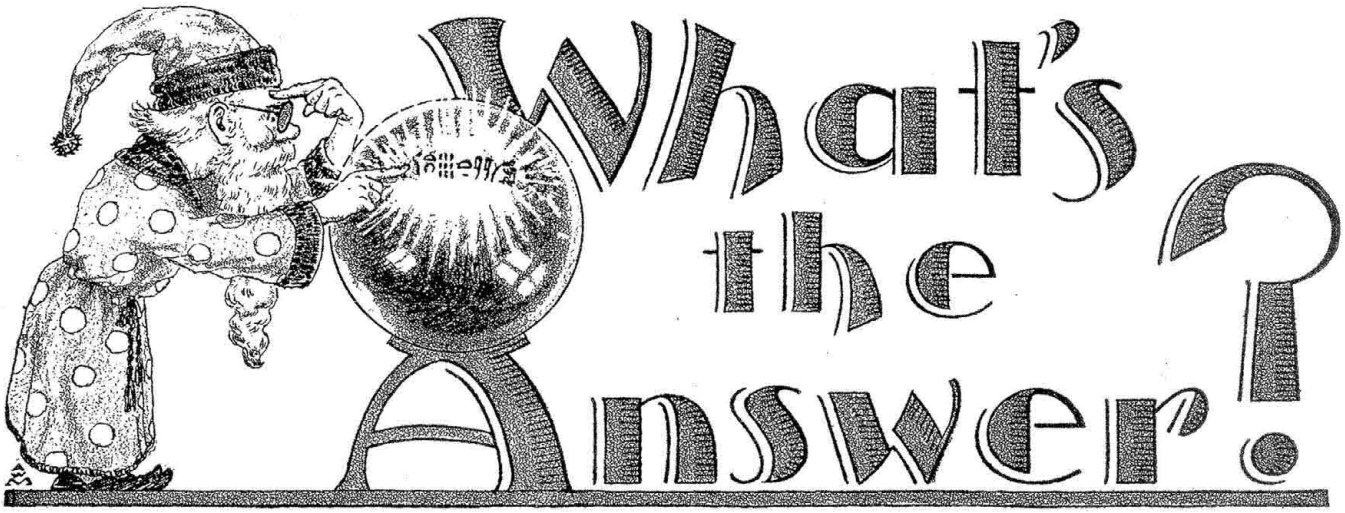


Adjustment of Clock-Work Time Releases

"How should the time setting of clock-work time releases at interlocking plants be adjusted?"

Time Setting Depends on Speed of Trains

By C. A. Taylor

Superintendent of Telegraph & Signals, Chesapeake & Ohio, Richmond, Va.

BELOW is quoted a portion of our instructions covering approach locking and setting of time releases and which outlines very clearly our practice in this matter:

"(1) The basis for setting time releases shall be the time required for a train to move the distance between the distant signal and the signal locked, plus 1,500 ft., at a speed of 30 m.p.h. (44 ft. per sec.)

"(2) Where time locking only is used for high and restricted speed routes, the same rules shall apply, assuming the distances the same as though approach locking were in service.

"(3) Time releases for dwarf and other slow-speed signals (no high or restricted-speed movements being involved) shall be set for a minimum of 20 sec."

Formulae Given for Computing Time Setting of Any Type of Release

By L. E. Carpenter

Signal Engineer, Pennsylvania, Philadelphia, Pa.

RULES for setting of time releases on the Pennsylvania are not peculiar to the clockwork type but apply to all types. Time releases are necessitated by approach locking or time locking. Approach locking is effective from the time an approaching train has reached a point from which the engineman may have observed the first signal that will give him an "approach" (or "approach-restricting") indication to the home signal and continues effective until the engine of such train has passed the home signal.

In general, the approach locking circuit extends from the home signal to a point not less than 1,500 ft. beyond the furthest distant signal, except in automatic territory, where the approach circuit extends to the next signal beyond the furthest distant signal, unless the track circuit between these two signals is cut for other purposes at a point 1,500 ft. or more beyond that distant signal.

Theoretically the release should be set for the time necessary for a train that may have observed a clear distant signal to reach the home signal and stop, or, in case the engineman failed to observe any change of the "clear" distant signal to a more restrictive indication, to pass the home signal if unable to stop. If this time is based on the maximum speed permissible in the territory involved, it will be too short for a train moving at slightly less than maximum permissible speed. Also, if based on a slow speed, it will be unnecessarily long. A critical speed at which a train can doubtless stop after coming in sight of the

To Be Answered in a Subsequent Issue

(1) *Do you consider it practicable to proceed with the plans and ordering of material, including interlocking machine, to be used for the installation of a large all-electric interlocking plant, involving underground cable in duct line, before the track layout is definitely decided?*

(2) *To what extent has rear-end flagging been eliminated or modified in automatic signal territory?*

(3) *What general instructions are available concerning the maintenance of automatic signals?*

(4) *What material do you use to block up the space around wires where they come in through entrance holes in relay or mechanism cases?*

