# Much is New in Signaling for 1955

**Those railroads which are to survive, by meeting competition with other forms of transportation, will install modern signaling systems, not only to get trains over the road faster, but also to utilize fewer track more efficiently, and to consolidate the controls of groups of interlockings**

THE CONSTRUCTION of centralized traffic control, highway crossing protection and car retarders continued in high volume during 1954, but automatic block and interlocking were reduced, so that the total volume was about 6,967 units which is about 12 per cent less than the average for the three previous years, and considerably less than the 8,510 units for 1953.

The trend to install CTC instead of automatic block, as discussed above, is evidenced by the fact that very few extensive installations of automatic block were made on single track lines during 1954. As a whole only 678 signals were installed in automatic block in 1954, a drop from 1,171 average for the previous three years.

Centralized traffic control construction continued in large volume during 1954, the power switches and signals in such projects totaling 3,012; which is an increase compared with 2,859, the annual average for the previous three years. On important single track lines, which were not previously signaled, most railroads are installing CTC rather than automatic block, not only to save train time, compared with time-table and train order operation, but also to reduce operating expenses in several ways. For example, on 466 miles where CTC has been installed progressively in recent years eight dispatchers and 58 operators have retired or transferred to other positions.

AUTOMATIC BLOCK SIGNALING INSTALLED IN 1954

| Railroad and Location | Miles of Road | Number of Signals | Manufacturer |
|---|---|---|---|
| ACL | | | |
| Bennett, S C-Hardeeville | 84.0d | 74 | Union |
| Ybor City, Fla-Tampa | 1.1d | 4 | Union |
| B&A | | | |
| Hermon, Me | 1.0d | 2 | GRS |
| B&M | | | |
| Ely, Vt-White River Jct | 19.5s | 47 | GRS |
| Hoosick Jct, N Y | 1.0s | 1 | GRS |
| CN | | | |
| Jackman, B C- Blue River | 68.4s | 93 | GRS |
| CP | | | |
| Hedonte, Ont-MacTier | 36.0s | 58 | Union |
| St. Johnsbury, Vt-Wells River | 20.0s | 29 | and |
| Brooks, Ala-Gleichen, Alta | 60.0s | 71 | GRS |
| Regina, Sask | 3.9d | 4 | GRS |
| CB&Q | | | |
| Galesburg, Ill-Bushnell | 20.5d | 16 | GRS |
| CRI&P | | | |
| Casey, Ia-Anita | 10.0s | 10 | Union |
| DL&W | | | |
| Dalton, Pa-Factoryville | 4.2d | 8 | Union |
| Craigs, N Y-No. Alexandria | 18.8d | 18 | Union |
| GN | | | |
| Holman, Minn-Moore | 7.0s | 12 | GRS |
| MTA | | | |
| Boston-Revere | 2.2d | 22 | GRS |
| NYO&W | | | |
| Middletown, N Y-Woodbridge | 26.0s | 23 | Union |
| N&W | | | |
| Bluefield, W Va | 1.1s | 2 | Union |
| NP | | | |
| Kalama, Wash-Vancouver | 24.0d | 37 | GRS |
| DeSmet, Mont-Paradise | 15.6s | 6 | GRS |
| Quinns, Mont-Paradise | 2.0s | 1 | GRS |
| ONL | | | |
| Latchford, Ont-Temagami | 22.0s | 38 | GRS |
| Southern | | | |
| Louisville, Ky-Harrodsburg | 74.0s | 95 | GRS |
| WM | | | |
| Cumberland, Md-CG Jct | 1.9d | 3 | Union |
| Union | | | |
| Mon Jct, Pa-Clairton | 1.9s | 4 | Union |
| | 364.5s<br>157.4d | 678 | |

COMPARISON OF ANNUAL SIGNAL CONSTRUCTION

| | 1954 | 1953 | 1952 | 1951 |
|---|---|---|---|---|
| Automatic block signals | 678 | 967 | 1,318 | 1,189 |
| Interlockings | | | | |
| Signals and switches | | | | |
| at new plants | 870 | 1,006 | 864 | 879 |
| at rebuilt plants | 283 | 826 | 508 | 405 |
| at automatic plants | 156 | 151 | 133 | 116 |
| Spring switches | | | | |
| Spring buffer mechanisms | 140 | 162 | 177 | 163 |
| Facing-point locks | 59 | 84 | 70 | 58 |
| Signals at spring switches | 203 | 256 | 317 | 280 |
| Centralized traffic control | | | | |
| Power switch machines | 548 | 680 | 597 | 396 |
| Semi-Automatic signals | 1,496 | 1,845 | 1,512 | 1,153 |
| Intermediate signals in CTC territory | 967 | 956 | 852 | 587 |
| Classification yards | | | | |
| Car retarders | 40 | 30 | 57 | 10 |
| Power switch machines | 165 | 156 | 304 | 32 |
| Highway crossing protection | | | | |
| Number of crossings at which new installations were made in year | 1,362 | 1,491 | 1,435 | 1,406 |
| Totals | 6,967 | 8,510 | 8,144 | 6,584 |

Opportunities to make somewhat similar savings in operating expenses could apply on perhaps a considerable proportion of the more than 53,700 miles of single track on which automatic block now in service could be replaced by CTC so that train movements could be authorized by signal indications rather than time-table and train orders. Here is a large opportunity, almost equal in mileage to all the CTC installed on single track up to now. Where extended sections of CTC are now in service with control machines at different places, these machines can now be consolidated. For example by using carrier, the Rio Grande, in 1954, consolidated, in one office, the controls of three CTC territories previously controlled from three offices on 285 miles of road.

