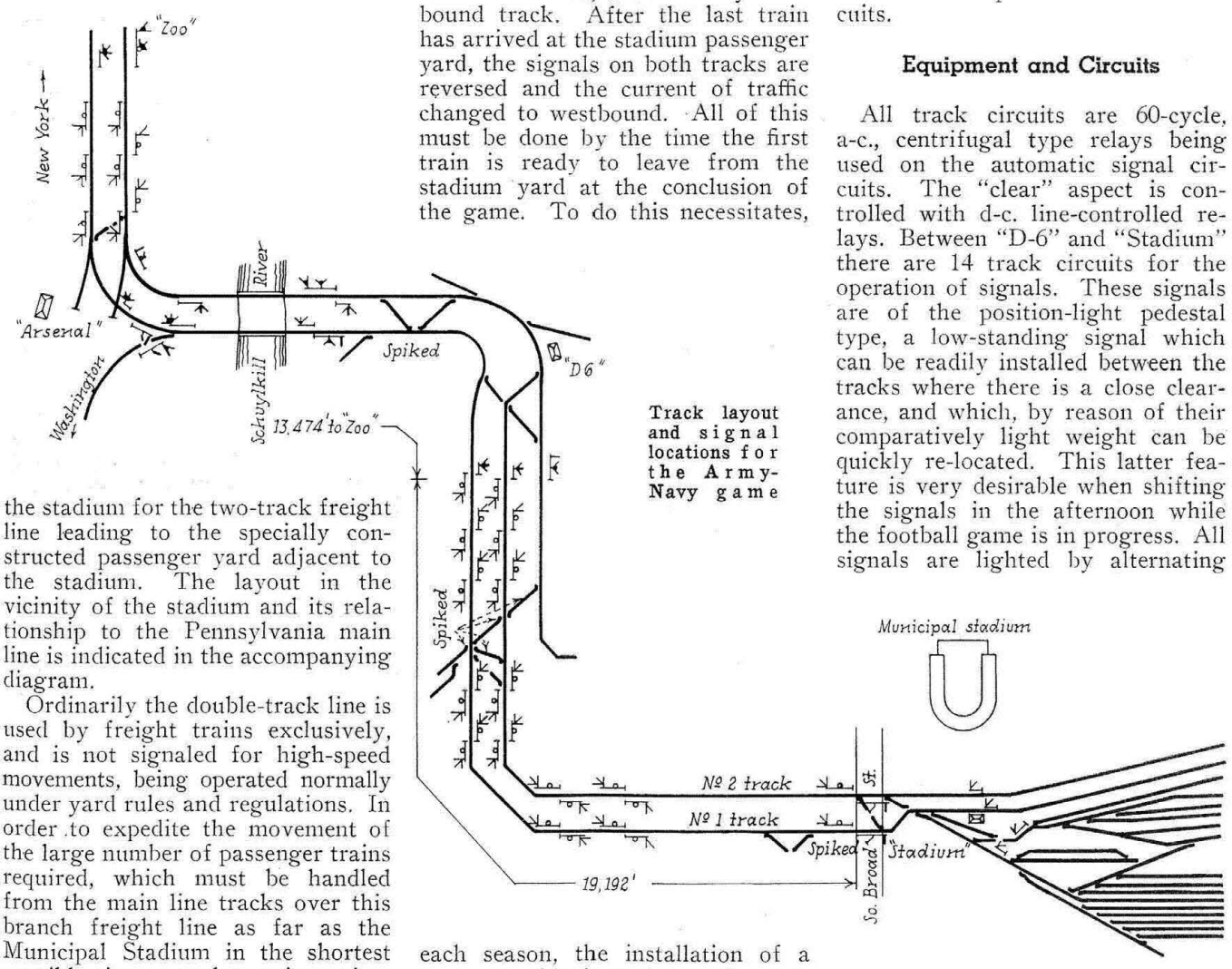
Pennsylvania provides signal system a la carte each year in order to handle traffic for annual classic at Philadelphia

Signaling for the Army-Navy Game

Handling between 35 and 40 fourteen-car passenger trains to and from the Municipal Stadium, incident to the playing of the Army-Navy football game in Philadelphia, Pa., is accomplished each year very expeditiously by the Pennsylvania, with the greatest degree of safety and dispatch, by providing a complete double-track modern signal system in each direction to and from the stadium for the two-track freight line leading to the specially constructed passenger yard adjacent to the stadium. The layout in the vicinity of the stadium and its relationship to the Pennsylvania main line is indicated in the accompanying diagram.



Track layout and signal locations for the Army-Navy game

Ordinarily the double-track line is used by freight trains exclusively, and is not signaled for high-speed movements, being operated normally under yard rules and regulations. In order to expedite the movement of the large number of passenger trains required, which must be handled from the main line tracks over this branch freight line as far as the Municipal Stadium in the shortest possible time, a rather unique piece of extraordinary signal work is executed by the employees of the Philadelphia terminal division on the day of the game, and particularly during the time the game is being played.

