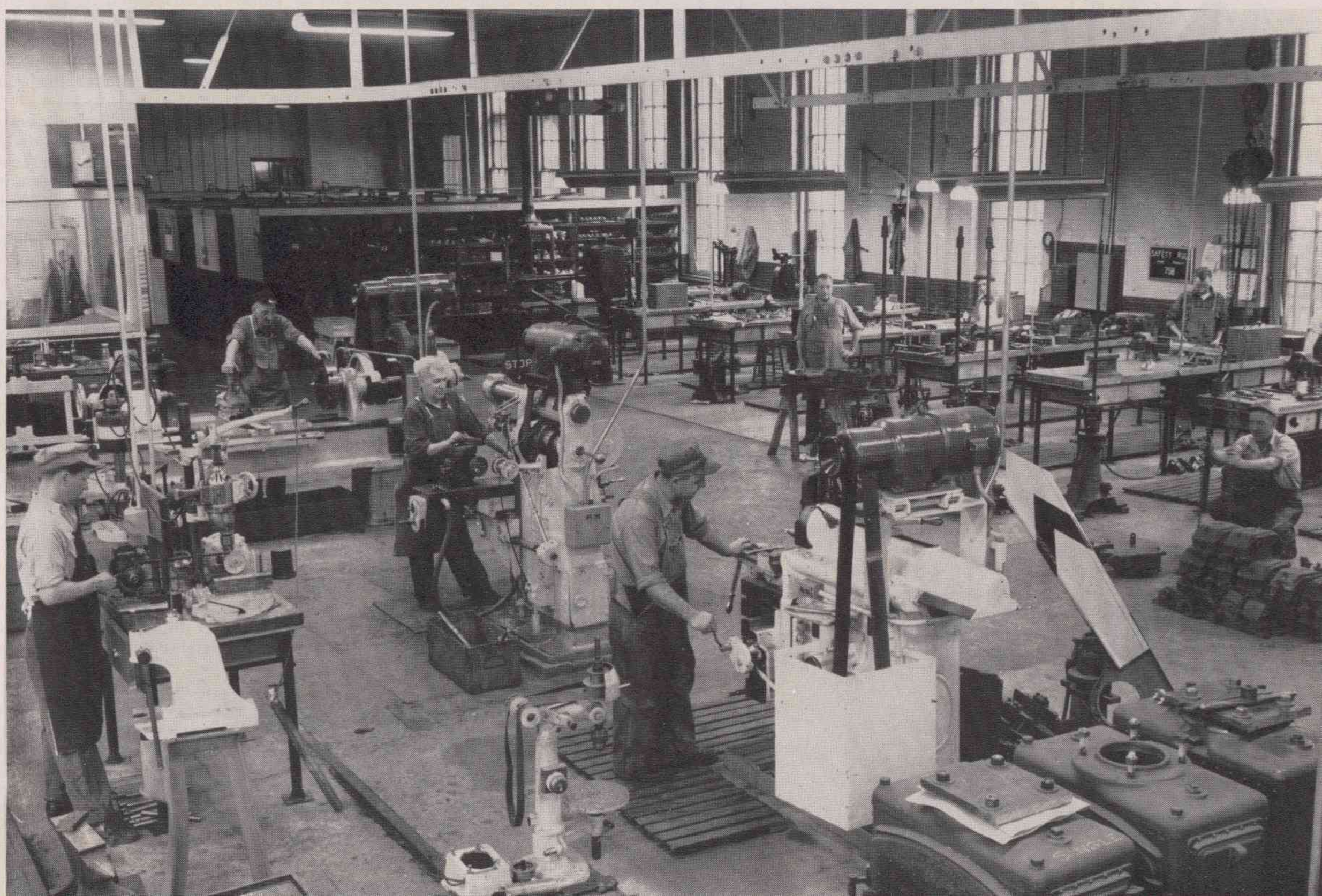
SIGNAL SHOP at Meadville, Pa., is a model of efficient layout. It has facilities for reclaiming all types of signal equipment, as well as for adjusting and testing.



SHORT-ARM automatic gates are in service at many highway crossings along the Erie. At several locations, cutout panels control gates while switching is in progress.

verted to remote control for more economical operation. A large number of additional projects of this type are now under study. Typical of this consolidation is the work carried out at Susquehanna, Pa. Here there were four interlockers, two of them remotely controlled, located in close proximity. In modernizing this setup, the two towers were closed and all four of the layouts combined for control by the operator at the Susquehanna station.

Great Notch, N. J., marks the end of double track on the Greenwood Lake line, and the junction with the Caldwell branch. The mechanical interlocker here was replaced by an arrangement of spring switches and signals operated automatically at all times except during the rush hours, when it can be controlled by the station agent.

Similarly, interlocking plants controlling switches at either end of the Portage and Moodna Creek viaducts in New York were replaced by automatic electric plants, resulting in economies.

Flashing light signals are the most extensively used type of grade crossing protection on the Erie, although numerous installations of short-arm automatic gates are also in service. Over the entire railroad there are about 500 flashers and 47 gates. At Arlington, N. J., automatically operated gates at three crossings are coordinated with a cutout panel operated by a crossing man while switching is in progress. The arrangement has been very successful, both from the standpoint of economy and increased protection, and three other similar projects are now under way.

During 1949 the Erie pioneered in the development of remote-controlled gas-operated switch heaters. Installations made at 14 points along the system proved highly satisfactory for snow melting during their first winter of operation. The heaters are in service at important switches and are often controlled from CTC panels. This arrangement enables the operator or dispatcher, merely by turning a lever, to melt the ice and snow from a switch in his territory no matter how remote it is from his office.