## Fewer Tracks, More Signaling

Because of the change from steam to diesel locomotives, trains are fewer and are operated at higher average speeds, thus reducing the track-occupancy time; which leads to a conclusion that maybe fewer tracks would serve adequately in some sections. Further incentives are that the expenses for track maintenance and rail renewals are mounting rapidly, in spite of extensive use of power machines. Furthermore, removal of one or more main tracks, not needed under present circumstances, is now logical because the installation of centralized traffic control on the remaining track or tracks will provide the capacity required to handle trains efficiently.

For example, on previous double track, one track has been removed and the remaining track equipped with CTC on extended sections of the Milwaukee, the Erie, and the Boston & Maine. In 1954, on 167 miles between Cincinnati, Ohio and Tateville, Ky., the Southern removed alternate 10-mile sections of second track, leaving alternate sections of approximately 10 miles of two-tracks with CTC signaling for train operation both ways on both tracks, as well as on all sections of single track. (See p. 33 May 1954.) This is a progressive development of merit that has proved to be entirely satisfactory in the operation of trains. Based on the improved advantages of this installation, the Southern is now proceeding with an extension of this single-track, double-track arrangement with CTC between Flat Rock, Ky., and Oakdale, Tenn.; 70 miles.

A different problem is to increase the capacity of double track to obviate the need for a third track or to permit removal of other main tracks. By installing double crossover layouts about 10 miles apart and by adding power switch machines in centralized traffic control to run trains both ways on both tracks, fast trains are run around slower ones, and all are kept moving without some wasting time on sidings or waiting in the yards. This has been done successfully on extended mileages on the Rock Island, the North Western, the Missouri Pacific and more recently, in 1954, on the Frisco and the Union Pacific.

On a re-signaling project completed in 1954 by the Burlington on 38 miles of three main tracks between Chicago and Aurora, the center track is signaled both directions all the way, and various sections of the two

CENTRALIZED TRAFFIC CONTROL INSTALLED IN 1954

| Railroad and Location | Miles of Road | No. of Power Switches | No. of Lever-Controlled Signals | No. of Intermediate automatic Signals | Manufacturer |
|---|---|---|---|---|---|
| **ACL** | | | | | |
| Ambrose, Ga-Waycross | 64.0s | 23 | 63 | 22 | Union |
| Uceta, Fla-Ybor City | 1.7d | 13 | 17 | - | Union |
| Yemassee, S C | 1.9s | 6 | 6 | - | Union |
| **AT&SF** | | | | | |
| Norman, Okla-Purcell | 15.5s | 4 | 10 | 8 | Union |
| Cross, Okla-White Eagle | 6.3s | 11 | 17 | 8 | Union |
| Guthrie, Okla | - | 6 | 10 | - | Union |
| Newkirk, Okla | - | 9 | 9 | - | Union |
| Wynnewood, Okla-Purcell | 28.5s | 15 | 33 | 12 | Union |
| Ricker, Tex-Brownwood | 4.6s | 6 | 14 | - | Union |
| **CN** | | | | | |
| Port Arthur, Ont-Conmee | 35.0d | - | - | 41 | GRS |
| Nepeon, Ont-Hurdman | 30.0s | 11 | 37 | 14 | GRS |
| **C&O** | | | | | |
| Saginaw, Mich-Clare | 52.6s | 9 | 32 | 11 | GRS |
| North Judson, Ind-Griffith | 40.5s | 10 | 31 | 20 | Union |
| **CB&Q** | | | | | |
| Pac. Jct., Ia-Oreapolis, Neb | 5.1s<br>3.8d | 1 | 5 | 8 | GRS |
| Ashland, Neb-Lincoln | 24.3s | 13 | 46 | 12 | GRS |
| Omaha, Neb | 2.3d | 30 | 36 | - | GRS |
| **Clinchfield** | | | | | |
| Kingsport, Tenn | 4.0s | 2 | 4 | - | Union |
| **C&S FtW&D** | | | | | |
| Wichita Falls, Tex-Estelline | 130.0s<br>1.1d | 15 | 95 | 42 | GRS |
| **D&H** | | | | | |
| Ft. Edward, N Y-Whitehall | 13.9s | 4 | 12 | 12 | GRS |
| Binghampton, N Y-Harpursville | 15.6s<br>2.1d | 2 | 6 | 22 | GRS |
| **GN** | | | | | |
| Delano, Minn-Willmar | 52.6s<br>12.2d | 30 | 90 | 57 | GRS |
| Blackfoot, Mont-Browning | 7.0s | 3 | 12 | 6 | GRS |
| Libby, Mont-Troy | 15.4s | 4 | 16 | 14 | GRS |
| **IC** | | | | | |
| Springfield, Ill-Divernon | 16.6s | 3 | 28 | 8 | Union |
| **KCS** | | | | | |
| Mena, Ark-DeQueen | 53.0s | 14 | 42 | 29 | GRS |
| **L&N** | | | | | |
| Kirkstall, Tenn-Corbin, Ky | 80.0s | 17 | 53 | 40 | Union |
| **MP** | | | | | |
| N. Little Rock, Ark-Holland | 17.2d | 6 | 7 | 6 | GRS |
| No. Jct., Ill-Gale | 3.1d | 1 | - | 8 | GRS |
| **NC&StL** | | | | | |
| Bruceton, Tenn-Aulon | 135.0s | 16 | 75 | 72 | Union |
| **N&W** | | | | | |
| Petersburg, Va-Camp Lee | 3.3s | - | 2 | - | Union |
| Roanoke, Va | 3.9s | 2 | 6 | 2 | Union |
| **NYNH&H** | | | | | |
| Braintree, Mass-Buzzards Bay | 44.5s | 15 | 36 | 26 | GRS |
| **P&LE** | | | | | |
| Neville, Pa-W. Economy | 12.7s | - | - | 12 | Union |
| **QNS&L** | | | | | |
| Seven Islands, Que-Silver Yard | 353.8s | 25 | 97 | 71 | GRS |
| **StL-SF** | | | | | |
| Amory, Miss-Tours | 93.7s | 15 | 70 | 40 | Union |
| Rosedale, Kan-Paola | 39.0d | 13 | 36 | 61 | Union |
| **SAL** | | | | | |
| Hayner, Ga-Kingsland | 23.1s | 6 | 18 | 10 | Union |
| Gross, Fla-Yulee, Fla | 6.1s | 4 | 10 | 2 | Union |
| Jacksonville, Fla-Baldwin | 14.3s | 7 | 21 | 6 | Union |
| **StLSW** | | | | | |
| Jonesboro, Ark-Brinkley | 71.4s | 13 | 50 | 40 | Union |
| **SP** | | | | | |
| Crescent Lake, Ore-Eugene | 97.4s | 45 | 130 | 78 | Union |
| **Southern** | | | | | |
| Saluda, N C-Melrose | 4.0s | 5 | 13 | 2 | GRS |
| **UP** | | | | | |
| Hermosa, Wyo-Laramie | 19.0d | 44 | 75 | 76 | Union |
| Speer, Wyo-Carr, Col | 16.0s | 8 | 20 | 14 | Union |
| Kansas City, Kan | 3.2d | 12 | 26 | 2 | Union |
| **Virginian** | | | | | |
| Elmore, W Va-Gilbert | 41.2s | 18 | 50 | 13 | GRS |
| **Wabash** | | | | | |
| Bement, Ill-Tolone | 17.7s<br>2.4d | 4 | 12 | 10 | Union |
| **WM** | | | | | |
| Cumberland, Md-Deal, Pa | 17.8s<br>4.0d | 5 | 12 | 22 | Union |
| Howardville, Md-Emory Grove | 8.9s<br>1.4d | 2 | 6 | 8 | Union |
| **WP** | | | | | |
| Hayward, Cal-Stockton | - | 21 | - | - | Union |
| Totals | 1,600.0s<br>165.1d | 548 | 1,498 | 967 | |

