

Canada occasion considerable variation in the resistance values of relay coils. For example, an ordinary 4-ohm track relay which agrees with its nominal rating at 70 deg. F, will increase in resistance to 4.45 ohms at 120 deg. F. On the other hand,

the lower temperature of 0 deg. F. reduces this value to approximately 3.38 ohms, a total variation of 1.07 ohms, or nearly 27 per cent. This is reflected proportionately in the current value, provided there is no other change in the circuit.

Maintainers' Blueprint Plans

"Some maintainers carry with them a complete set of blueprints showing all signal locations, circuits, etc., included in their territories. Do you think this is necessary during ordinary routine work? What are the advantages of providing a permanently-mounted blueprint at each instrument housing? What is the practice on your road in this respect?"

Plans in Tool House

D. M. Noell

Signal Supervisor, Canadian Pacific,
Toronto, Ont.

I do not consider it necessary for a signal maintainer, during ordinary routine work, to carry with him blueprints of all signal circuits on his territory because he is usually quite familiar with all circuits on his section and should be able to locate any ordinary trouble that may arise, without the aid of a blueprint. Furthermore, I do not see any advantage in providing a permanently-mounted blueprint at each instrument housing. Such an arrangement would be expensive because of the necessity for keeping these prints up to date and in good condition, owing to minor circuit changes from time to time and replacing age-worn prints, for blueprints deteriorate very quickly in such locations.

It is our practice to provide the maintainer, at all times, with an up-to-date blueprint showing all signal locations and circuits on his territory. This blueprint is kept in the maintainer's tool house for ready reference at any time.

Mounted Plans Invaluable to Relief Maintainer

R. L. Broomfield

Signal Maintainer, Atchison, Topeka &
Santa Fe, Syracuse, Kan.

In ordinary routine maintenance, complete detailed plans covering signal locations are not required, especially if the locations have been wired from typical plans, as practiced on the Santa Fe. On the Western lines of this road, cloth circuit plans are supplied to maintenance forces in a continuous roll of standard size blueprint sheets, matched and pasted to-

gether to form a continuous plan, showing the track layout, signal locations, buildings and other permanent fixtures and signs along the right-of-way. The pole-head and line-wire diagram is continuous, all circuits being shown in detail from the power source to operated unit. Local wiring, however, is omitted by substituting a reference number covering a typical plan. These typical plans are bound in books 8 in. by 10½ in. It is impractical to carry and care for these books while in the field.

Most maintainers are thoroughly familiar with the most frequently used typical plans, so that the roll of plans is adequate for most purposes. I believe that all special or unusual locations, whether a typical plan applies or not, should have local circuits in complete detail and mounted in the instrument housing. Such an arrangement not only assists the regular maintainer, but is invaluable to relief maintainers or maintainers called from adjacent territories to investigate a signal interruption at a location with which they are not familiar.

It is not common practice on the Santa Fe to make this provision, although a few maintainers have themselves prepared small sketches of special circuits and have mounted these sketches at the location for reference purposes.

Circuits Well Marked

W. R. Smylie

Signal Supervisor, Texas & New Orleans,
Houston, Tex.

It is not the practice on the Texas & New Orleans to require signal maintainers to carry with them blueprints showing circuits for the signal equipment on their districts, and I think it unnecessary under ordinary conditions. Where a signal main-

tainer is maintaining various types of equipment, as is usually the case around terminals, involving a number of different blueprints and complicated circuits, the job of carrying them along would be burdensome. In straight automatic signal territory the circuits are usually a repetition, one after another, and should be well enough marked and understood by the signal maintainer to enable him to locate ordinary trouble.

Neither is it our practice to provide framed or permanently-mounted blueprints for each instrument housing. While there are some advantages in this practice, it is not necessary where the wires are properly marked. The average signal circuit extends from location to location, and a print showing only the wiring at a particular housing is of small benefit in looking for a case of trouble.

Plans Shellacked in Cases

Carl T. Smith

Concord, N. H.

The practice of carrying around a complete set of electrical circuit plans of a signal territory does not seem to me to be warranted. Plans so carried are soon soiled and torn, and after a time become worthless even with the best of care. In recent years, however, the idea of permanently mounting plans in the instrument cases has been advanced, and the value of such practice is apparent. A properly mounted circuit plan that has been given a good coat of shellac will last indefinitely, informing all concerned of the exact operating conditions at any particular location.

Since many of the electrical circuits connected with signaling are standard with little or no variation, except in case of special complicated circuit arrangements, a maintainer who is entirely familiar with the territory can almost tell by looking at the aerial circuits and track arrangement everything necessary for him to know. At interlockings, it has for years been common practice to have on file at each tower a complete set of operating circuit plans available at all times.

Complete Plan Too Cumbersome

G. E. Beck

Signal Supervisor, New York Central,
Toledo, Ohio

We do not consider it necessary for maintainers to carry with them a complete set of blueprints showing all
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signal locations, circuits, etc., because a complete set of prints for a maintainer's territory would be very cumbersome to carry around. Proper protection for such a set of prints would require a special box on each motor car.

