focusing adjustment on light units is in the laboratory where a screen, with equipment for exact photometer readings, is available. In our case this work is done at the signal company's factory where the lamp base is originally focused in the proper position for the given unit, after which it is only necessary for us to replace the lamps at regular intervals. We find that using the precision-base lamps provides a uniform and satisfactory light distribution and that the small additional expense is well warranted.

### Signal Indications More Uniform If Precision Lamps are Used

By A. W. Fisher
Engineering Department, Union Switch & Signal Company, Swissvale, Pa.

All manufacturers of light signal equipment find that very accurate focusing of the light source is necessary to get the best result, and there is no doubt that all railroads using light signals recognize the same necessity. It has been found by repeated laboratory tests that light sources which are displaced more than 1/64 in. from the focal point, at which location the best results are produced, will throw the beam out of alinement or out of focus to such an extent that the necessity for readjustment is obvious.

Sighting devices on light signal cases are adjusted to give the proper alinement to the light signal beam, only when the beam is focused along the axis of the lens system. This adjustment is obtained with a lamp of proper design having its light source located at the point determined by the proper dimensions for light center length and axial alinement.

Obviously, if replacement lamps are used which have their bases applied with relation to the proper location of the filament within an error of 1/64 in., or if special rebased lamps giving the same 1/64 in. precision are used, there will be no departure from the original alinement of the signal beams, assuming this to have been properly made, and therefore the need for refocusing the signal when replacing lamps is eliminated.

Signals built for 1/64 in. precision lamps have the lamp receptacles permanently located in their correct position before they leave the factory. The alternative is the use of an adjustable lamp receptacle, to which can be applied, for lamp renewals, lamps with ordinary commercial tolerances of plus or minus 3/64 in. or 1/8 in. for light center length and axial alinement. Such lamps are slightly cheaper than the 1/64 in. precision lamps, but in all cases of renewal, it will be necessary for the maintainer to adjust or refocus the receptacle. Lamps can be brought into proper focus by this means to obtain results equally as good as with a 1/64 in. precision lamp, but these results depend entirely on the individual maintainer. Experience has shown in a great many cases that the maintainers often fail to get the proper adjustment, or, due to lack of time when replacing a lamp, postpone the adjustment to another day and often overlook it entirely. Conditions vary on different roads and with different maintainers, the natural result being some good signal indications and some poor signal indications.

The 1/64 in. precision lamps in accurately located and permanently fixed receptacles provide uniformity in signal indications and eliminate the labor of readjustment and irregularities in indication due to refocusing with adjustable receptacles.

The slight extra cost of the 1/64 in. precision lamps as compared to lamps based with commercial tolerances is an item which must not be compared alone to the labor expense of adjusting receptacles in the field, but must be considered also in connection with the insurance it provides for uniformly good indications and the elimination of the human element.

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C. J. Kelloway, superintendent of signals, Atlantic Coast Line: It depends entirely upon the type of signals as to whether it is necessary to re-focus the signal when replacing lamps. It appears to me that this is a question to be decided by each railroad for its particular type of signal.

# Call-on Route Control

*"What control features can be incorporated to insure that a call-on signal will clear for only a specified route? Under what operating conditions should call-on signals be used?"*

### Security of Operation Depends Upon Strict Enforcement of Rules

By D. W. Richards
Signal Engineer, Norfolk & Western, Roanoke, Va.

I do not know of any control features that could be added to or incorporated in the circuits of an electrically-operated calling-on signal so that it will clear for only a specific route and at the same time convey to enginemen what route is set up, unless it is a one-route signal. When it is installed as a restrictive speed signal governing movements into one or more occupied tracks, in order to insure that an engineman knows where he is going, it would be necessary to go back to the old route-indicator signals, using illuminated numbered disks selected by the route lined up, the proper disk being displayed to show the number of the track or route for which the switches have been lined up.

With the use of the present type of restrictive-speed signals governing movements into occupied blocks, the only security which can be obtained is in the strict observance and enforcement of the rules governing the use of this type of signal.

### Favors Exclusive Use of Route-Controlled Signals

By W. F. Zane
Signal Engineer, Chicago, Burlington & Quincy, Chicago

Until about four years ago, a few call-on signals were in use at interlocking plants under my jurisdiction. At that time I removed them from service, as I do not believe it is safe practice to use any signal in an interlocking plant that is not 100 per cent route-signal controlled through the routes over which it governs. Since discontinuing the use of these call-on signals, I have found that they were not of as much value as they had previously been considered to be.

My personal opinion is that the regular route signal, controlled through the track circuits and through the proper lever on the machine, and with the proper selection through the switches, is an efficient signal, and will answer all the purposes that an interlocking plant is designed for. At the same time, it will handle the traffic as quickly as if a call-on signal were displayed. I feel sure that the regular route signal is much safer.