INTERLOCKINGS INSTALLED IN 1954

| Railroad and Location | Number of Home Signals | Number of Power Switches | Manufacturer |
|---|---|---|---|
| **AT&SF** | | | |
| Arkansas City, Kan | 12 | 6 | Union |
| Needles, Cal | 6 | 4 | Union |
| DT Jct, Cal | 2 | - | Union |
| **ACL** | | | |
| Ybor City, Fla | 9 | 5 | Union |
| Yemassee, S C | 9 | 7 | Union |
| **B&O** | | | |
| Clarksburg, W Va | 18 | 24 | GRS |
| MK Jct, W Va | 7 | 19 | GRS |
| **B&M** | | | |
| Worchester, Mass | 4 | - | GRS |
| **CN** | | | |
| Port Arthur, Ont | 10 | 6 | GRS |
| **CP** | | | |
| Norcran, Man | 8 | 5 | Union |
| **C&O** | | | |
| Huntington, W Va | 33 | 36 | Union |
| **CB&Q** | | | |
| W Hinsdale, Ill | 9 | 4 | Union |
| Highlands, Ill | 9 | 4 | Union |
| **CRI&P** | | | |
| Colona, Ia | 7 | 3 | Union |
| **CTA** | | | |
| Chicago | 6 | 2 | Union |
| **Clinchfield** | | | |
| St. Paul, Va | 4 | 2 | Union |
| **D&RGW** | | | |
| Orestod, Col | 3 | 1 | GRS |
| Pueblo, Col | 3 | 1 | GRS |
| **Erie** | | | |
| Kearny, N J | 7 | 7 | GRS |
| **GN** | | | |
| Crookston, Minn | 3 | 1 | GRS |
| Troy, Mont | 3 | 1 | GRS |
| **GM&O** | | | |
| Bloomington, Ill | 7 | 6 | GRS |
| **JC** | | | |
| Plainfield, N J | 12 | 16 | Union |
| Dunnellen, N J | 8 | 8 | Union |
| Middlesex, N J | 8 | 8 | Union |
| **K&IT** | | | |
| Louisville, Ky | 9 | 4 | GRS |
| **LV** | | | |
| Easton, Pa | 6 | 5 | GRS |
| Jersey City, N J | 4 | 2 | - |
| Manville, N J | 13 | 9 | GRS |
| **L&N** | | | |
| Gentilly, La | 9 | 3 | GRS |
| **MTA** | | | |
| Revere, Mass | 6 | 5 | GRS |
| **NYC&StL** | | | |
| Chicago | 6 | 4 | - |
| **NYNH&H** | | | |
| New Haven, Conn | 53 | 48 | Union |
| **NOUPT** | | | |
| New Orleans, La | 88 | 80 | GRS |
| **NOTC** | | | |
| East City Switch | 19 | 8 | GRS |
| L&N Jct, New Orleans | 27 | 9 | GRS |
| **N&W** | | | |
| Bristol, Tenn | 10 | 8 | Union |
| **NP** | | | |
| Livingston, Mont | 4 | 3 | GRS |
| **Pennsylvania** | | | |
| Chatfield, Ohio | 6 | - | Union |
| **Philadelphia Transit** | | | |
| Philadelphia | 8 | 4 | Union |
| **P&LE** | | | |
| Kendall, Pa | 4 | 1 | Union |
| W Economy, Pa | 1 | 9 | Union |
| **UP** | | | |
| Sand Creek, Col | 7 | 5 | Union |
| | 487 | 383 | |

