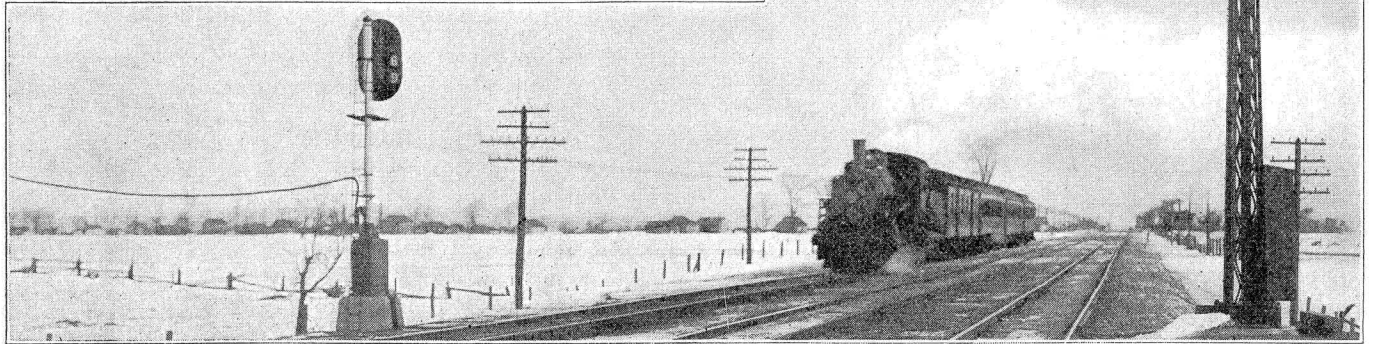


Train Control Progress in 1924

Intensive Development, Changes in Specifications, Suspension of Part of Second Order, and Interim Inspections Features of Year



Train Control Assures Observance of Signal Indications

THE year 1924 has seen greater strides in the development and installation of automatic train control than any previous year. The insertion of the provision for the permissive feature of the train stop in the specifications and several new interpretations of the requirements of the Commission's order have necessitated intensive development on the part of the manufacturers. Of the 46 roads on which the first order is now effective in requiring a complete engine division to be equipped by January 1, 1935, all but four have announced their selection of a system or device.

The two complete division installations previously in service, i. e., the Chicago & Eastern Illinois, and the Chicago, Rock Island & Pacific have been continued in service during the year without extension of roadside equipment. Three other roads have practically completed their wayside signal and control installations on a complete division but equipment for the full quota of locomotives has been delayed. At least twenty-four additional roads have installed control apparatus on sections of 20 miles or more on the specified territory and have equipped a corresponding number of locomotives. Five interim inspections of these installations have already been made by representatives of the Commission and several other roads are now ready for such inspections.

Important Changes in the Orders of the Commission

Evidently the Interstate Commerce Commission was not satisfied with the progress being made by the 49 roads which it had ordered to equip one division by January 1, 1925, in accordance with the order of July

13, 1922. Therefore, on January 14, 1924, a second order was issued, requiring 47 of the roads listed in the previous order to install train control on a second division and also ordering 45 additional roads to equip one division prior to February 1, 1926. On March 3, the carriers filed a joint petition requesting that the second order be vacated, and that an extension of time be granted for compliance with the first order. The

Of the 46 roads on which the first train control order is now effective, two installations are completed and four others are from 75 to 90 per cent finished. At least 24 roads have sections of 20 miles ready for service. They have also installed signal equipment and erected pole lines, so that a large portion of the wayside work over entire divisions is finished. Therefore, the majority of the 45 division installations of train control can be completed in a few months, providing the results of the interim inspections are satisfactory. Only four have not announced contracts, but these have made extensive tests.

new roads included in the second order were granted a hearing before the Commission on May 7-15, as a result of which the Commission, under date of July 18, suspended the second order insofar as the 45 new roads were concerned and also inserted a provision for the permissive feature of the train stop in the specifications of the order. However, no extension of the time for compliance with the first order was granted.

