



TO BE ANSWERED IN A SUBSEQUENT ISSUE

(1) How does the voltage of a track circuit battery (high or low) influence the shunting sensitivity of the circuit? What effect does its voltage have upon the degree of broken rail protection?

(2) At what minimum value of ballast resistance should track circuits be adjusted? Would it be safer to reduce the length of the track circuit and adjust each of the shorter circuits for a higher value of minimum ballast resistance?

(3) When using the enclosed type of storage cells (either nickel-alkaline or lead type), is it necessary to provide a separate room for the operat-

ing storage battery at interlocking plants; likewise is a separate housing or compartment required for this purpose in signal or relay cases in automatic territory? Why?

(4) At interlocking plants and on automatic signal installations, some roads run the solid conductor insulated wires direct to the terminal posts on relays and other instruments, while other roads take the solid wire to a terminal mounted in the case and extend a flexible jumper wire to the relay terminal post. Which practice do you follow and why?

Where Should Grade Signals Be Installed?

"What limitations are placed on the application of 'grade signals,' permitting trains to pass automatic 'stop and proceed' signals indicating danger without stopping? What percentage of grade, and what maximum speed of trains governs the use of grade signals? Are they used on both single and double track?"

N. P. Employs Markers at Maximum Grades—No Light Is Necessary

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ON the Northern Pacific, grade signals are used both on single and double track. All such signals have a 12-in. by 16-in. square marker placed 5 ft. below the blade, and this marker is painted yellow with a black border. No light of any kind is used on these markers and none is necessary. The rule for the installation of these markers requires that these signals must be placed on a maximum grade in that territory. The maximum grade might be four-tenths of one per cent, or it might be two per cent. As a general thing, percentage of grade has not much to do with it, because trains are loaded in accordance with the ruling grade. The rule for passing one of these signals, when it is at stop, is as follows:

"When a heavy passenger or heavy freight train approaches a block signal at stop having a 12-in. by 16-in.

square marker painted yellow with a black border and located to the right of the signal mast, about 5 ft. below the signal, and known as a tonnage signal, as designated by Rule 501-H of the "Transportation Rules," it may proceed without stopping at the signal at a rate of speed not exceeding 15 m.p.h."

As already stated, the percentage of grade has nothing to do with it whatsoever. We only permit a heavy loaded freight train or passenger train (a full tonnage train) to pass these signals, and then at a rate of only 15 m.p.h. through the block. This, we consider a good practice, as we do not believe it to be good policy to stop a heavily loaded freight or passenger train at a maximum grade in any block. We have followed the above practice for a number of years and have always found it to work out successfully.

Many railroads consider it necessary to place a light on these markers. I have always considered this unnecessary, inasmuch as they are only placed on a heavy grade, where trains come up the grade expecting to stop at the red light. When they are near enough to see this marker, which can be seen plainly with the headlight, they will see that it is a signal that they do not have to stop at (should the permissive signal indication be "stop"), and as they are only going at a very low rate of speed, it will not delay them any. Therefore, a light is not necessary.

Furthermore, an engineman will have to go over the line only once or twice and he will have every grade signal spotted, and I hardly think it would be necessary to provide the marker, if we printed in the time card, the numbers of these particular signals.