I am aware of the several arguments in favor of the call-on signal as a medium of keeping traffic moving through the plant in case of a track relay being down, and also for switching movements, with the customary safeguards afforded by the operating rules, but my opinion is that an interlocking plant can be maintained so that the possibility of the track circuit or any other apparatus failing to function is very remote.

In regard to switching movements, I believe that most of them can be made with the regular signal. However, when this signal is in the vicinity of a large terminal where either the head or rear ends of trains are switched, the switching can be taken care of more safely by the use of a push-button in the tower; this push-button is used jointly with the signal lever, and, when operated, causes the regular signal to display the yellow aspect only. In using the push-button and lever jointly to obtain this switching move with the regular signal, positive instructions should be issued to the effect that it is to be used only for switching moves to place cars or engines upon the train being switched and in no case to be used for any through moves.

All through moves are to be made upon the standard indication of the interlocking route signal. The responsibility for the use of the push button jointly with the signal lever rests with the towerman, who is not permitted to use the push button to permit a train to pass a signal in case of a failure of any of the apparatus through which the signal is controlled. The joint use of the push-button and lever in reality cuts out the track circuit where the train stands while it is being switched.

I do use, in automatic signal territory, a signal called a call-on signal but which is used for an entirely different purpose than the one referred to in the question. The call-on signal thus used is located at the distant end of a passing track, and the aspect of this signal is dark when the signal is not in use and yellow when conveying information to a train. It is controlled by the operator at the station and is selected through all of the track sections between the operator and the signal location. It is used only to advance a train to the operator and gives no block rights or other authority. When the indication of this signal is yellow a train may proceed under rule to the station for further orders, but the signal does not give the train any rights, and it is necessary for the train to go farther than the station to receive orders from the operator at that point. This signal is never used in connection with interlocking plants.

As I do not use a call-on signal at interlocking plants, I am unable to answer the question, "What features can be incorporated to insure that a call-on signal will clear for only a specified route?," other than to suggest making it a 100 per cent route signal, in which case it ceases to be a call-on signal. However, if used as a call-on signal, the circuit should be the stick type so that it will have to be cleared for each move, and the control should be cut through as many functions ahead of the signal as possible.

## Complications Would Arise

By C. J. Kelloway
Superintendent of Signals, Atlantic Coast Line, Wilmington, N. C.

The primary object of the "call-on" signal is to eliminate hand signaling and its indication to "proceed at slow speed prepared to stop" should be rigidly observed. Occasional "efficiency checking" will soon determine whether its indication is being violated.

Undesirable complications would be introduced by endeavoring to change the operation of the "call-on" signal and I doubt whether the final result would warrant the additional expenditure, for it would still be necessary to give the signal practically as at present.

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**W. H. Elliott,** signal engineer, New York Central, suggests that mechanical locking be used to compel a call-on signal to clear for only a specified route. Mr. Elliott's opinion is that call-on signals should be used when movements are to be made at restricted speed, the latter being defined as "a speed not exceeding that which will enable a train to stop short of a train ahead, obstruction, or switch not properly lined, and to look out for a broken rail."

# Centralized vs. Remote Control

*"What is the proper definition of centralized traffic control as distinguished from remote control?"*

## As the Operating Department Sees It

By H. B. Reynolds
Assistant Trainmaster and Division Operator, Pennsylvania, Fort Wayne, Ind.

The editorial comment under "A definition for centralized traffic control," in the June issue of *Railway Signaling*, expresses practical and sensible views on this subject.

In naming and defining the "hot potato," I would suggest the definition given in the following paragraph. This definition in no way conflicts with interlocking rules. It paves the way to directing and governing movements between holding points, by means of fixed signals whose indications supersede time-table superiority and take the place of train orders. This new member of the block system family must be provided with requisites, a set of operating rules, and a place beside its brothers—"manual," "controlled manual" and "automatic" signal systems.

Centralized traffic control block system: A series of consecutive blocks governed by block signals controlled by continuous track circuits, electrically operated by control machine in central station, the signals arranged to restrict movements opposing that for which their indications establish the current of traffic."

## Operating Expense Factor in Definition of C. T. C.

By F. B. Wiegand
Signal Engineer, New York Central, Cleveland, Ohio

Centralized traffic control is what might be termed "amplified remote control." Signal apparatus remotely controlled is ordinarily a unit layout whereas centralized traffic control is comprised of several of these units spaced as traffic conditions warrant to keep trains moving with minimum delay. I believe that the following definitions are proper:

Centralized traffic control—A series of remotely controlled interlocked switches and/or signal layouts operated from a central location, designed for the purpose of increasing freight train speed, gross tons per freight