INTERLOCKINGS REBUILT IN 1954

| Railroad and Location | Number of Home Signals | Number of Power Switches | Manufacturer |
|---|---|---|---|
| AT&SF | | | |
| Baring, Mo | 10 | 2 | Union |
| Willow Spr, Mo | 8 | 6 | Union |
| Shopton, Ia | 6 | 8 | Union |
| ACL | | | |
| Ashley Draw, S C | 4 | - | Union |
| B&O | | | |
| Hyndman, Pa | 2 | - | GRS |
| B&M | | | |
| Manchester, N H | - | 1 | Union |
| CN | | | |
| Limoilou, Que | 4 | 2 | GRS |
| Toronto, Ont | 13 | - | Union |
| Clifton Jct | 8 | - | |
| St. Lambert, Que | 2 | 2 | GRS |
| CMStP&P | | | |
| Milwaukee, Wis | - | 1 | Union |
| Fondulac, Wis | - | 1 | Union |
| Savanna, Ill | 2 | 1 | Union |
| Melbourne, Ia | 2 | 1 | Union |
| DT&I | | | |
| Detroit, Mich | 4 | 2 | Union |
| Erie | | | |
| Cuba, N Y | 5 | 5 | Union |
| FtW&D | | | |
| Chillicothe, Tex | 6 | 1 | GRS |
| GN | | | |
| Minneapolis, Minn | 12 | - | GRS |
| KCT | | | |
| Additions | 8 | 8 | Union |
| MTA | | | |
| Boston | - | 4 | GRS |
| N&W | | | |
| Petersburg, Va | 18 | 9 | Union |
| St Paul, Va | 4 | 2 | Union |
| Norfolk, Va | 4 | - | Union |
| NYC | | | |
| Cleveland, Ohio | 10 | 10 | GRS |
| Blue Island, Ill | 6 | 4 | GRS |
| Colfax, Ind | 8 | 6 | GRS |
| SAL | | | |
| Taylor, Fla | 4 | - | Union |
| RA Tower | 6 | 4 | Union |
| NY Tower | 4 | 4 | Union |
| SP | | | |
| El Paso, Tex | 12 | 5 | Union |
| Union | | | |
| J-Tower | - | 4 | Union |
| BR-Tower | 6 | 6 | Union |
| WP | | | |
| Sankey, Cal | 4 | 2 | Union |
| Totals | 182 | 101 | |

AUTOMATIC INTERLOCKINGS INSTALLED IN 1954

| Railroad | Location | Number of Home Signals | Manufacturer |
|---|---|---|---|
| AT&SF | Pawnee, Okla | 4 | Union |
| CN | Carlyle, Sask | 4 | GRS |
| C&O | La Crosse, Ind | 4 | Union |
| CB&Q | Louisville, Neb | 4 | GRS |
| | | 1s | |
| | La Platte, Neb | 4 | GRS |
| | | 1s | |
| | Oreapolis, Neb | 4 | GRS |
| CI&L | Victoria, Ind | 4 | GRS |
| CRI&P | Cone, Ia | 4 | Union |
| | Seymour, Ia | 5 | Union |
| EJ&E | So. Chicago | 8 | GRS |
| FtW&D | Quanah, Tex | 4 | GRS |
| | Acme, Tex | 4 | GRS |
| | Vernon, Tex | 7 | GRS |
| | | 1s | |
| GN | Warroad, Minn | 6 | GRS |
| | Butte, Mont | 5 | GRS |
| IC | Brown, Ill | 4 | |
| MP | Jacksonville, Tex | 4 | GRS |
| NY)&W | Summitville, N Y | 4 | |
| | | 2s | |
| NP | St. Paul, Minn | 4 | GRS |
| PE | Santa Fe Springs, Cal | 6 | Union |
| StL-SF | Altus, Okla | 4 | Union |
| | Fairmont, Okla | 4 | Union |
| | Bridge Jct, Ark | 9 | Union |
| | | 4s | |
| SAL | Taylor, Fla | 4 | Union |
| Southern | Macon, Ga | 4 | GRS |
| SP | Cleveland | 4 | Union |
| UP | 4th St. Salt Lake | 6 | Union |
| | 5th St. Salt Lake | 6 | Union |
| WP | French Camp, Cal | 8 | Union |
| | Lyoth, Cal | 5 | Union |
| | | 146 Signals<br>10 Switch Machines | |

other tracks are signaled both ways. (See p. 29 June 1954.) This territory handles 144 scheduled trains daily including 66 suburban passenger trains that make many stops.

In a recent address, Alfred E. Perlman, president of the New York Central said, "All four-track main-line on the NYC will be cut back to double-track, with centralized traffic control installed to retain approximate capacity of present four-track line." In a second address Mr. Perlman said: In the 1955 budget "we have 300 miles on the Erie Division in which we will cut four tracks to two tracks, with reverse signaling." (CTC)

## Signaling for High-Speed Turnouts

The practicability of utilizing alternate sections of single and double track, or two-track and three-track, was advanced in 1954 by the development, on the Erie, of the new No. 24 turnout applied in equilateral layouts where diverging moves can be made at 70 mph and eventually at 75 mph. These turnouts are in CTC territory including signaling to direct trains at the speeds for which the turnouts are designed. On the recently completed Frisco installation of two-track CTC, the power crossovers are good for diverging moves at 50 mph, and the signal aspects are designed to tell enginemen to bring their trains up to and through the crossovers at this speed. Freights which are running at 50 mph lose no time in making a move to the other track, and the passenger trains lose very little time. These developments in track, and in adaptation of signal aspects, contribute to the practicability of making run-around moves where both tracks are signaled both ways with CTC.

