Signal Indications Replace Train Orders

Thorough Investigation Reveals Convincing Information Applicable to Various Roads

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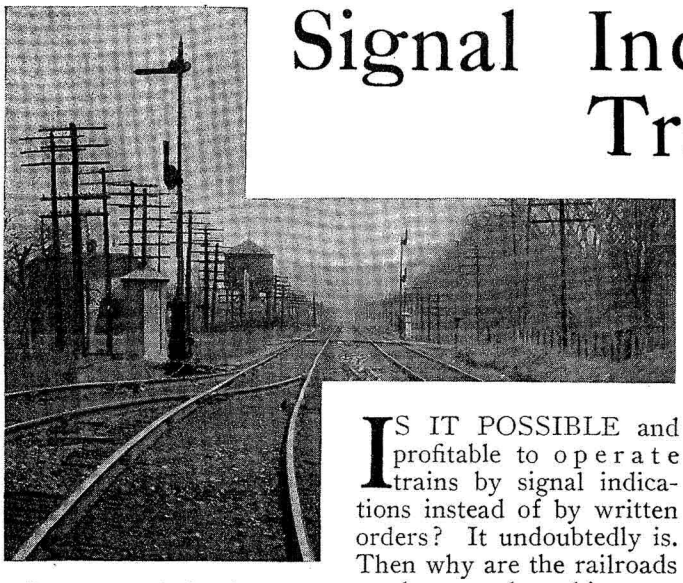


Erie Train Order Signals

IS IT POSSIBLE and profitable to operate trains by signal indications instead of by written orders? It undoubtedly is. Then why are the railroads so slow to adopt this more efficient method of operation? Wm. Nichols said in his treatise on train operation which was published in 1916, that "with a proper block signal system, the signals to govern train movements into and out of sidings, trains may be moved safely on single track without train orders and with but few train rules." It is our purpose in this paper to show that it is feasible and advisable to operate trains in this manner.

The problem is relatively simple for double track movements and many railroads are now operating such divisions more or less completely under signal indications. The best example of this method of operation is that in use between Port Jervis, N. Y., and Chicago on the Erie, a distance of approximately 900 miles. The system has been employed on this road for many years and has been found to be a great improvement over the old method of using written train orders to convey information. Several years ago the writer and one of our division superintendents made a careful investigation of the operation on the Susquehanna division of the Erie, spending a number of days on it interviewing local officers, visiting dispatchers' offices and riding various classes of freight and passenger trains. The operation was found to be smooth and every one concerned was favorable to it with the possible exception of the train dispatchers, who did not like to assume the additional responsibility of directing all of the train movements in spite of the fact that their work was made more easy.

To make effective the Erie method of train operation by signal indication the line of road is equipped with one-arm automatic signals of the three-position upper quadrant type. Where train order signals are required, they are placed on the automatic signal mast below the automatic signal. The train order signals are one-arm, three-position electric signals. They are located at passing sidings or crossovers and are controlled from the nearest day and night train order office. The dispatcher directs their operation by telephone instructions to the office controlling them. One operator usually controls the train order signals at the point where he is located, as well as at either one or both adjacent sidings, this being possible because they are electrically controlled.

Train Order Signal Indications

The upper arm of the signal is the automatic signal and it controls the movement through the block in the usual way. The lower arm or train order signal indicates as follows:

Horizontal (Red Light)

Stop on main track and consult dispatcher on telephone.

Diagonal (Yellow Light)

Take siding and consult dispatcher on telephone when clear of main track.

Passenger trains will report before pulling into siding.

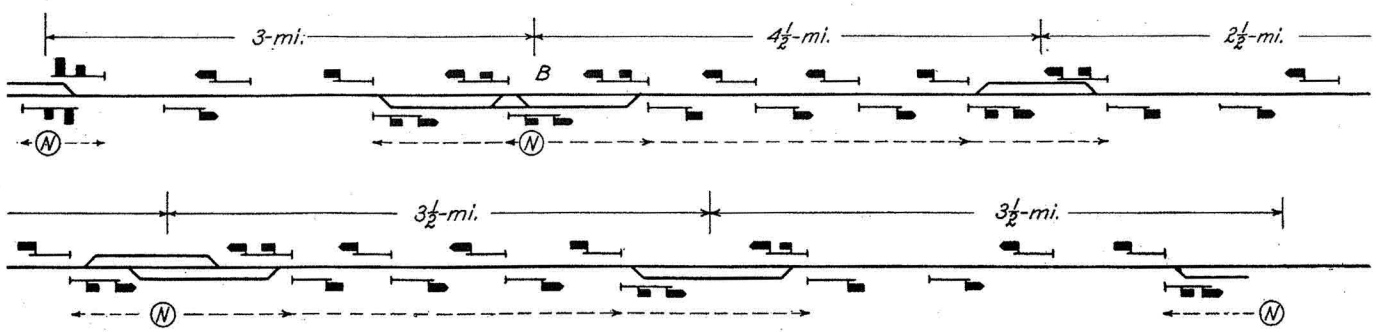
Vertical (Green Light)

(1) Proceed regardless of following preferred trains until otherwise directed by dispatcher.

(2) Trains are forbidden to accept this indication if there is any known cause that will prevent their making their usual running time. In such event they will consult immediately with dispatcher by telephone. When a train accepts the "proceed" indication and for any cause is unable to make its usual running time, it must protect itself against the following preferred train according to Rule 99, operating department.

When the train order signal displays "stop" or "take siding" the automatic signal displays "stop."

Under this system a freight train, whether local or through, holds the main track on the time of any passen-



N-Continuous train order office. Controls indicated by dotted lines.

