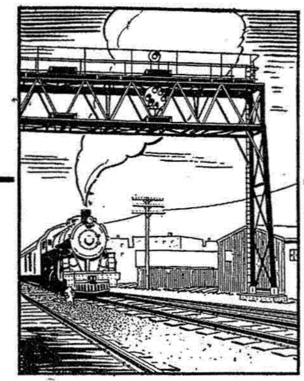
What's the ANSWER?



"Yard Limit" Boards in C. T. C. Territory

"Were 'yard limit' boards eliminated in centralized traffic control territory when C.T.C. was installed on your road, and, in your opinion, what are the reasons for or against 'yard limit' boards in C.T.C. territory?"

Operating Advantage

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

When the C.T.C. installation was made between Berwick, Ohio, and Stanley, the "yard limit" boards were continued. We feel it is an operating advantage to have the "yard limit" boards, as these permit the use of the main track for switching purposes without protecting against other than first-class trains.

Necessity Eliminated

W. F. Zane
Signal Engineer, C. B. & Q., Chicago

When C.T.C. is installed, it has been the practice to eliminate yard limit boards at all points within the territory covered by such a system, as it has been deemed unnecessary to apply Rule 93 in the territory that is controlled. Since the dispatcher or operator controlling the C.T.C. territory has absolute control of switches and signals, trains on opposing control routes cannot make opposing moves against trains on other routes, as each controlled switch constitutes a complete interlocking with approach, route and time locking, thus producing the same protection as is obtained at a modern electric interlocking plant.

With regard to hand-operated switches: The most important of these, especially where there is room for an entire train or engine to work in the siding without interfering with the main line, have been protected with electric switch locks which indirectly require the dispatcher or operator to participate in unlocking them, in addition to the rule requiring permission to be obtained over the telephone for use of the switch. This is accomplished by requiring that the nearest controlled signal in each direction protecting the territory in which the switch is located be placed to display its most restrictive indication before any automatic electric switch lock can be unlocked. In addition to this, the circuits are so arranged that any train in the territory between these controlled signals also locks the electric switch lock so it cannot be used. This gives practically positive protection for this class of hand-operated switches in centralized traffic control territory.

The other hand-operated switches, where electric locks are not used, are for tracks too short for a train to get entirely in the siding, and where the setting of cars requires that a part of the train continuously occupy the main track. The rules require that permission be obtained over the telephone for use of such sidings.

From the above it will be noted that the territory is as nearly completely controlled as possible without placing switch machines on all sidings other than passing sidings; this eliminates the necessity for Rule 93 and yard limit boards.

I can see no use for yard limit boards within C.T.C. territory, providing that the installation is complete and all passing sidings are controlled and the other sidings are properly taken care of so that they are always under the supervision of the dispatcher or operator. However, if an installation is made where all of the passing sidings are not controlled and some of them are hand-operated and

To Be Answered in a Later Issue

(1) What arrangement and control of signals should be provided at spring switch locations, at ends of passing tracks, and at ends of double track? In your opinion, should some special signal or color-light arrangement equivalent to a high switch stand controlled only by the position of the switch independent of the automatic block signals be used at spring switch locations? What are the advantages and disadvantages of different types of signaling arrangements at spring switches?

(2) What is the best way to locate a partial ground in an underground cable at an interlocking?

(3) What is the most practicable and effective means of inspecting the short mechanically applied head-of-rail type of bond?

(4) What is a satisfactory and efficient method of painting an extended mileage of aerial cable having a cotton braid covering?

If you have a question you would like to have someone answer, or if you can answer any of the questions above, please write to the editor. Answer to any of the questions above will be paid for in cash or by a subscription to Railway Signaling.

no electric lock nor other automatic or semi-automatic features are employed and trains are permitted to operate by signal indication, then there might be a question as to whether it might be necessary at certain points to keep Rule 93 in effect, which would then require yard limit boards.

Spread of Color-Light Signals

"On a color-light signal equipped with a spreadlight lens, for use on curved track, will the use of a lamp of higher wattage rating increase the spread, increase the intensity and range of the light within the established spread, or merely increase the range in a certain area?"

