Editorial Comment

Train Signals for Highway Crossings

CO-ORDINATED controls of highway crossing signals and track-side signals for directing train movements, is a subject which has been discussed from time to time during the past 20 years, especially in more recent years when electrically-operated gates have been installed in increasing numbers.

Where street crossings are within the home signal limits of interlockings, several roads have arranged circuits so that the crossing gates will not go down when a train enters approach sections unless, or until, the home signal is clear for an approaching train to pass through the interlocking and over the street crossing. Similar controls are used in some centralized traffic control projects, for example, as explained in the Western Pacific article on page 296 of the May issue.

A proposal advanced by some persons—not familiar with signaling—is that all signals directing train movements should not display a proceed aspect until the gates at a crossing are down across the highway. Obviously this cannot be done with satisfactory results in territories where trains operate at ordinary road speeds. The approach control sections are at least long enough for the crossing protection to be in operation a minimum of 20 sec. prior to the arrival of a train at the crossing. Allowing about 4 sec. margin for operation of relays and release coils, this totals about 24 sec. At 70 m.p.h., a train travels 2,640 ft. in 24 sec.

Ordinarily an approach control section of 2,640 ft. or more is located in approach to such a highway-crossing signal. However, in order to obtain the objective under discussion, this 2,640 ft. would have to be in approach to a "distant" signal, which in turn would have to be train-braking distance from a "home" signal at the highway crossing. Train-stopping distance may be at least 9,000 ft., to which is added 2,640 ft., plus at least 1,000 ft., for an engineman to observe the distant signal aspect as he approaches it. Thus, the gates would be down for 10,000 ft. at 75 m.p.h. which at 110 ft. per sec. means 99 sec. before a train arrives. For a freight train at 45 m.p.h., the gates would be down 2.5 min. before the train arrived. Obviously such a delay to highway traffic is not justified by the merit—if any—of having signals to stop trains if the gates do not go down to protect the crossing. One reason for this conclusion is that the gates lower themselves by force of gravity. Instances in which gates fail to lower are rare indeed, and, therefore, in ordinary line of road territory, wayside signals would serve no purpose to justify their expense.

Entirely different circumstances are involved, however, where trains regularly make stops in control sections, or where switch engines operate back and forth in control sections without closely approaching the crossing. One solution to problems involved in switching territories, is to include automatic time cutouts to raise the gates after a switch engine or train has occupied a certain portion of the approach control section for a certain time—as for example, about 2 min. When the train again starts and enters a shorter track circuit near the crossing, the gates again are lowered. At such slow train speeds, it is practicable for the engine crew to see that the gates are down before the engine or cars enter on the crossing. However, as an aid in this respect, some roads have installed signals which display an aspect for a train to proceed, only after the gates are down. Such a project, on the Terminal Railroad Association of St. Louis, was described in an article in the February issue.

If trains regularly make a station stop with the locomotive just short of a particular street crossing, there is no need, of course, for the gates to go down as the train approaches, because street traffic would be obstructed needlessly for the duration of the stop or until a time limit expired. Under these circumstances, however, if the gates are not to be lowered as a train approaches, some roads see the need for a signal as a definite location for trains to stop short of. When a train is ready to depart, the gates can be lowered by control of a short track circuit immediately in approach to the crossing, or manually. Then when the gates are down, the signal clears for the train to proceed.

Thus, although the installation and control of signals for trains in conjunction with highway crossing gates is obviously impracticable where trains are operated at normal road speeds, nevertheless the use of such signals in switching territories, or where trains regularly stop, may be worthy of study as a means of minimizing delay to street and highway traffic.

Increase In Train Communication Systems

DURING the last several years, numerous circumstances have hindered the adoption and installation of radio and inductive communication systems on railroads, but, regardless of these handicaps, these systems of communication are proving their worth, as is evidenced by the fact that more and more railroads are deciding to proceed with such projects on a large scale.

One of the obstacles, that has delayed projects on several railroads, has been the costs involved in the installation of equipment to supply power on cabooses. Some roads have applied conventional car-light generators, regulators and batteries, and these roads, in part, justify the expense of such equipment by the fact that power is thus available not only to operate the radio or inductive communication equipment, but also to furnish electric lights on the cabooses. On the other hand, if the communication facilities are to be considered on their merits alone, the use of simpler forms of power supply, at much lower costs, may be an important factor in justifying the installation of communication facilities.

Another reason for delay in adopting radio on many railroads, is that a change-over is being made from steam to Diesel locomotives. Rather than waste wire, conduit and labor to make installations on steam locomotives, and later remove the communication equipment and install it on Diesels, initial installations are being delayed until Diesels are purchased. This change-over to Diesels is already well along, and more than 300 Diesels are now being delivered to the railroads each month. Therefore, very little delay in future installation of radio or inductive communication can be attributed to changes in locomotives.

