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

Signal and Electrical Inspector, Florida East Coast, St. Augustine, Fla.

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

Signal Engineer, Wabash, Decatur, Ill.

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.....

signal equipment.) We permit a maximum of 15 m.p.h. for motor cars, and the time spent in traveling is figured on this basis. It is also agreed that allowances must be made for different types of equipment, for example, it would not be logical to set up the same value for a three-arm semaphore signal as for a three-color light signal. Where a lot of salt brine is deposited constantly from refrigerator cars on certain tracks, it is logical that the track circuits in this territory might require more attention. The division point between various pieces of apparatus would be interpreted differently by different roads.

Therefore, we are not setting this table up as an ideal for all roads nor do we believe that it is entirely complete or finished for our own use. We may make changes or additions to it as experience requires. However, we feel that we have made progress in establishing a basis for limiting maintainers territories that is fair for the maintainers and for the railroad.

A.R.A. Units, Properly Qualified, May Be Used as a Basis

By G. E. Beck
Assistant to Signal Engineer, New York Central, Cleveland, Ohio

ARE the A.R.A. signal and interlocking units satisfactory for dividing maintainers' sections? My answer is that these units are not a panacea for maintenance difficulties, but that they can be used as a basis if consideration be given the following factors: (a) Density of traffic, (b) location of units, (c) climatic conditions, (d) type of apparatus, (e) age of apparatus, and (f) mileage to cover.

As regards (a) density of traffic: It would be unfair to compare the time required to maintain a unit in a terminal territory when there are several hundred train movements per day, with the same unit in light-traffic territory, where there are only 20 train movements per day; (b) location of units: The same applies to the location of units where considerable distance must be covered to reach the apparatus, as in automatic signaling. This factor should be allowed for, as against assembled units in an interlocking plant; (c) climatic conditions: On a north and south road, especially, where climatic changes are extreme, this should be considered; (d) type of apparatus: If apparatus is well standardized, this item may be ignored, but if the apparatus is of many makes this factor should be considered; (e) age of apparatus: When apparatus is new, it is reasonable to assume that it requires less time to maintain it than when it is nearly worn out; (f) mileage to cover: This refers generally to branch territory, with scattered apparatus, as compared with main line where apparatus is more concentrated. Train service may play an important part on branch territory.

Cleaning Signal Blades

"What is the best method of cleaning enameled steel signal blades and roundels on semaphore signals, and cover glasses on light-signal units?"

Soap or Fire-Extinguisher Fluid

By R. B. Workman
Signal Maintainer, Colorado & Southern, Trinidad, Colo.

IN outlying territories where the blades, roundels and cover glasses become soiled by weather conditions only, a pail of soap suds is sufficient for cleaning them, after which they may be dried with a piece of clean cotton waste. This treatment twice yearly with an occasional dusting off with a piece of dry waste, is sufficient for the outlying signals. But in terminals, where the blades, roundels and cover glasses become soiled by smoke and gasses discharged from locomotives, it is quite a problem to keep them clean and in a polished condition, since the average maintainer's territory is too long to permit him to wash off the blades and roundels daily. Consequently, after a few days of exposure the smoke and gas are burned on to an extent that makes their removal with soap suds, or other gritty cleaners, almost impossible.

To clean blades and roundels in this soiled condition, try using Pyrene fire-extinguisher fluid, which is a very effective solvent. This chemical should be applied, with a small piece of waste, directly to the surface to be cleaned, and then the surface should be slightly scoured, after which the solvent should be removed with clean waste. This chemical can be obtained at no cost from the man who has charge of maintaining the fire-extinguishers around the station, by asking him to save the old fluid for you when he refills one of the guns.

Still another way to clean badly corroded and smoked enameled blades and roundels is to use a small quantity of paint-and-varnish remover, applying it with a small paint brush having bristles not over 1 in. long, using this brush to scour the surface. Since paint-and-varnish remover is injurious to the skin, it is important that the hands be protected. This solvent will remove the paint and dirt from the roundels, cover glasses and blades, and the cleaned surface will be as clear and lustrous as it was when new. Paint-and-varnish remover can be procured from your stores department. A quart will be sufficient for the ordinary maintenance territory for several months.

C. L. Maness, assistant signal supervisor on the Frisco, comments briefly: "For enameled signal blades, I have used water fairly heavy with washing powders such as 'Gold Dust Twins.' For roundels and cover glasses, a primary battery solution, allowed to dry on, and then washed off with soap and water, will clean satisfactorily."

Breaking Signal Control Circuits

"Is there any objection to selecting signal control circuits through the polar contacts of d-c. polarized relays in such a manner that this current will be interrupted at the polar contact? Will this materially affect the polar-contact pressure and, therefore, the polar calibration?"

Practice Is Not Desirable

By R. M. Gilson
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WE feel that the use of d-c. polar relay contacts for the interruption of signal control circuits is not as good practice as arranging the circuits so that the neutral contacts of the polar relay interrupt the relatively heavy lamp currents of light signals. It is obvious that any wear or pitting of the contacts will have less effect on the relay characteristics and will necessitate less maintenance, if restricted to the neutral contacts. It is also a simpler problem to keep the contact resistance of the circuit uniformly low if the wear due to arcing is limited to the neutral contacts. For the