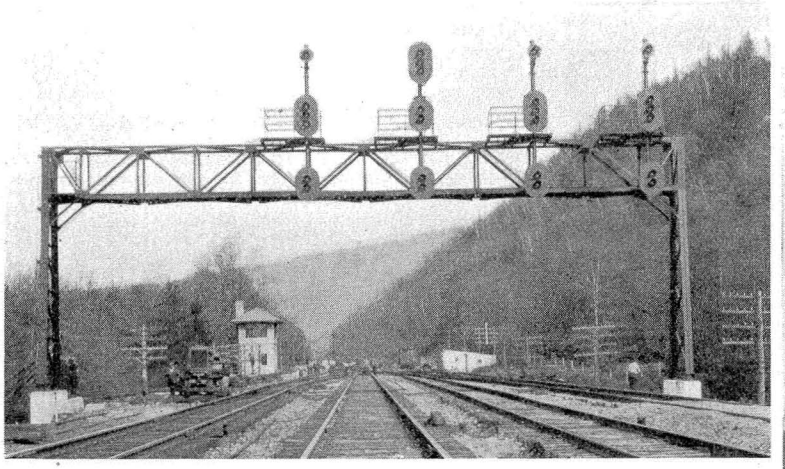
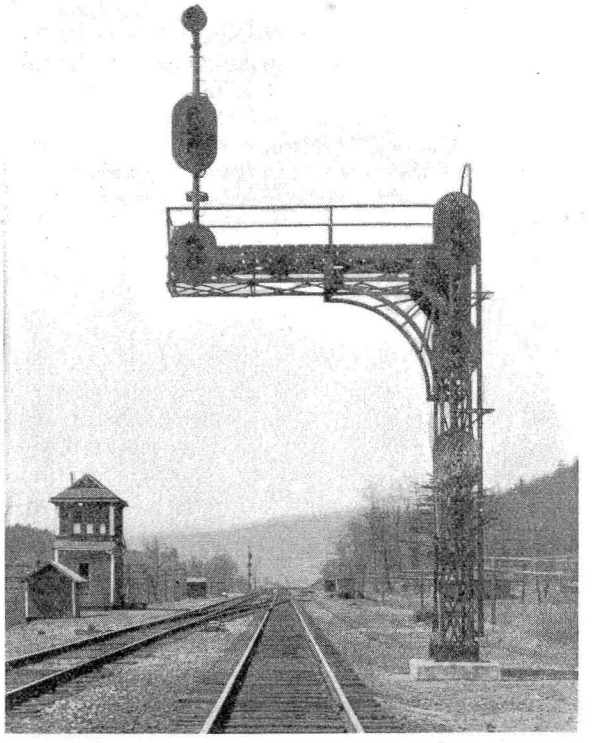
Erie Increases Track Capacity on Busy Section of Double Track

New mechanical plant and centralized traffic control installation solve problem



Eastbound home signal bridge at Lackawaxen



Westbound home signal at Tusten

THE Erie has effectively solved two operating problems with a large signaling installation in which mechanical interlocking and centralized traffic control were judiciously adapted to produce the results needed. The Delaware division of the Erie extends from Port Jervis, N. Y., to Susquehanna, Pa., and is a double-track line handling heavy freight and passenger traffic, including 9 passenger trains and about 12 freight trains in each direction, making a total of 42 trains daily. Port Jervis, the eastern end of this division, is 88.4 miles from New York. About six fast eastbound merchandise, fruit and meat trains from the west, destined for early morning deliveries in New York, are scheduled over this division in the period from 7 p. m. to midnight. Freight loaded during the day in the port of New York, as well as in the industrial zone adjacent, is made up and dispatched in six to eight trains which are operated westbound over the Delaware division. Further complications are introduced by the operation of seven through passenger and express trains over this territory between 10 p. m. and 7 a. m. As a result, this is a very hot piece of railroad during the night and the most serious congestion was on the 11.3-mile section between Lackawaxen and Narrowsburgh. In this particular territory the line follows along the Delaware river at water-level grade. Although the curves are numerous, the degree of curvature at no point is large enough to interfere with the normal operation of trains. The speed limit is 50 m.p.h. for passenger and 40 m.p.h. for freight trains. The freight locomotives are rated to handle 6,155 tons eastbound and 3,150 tons westbound and usually pull from 100 to 125 cars.

