WHAT'S THE ANSWER?

Directional Approach Lighting

"What, if anything, has been done to make approach lighting effective only when trains are approaching, and not when receding from, a signal?"

Directional Lighting Not Desirable Under A. P. B. System That Permits Opposite-Direction Signals to Clear

By C. B. CARGILE

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I FAVOR the practice, in A.P.B. signaling, of allowing reverse-traffic intermediate signals at double locations to clear behind trains. In standard practice single intermediate signals for reverse traffic are held at stop. In permitting reverse-traffic signals to clear, more complete flexibility in train operation under full signal protection is secured. The dangerous condition illustrated as Fig. D in B. W. Molis' letter in the August issue of *Railway Signaling* may be provided against by providing a permanent overlap for signal *2* past signal *3*, and for signal *7* past signal *6*. This would stop the train in the yard at signal *2* before the approaching train passed signal *3*, thus giving protection and avoiding unnecessary delay.

A railroad is built for the operation of trains; and signals, particularly on a single-track line, should allow every flexibility in train operation that is consistent with safety. Wherever there are tracks and switches, trains will use them under certain conditions for every movement that it is possible for them to make, regardless of rules; and it is when making these unusual moves that signals often prevent serious accidents.

For the reasons just stated, I would say, in answer to the current question, regarding the desirability of directional control of approach-lighted signals, that I have always considered that a train should light the signal from which it is receding, as well as the one which it is approaching. A light out is equivalent to a red signal, and cutting these lights out in the rear of trains would often cause delays in train operation.

Applicable Only to Intermediate Signals

By G. W. TROUT

Signal Engineer and Superintendent Telegraph, Pere Marquette, Detroit, Mich.

I HAVE never gone into the matter with the idea of overcoming the lighting of a signal when a train is receding from it, as such an arrangement could be applied only to intermediate signals between two passing tracks. Headblock locations must necessarily light for either an approaching or a receding train. Furthemore, there is some benefit to trainmen if they are able to read the indication of intermediate signals after they have passed them, as it will give them information as to the approach of following trains.

Carl T. Smith, assistant signal supervisor, Boston & Maine, expresses the opinion that any expenditure for additional equipment that might be necessary to secure directional control would not be justified, in view of the comparatively small savings that would be effected. He adds that when making monthly night-time inspections from locomotives it is helpful to find the reverse-traffic signals lighted behind the train.

TO BE ANSWERED IN A LATER ISSUE

(1) *Is a breather of any value in preventing frost formation and vapor condensation on the internal parts of relays? How may these troubles best be eliminated?*

(2) *What may be done, in designing or maintaining signal circuits, to eliminate inductive interference, with a-c. or d-c. signal line circuits, that is caused by adjacent power transmission lines?*

(3) *Is the use of either a series or a floater track relay at the battery end of a d-c. track circuit sufficiently reliable for non-vital circuits such as approach lighting, directional relay control, back-locking, annunciator circuits, etc? Which is to be preferred? Why?*

(4) *What indications are necessary or desirable on the control machine of a centralized traffic control system?*

(5) *What type of bonding should be used in road or street crossings?*

(6) *What is the proper method of applying aluminum paint in order to secure a smooth even finish?*

Maintainers' Territories

"Is the unit system of defining maintenance districts satisfactory? What are its limitations, advantages, disadvantages?"

Wabash Uses Man-Hour Rather Than Equipment Unit as Basis

By H. J. FOALE

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DURING recent months when the management of the railroad has been making reductions in operating expenses, we found it desirable to devise an explanation of the work performed by each maintainer,

using terms such as the "man-hour" that can be understood by the management much better than units of signal equipment. Working entirely independently of each other, five men in the signal department were directed to work out a value of the number of hours required per month for a maintainer to inspect and maintain each item of equipment. These men included a supervisor, an inspector, the office engineer, the circuit designer, and the assistant signal engineer, each of whom had previously had several years of experience as maintainer on the Wabash. After each man had completed his list, we held a meeting and, where a difference of opinion existed as to the value of a certain item, they discussed the subject and agreed on a certain value. Later these men, together with the remainder of the supervisors, were called into a conference and the final values were fixed for the man-hours required each month for the maintenance of each item as shown in the accompanying table.

