will run, regardless of anti-creepers, braces or heel blocks, so that variation of the angle of the stock rail and switch point will vary the gage of track. Rail braces, ties and fastenings also wear and cause the gage to vary. Furthermore, in winter a switch may be perfectly free from snow, but ice packed over the switch rod and under the point will cause the point to gap enough to foul the rod having a $\frac{1}{16}$-in. clearance adjustment.

During the recent snow and sleet storms we have had plenty of trouble where the $\frac{1}{8}$-in. clearance is used, although the point is not exposed beyond the gage line.

Type of Rod Determining Factor

E. K. Post
Assistant Chief Signal Engineer, Pennsylvania, Philadelphia, Pa.

The permissible clearance between the lock and the notch for safe locking of switches is determined very largely by the type of front and lock rod that is used. If the front rod permits considerable roll of the stock rail when an obstruction test is made, the actual opening at the point will not be closely detected, even with 1/64-in. clearance between the lock and the notch in the locking mechanism.

With a front rod without pin connections, however, and of proper design to securely hold the switch rails, a clearance of $\frac{1}{8}$ in. between the lock and notch can be safely used providing, of course, that the switch machine is properly secured to the ties. Such an arrangement is used on the Pennsylvania, and the same practice is followed on remotely-controlled switches as at other interlocked switches.

Illinois Central Practice

H. G. Morgan
Signal Engineer, Illinois Central, Chicago, Ill.

Regarding lock-rod clearances, our instructions, which have been in effect on the Illinois Central for a number of years, provide that the width of the notch shall be $\frac{1}{8}$ in. in excess of the width of the locking bar on power switch machines, whether at standard interlocking plants or at locations handled by remote control or centralized traffic control.

One-Eighth Inch Total Clearance

R. D. Moore
Signal Engineer, Southern Pacific, San Francisco, Cal.

Our allowable clearance between the notch and the lock rod for facing-point locks on power switches is $\frac{1}{16}$ in. on each side, or a total of $\frac{1}{8}$ in. We do not make any distinction, on the Southern Pacific, between power interlocking and remote control or C.T.C. outlying locations.

This practice was adopted about 10 years ago as a result of difficulty experienced in maintaining a satisfactory adjustment with a $\frac{1}{16}$-in. over-all clearance, which was our previous practice.

Testing New Interlocking*

"In testing a new interlocking prior to placing it in service, which of the following methods do you consider the most reliable: (a) An operating test of each individual function under all normal conditions or (b) detailed checking of each branch of all circuits according to the circuit plan? Why?"

Plans Should Agree with Field Conditions

O. R. Unger
Signal Supervisor, Missouri Pacific, Nevada, Mo.

In testing new interlocking prior to placing in service, we have always practiced the following method. When the foreman reports that the plant is ready for service, we take a complete new set of plans from the general office and make a thorough check of the plant to see that the installation complies in every detail with the latest circuit plan.

If any slight alterations have to be made, they will be marked on the plan with colored pencil. Then the circuit plan is thoroughly checked to make sure that the proper electrical requirements are fulfilled with reference to each instrument or apparatus. This will in some cases necessitate voltage adjustments, either an increase or decrease. When that check has been made, then an operating test of each individual function is made.

Finally, the route is set up for one line, and again a thorough check made to make sure that all opposing-signal apparatus is functioning properly. When these tests have been completed, the plant is placed in service, and the marked plan showing alterations, if any, is forwarded to the signal engineer so that the tracing can be corrected. The final plan will represent the installation in the field, and shows the date when it was placed in service.

Other answers to this question were published on page 40 of the January issue.

Efficient Use of Transformers

"What has been done to adapt signal transformers to the a-c. floating-storage or a-c. primary-battery systems in order to improve their effectiveness and reduce the transformer losses when operating at a small proportion of rated capacity?"

Designer's Point of View

Harry M. Jacobs
Transportation Dept., General Electric Co., Schenectady, N.Y.

Nothing has been done to *adapt* any transformer for any other service. In other words, transformers are *designed* for the particular service requirements.

It would be interesting to know the questioner's definition of a "signal" transformer. Any transformer supplying energy for signal operation is a "signal" transformer. There are signal transformers for different purposes such as for supplying track circuits, rectifiers for battery charging, low-voltage signal lighting, "line" transformers for supplying all the energy at a location from the signal power line, and various miscellaneous applications. For efficient operation, transformers should be selected so that the actual load is a large proportion of the rated output.

Improvements Have Been Made

For signal systems employing the a-c. floating-battery or a-c. primary-battery system of power supply, it is exceedingly important that apparatus losses be at a minimum in order that the line voltage drop will not be excessive. Transformer manufacturers who have studied signal operating conditions have designed their transformers for signal service in such a manner that lower core and copper losses and lower exciting current are required, in comparison with transformers of corresponding ratings for industrial applications. In recent years, leading manufacturers have made great strides in the development and perfection of materials, resulting in highly-efficient long-life transformers.