Later in the year the Commission released the Chicago, St. Paul, Minneapolis & Omaha the Western Maryland and the Buffalo, Rochester & Pittsburgh from compliance with the train control orders. Therefore, as the situation now stands, 44 of the roads listed in the original order are required to equip two complete passenger divisions; while two roads, the Richmond, Fredericksburg & Potomac and the West Jersey & Sea Shore, each of which has only one main line division, are required to equip these divisions.

In the hearings before the Commission, representatives of the roads made a strong plea for the insertion of a permissive clause in the train stop specification. They stated that without the permissive feature the train stop device, without speed control, would not meet their needs on account of the impracticability of bringing all trains

to an absolute stop at certain locations on grades, and because of the necessity for stopping trains when approaching a siding when a train was holding the main track for a meet.

The insertion of the permissive clause, which had long been advocated by the *Railway Signaling*, led several roads, which had not proceeded very far with their installations, to change their plans. For example, the Burlington discarded the speed control feature, thereby

PROGRESS MADE ON TRAIN CONTROL INSTALLATIONS UNDER THE FIRST ORDER

| Road | Maker of Train Control | Type of System | Mileage of Specified Division | Miles of Road Eq'p'd | Engs. Eq'p'd |
|-------------------|------------------------|----------------|-------------------------------|----------------------|--------------|
| A. T. & S. F. | Union | Continuous | 104.5 | 104.5 | 40 |
| A. C. L. | General | Intermittent | 114.5 | --- | --- |
| B. & A. | General | Continuous | 101.0 | --- | 1 |
| B. & M. | Union | Continuous | 105.6 | 13.8 | 4 |
| B. & O. | | | 36.3 | --- | --- |
| B. R. & P. | General | | 94.0 | 16.0 | 5 |
| C. R. R. of N. J. | Union | Continuous | 65.9 | --- | 2 |
| C. & A. | National | Intermittent | 126.6 | 20.0 | 10 |
| C. & E. | | | 126.6 | --- | --- |
| C. & E. I. | Miller | Ramp | 105.4 | 105.4 | 108 |
| C. R. I. & P. | Regan | Ramp | 165.0 | 165.0 | 102 |
| C. & O. | American | Ramp | --- | 61.0 | 26 |
| C. & N. W. | General | Continuous | 149.0 | 22.0 | 3 |
| C. B. & O. | Sprague | Intermittent | 82.0 | 20.7 | 8 |
| C. I. & L. | Sprague | Intermittent | 97.0 | 20.0 | 4 |
| C. M. & St. P. | Union | Continuous | 108.0 | 24.7 | 1 |
| C. N. O. & T. P. | General | Intermittent | 156.5 | 35.2 | 8 |
| C. C. C. & St. L. | General | Continuous | 128.3 | 20.9 | 1 |
| D. & H. | General | | 113.0 | --- | --- |
| D. L. & W. | Union | Continuous | 146.0 | 37.0 | 10 |
| Erie | | | 104.2 | 2.0 | 1 |
| G. H. & S. A. | National | Intermittent | 86.5 | 50.6 | 34 |
| G. N. | Sprague | Intermittent | 121.0 | 25.0 | 6 |
| I. C. | Union | Continuous | 123.0 | 22.0 | 10 |
| K. C. S. | General | Intermittent | 104.0 | 17.0 | 5 |
| L. V. | General | Intermittent | 65.0 | 28.0 | 10 |
| L. I. | Union | Continuous | 19.5 | 2.03 | --- |
| L. & N. | Union | Continuous | 165.0 | 17.0 | 5 |
| M. C. | General | Continuous | 74.5 | 20.0 | 5 |
| M. P. | National | Intermittent | 146.0 | 14.0 | 29 |
| N. Y. C. | Sprague | Intermittent | 148.5 | 20.5 | 15 |
| N. Y. C. & St. L. | Union | | 142.6 | --- | --- |
| N. Y., N. H. & H. | | Continuous | 62.0 | 23.7 | 10 |
| N. & W. | Union | Continuous | 107.0 | 108.0 | 14 |
| N. P. | Sprague | Intermittent | 109.3 | 21.5 | 6 |
| O. W. R. R. & N. | Union | Continuous | 84.0 | 33.6 | 8 |
| Pennsylvania | | | 83.2 | --- | --- |
| P. M. | | | 60.9 | --- | --- |
| P. & L. E. | Union | Continuous | 65.8 | 20.0 | 10 |
| P. C. C. & St. L. | | | 187.0 | --- | --- |
| R. F. & P. | Union | Continuous | 101.6 | --- | --- |
| St. L.-S. F. | National | Intermittent | 43.7 | 20.0 | 23 |
| Reading | Union | Continuous | 55.5 | 54.0 | 12 |
| S. P. | National | Intermittent | 75.0 | 51.0 | 73 |
| Southern | | | 153.0 | --- | --- |
| U. P. | Union | Continuous | 102.0 | 60.1 | 15 |
| W. J. & S. S. | Union | Continuous | 58.5 | --- | --- |