Track and Signal Plan Showing Train Order Signals and Location of Operators

ger train until directed by the dispatcher to take siding through means of the train order signal.

Single Track Operation

Our thorough investigation of the Erie system convinced us of the desirability of this method of operation for double track movements and also that a similar scheme can be developed for use on single track. We submit the following method for operating on single track.

The diagram represents a typical single track railroad equipped with automatic signals of the absolute permissive type and electric train order signals arranged to be controlled by the operator to convey orders to trains at the direction of dispatcher.

All entering signals at passing tracks are to be equipped with a second arm, this arm to be a three-position electrically-controlled train order signal. The train order signals and the leaving automatic signals will be under the control of the operator. The leaving signal is a positive signal and by placing it under the control of the operator a train may be stopped by it if desired. The indications of the train order signals will be the same as used by the Erie as previously explained. Thus the operator is enabled to inform the train to proceed, take siding; stop at the entrance of the siding and get into telephone communication with the dispatcher, or to proceed on the main track to the clearance point at the leaving end of the siding.

When there is a double siding such as at B, in the sketch, additional train order signals may be located between the switches of the sidings. The addition of these signals will enable the operator to instruct the train to enter either of the two sidings. A similar arrangement may be used at lap sidings if thought desirable. However, this should not generally be necessary if each siding is used only by trains in a certain defined direction.

The proposed plan of operation includes a train-announcing scheme which may consist of a separate small light, similar to lights used on telephone exchange boards, to represent a direction of traffic for each positive block, the light to indicate when the block is occupied. For example, on a northbound movement, the northbound light would indicate as soon as a train passed the leaving signal at the next station to the south, and the southbound light for this block would indicate from the time that the southbound train left the leaving end of the siding until it had cleared at the next station. The lights would continue to indicate until the train cleared the block.

The Use of Electric Switch Machines

Train operation may be further expedited by equipping siding switches with electrically-operated switch mechanisms and placing their control in the hands of the operator. This will enable the operator to move a train into or out of a siding without stopping it or requiring the train crew to throw the switch. The low-voltage electric switch movement enables switches to be so equipped at reasonable cost and switches may be fitted up at certain locations or over the entire territory as may be felt desirable. Some roads are making large savings by the installation of these machines to enable the operator to handle bad pull-in or pull-out switches for trains, and yet the roads generally have been very slow in adopting this time and money saving device, the efficiency of which has been proved many times.

Each train should be provided with a portable telephone train set in order to enable it to get into communication with the dispatcher if it should be unduly delayed between stations or at other points not near a telephone location.

Operation under this system will, of course, call for quite a departure from the Standard Code operating rules, making a revision or separate set of operating rules or instructions necessary.

The cost of providing the additional facilities necessary for train operation by signal indication where automatic signals are already installed, is not very great and the operating advantages that will be obtained will far outweigh the cost of installation as the economies made in operation would pay for the expenditures within a very short time. I am satisfied that when systems of this kind are installed they will prove as safe, economical and desirable as automatic signal systems.

Railroads have been slow to avail themselves of the full benefits offered by signal systems. As an example the "19" order for restricting the rights of trains represents one of the greatest advantages of an automatic signal system, and yet it required years of missionary work to induce any road to adopt this economical method of operation, and many roads still refuse to do so.

Since the railroads are so slow in availing themselves of the use of the "19" order for restricting rights of trains in automatic signal territory, or in using electrically-operated passing siding switches, it is not strange that they are failing to eliminate written train orders and substitute therefor the signal indication method of conveying orders. And yet this will be brought about sooner or later.

Results of Check-Up at Grade Crossings

INTERESTING observations have been made upon 50 Class I railroads throughout the country at railroad crossings not protected by crossing gates. On July 15 and 16 at 300 such crossings a total of 306,306 automobiles passed over the crossings, and the drivers of 156,607 of these apparently made no observations whatever while approaching or passing over the same.

The fact, however, was also developed that but 26,453 of the observed automobiles passed over the crossings at a higher rate of estimated speed than 20 miles an hour. This is highly creditable to the average driver, and, in itself, shows a recognition of the necessity for careful driving.

The following is a summary of replies received from 52 railroads on the result of observing automobiles at crossings:

1. Kind of protection, if any	First crossing	None	
	Second crossing	None	
	Third crossing	None	
		July 15	July 16
2. Total number of vehicles (all kinds) passing over crossings during eight-hour period	First crossing	69,971	63,184
	Second crossing	55,092	45,778
	Third crossing	38,747	33,534
3. Total number of vehicles stopped for observation by driver	First crossing	1,292	989
	Second crossing	1,633	854
	Third crossing	1,061	867
4. Total number of vehicles passing over crossing where driver looked in but one direction	First crossing	12,455	13,384
	Second crossing	10,340	8,545
	Third crossing	8,838	8,125
5. Total number of vehicles passing over crossing where driver looked in both directions	First crossing	11,654	13,761
	Second crossing	10,788	9,868
	Third crossing	8,380	8,378
6. Total number of vehicles passing over crossing without driver observing any precautions	First crossing	42,863	32,659
	Second crossing	30,446	20,954
	Third crossing	17,557	12,128
7. Total number of vehicles passing over crossing at a speed of 20 miles or more per hour	First crossing	5,236	5,407
	Second crossing	4,554	3,503
	Third crossing	4,278	3,475

It is proposed to conduct another surprise test on the same basis at probably the same crossings, and it is hoped as a result of the publicity to the "Careful Crossing Campaign" of the American Railway Association that progress will be noted in the care with which drivers pass over the railroad crossings.—*Railroad Data.*