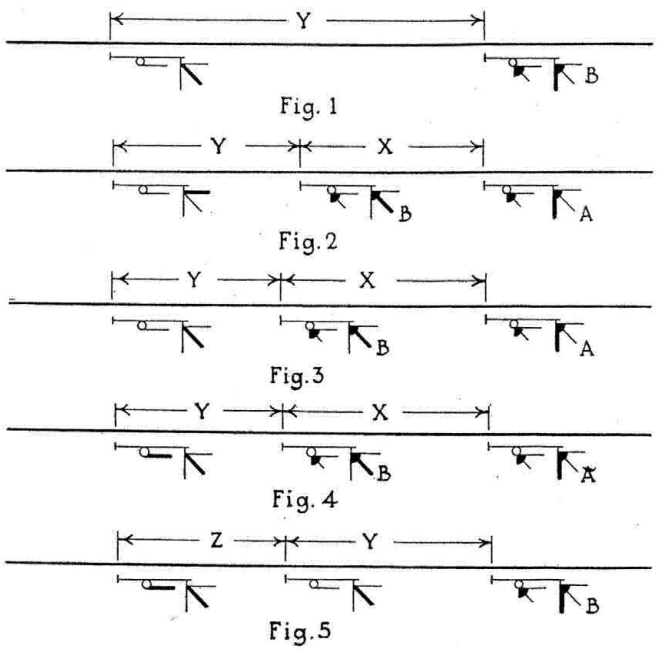
(5) *What action is expected of a motorist who upon reaching a highway-railway grade crossing finds the automatic signals displaying a warning? Are such protective devices in the nature of "stop-and-proceed" signals, or do they require that the driver wait until the train has cleared the crossing?*

(6) *What track circuit adjustments should be made before the arrival of winter so that failures will not occur?*

home signal, and after failing to observe a change in the distant signal from "clear" to "approach" (or "approach-restricting"), was used. The following rules are in effect:

"The basis for setting time releases shall be the time required for a train to move the distance between the distant signal and the signal locked, plus 1,500 ft., at a speed of 30 m.p.h. (44 ft. per sec.), except that, on descending grades of ½ per cent or more, the basis shall be 20 m.p.h. (30 ft. per sec.) and 30 must be substituted for 44 in the accompanying formulae.

"Where time locking only is used for high- and restricted-speed routes, the same rules shall apply, assuming the distances the same as though approach locking were in service. Time releases for dwarf and other slow-speed signals (no high- or restricted-speed movements being involved) shall be set for a minimum of 12 sec."



How to Determine Time-Release Setting

Fig. 1.—Where Y is full braking distance for authorized speed (Fig. 1, 2, 3 and 4):

$$\text{Time for release of } B \text{ in sec.} = \frac{Y+1{,}500}{44}$$

Fig. 2—Where X is full braking distance for maximum authorized speed (Fig. 2):

$$\text{Time for release of } A \text{ in sec.} = \frac{X+1{,}500}{44}$$

Fig. 3—Where X is less than braking distance for restricted speed.

Fig. 4—Where X is less than full braking distance for maximum authorized speed, but is braking distance for restricted speed:

$$\text{Time for release of } A \text{ in sec. (Fig. 3 and 4)} = \frac{X+Y+1{,}500}{44}$$

Fig. 5—Where three-block indication is in service:

$$\text{Time for release of } B \text{ in sec.} = \frac{Y+Z+1{,}500}{44}$$

Herman Henn, of the signal department of the Chicago & North Western replies in answer to question No. 1: "The adjustment of time releases at interlocking plants is governed by local conditions at the plant, such as the distance between the home signals and approach signals and also the speed of trains. The usual delay period is about two minutes. During a two-minute period, a train traveling at the rate of 30 m. p. h. will traverse a distance of one mile. Of course, a train going at a faster speed will cover the distance in a shorter time, and conversely a train going at a slower speed will consume more than two minutes and will be able to stop upon reaching the home signal.

Release Time Depends on Safe Stopping Distance—Comparative Data Given

By D. W. FULLER
Assistant Signal Engineer, Atchison, Topeka & Santa Fe, Topeka, Kan.

IN determining the operating period of clock-work time releases, in order to provide reliable timing, it is essential that the local conditions be given careful consideration. On tracks where high-speed traffic is handled, the timing of releases would be very much different than on slow-speed territory.

It is hard to determine the braking distance of the various lengths of freight trains; however, various tables have been prepared which show this information, but grade conditions at various locations are such that it almost requires that local information be used in determining the adjustment of the operating period of clock-work time releases.

The following table shows the stopping distance and stopping time required under ordinary conditions for a 100-car freight train traveling at various speeds from 20 to 50 m.p.h. on level track when a full service application is used:

Speed	Stopping Distance	Stopping Time
20 m.p.h.	1,800 ft.	2 min. 3 sec.
30 m.p.h.	3,340 ft.	2 min. 32 sec.
40 m.p.h.	5,500 ft.	3 min. 8 sec.
50 m.p.h.	8,600 ft.	3 min. 55 sec.

The following table has been prepared from the above table and it will be noted that the distance is shown between home and distant signals, and the releasing time is shown for the various distances. It would appear that with this adjustment a safe arrangement would be provided:

Approach Circuit Back of Distant Signal	Distance Between Home and Distant Signals	Total Effective Track Locking	Releasing Time
2,640 ft.	4,000 ft.	6,640 ft.	2 min.
2,640 ft.	5,000 ft.	7,640 ft.	2½ min.
2,640 ft.	6,000 ft.	8,640 ft.	3 min.
2,640 ft.	7,000 ft.	9,640 ft.	3½ min.
2,640 ft.	8,000 ft.	10,640 ft.	4 min.

The above table is prepared on the basis of a freight train of 100 cars traveling at a speed of 50 m.p.h. In territory where switching movements are handled and slow-speed movements prevail, the release timing could be much less and yet provide safe operation. It would appear from the above tables that the location of the distant signal 4,000 ft. in advance of the home signal would be preferable, as it would permit the use of a minimum releasing time.

The operating condition requiring the maximum time seems to occur when the distant signal goes to caution just before a train passes it. The time interval must be long enough to insure that, before the plant can be released, the train would ordinarily come to a stop at the home signal, or pass on to the detector section so as to hold the route locked. However, this is a hard question to answer and about the only way that it can be answered fully is to cite a specific case as I have done.