simplifying the roadside installation and reducing the apparatus on the locomotives.

In a recent opinion the Commission ruled that, if an automatic brake application had once been initiated, this application should continue through its course of action without interruption by any permissive feature or acknowledging device. The purpose of this ruling was to prevent an engineman from habitually annulling automatic brake applications without necessarily becoming alert to recognize the signal indications or conditions ahead. This requirement has been met by some manufacturers by developing an acknowledging device involving a time element such that if the automatic brake application should be initiated during the time interval involved in the operation of the acknowledging device a brake application would not be effective. In order to

prevent the possibility of an engineman holding down an acknowledging button constantly, various arrangements have been devised to limit the time or space of possible acknowledgement to an interval of 7 to 20 seconds prior to arrival at the point of application or change of indication.

On July 22, the Commission announced an addition to sub-paragraph *b* under "Functions" in the specifications, to the effect that "Consistent practice requires definite acknowledgment by the engineman at each signal indicating stop." Some railroad officers state that they see no necessity for the recurrent acknowledgment feature, although in the report of the Commission regarding the interim inspection on the Pennsylvania a criticism was made to the effect that, "no provision had been made in this installation for reacknowledgment at successive stop signals."

Interim Inspection Affords a Relief to the Carriers

The carriers greeted with enthusiasm the announcement of the Commission in April to the effect that if a road would equip a 20-mile section of its division and a suitable number of engines of each class with control apparatus the Commission would co-operate in an inspection of this portion of an installation for the purpose of giving opinions of advice to the carrier as to the desirability or objections of the principle or construction of the system. This offered a promise of an opinion on the essential features of a device or installation with an expenditure of only approximately one-fourth of the cost of equipping an entire division.

As only a few of the carriers had actually installed any roadside equipment beyond the proportion mentioned, it was logical that efforts should be concentrated on a 20 or 25-mile section and on the 6 or 8 engines required to secure this interim inspection. The Commission held out no promise that the interim inspection could be used as an excuse for failure to complete the entire division by January 1, 1925. Therefore, perhaps with this idea in mind, some of the roads such as the Norfolk & Western, the Atchison, Topeka & Santa Fe and the Galveston, Harrisburg & San Antonio have completed their wayside control apparatus without requesting any interim inspections.

Three Older Installations Continued in Service

The Chicago, Rock Island & Pacific installation of the intermittent ramp type of the Regan Safety Devices Company on 165 miles of double track between Blue Island, Ill., and Rock Island was inspected by the Commission on November 30, 1923, and a decision was rendered on December 17, 1923.