A special aspect to make a "Stop and Proceed" out of a "Stop" on an interlocking home signal, as developed on the Burlington, was explained on page 30 in the June 1954 issue.

## New Meaning for Interlocking

In the interlocking field, the thinking today is that the control of several interlockings, even in heavy traffic terminal territories, can be consolidated. This is now more practicable than previously because of new electronic devices, syncrostep, and multiplex high speed line systems that have the capacity to handle numerous outgoing control and incoming indication codes simultaneously, and all on two wires. Therefore the size of the interlocking or the remoteness from the control point are no obstacles. In the vicinity of Newark, N. J., the Lackawanna combined three interlockings. In New Haven, the New Haven is consolidating the control of several large plants. At Chicago, the Burlington is combining the control of four interlockings in terminal territory, and perhaps this project can later be extended to include more. Other roads are making studies to determine the practicability of similar consolidations, as for example all the interlockings between Division Street and the Madison Street terminal of the North Western at Chicago, or all the interlockings on the Illinois Central as far south as Sixty-Third Street in Chicago. Such projects will improve train operations by utilizing tracks more effectively because one man has control of switches and signals to set up routes and authorize train movements by signal indication on an entire terminal area or a major portion thereof. Furthermore, operating expenses will be reduced. For example, on a six-mile section of terminal, a proposal is to consolidate the control of six interlockings, with the result that more than 40 towermen positions would be eliminated.

Possibly the ultimate in an easily manipulated machine for the consolidated control of several interlockings is in the form of a sloping desk panel, not much larger than an ordinary office desk, each interlocking being controlled by entrance-exit buttons which are in two sets, each in a vertical row. The right row, for example, has one button for all westward routes entering on a certain track, and the left row has one button for all eastward routes entering on that track. These pairs of rows can be spaced about four inches horizontally, so that the panel for control of an entire interlocking, including perhaps several switches and crossovers, would be only about six or eight inches horizontally. Thus, as many as seven or eight interlockings could be controlled from one desk type machine no longer, horizontally, than an office desk so that a seated man could reach all the control buttons. Such a machine includes no diagram of switches and crossovers, these being shown in a line-of-light track diagram on a large scale mounted in a semi-circular form above and to the rear of the control machine.

Control of a power interlocking switch by radio from the cab of a locomotive was installed in 1954 by the Santa Fe as explained in the October 1954 issue.

## Practicability of Automatic Controls

Automatic control of interlockings at railroad crossings, where trains approaching on each track all use a certain route, have been installed extensively for years. Some of these plants include switch machines to operate movable crossing frogs or derails, and a few plants include switch machines to operate switches at junctions of single and double track, where trains approaching on a given track always go through on a given route. Years ago the Great Northern used automatic intermittent inductive train stop equipment, on the wayside and on a locomotive, to selectively control the switch machine on a facing-point junction switch leading from a main line to a branch.

In 1954 the Chicago Transit Authority, on its elevated lines, made the first installation of an automatic interlocking including selective control of a facing-point junction switch utilizing electronic train identification equipment as explained in the October 1954 issue. A similar system now being installed on the Flushing line of the New York subways will reduce the present ten points (for control of interlocking power switches and signals), to two, and will thereby result in large savings in operating expenses, and will reduce train delays.

## Savings in Yards Also

Also in the field of power switches and car retarders in yards, new electronic devices are being developed to expedite operation and reduce operating expenses. Previously each towerman had control of the switches and retarders in a certain area, so that for a large yard there might be three or more towers. In 1950 the Canadian Pacific and the Illinois Central made the first installations of automatic switching which is a system in which automatic controls of power switches are set up before cars pass over the hump, the controls being initiated by a man pushing a button corresponding with the classification track to which a car, or cut of cars, is to be routed. In 1952, the Reading incorporated these switch buttons in the panel in the tower, so that the same man controlled all the switches as well as all of the retarders in a yard with 33 classification tracks. In these automatic switching controls as many as four or five controls could be punched and stored, prior to arrival of cars at the crest of the hump. Whether it is desirable to store more than six controls is an open question, depending on local circumstances. However, if desired, a system can be arranged to set up the automatic switching control for an entire train of 120 cars or more. This is done in a system developed on the Union Pacific and installed as a demonstration on 8 tracks in 1954.