Range Increased

A. W. Fisher
Engineer, Union Switch & Signal Company, Swissvale, Pa.

A practical consideration in the use of lamps of higher wattage on color-light signals equipped with a spreadlight cover glass does not permit any assumption that there will be an increase in the spread or an increase in the range in a certain area, but there can be anticipated an increase in the intensity and range of the light within the established spread provided by the cover glass.

The spread of the signal beam in a color-light signal is dependent first upon the size and shape of the lamp filament light source, and second upon the pattern of the cover glass applied for forced spread through an established area. When lamp filaments are of the same voltage rating, the area of the light source usually increases slightly when the designed wattage is increased, but within the limits of approximately 100 per cent or 125 per cent increase in wattage the increase in spread due to the increased area of the filament has no practical value. The pattern of the cover glass does not change, and, therefore, the increased amount of light produced by the higher wattage filament is distributed uniformly throughout the established spread area in the same manner as the light produced by the lower wattage filament is distributed. The result is, therefore, a uniform increase in the intensity and range of the light within the established spread determined by the spreadlight lens or cover glass used in the signal.

An example of this performance is indicated in data taken for the Union Style H-2 searchlight signal, equipped with a 30-deg. spreadlight cover glass, wherein the range on the axis with an 8-volt, 5-watt lamp is 1,600 ft., with an 8-volt, 13-3½-watt lamp, 2,300 ft., at the edge of the beam the range is increased from approximately 1,250 ft. to approximately 1,800 ft. The total width or spread of the beam does not change.

Practical Features Discussed

O. S. Field
General Railway Signal Company, Rochester, N.Y.

Technically speaking, everything else remaining constant, an increase in wattage in any type of light signal or light projection device will not increase the spread but will increase the intensity throughout the spread in about the same ratio as the increase in wattage and the range of visibility in the ratio of the square root of the wattage.

This condition, however, is not met with in practice, as an increase in wattage invariably means a necessary increase in area of filament. This change in area may be great or small, depending upon whether the increase in wattage is in the form of higher voltage or higher current, and also upon individual design characteristics necessary in the lamps of different wattage.

To illustrate this, suppose we assume in the new lamp that the wattage increase comprises a reasonable increase in current with a voltage of substantially the same order as the lamp being replaced. A substitution of this kind, which would involve a nominal increase in overall dimensions of the filament, might reasonably be expected first of all to give an increase in spread. This increase in spread would, if a straight optical system were employed, vary directly as the increase in diameter of the light source.

Where a spreadlight lens is used, however, the increase in spread would be approximately the same as with the optical lens, not the same percentage of total spread. Hence, if the spreadlight lens is of quite wide angle, the increase in horizontal spread will be only a small percentage of the total horizontal spread. The vertical spread, however, will increase directly as the diameter of the light source, as in the case of the optical lens.

We will next find a definite increase in beam candle power or intensity throughout the whole spread of the beam. This increase in intensity will be somewhat less than the ratio of the wattage increase, because some of the additional energy has, as shown above, been utilized to give an increase in spread of the beam from the signal.

The increase in beam candle power can be interpreted as having accomplished two purposes. It has increased the range throughout the beam. There is also an increase in spread of the effective indication. By effective indication, we refer to an established minimum beam candle power which will produce an indication which is considered an adequate indication when viewed by the observer at a given distance. Due to the characteristic diminution of intensity of a projected beam of light as the edge of the beam is approached, it will be apparent that the effective indication is at a position removed from the absolute edge of the beam by a certain number of degrees, determined by the contour of the beam candle power curve. As the light intensity is increased, the contour of this curve changes and the sides become correspondingly more steep. This change of contour automatically moves the point of adequate indication nearer to the absolute edge of the beam, and hence provides a somewhat greater effective beam spread.

All of the above is true only if the filaments under discussion are of the same general design.

We are all more or less familiar with the problem of providing high voltage bulbs for light signals. As the voltage requirements go up, the filament distribution increases until we eventually arrive at a combination where an increase in wattage may result in an actual material reduction in beam candle power, more than the additional energy supplied being utilized to provide greater spread or distribution of light. Fundamentally, increased wattage means increased output of flux, assuming the same burning efficiency in both cases, but the distribution of this flux in the beam pattern will vary in accordance with a number of other fundamental factors not brought out in the question asked.