The Chicago & Eastern Illinois has had an installation of the Miller Train Control Corporation's intermittent ramp system in service for 10 years on 105.4 miles of double track from Yard Center, Ill., to Danville. The equipment of the 108 locomotives assigned to this division now conforms to the requirements of the Commission's order and 30 engines of the Elgin, Joliet & Eastern, which operate over a portion of the train control territory, have been equipped. The C. & E. I. has recently requested a final inspection and approval of this division installation in compliance with the first order.

The Chesapeake & Ohio has had train control in service on 21 miles of single track between Gordonsville, Va., and Charlottesville since June, 1919. A 40-mile single track section from Charlottesville to Staunton with 8 passenger and 9 freight locomotives was also placed in service on January 16, 1924. The intermittent ramp system of the American Train Control Corporation is used, a total of 26 engines being equipped. This in-

stallation now constitutes 100 per cent of the division installation required under the first order.

Six Roads Secure Interim Inspection

The Southern Pacific installation on 50 miles of single track and 24.4 miles of double track between Oakland, Calif., and Tracy is 95 per cent completed. An official inspection of this installation was made by representatives of the Commission in August. The National Safety Appliance Company's intermittent inductive system of train control with the forestalling device is being used on this installation. Forty-three locomotives are equipped.

The Missouri Pacific train control installation on 14 miles of single track between Leeds, Mo., and Stillwell, Kan., was inspected by the Commission between September 1 and 12. In this instance the wayside apparatus of the National intermittent inductive system is superimposed into a controlled manual system by means of which the movements of trains are directed by signals without train orders. Ten freight and 19 passenger engines are now equipped.

The Pennsylvania installation of the Union Switch & Signal Company's three-speed continuous train control on the Lewistown Branch was inspected by the Commission, starting on September 16. This installation was made primarily for the purpose of development and test and is not on the territory specified by the order of the Commission. The Commission's report of this interim inspection was published on page 957 of *Railway Signaling* for December.

The 22 miles single track installation on the St. Louis-San Francisco between Nichols, Mo., and Logan, was inspected by the Commission on October 15 to 18. This territory is a section of the division included in the Commission's order and is fully equipped with direct current automatic block signaling. On this installation the National intermittent inductive system is used, 19 passenger and 4 freight locomotives being equipped. No speed governor is employed on the locomotive but intermittent speed limits are enforced by track circuit arrangements. At the time of the inspection two of the engines were equipped with the forestalling device.

The Great Northern installation of train control on 20 miles of single track from Minot, N. D., to Berthold was inspected by representatives of the Commission on November 22 to 26. This road is using the intermittent inductive system of the Sprague Safety Control & Signal Corporation without the speed control features, six engines being now equipped.

Starting on December 1, the examiners for the Commission inspected the 20-mile double track installation of the Chicago & Alton between Normal, Ill., and Chenoa. This installation of the National system includes equipment for 4 passenger and 6 freight locomotives.

Construction Progress Made on Other Roads

Having decided on the type of train control to be adopted many carriers have entered on an intensive construction program to finish the roadside control installation on the 20-mile test sections as soon as possible. Three roads have carried their signal construction or reconstructed through the entire division and in some cases new pole lines were constructed throughout.

On the A. T. & S. F. the roadside equipment for the Union continuous system has been completed on 104.5 miles of double track between Ft. Madison, Ia., and Chillicothe, Ill. This installation is unique in that no wayside signals are to be used except at interlocking

plants, 12 of which were revised on this territory. Equipment for 100 locomotives has been ordered and 15 passenger and 25 freight engines have been equipped. The installation of the second division from Chillicothe to Chicago is proceeding rapidly, from 25 to 75 per cent of the various parts of the work being completed.

The Norfolk & Western has practically finished the installation of light signals and the Union continuous train control on 107 miles of single track between Shenandoah, Va., and Hagerstown, Md. Approximately 14 engines are equipped at this time. Estimates have been completed and plans started for the work required on the division listed in the second order.

