Editorial Comment

Signaling and Rules

SAFETY of train operation necessitates that enginemen be governed by the aspects of block signals and interlocking signals. When an engineman encounters a signal displaying an "Approach" aspect, a "Stop" aspect, or a "Stop and Proceed" aspect, the action which he should take is set forth in the operating rules. Statement of this fact is not trite, because there is a need at this time to promote better ways and means for compliance with these operating rules. The following discussion is intended as an aid to that objective.

Enforced automatic compliance with operating rules is fundamental in automatic train control which includes speed control and equipment for automatically applying the brakes if the engineman does not reduce speed below the maximum set for compliance with the restrictive signal aspects. However, after having reduced speed to less than the most restrictive speed, the engineman is then governed solely by rule. In an intermittent inductive train-stop system, which does not include speed control, the brakes are applied automatically at signals displaying restrictive aspects such as "Approach", "Stop" or "Stop and Proceed", providing the engineman does not operate his acknowledging lever when passing the signal. In a cab signaling system, when the cab signal aspect changes from a clear to a restrictive aspect, a loud whistle is sounded until the engineman operates his acknowledging lever. Thereafter, he is governed by rule with respect to reduction in speed to comply with the aspect. In conventional automatic block, without train control, train stop or cab signaling, the engineman is governed by rule with respect to reduction in speed to comply with signal aspects.

Thus, in all signaling systems—including automatic block, train stop, and train control—safety of train operation necessitates compliance with ordinary common-sense operating rules. Of these rules, perhaps the most important is that applying to the Approach aspect, and the important part of it is the "at once" admonition concerning reduction of speed. This means that when an engineman encounters a signal displaying an Approach aspect, that he is to take action—then and there—to reduce speed, rather than waiting to do so until he gets down to the curve by the old red barn. Thus, the whole situation reverts to strict observance of rules, which calls for efficient supervision on the part of operating officers. An important part of this supervision is for trainmasters, in company with signal supervisors, to go out on the road to make secret observation of action taken by enginemen at signals which display the Approach aspect.

Such checks are made and recorded automatically on some types of automatic graphic recorders, such as are used at some automatic interlockings. Some roads install these graphic train recorders temporarily at various locations, unknown to engine crews, so that if an engineman does not comply with the rule, requiring speed reduction at an Approach, his violation is marked on the graphic record. This "word" gets around the "sand house"—no one knows where the recorder machines will be transferred to next—and the overall result is much better observance of rules.

One large railroad system which has extensive mileages of intermittent inductive train stop equipment, has an automatic tape speed recorder machine on each road locomotive. A mark is made on this tape if an engine passes an inductor at a signal which is displaying an Approach or other restrictive aspect. The tape records the speed. As a consequence, on this railroad there is an excellent record of compliance with the rule regarding reduction of speed at a signal displaying "Approach".

A conclusion of this discussion is that with all forms of signaling—including automatic block, cab signaling, train stop, and train control—strict compliance with operating rules in connection with signal aspects is necessary, and that, where there is a possibility that such compliance of rules may not be satisfactory, the officers of the operating department, with the aid of the signal department, can employ means for developing better compliance with these rules.

Microwaves on Railroads

WITHIN a short time, information will be available to demonstrate whether the microwave system of transmitting communications will be practicable for use on railroads. Microwaves use super high frequency energy, such as in radar, but rather than being broadcast in all directions, as in conventional radio, the energy in microwaves is transmitted in a beam, which, at the receiving station or repeater stations, is received by parabolic antennas. By means of multiplexing equipment, the one beam can be utilized, to transmit numerous channels for telephone and telegraph service or other circuits. The transmission is by line-of-sight, so that repeater stations are required at intervals of, for example, 15 to 30 miles, depending on the terrain. This microwave system was developed and used extensively for military purposes during World War II. Since then, commercial communications companies have made extensive installations between New York, Boston, Philadelphia, Washington, Pittsburgh and Chicago.

With a general knowledge of this progress in microwaves by commercial communications companies, railroad communications officers have expressed various opinions concerning the practicability of, and economic justification for microwaves to replace pole lines along railroads. Of importance, therefore, is the fact that the Rock Island, in cooperation with the Philco Corporation, has made an installation of microwaves on 106 mi. of main line railroad, and is now completing the testing of this project. Information concerning this installation of microwaves will be given in an address by C. O. Ellis, superintendent of communications of the Rock Island, during the convention of the Communications Section, A.A.R. October 17. An illustrated article, giving technical details of construction of this microwave project has been prepared, and will be published in an early issue of this magazine. In the meantime, the installation will be in service, and further information will be accumulated concerning its operations. Also in these considerations, reference may be made to results of extensive tests of microwaves and sub-carrier equipment on the Long Island, using equipment made by the Union Switch & Signal Company and by the Sperry Gyroscope Company. And of interest is the microwave project now under construction between Galveston, Tex. and Beaumont, Tex., 70 miles, on the Santa Fe. Thus, the railroad communications fraternity has, at hand, the basic information to determine whether microwaves are to have an important place in railroad communications.