**SPRING SWITCHES INSTALLED IN 1954**

| Railroad | Number of Spring Switches Installed | Number Equipped With Facing-Point Lock | Number of Signals |
|---|---|---|---|
| AT&SF | 2y | - | 38 |
| B&M | 2d | - | 4 |
| CP | 3s | 3 | 9 |
| CN | 5s | - | - |
| CMStP&P | 2s | 3 | 3 |
| | 1d | | |
| C&IM | 1y | - | 2 |
| C&NW | 1s | 3 | 12 |
| | 2d | | |
| | 2y | | |
| CRI&P | 3s | 2 | 6 |
| D&RGW | 1s | 1 | 3 |
| FtW&D | 9s | 9 | 27 |
| FEC | 1y | - | 2 |
| GN | 2s | 2 | 10 |
| IC | 1s | 0 | 2 |
| M&StL | 1y | - | - |
| NC&StL | 1y | - | 1 |
| NYC | 1j | 1 | 3 |
| NYO&W | 2s | - | 2 |
| NYNH&H | 1d | 1 | 1 |
| N&W | 3y | - | - |
| Penna | 1s | 5 | 7 |
| | 4d | | |
| QNS&L | 22s | 22 | - |
| StL-SF | 8s | - | 16 |
| | 1y | | |
| SAL | 2y | 1. | 2 |
| Southern | 20s | - | 21 |
| | 1d | | |
| SP | 6s | 5 | 9 |
| | 4j | | |
| | 4y | | |
| T&P | 6s | - | 18 |
| UP | 3s | - | 3 |
| Wab | 1y | - | - |
| WP | 1y | 1 | 2 |
| | 95s | 59 | 203 |
| | 29y | | |
| | 11d | | |
| | 5j | | |
| | 140 | | |

**CAR RETARDERS INSTALLED IN 1954**

| Railroad | Location | Number of Retarders | Rail Feet of Retarder | No. of Power Switches | No. of Track Circuits | No. of Signals | Number of Classification Tracks | No. of Towers | No. of Control Machines | Manufacturer |
|---|---|---|---|---|---|---|---|---|---|---|
| Bowater Paper Co. | Calhoun, Tenn | 2 | 110 | - | - | - | - | - | - | GRS |
| Iron Ore Co. Canada | Seven Islands, Que | 4 | 306 | 7 | 12 | 12 | 8 | - | - | GRS |
| | | 1* | 87 | - | - | - | - | - | - | Union |
| | | 1 | 99 | 6 | 7 | 6 | 4 | 1 | 1 | GRS |
| L&N-NC&StL | Nashville, Tenn | 11 | 1373 | 55 | 50 | 5 | 56 | 2 | 2 | Union |
| Norfolk & Western | Bluefield, W Va | 2 | 312 | 11 | 11 | - | - | 1 | 1 | Union |
| Orinico Min. Co. | Puerto Ordaz, Ven | 1* | 110 | 3 | 3 | 3 | 3 | 1 | 1 | Union |
| Pitt. & Con. Dock | Conneant, O | 3 | 525 | - | - | - | - | 2 | 1 | Union |
| SAL | Hamlet, N C | 11 | 1169 | 57 | 234 | 4 | 58 | 1 | 1 | Union |
| Union | Duquesne, Pa | 4 | 743 | 26 | 26 | 6 | - | 1 | 1 | Union |
| | | 40 | 4834 | 165 | 343 | 36 | | | | |

*Inert Retarders

HIGHWAY-RAILROAD GRADE CROSSING PROTECTION INSTALLED IN 1954

| Railroad | Number of Crossings Protected by New Installations | | Source of Funds Based on Number of Crossings | | |
|---|---|---|---|---|---|
| | No. of Crossings At Which Flashing-Light Signals Only Were Installed | No. of Crossings Electrically Operated Gates and Flashing Light Signals Were Installed | Railroad | Public Funds (Any Source) | Joint Railroad and Public Funds |
| AT&SF | 69 | 16 | 42 | 4 | 39 |
| ACL | 27 | 20 | 18 | - | 29 |
| A&WP | - | 1 | - | - | 1 |
| Geo | 2 | - | 1 | - | 1 |
| B&O | 9 | 20 | 18 | 2 | 9 |
| B&Ar | 1 | - | - | - | 1 |
| B&LE | 3 | - | 3 | - | - |
| B&M | 10 | 9 | 12 | 2 | 5 |
| CN | 45 | 7 | 7 | - | 35 |
| CP | 21 | 9 | 7 | 4 | 17 |
| CG | 17 | 2 | 13 | - | 6 |
| CV | 2 | - | 2 | - | - |
| C&O | 17 | 9 | 11 | 3 | 12 |
| CI&L | 5 | - | 2 | - | 3 |
| CMStP&P | 24 | 5 | 7 | - | 22 |
| C&EI | 2 | 2 | 1 | - | 3 |
| C&IM | - | 1 | 1 | - | - |
| C&NW | 27 | 13 | 11 | - | 29 |
| CA&E | 1 | - | 1 | - | - |
| CB&Q | 8 | - | 4 | - | 4 |
| CGW | 1 | - | - | - | 1 |
| CNS&M | - | 3 | 1 | - | 2 |
| CRI&P | 15 | 11 | 12 | 2 | 12 |
| CSS&SB | - | 1 | 1 | - | - |
| CTA | - | 4 | 4 | - | - |
| DL&W | 2 | - | 2 | - | - |
| D&H | 12 | 4 | 8 | 5 | 1 |
| DT&I | 2 | - | 1 | - | 1 |
| D&RGW | 4 | - | 4 | - | - |
| DSS&A | 1 | - | - | - | 1 |
| EJ&E | 1 | 2 | 1 | - | 2 |
| Erie | 9 | 13 | 16 | 1 | 5 |
| FtW&D | 1 | - | 1 | - | - |
| FEC | 1 | 23 | 15 | 5 | 4 |
| GN | 16 | 8 | 9 | - | 15 |
| GB&W | 2 | - | - | - | 2 |
| GM&O | 8 | 2 | 1 | 2 | 7 |
| IC | 13 | 7 | 3 | 1 | 16 |
| JC | 5 | 8 | 13 | - | - |
| KCS | 8 | - | 5 | - | 3 |
| K&IT | 5 | - | 5 | - | - |
| L&NE | 3 | - | 3 | - | - |
| LV | 6 | 3 | 6 | - | 3 |
| LI | 3 | 13 | 16 | - | - |
| L&N | 5 | 2 | 4 | 1 | 2 |
| MP | 78 | 8 | 61 | 4 | 31 |
| M&StL | 3 | - | 1 | - | 2 |
| MKT | 7 | 1 | 7 | - | 1 |
| NC&StL | 5 | 1 | 4 | - | 2 |
| NYO&W | - | 2 | 2 | - | - |
| NYC&StL | 19 | 14 | 21 | 6 | 6 |
| N&W | 10 | 3 | 9 | - | 4 |
| NP | 23 | 6 | 20 | 2 | 7 |
| NYC | 51 | 24 | 43 | 1 | 31 |
| P&LE | 1 | 7 | 8 | - | - |
| NYNH&H | 34 | 2 | 35 | 1 | - |
| ON | 1 | - | - | - | 1 |
| PE | 20 | - | 6 | 2 | 12 |
| Penn | 35 | 23 | 20 | 2 | 36 |
| PRSS | 2 | - | 1 | 1 | - |
| P&WV | 2 | - | 2 | - | - |
| QC | 5 | - | - | - | 5 |
| Reading | 17 | 10 | 21 | - | 6 |
| RF&P | - | 1 | - | - | 1 |
| StL-SF | 28 | 6 | 23 | - | 11 |
| StLSW | 8 | - | 5 | - | 3 |
| Soo | 13 | 4 | 5 | - | 12 |
| SAL | 23 | 4 | 4 | 4 | 19 |
| Southern | 43 | 4 | 35 | - | 12 |
| SP | 86 | 18 | 22 | 2 | 80 |
| SP&S | 2 | - | 1 | - | 1 |
| TRAStL | 3 | 7 | 7 | 2 | 1 |
| T&P | 9 | 2 | 7 | - | 4 |
| T&PW | 3 | - | - | - | 3 |
| TH&B | 2 | - | 1 | - | 1 |
| UP | 23 | 7 | 12 | - | 18 |
| Union | 1 | - | 1 | - | - |
| Wabash | 10 | 4 | 5 | 4 | 5 |
| WM | 2 | 2 | 2 | - | 2 |
| WP | 3 | 1 | 2 | - | 2 |
| Totals | 985 | 379 | 684 | 63 | 612 |