The Galveston, Harrisburg & San Antonio has practically completed the installation of the roadside equipment of the National intermittent induction system on 50.6 miles of single track between Rosenberg, Tex., and Glidden. The equipment for the 17 passenger and 17 freight locomotives includes the forestalling device for the permissive train stop features.

The Chicago & North Western has completed the installation of the General Railway Signal Company's continuous system on 22 miles of double track between Missouri Valley, Ia., and Council Bluffs. One passenger and two freight locomotives are equipped.

The Chicago, Burlington & Quincy has completed the wayside installation of the Sprague intermittent train control system on 20.7 miles of double track west of Creston, Ia. No speed governors are used on the locomotives and as this is a train stop system, no forestalling devices are used. Four passenger and 4 freight locomotives are equipped.

The Chicago, Milwaukee & St. Paul has installed the wayside control for the Union two speed continuous system on 24.7 miles of double track between Bridge Switch, Minn., and Winona. One locomotive is equipped and apparatus for six others is being installed. Roundhouse stalls at Milwaukee, Wis., La Crosse and Minneapolis, Minn., have been wired for testing purposes.

The Cincinnati, New Orleans & Texas Pacific has finished a 35.2 mile, double-track section between Ludlow, Ky., and Williamstown. The General intermittent inductive auto-manual system is being used on this territory and 8 locomotives have been equipped.

The Delaware, Lackawanna & Western has completed an installation of the Union continuous inductive system on 30 miles of double track and 10 locomotives have been equipped. The tests of the Finnegan train control system are being continued and new units have been installed.

The Illinois Central has a 22-mile double track installation of the Union two-speed continuous system in service between Champaign, Ill., and Tuscola, 10 engines are equipped.

The Louisville & Nashville has installed the Union intermittent inductive train control on 17 miles of single track between Madisonville, Tenn., and Etowah. Three passenger and two freight locomotives are equipped.

The Michigan Central has 20 miles of double track equipped with the General continuous inductive system. Two passenger and three freight engines are equipped.

The New York Central has installed the Sprague intermittent inductive system on 20 miles of two passenger tracks just west of Hoffmans, N. Y. Ten passenger and five freight locomotives are equipped.

The Northern Pacific is using the Sprague intermittent inductive system having 20 miles of roadside equipment in service just west of Mandan, N. D. Six engines are equipped.

The Union Pacific is using the Union continuous sys-

tem on 102 miles of double track between Sidney, Wyo., and Cheyenne. Sixty miles of the installation is completed and practically half of the roadside and pole line work on the remainder of the territory is finished. Fifteen locomotives are equipped and apparatus for 17 more is on hand.

The Baltimore & Ohio, the Erie, the Chicago & Erie, and the Pere Marquette have not as yet made any definite announcement as to a choice of the train control system to be installed. The Southern, although not having announced any contract for its own installation, is associated with the C. N. O. & T. P. on the installation and tests of the General Railway Signal Company's intermittent inductive auto-manual system.

The Reading has 56 miles of double track equipped with the Union continuous system east of Camden, N. J. Twelve locomotives have been equipped and apparatus for 13 more has been received.

The Chicago, Indianapolis & Louisville has practically completed the signal changes and installation of the way-side apparatus on a 20-mile section using the Sprague intermittent induction system. Four equipped engines are now in service.

The Oregon, Washington Railroad & Navigation Com-

pany has completed over half of the pole line and way-side apparatus on the 85-mile single track installation of the Union continuous system between East Portland, Ore., and The Dalles. Control equipment for eight locomotives has been applied and other equipment is enroute.

The Erie has a test installation of the ramp type of the International Signal Company's (Webb) system of 5 miles of double track with two passenger engines equipped on the northern division and one mile of track with one freight engine equipped on the Delaware division. On its New York division a section of 4 miles of one track and one passenger engine is equipped with the Clifford system of train control. One engine has been equipped with the intermittent inductive system of the National Safety Appliance Company's and equipment for one engine has been ordered for trial from the Sprague Safety & Control Company.