It was decided that no differential would be considered for the number of trains. This decision was based on the fact that the single-track lines were not equipped with signals until the traffic required such protection. As a result, there is not enough difference in the traffic on the different sections of single track equipped with signals out in open country to make any appreciable difference. The same condition exists with reference to most all of the double-track lines, and in addition it was considered that variations in the traffic on double track did not make much difference in the maintenance work. However, in terminal territories, such as in the vicinity of Chicago, and also near Detroit, consideration is given to the number of trains, especially when figuring the man-hours required on large interlockings and highway crossing gates, etc.

A maintainer working eight hours a day, six days a week, averages 204 hours a month. Where a helper is employed he works the same number of hours, but is paid two-thirds as much as the maintainer; on this basis the helper's time is figured as 136 hours per month. Therefore, a one-man territory should require about 204 hours per month and a two-man territory (maintainer and helper) about 340 hours per month.

In order to check our tentative man-hour values, a study was made of several territories which were considered as being well maintained, and in each case the total man hours figured, according to the values, was within 5 per cent or less of the man-hours being worked.

A check was then made of all the remaining maintainers' territories and a complete list was prepared for presentation to the management when discussing matters of adjusting maintenance forces. With the information presented on the "man-hour" basis, the management can more readily understand why it is impracticable to reduce maintenance forces on an arbitrary basis. In some cases where new equipment, such as remote-control installations and highway crossing apparatus had been added from time to time such that the maintainer was overworked to the extent that the territory was not being maintained properly, it is possible to secure authority for additional help on the basis of this new man-hour system of explanation of the work required.

The new system has likewise been of benefit to us as a basis for adjusting the limits of certain territories where slight inequalities existed before.

The values of the man-hours required as set up in this table are based on the amount of maintenance and inspection required on the Wabash, and therefore, may not apply on other roads. For example, we require a maintainer to make a visual inspection of each relay, tighten nuts and inspect contacts, ribbons and relay leads, once a month, which is figured as 1/10 hr. per month. (Another factor is that the signal maintainers on the Wabash are not required to do any painting of

UNIT CHART
FOR
SIGNAL MAINTAINERS TERRITORY

Item	Unit	Unit Hours per month	Amount Apparatus	Total Unit Hours	Remarks
MILES OF TERRITORY	Mi.	$ .50			
SIGNALS					
Automatic Semaphore					
Top Post	Each	1.50			
Bottom Post	Each	1.50			
Color Light	Each	.75			
SIGNAL ARMS					
Interlocked Power					
Top Post	Each	1.50			
Bottom Post	Each	1.50			
Mechanical					
Pipe Connected	Each	.50			
Wire Connected	Each	1.00			
SIGNALS					
Order Board Post	Each	.50			
BATTERY					
Storage	Cell	.10			
Primary Operating					
Double Track	Set	.33			
Single Track	Set	.66			
Primary Track					
In 7-ft. Chutes	Set	.60			
In ARA Boxes	Set	.50			
BONDED TRACK	Mi.	2.00			
TRUNKING OR PARKWAY					
Locations (exclusive of switch locations)	Each	.25			
SWITCH LOCATIONS in Automatic Territory	Each	.20			
SWITCHES & DERAILS					
Interlocked and Remotely Controlled					
Mechanical					
Medium Traffic	Each	2.00			
Heavy Traffic	Each				
Electrical					
Medium Traffic	Each	2.50			
Heavy Traffic	Each				
SWITCHES, Spring	Each	3.00			
DETECTOR BARS					
Medium Traffic	Each	2.00			
Heavy Traffic	Each				
LOCKS, Electric	Each	.50			
INTERLOCKER LEVERS					
Working					
Mechanical	Each	.50			
Electrical	Each	.50			
OIL LAMPS	Each	1.00			
CROSSING GATES					
Posts					
Light Traffic	Each	2.00			
Medium Traffic	Each	3.00			
Heavy Traffic	Each				
Flashers, Posts	Each	.75			
Wigwags, Posts	Each	1.50			
Bells, Posts	Each	.50			
POLE LINE	Mi.	.50			
RELAYS, Annunciator, Indicators	Each	.10			
BRIDGE CIRCUIT CONTROLLER	Each	3.00			
Care of Tools, Supplies, Motor Car, Clerical Work		16.00			
TOTAL HOURS					

Average man-hours per month @ 6 day week, 8 hr. per day—Maintainer. 204 hours. Helper, 2/3 of 204, 136 hours. TOTAL, 340 hours.

Number of men on this Territory.

Maintainers.....days per week.....hours per month.

LOCATION HEADQUARTERS.....

Helpers.....days per week.....hours per month.

FROM.....TO.....

TOTAL..... MAINTAINER.....