At Lackawaxen, the Wyoming division branches off and extends 64.2 miles to Avoca, Pa. Eastbound the traffic from this line is principally hard coal, manufactured products, etc. For years the crossover and junction switches leading to this branch line had been thrown by hand, but signals, bolt-locked through the switches, had been used for protection and to direct train movements. The track layout was not satisfactory as there was not enough room to hold trains off the main lines nor was it possible to pass branch-line trains without interfering with main-line movements. In view of the fact that the Lackawaxen layout was located in the midst of the main line operating difficulties, it was necessary to correct conditions.

The Solution

The junction of the Avoca line (Wyoming division) was moved about 2,600 ft. east and the passing track for this branch line was lengthened this distance also. Two new No. 15 main-line crossovers, one facing for each direction, were also included in the track improvements. A new electro-mechanical interlocking was constructed at this new junction, and a power-operated switch was installed at the west end of the passing track on the branch line, the control being included in the interlocking machine.

At Tusten, 8.5 miles west of Lackawaxen, on the main line, a 20-lever mechanical plant had been used to handle

a crossover and the entering switches for two passing tracks. As these passing tracks were too short for the freight trains now operated, the eastbound passing track had been practically abandoned and the westbound passing track was used only infrequently. However, the interlocking was continued in service as a block station and crossover layout. East and west telephone train order signals were in service at "N.O.," Nobodys, which is 7.7 miles west of Tusten.

With the new reverse crossover in the Lackawaxen plant, it was decided to add a new facing-point crossover in the Tusten layout so that trains could be diverted readily to or from either track at both Lackawaxen and Tusten, thus permitting the use of both tracks in either direction between these points. Keeping in mind that a large percentage of the traffic is handled during the night and that the preponderance of traffic is eastbound between 7 p. m. and midnight and westbound the remainder of the night, it is readily apparent that the ability to run trains in the same direction on both tracks simultaneously would be a big step in relieving congestion and would keep all trains moving rather than having some of them waiting on passing tracks.

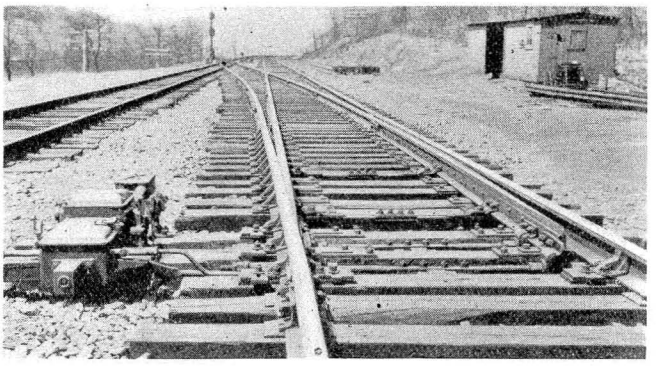
It would have been possible to operate the new crossover at Tusten from the existing interlocking at that point and to install a system of signaling to direct trains in either direction on both tracks between that point and Lackawaxen under the joint control of the levermen at the two plants. However, a plan was devised to use a centralized traffic control system such that the one leverman at Lackawaxen not only has control of the signals for directing train movements in this territory but also operates the crossovers at Tusten, thus eliminating the interlocking and the need for levermen at Tusten. Included in the same centralized machine is the control for the telephone train order signals at Nobodys. Thus the operation of the interlocking at Lackawaxen and the direction of train movements on the main line from that point to Nobodys is now centralized in the hands of one man, thus eliminating confusion and delay.

Operating Results Satisfactory

The leverman at Lackawaxen keeps advised as to the movement of trains approaching the Lackawaxen-Tusten territory, and preference of trains and routings through this section is made on instructions from the dispatcher at Susquehanna, Pa. Ordinarily freight trains keep moving on the right-hand normal track, while passenger and express trains are diverted to run around on the other main. Likewise, a train of fruit or meat may be run around a slower freight train. The new interlocking and centralized control facilities were placed in service on May 6, 1931, and operating officers are highly pleased with the results being obtained in keeping all trains moving on this territory where delays were previously experienced.

The Electro-Mechanical Plant

The new two-story and basement tower at Lackawaxen was constructed with a concrete foundation and wall of concrete blocks. In the top floor the entire wall space on three sides is taken up by large steel casement windows, which afford an excellent view of the tracks in all directions.