As may be seen in the table herewith several of the other companies have made short test installations. Some of the carriers have let contracts and have proceeded with pole and signal changes but have not as yet placed any train control apparatus in service. A few of the roads have equipped one or two locomotives and a few track sections for test purposes.

Train Control Inspection Reports

THE Interstate Commerce Commission has made public a letter from E. H. De Groot, Jr., director of its Bureau of Signals and Train Control, to W. R. Scott, president of the Southern Pacific lines in Texas, written as a substitute for a previous letter regarding the results of the preliminary inspection by the commission's representatives of the Southern Pacific train control installation. An earlier report, which was sent to General Manager Dyer of the Southern Pacific, was the subject of a recent conference at the office of the commission, attended by representatives of the railroad and of the National Safety Appliance Company.

Following is the substance of the letter:

After further investigation, conference and demonstration my former letter, dated September 29, 1924, to General Manager Dyer concerning the preliminary inspection of the National Safety Appliance Company's automatic train stop device as installed on the 20-mile single track section of the Southern Pacific between Brantwood and Tracy, California, (this preliminary inspection having been made in accordance with the commission's circular, or press notice, of June 9, 1924) is withdrawn and the following substituted:

1. A signal governing the entrance to a block may indicate stop due to local signal trouble and the track magnet indicate clear at the same time.

The specifications and requirements covering this point are as follows:

Paragraph 1, General Requirements. "An automatic train-stop device shall be effective when the signal admitting the train to the block indicates stop, and, so far as possible, when that signal fails to indicate existing danger conditions." Also,

Paragraph 2, Design and Construction. "The apparatus shall be so constructed . . . as to perform its intended function (a) in the event of failure of the engineman to obey the signal indications; and (b) so far as possible when the signal fails to indicate a condition requiring an application of the brakes."

2. The track magnet may be displaced or removed without affecting the operation of the signal system, and, under these conditions, a stop signal and an automatic brake application would not result at the signal and magnet in the rear.

The specifications and requirements are as follows:

Paragraph 3, Design and Construction. "The apparatus shall be so constructed that it will, so far as possible, perform its intended function if an essential part fails or is removed. . . ."

3. At some distant signals track magnets are so located that an automatic brake application made thereat will not stop a train proceeding at high speed before it reaches the home signal.

Further, the staggered signals between sidings are located so close to each other, that, should opposing trains leave such sidings under clear signals, automatic brake application at these staggered stop signals might not prevent a collision.

The specifications and requirements are as follows:

Paragraph 3, General Requirements. "An automatic train-stop, train control, or speed-control device shall be operative at braking distance from the stop-signal location if signals are not overlapped, or at the stop-signal location if an adequate overlap is provided."

4. Should the condenser which bridges the contact points of the magnet relay break down and short, a false clear failure would result.

The specifications and requirements are as follows:

Paragraph 3, Design and Construction. "The apparatus shall be so constructed that it will, so far as possible, perform its intended function if an essential part fails or is removed, or a break, cross or ground occurs in electric circuits, or in case of a failure of energy."

5. The forestalling valve is experimental and while the principle appears to be correct, comment is reserved until this valve can be further inspected and tested under actual railroad operating conditions.

6. The clearances in the valve assembly of the duplex control valve are such that freedom from dirt, oil, gum, etc., must be maintained to insure proper functioning and to prevent false clear failures.

Further, should the duplex control valve strainer or the connection between the stop valve and duplex control valve be stopped up by accumulation of scale, dirt, ice, etc., a false clear failure would result.

The specification and requirements are as follows:

Paragraph 14, Design and Construction. "The apparatus shall be constructed, installed, and maintained as to be safe and suitable for service. The quality of materials and workmanship shall conform to this requirement."

It is felt that the importance of these criticisms is very great, but they are not intended, nor are they to be taken, as a condemnation of this or any other device in connection with which similar criticism may be offered in future.

We understand that you have undertaken to see that the system is properly protected from the entrance of foreign