In a classification yard at Portsmouth, Ohio, where retarders were installed years ago, the Norfolk & Western, in 1954, modernized the track layout, reduced the number of retarders from 12 to 5, and installed modern systems of retarder speed control and automatic switching control. A special feature is that automatic switching controls are prepared in tape form, so that controls for an entire "train" of perhaps 150 cars or more can be punched and stored on the tape before starting to push the cars over the hump. This is the first use of this punched tape system of storing controls.

The next step, automatic control of retarders, has also been under development. A system of automatic retarder control, in which the speed is measured by short track circuits, was installed in a yard on the Milwaukee in 1952. At Gary, Ind., in 1953, the Elgin, Joliet & Eastern made a 16-track test installation of automatic retarder controls using radar equipment for speed measurement, and this system including further developments, was installed in 1954 in the entire 58-track yard. In 1954 the Union Pacific made an 8-track test installation at North Platte, Neb., using radar for speed measurement. A new factor of this installation is that it takes into account the distance a car is to go on a classification track before reaching other cars already standing there. Large yards including some or all of these new developments are nearing completion on the Southern at Chattanooga; on the Seaboard at Hamlet; and on the Southern Pacific at Houston.

### New Crossing Protection Controls

New developments in the controls of automatic highway crossing protection, brought forth in 1954, dealt primarily with methods for preventing unnecessary delay to highway traffic when train movements over a crossing are not imminent. These controls cut out crossing signals and raise gates when trains stop after entering approach control sections, and place the protection in operation again when the train is ready to proceed toward the crossing again. In 1954 the RF&P accomplished these special restart controls by using radio on the locomotive and on the wayside; and by using wayside apparatus to detect the sound of the locomotive whistle (Oct. 1954 issue). Also in 1954, the Union Pacific announced the development of a recurrent timing system in which changes in controls are effected by a small impulse developed when the leading wheels pass one insulated joint (Dec. 1954 issue).

Because of the increased wage costs, the railroads in 1954 planned and installed numerous crossing protection projects including automatically controlled gates to replace watchmen or gatemen. Because of the improved protection provided by automatically controlled gates with flashing lights at the principal street crossings in a town, other previous crossings have been closed, for example as discussed in the article "Gates at Three Crossings; Barriers at Four on the GM&O" in the July 1954 issue.

### Power Equipment in Signal Construction

In signal construction work the trend is to reduce the amount of hard work involved, by using power driven pole-hole diggers, trench digging machines, and power derricks for lifting and setting all heavy objects, such as precast foundations, signal masts and instrument cases or housings. The wiring of instrument cases and houses is being done in the factory or in shops at central locations on large projects, thus producing uniformly good wiring, as well as saving much time that was previously lost in travel when cases were wired in place on the road. Where highways are available and local terrain permits, many railroads are using highway trucks for transporting light-weight materials and men on signal construction projects. Some of these trucks are equipped with "A" frames at the rear, and with power winches, so that cases, switch machines and other heavy equipment can be handled easily.