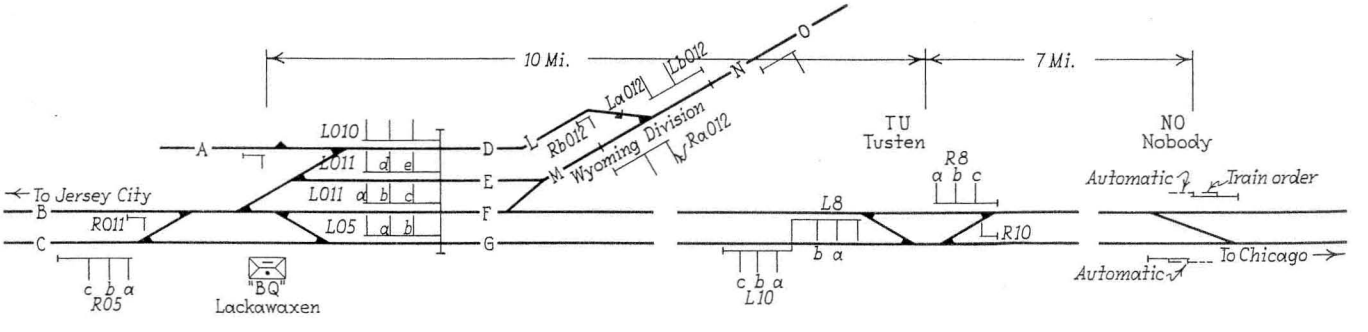
The power-operated switch layouts are well braced

In the mechanical section of the machine five levers are provided to operate, by pipe connections, the two main-line crossovers, the one junction switch and the crossover to the back track, and one derail. Five levers are used for facing-point locks on the above mentioned switches and derail. The lock levers are equipped with forced-drop electric locks, which are mounted on an angle-iron frame attached to the brackets and the connecting rods extend to the quadrants. All the wiring is run in either metal conduit or Transite board chase-way.

The S-8 electrical section mounted over the mechanical machine has 7 levers. Four of these levers are for the control of 10 signals, 2 are traffic levers, and one is for the control of the power-operated switch at the far end of the passing track on the branch line. Each signal lever has a push-button to control the slow-speed call-on arm.

The lead-out is of the rocker-shaft type bolted to steel channel beams set on concrete foundations. These channel beams are 10 in. wide with the flat side up. The up-and-down rods to the levers are made of 1½-in. pipe. Standard 1-in. wrought-iron pipe is used for the pipe lines. A rectangular plunger-type facing-point lock is used for each switch. The switches are well braced with wedge-type adjustable rail braces on three ties outside and inside on the first tie ahead of the point. The Wharton-O'Brien type of adjustable rods are used for the head and front rods.

The high signals are the color-light type, each mast



Track and signal plan showing only the interlocked and controlled signals at Lackawaxen, Tusten and Nobody

having three units. Each home signal for the normal direction on a main line has a three-light unit for the top arm, a two-light unit for the second and lower arms. For a move off the branch line or for a reverse direction move on a main-line block, the top arm is a single red unit, the second arm has a three-light unit and the lower arm a two-light unit.

Lead storage battery is provided for the control circuits, electric locks and model board, lights, etc. The signals are normally on a-c. but can be fed from the battery in case of an a-c. power interruption. The track circuits in the Lackawaxen plant, as well as on the territory through to Tusten, are fed by Edison storage battery, excepting circuits between eastbound distant signals at B.Q. and westbound distant signals at Tusten, which are Edison primary.

The Centralized Traffic Control

The centralized traffic control machine is located at the left end of the leverman's desk in the Lackawaxen tower. The two levers at the left, the one above the other, are for the westbound and eastbound telephone train-order signals at Nobodys. When in the vertical position on center, the corresponding signal indicates "stop," when turned to the left the indication is "caution" and when turned to the right, "clear." A small lamp above each position of the lever repeats the signal indication. These are a combination automatic and train-order signal and are Union Style-S, two-arm, three-position signals and were controlled previously from Tusten.