There is an advantage in having permanently-mounted blueprints at each instrument housing. However, to maintain the required number of prints and keep them up to date would be a task beyond the capacity of the average signal department drafting force.

We furnish each maintainer and foreman with a binder book of standards which has a lithographed white and black sheet 8 in. by 14 in. overall and 7 in. by 12 in. within the border lines. These plans reflect in a general way all standards. For flashing-light signal locations, interlockings or special locations we furnish the maintainer with a complete set of plans and endeavor to keep them up to date. I feel that regardless of the number of plans furnished, the important part is to keep them correct, as a plan which does not properly reflect the circuits, as in use, is worse than no plans at all.

Complete Circuits Advantageous

C. A. Cotton

Signal Supervisor, Atchison, Topeka & Santa Fe, Arkansas City, Kan.

On the Oklahoma division of the Santa Fe, all maintainers carry with them on their motor cars a complete set of blueprints showing all signal locations and circuits on their territory. The practice is a good one, in that they always have plans to refer to if some question arises or if they are questioned by supervisory officers. At interlocking plants, the prints are kept in the tower or the maintainer's tool house. At automatic plants, copies of circuit plans are kept in the relay house.

All prints are kept up to date. The supervisors are required to notify the office promptly when any changes are made in existing circuits, and corrected plans are furnished to supervisors and maintainers. No attempt has been made to mount blueprints permanently at each instrument housing, as it would require a large number of copies and would be of no great benefit.

All maintainers are required to have in their possession a copy of Standards of Construction and Maintenance, Instructions for Standards of Construction and Maintenance, and Standard Wiring Diagrams and Symbols. These cover all standards of construction and maintenance and the wiring standards.

Speed at Automatic Plants

"In your opinion, should the speed limits of 20 m.p.h. through automatic interlockings be eliminated? Why?"

Eliminate Low Limit

H. J. Foale

Signal Engineer, Wabash

In my opinion, there is no more reason for imposing a speed restriction at an automatic interlocking than at a manually-operated interlocking with derails, over remotely-controlled switches or throughout C.T.C. territory. There are still many purely mechanical interlocking plants with derails throughout the country where no speed restrictions are imposed, which, in my opinion, offers a greater potential hazard, by reason of the possibility of quickly changing a route in face of a train, than is offered by a modern automatic plant.

In either event, safety cannot be attained unless the stop signal is obeyed. With the extended use of signals today, there are few infractions of this rule. The derail is installed as a disciplinary agent, and if operating officers will require engineers to obey the rules of stopping at "stop" signals, and impose strict discipline for the few infractions, there is no reason why unlimited speeds cannot be maintained through automatic plants without derails.

I favor a recording device at automatic interlockings to check any infractions and to aid operating officers in substantiating their case where infractions are detected. When it is known by engineers that such a recording device is in use, it acts as a disciplinary agent similar to the derail, but in a considerable safer manner. I am wholly in favor of the elimination of the speed limit of 20 m.p.h. through automatic plants.

Favors High Speed Limits

Leroy Wyant

Signal Engineer, C. R. I. & P.

When introducing these plants, we had to be conservative and recommended relatively low speed restrictions. Our first plant was installed in 1925. We have now had a large number of these plants in service for a long period, and I am definitely convinced we should eliminate speed restrictions so far as they might be prompted by the automatic versus manual operation of the signaling.

We have operated terminal interlocking plants without derails and without speed restrictions for over

25 years, to my personal knowledge. Therefore, it would appear that the determining factor should be safety of operation of trains over the crossing on hand signals (in case of failures) by a "towerman" versus member of train crew.

It has been said that a towerman has more information on the position of his signals through normal indication locks, repeater indicators, etc. We are now giving consideration to this problem and have in mind two procedures at automatic plants—(a) add special electric lock, with indicator, similar to an ordinary outlying electric switch lock, indicator to check positions of home and distant signals on cross line, to the present time-element releasing arrangement for use of trainman; (b) require trainman to flag on cross line, per standard code rule 99, whenever he cannot get his own signal to clear by operation of the present time-element releasing arrangement. Assuming that the instances requiring a train to flag through an automatic plant will be very infrequent, I am inclined to favor scheme (b). However, this matter is still under consideration.

After satisfactorily taking care of the condition cited above, I will support the elimination of any speed restrictions now imposed at automatic plants just because they are that type.

Changes Necessary at Some Plants

P. M. Gault

Signal Engineer, Missouri Pacific

An automatic interlocking must be designed and constructed to conform to the same requisites of safety as a manually-operated plant. To do otherwise would result in delays and possibly serious accidents. Even in the present day manual plants, a good many of the devices operate automatically so that about all the leverman does is throw a few levers, and the devices connected to them perform their cycle of operation. It is not general practice to establish any particular low-speed limit through a manually-operated plant, at least not on account of the interlocking, and I have never been able to find any logical reason for doing so through an automatic plant. Certainly a leverman standing by the

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