A trend which gained momentum in 1954 was to do

(*Continued on page* 29)

**POLE LINE CONSTRUCTION IN 1954**

| Railroad | Miles of New Or Rebuilt Pole Line | Miles of New Copper Wire |
|---|---|---|
| AT&SF | 123 | 209 |
| ACL | - | 1,058 |
| B&O | 84 | 84 |
| BAR | 85 | - |
| B&M | 50 | - |
| CN | 748 | 2,966 |
| CP | 710 | 894 |
| CofG | 279 | 65 |
| C&O | 217 | 101 |
| C&NW | 300 | - |
| C&WI | 1 | 100 |
| CB&Q | 96 | - |
| CMStP&P | 278 | 897 |
| CRI&P | - | 62 |
| Clinchfield | 10 | - |
| C&S | 160 | - |
| FW&D | 25 | - |
| D&H | 4 | 62 |
| DL&W | 17 | - |
| Erie | 61 | 50 |
| GN | 186 | - |
| GB&W | 10 | - |
| IC | 256 | 82 |
| KCS | 204 | - |
| L&HR | - | 10 |
| LV | 40 | 95 |
| L&N | 430 | 20 |
| M&StL | 42 | 83 |
| MKT | 203 | - |
| MP | 355 | 261 |
| NYC | 494 | 1,120 |
| NYC&StL | 76 | - |
| NYNH&H | - | 20 |
| N&W | 126 | 204 |
| NP | 136 | - |
| Penna | 85 | 32 |
| QC | 9 | 90 |
| QNS&L | 360 | - |
| Reading | 22 | 27 |
| StL-SF | 106 | 212 |
| StLSW | - | 100 |
| Soo | 70 | - |
| Southern | 284 | 19 |
| AGS | 69 | - |
| C&NW | 30 | - |
| CNO&TP | 45 | - |
| GS&F | 160 | - |
| NO&NE | 25 | - |
| SP | - | 364 |
| T&NO | 93 | - |
| SP&S | 42 | - |
| T&P | - | 90 |
| Union | 1 | - |
| UP | 622 | 6 |
| Virginian | 29 | - |
| Wabash | 127 | - |
| WM | 95 | - |
| WP | 164 | - |
| Totals | 8,244 | 9,383 |

telegraph and printing telegraph service, particularly in storm areas. It has been and still is being used successfuly on the Rock Island and the Santa Fe, and is well established for pipe line and power companies and toll road authorities. But the stumbling block for more extensive use of microwave by the railroads is the telephone companies' attitude toward the railroads' use of microwave. When the railroads are assured that their facilities including microwave systems will be accorded the same interconnection privileges as their existing line wire circuits are, then they will install more microwave systems.

### Automatic Telephones Promise Savings

Because of the increased cost of wages for telephone switchboard operators, several roads are now showing increased interest in railroad-owned automatic telephone systems. In 1954, the Louisville & Nashville added an automatic exchange making a total of 11 such railroad-owned exchanges, in as many different cities, which are connected by the railroad's long-distance trunk circuits, so that a railroad man in his office in one city can dial through to a railroad man in any of the other cities.

Thirty-three railroads, including the L&N, in the United States and Canada have in service a total of 88 railroad-owned private automatic exchanges, P-A-X, including about 6,900 lines to telephones in railroad offices, shops, yards and stations. These automatic exchanges range in size from 25 to 600 lines. Some of them include night watchmen reporting systems and fire alarm systems.

Television may also be used more extensively in yards, furthering the vision of the yardmaster. The Southern Pacific plans an installation in which the yardmaster will have several cameras at his command, telephoto lenses on some for close-up shots, and others with wide-angle lenses to give him an over-all view of the yard.

The Pennsylvania now has a TV camera watching operations at the Post Office in Pittsburgh, Pa. (RS&C p. 56 May 1954) enabling the train director to better coordinate switching moves in the area. The Rock Island is planning to use TV cameras at several street crossings in Cedar Rapids, Ia., enabling a gateman to control several crossings more effectively during switching operations. The Rock Island made an experimental installation in 1954 of television and microwave in which a camera at Englewood station, Chicago, and controlled by the stationmaster "shot" a picture which was transmitted by microwave 6.7 miles north to La Salle street station, and viewed on receivers in the railroad's general offices.

### Communications' Future Growth Assured

Railroad communications will grow because railroad management desires well-integrated and complete communication systems to meet their ever-growing needs for information transmission. "It is management's responsibility to designate what information is to be transmitted," stated J. A. Feagler, chief methods research officer, Chesapeake & Ohio, at the November, 1954 convention of the Railway Systems and Procedures Association. He further remarked that the communications department role is to provide the means for transmitting that information. But only through an understanding and appreciation of each others responsibility and work will managements and communications engineers obtain for their railroads well-integrated and efficient communications systems which can be economically justified.

## Signaling for 1955

*(Continued from page 21)*

away with so-called "outfit cars," including kitchen, dining, sleeping and tool cars, and, instead, to adopt one of two practices:

1) Use highway trucks with crews headquartered at a central point on a territory of up to about 50 to 60 miles. If some or all of the men do not have their homes at the headquarter town, highway trailers are provided by the railroads as living quarters.

2) On new signaling projects extending over considerable mileage of 100 miles or more, establish construction headquarters in an empty roundhouse or other railroad building, where a headquarters crew does all the case wiring and other preparatory work, and road crews, using trucks and highway trailers, move their headquarters from place to place as the work progresses.

In conclusion, the signaling on railroads is never finished, but must be changed constantly, not only to secure the advantages of up-to-date equipment but also to install modern systems of signaling which will meet tomorrow's need for increased safety, more efficient utilization of locomotive cars and tracks, as well as reduced operating expenses. For these reasons the volume of signaling purchased by the railways will continue at a high level during 1955.