Thus some of the more important hinderances to more rapid adoption of radio and inductive communications systems are being, or have been, overcome. As a result, various railroads are planning projects to provide communication between locomotives and cabooses of freight trains, as well as with wayside offices. Each issue of Railway Signaling and Communications includes a list of the radio assignments made by the Federal Communications Commission to the railroads in the previous 30 days. A tabulation of these statements for 12 months—July, 1949 to June, 1950 issues, inclusive—shows a total of 173 new fixed stations and 1,207 new mobile stations. Increased activity in the last few months is shown by the fact that 289 mobile stations were authorized, as reported in the March issue, 136 in the April issue, and 377 in the June issue. In most instances, an extended period expires from the time authorizations are made until equipment is ordered and installed. However, two sizable orders for equipment have been placed recently. The Missouri Pacific placed an order for 113 radio sets for train communication and the Southern Pacific placed an order for 100 sets for road and yard service. Another sizable project recently authorized, includes 75 mobile units on the Texas & Pacific.

A conclusion is that in spite of what may have seemed to be adverse circumstances, the use of radio and inductive systems of communication is gradually increasing. The fact that this growth is gradual may be helpful, because advantage can thus be taken of improvements in equipment and better construction practices as they are being developed.

Portable Communications Booths

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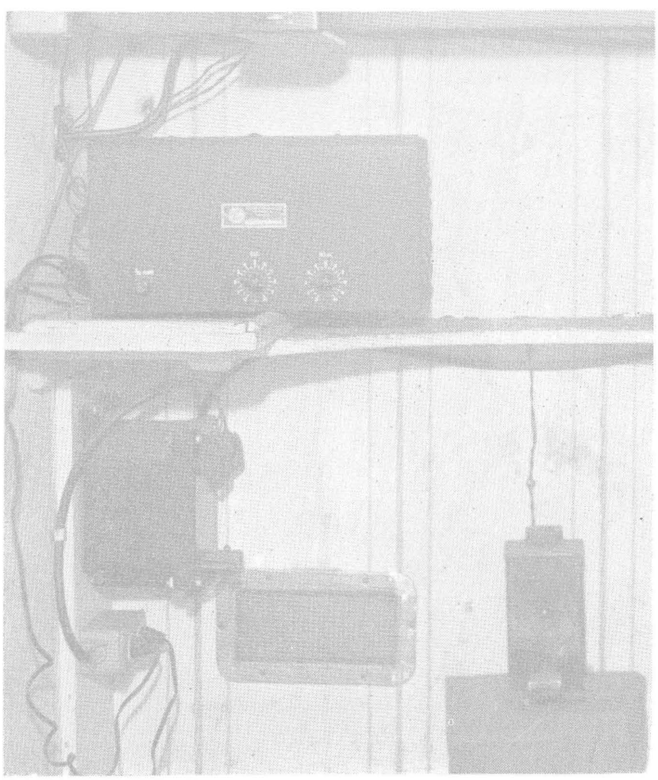
and four truckers for each car. The caller segregates the packages by consignee and destination, and this information is called off to the check clerk in the booth through the talk-back speaker located in his car, the check clerk then furnishes him with the proper information to mark the freight. Each package is marked with blue chalk indicating the car in which it is to be loaded, together with the truckers number and crew initial. For example—the package is chalk marked board No. 72, indicating to the trucker the shipment is to be loaded in the San Francisco car. When the package reaches the outbound car, it is loaded in the car by a man known as a packer or stowman.

Commercial a.c. power at 110-volts is required in each booth for operation of the amplifier and other electrical equipment. This power is available through a plug-in connection located on each of the posts supporting the roof. Each booth has a two-conductor cable, 50-ft. long for connecting a.c. power. The communications circuits are composed of four-conductor No. 16 flexible Tyrex cables (one pair for communication and one pair for signaling) which are extended from the booth to each car. Each cable is 125-ft. long so that one booth can serve two cars that are some distance apart. Cables are connected at both ends with Hubbell twist-lock polarized plug couplers. A piece of ordinary sole leather, about 4-in. wide and 1-ft. long is attached to the side of each of the talk-back speakers used in the cars. A hole near the upper end of this leather is placed over a nail driven in the wall of a car so as to place the speaker at the height and location to afford proper operation for both incoming and outgoing conversation between the check clerk in the booth and the caller in the car.



View inside of a booth showing the amplifier, transformer and switch

The amplifiers, used on the system between each booth and the speakers in the cars with which it operates, is of special design to limit the effect of noise and extraneous sounds, and at the same time allow speech to go through clearly. These limiter type amplifiers are the Model 8ALTS manufactured by the Electronic Communication Equipment Company, Chicago. Each is a package unit, having a built-in change-over relay and a source of 6.0 volt d.c. current for signaling purposes. There are two independent volume controls, one controlling the talk-out volume and the other the talk-back volume. The 5.0-watt undistorted output is obtained when the input is between—13 dbm and—48 dbm across 600 ohms. The check clerk has a push-to-talk foot switch which when pushed connects his amplifier outgoing, and, when released, connects the amplifier incoming.

The talk-back speakers used in the cars and in the booths, as well as those at the 14 locations on the platforms connected to the office are the Model 8A made by the Webster Company, Racine, Wis., and the same company made the central console in the foreman's office. The 20 paging speakers, also controlled from the office, are the 25-watt type made by Racon. Insulated No. 14 twisted-pair conductors, run in porcelain insulated rings on the roof support posts, are used for the circuits between the office and the 20 paging speakers and 14 talk-back speakers mounted permanently on the posts. These communications systems were planned and installed by the Southern Railway forces under the jurisdiction of D. G. Whitfield, superintendent communications.