Four levers in the C.T.C. machine are for the control of the Tusten layout. The two top levers are for the control of the two crossovers, and the two lower levers are for the control of the eastbound and westbound home signals, respectively. It should be noted that the eastbound home signal at Tusten is not only the home signal for this layout but also serves to direct train movements on either track between Tusten and Lackawaxen. In the illustration of the control machine, it will be noted that spare space is provided for additional levers to control the territory from Lackawaxen to Rosas, Pa.

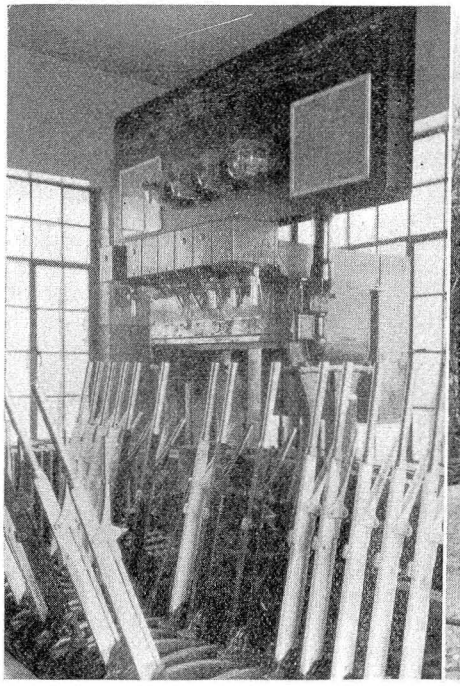
The centralized control system is the two-wire coded type, of the Union Switch & Signal Company. The two line wires for the controls are No. 8 copper with weather-proof covering. At Tusten, the relays, etc., are housed in a sheet-metal house 5 ft. by 7 ft. Sixteen cells of EMGO19 160-a.h. Exide battery are provided for the operation of the four switches, and a center tap is used for the 16-volt local code circuits. A six-cell set of KXHS11 battery is used for the control of the train-order signals at Nobodys and for local circuits.

The circuits from the steel house to each switch are run in three parkway cables, one 5-conductor No. 6, one 7-conductor No. 14 and one 5-conductor No. 14. Single-conductor No. 9 parkway cable is used for the rail connections. Raco bootleg outlets, with the conductor soldered to a Keystone rail connector, are used. This cable was furnished by Okonite, a lead sheath being included in the protection for all cables excepting those used for track connections. The circuit distribution to signals within interlocking limits consists of single conductors made up in cables using Raco cable straps spaced 15 in. apart to support the cable from 3/8-in. stranded messenger.

A 440-volt alternating-current circuit on two No 8 copper weather-proof wires carried on Pyrex insulators was added to the pole line as a feed to charge the storage batteries at Tusten, as well as at intermediate signal locations. As a part of the reconstruction, several of the intermediate signals were relocated to secure proper braking distances.

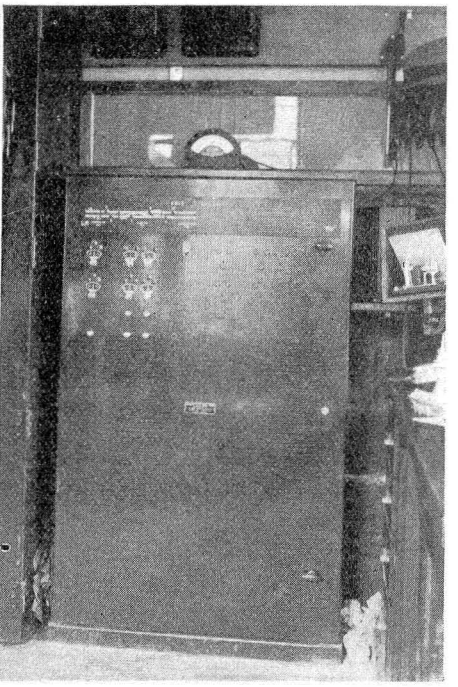
Intermittent inductive train stop is in service for main-line moves on the right-hand track. Dead inductors were installed as a protection for reverse moves, as well as for those from the branch line to the main tracks. Each dead inductor is made of a piece of 3/4-in. sheet iron 6 in. wide and 5 ft. 2 in. long.

The signal and interlocking equipment for the interlocking and the C.T.C. installation was furnished and installed by the Union Switch & Signal Company under the direction of M. A. Baird, signal engineer of the Erie.



The interlocking machine

The tower



The CTC machine