The switch heaters are operated by means of propane gas. In order to obtain the pressure required to operate in extremely cold weather, a number of tanks, connected in multiple, are used.

Remote control of the heaters is accomplished by means of a solenoid valve, operated through a line code by the dispatcher, and an ignition system utilizing a spark plug, hot wire, or magniter. All three types of ignition have proven satisfactory in service. The magniter type does not require a battery. By means of a bimetallic thermostat or thermocouple an indication is returned to the dispatcher's office to indicate that the heater is in operation.

During the 1950-51 season, installations of these gas-operated switch heaters were made at River Jct., Fillmore and Belfast, N. Y., and Columbus Jct., Pa. At present, the greatest problem is to develop reliable local sources of supply for the propane gas. When this has been accomplished the Erie expects to utilize more of these heaters. To date, the present installations, while still in the developmental stage, have operated with few failures. They have eliminated the necessity of calling out men at odd hours during stormy weather to clean the switches, and have made switch operation much more reliable at remote locations on the railroad.

Recently the Erie completed a program of modernizing the camp cars used by its signal construction gangs. Six two-unit outfits have been converted from troop sleepers and kitchen cars. One car is used

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as the kitchen-dining unit while the other car provides sleeping and recreational facilities. The cars have automatic oil heat, electric lights and refrigerators, and propane gas cooking stoves.

The winter of 1950-51 was unusually severe with heavy snows and high winds. At some locations power lines were out for as long as five or six days at a stretch. The Erie's signal system, for the most part, maintained operation by means of standby storage batteries, but where conditions demanded, portable motor generator sets were used to feed the signal power lines until normal commercial service was resumed.

As modern as Erie's signal system itself is the new reclamation and repair shop at Meadville, Pa. Occupying a building formerly used as a cab shop by the Mechanical Department, it is light, roomy and arranged for the most efficient operation. The building is well heated by the shop's central heating system. Fluorescent lighting is used, and modern washing facilities have been installed.

Heavy material such as poles and signal bridges is kept in the outside yard adjacent to the shop, but large doors permit this equipment to be brought inside the shop for working over. A welding and blacksmith room is located near the doors. Smaller items to be reclaimed, such as relays, are stored on stock shelves within the shop.

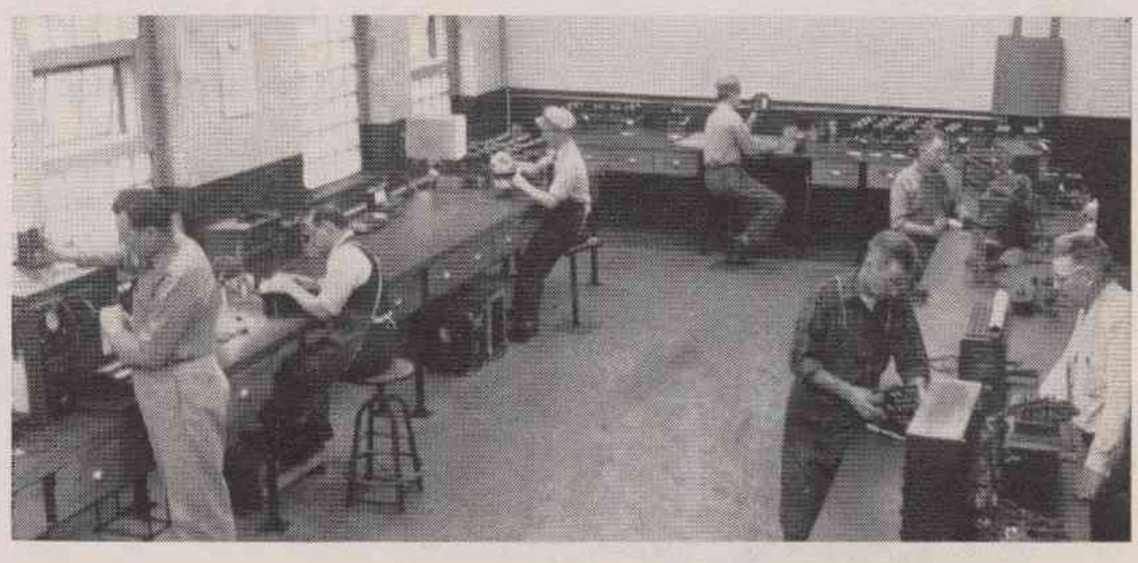
All shop machines are equipped with individual drives, and a monorail crane permits heavy material to be carried easily from one machine location to another. Along one side of the main shop room are benches where equipment such as switch machines, circuit controllers and signal mechanisms can be assembled and tested.

In a separate room closed off from the rest of the shop to keep out dust, are facilities for assembly line testing and adjusting of relays. Here relays for the entire system are adjusted, tested and sealed. Another bench is equipped with test boards for the two types of code control used on the Erie. It can be used to duplicate road conditions for the checking of code units.

Materials to be reclaimed are sent to the signal shop and there held awaiting overhauling. Signal maintainers on the road make no repairs to relay equipment, but simply replace defective units and ship the old ones to the shop.

A program is now underway for enlarging the decks on bracket signals for greater safety. The steel grating type of freight car running board material is used and is welded in place.

The Erie has found signal reclamation activities very worthwhile from a money-saving standpoint. In general, where an article can be reclaimed for 50 percent of the cost of a new replacement, the Erie performs the work in the signal shop. The new shop because of its efficient arrangement and ideal working conditions has stepped up production considerably.



ABOVE: Relays are tested, adjusted and sealed in a dustproof room at the Meadville signal shop. In right foreground is bench where code units are checked.

RIGHT: Winding relay coils at signal shop. Pleasant working conditions plus modern tools and equipment have stepped up production at the Meadville facility.