Prior to the hour for calling the game, and before the first of the fleet of trains arrives, both of these railroad tracks are signaled in the direction of the stadium. This means that the current of traffic on the westbound, or No. 2 track, is temporarily reversed and signaled accordingly, in addition to the signals provided for No. 1 track, the normally eastbound track. After the last train has arrived at the stadium passenger yard, the signals on both tracks are reversed and the current of traffic changed to westbound. All of this must be done by the time the first train is ready to leave from the stadium yard at the conclusion of the game. To do this necessitates, each season, the installation of a temporary block station at the eastern end of the territory involved; the provision of reversible signal systems on the two tracks for a distance of 3.6 mi.; and changes to the existing signal installations at three interlocking plants controlling movements to this branch line, namely "D-6," "Arsenal" and "Zoo." This work involves the installation of 16 new automatic signals and 6 home signals, all of the position-light type.

As all tracks in this territory are electrified, the placing of impedence bonds is necessary at the signal locations where insulating joints are installed to separate the track circuits.

Equipment and Circuits

All track circuits are 60-cycle, a-c., centrifugal type relays being used on the automatic signal circuits. The "clear" aspect is controlled with d-c. line-controlled relays. Between "D-6" and "Stadium" there are 14 track circuits for the operation of signals. These signals are of the position-light pedestal type, a low-standing signal which can be readily installed between the tracks where there is a close clearance, and which, by reason of their comparatively light weight can be quickly re-located. This latter feature is very desirable when shifting the signals in the afternoon while the football game is in progress. All signals are lighted by alternating current, rectifiers being used for supplying 12 volts, d-c., for the d-c. circuits required for signal operation. All relays and associated apparatus are mounted in iron housings, placed at each signal location.

At "Stadium" block station, eight hand-throw switches leading to the various platform tracks are equipped

(Continued on page 558)

aspect to indicate that the next signal is displaying the Stop-and-Proceed aspect. With three-aspect automatic block signaling, the Medium Clear aspect of a home signal for a medium speed diverging route or the Limited Clear aspect for a diverging route at a higher speed would not logically be displayed unless the automatic block signal in advance were displaying an Approach aspect or better. Where automatic block signals with more than three aspects are used, however, the multiple-aspects can be carried through on home and distant interlocking signals.

In order to operate a train through a diverging route within an interlocking at the speed for which the crossovers and turnouts are designed, the speed when approaching the home signal must be properly governed by distant signals. With three-position distant signals, the Clear aspect is ordinarily used as advance information that the home signal is indicating clear for a straight through route, and at many plants where distant signals with only three aspects are used, the Approach aspect of the distant signal is displayed just the same when a diverging route is lined up or when the home signal is displaying the Stop aspect. Under this arrangement and with signals spaced train stopping distance, an engineman encountering an Approach aspect at a distant signal would be required to apply the brakes, and the speed of the train would be materially reduced before he came within view of the home signal, if the sighting distance is short. Especially with long heavily-loaded freight trains, if the speed is below 15 or 20 m.p.h., the brakes should not be released until the train stops. Such operation, involving train stops or speed reductions below that for which the crossovers and turnouts are designed, defeats the possible advantage of the new track facilities.

Therefore, where high-speed crossovers and turnouts are in service with home signal aspects in accordance, additional distant signal aspects are required. The distant signal aspect used in conjunction with the Medium-Clear home signal aspect is Rule 282, Approach Medium; the distant signal aspect corresponding with the Limited Clear home signal aspect is Rule 281B, Approach Limited, while the distant signal aspect corresponding with the Slow Clear home signal aspect is Rule 284, Approach Slow.

A Logical Procedure

If turnouts of various lengths are installed indiscriminately, the provision of proper signal aspects to permit trains to use the track facilities most efficiently may become impracticable, and it is desirable, therefore, that signal engineers confer with the operating and engineering officers to point out the possible difficulties. Granting that on many roads it may not be practicable to provide aspects for all four ranges of speed in the near future, the neglect to install Medium Clear and Approach Medium aspects as a part of any project involving high speed crossovers and turnouts evidences lack of consistency because the track improvements are of little benefit without corresponding signaling. On an engineman's district where the majority of the turnouts are good for a certain high speed, a practicable solution may be to work toward a standard by making the necessary track changes at the remaining locations so that all diverging moves in normal main line routes can be made at a given speed, such as 45 m.p.h. Then an operating rule, effective on that sub-division, can be established to the effect that medium speed within interlocking limits is 45 m.p.h. Making the necessary track changes would effect desirable reductions in train delays and perhaps can be made at less expense than required to provide the additional aspects applicable for four or more ranges of speed.

Army-Navy Game Signaling

(Continued from page 547)

with switch circuit controllers over which the home signal control circuits are selected through "SS" repeating relays. At this point there are two of the position-light pedestal type signals which govern movements from the two main tracks to the platform tracks, and four standard position-light dwarf signals governing movements from the platform tracks outward to the two main running tracks. Knife switches, located in the block station, are used to control these signals.

Trains are operated between "D-6" and "Stadium" under automatic block signal rules, the current of traffic being toward "Stadium" on both tracks between 9:46 a.m. and 1:16 p.m., and toward "D-6" on both tracks from 4:01 p.m. to 7:01 p.m. Between 1:16 p.m. and 4:01 p.m., when the automatic signal system between "D-6" and "Stadium" is reversed on both tracks, the pedestal type signals are transferred at each location to govern traffic in the opposite direction. The track circuits and controlling circuits are changed, and the entire system is checked out before the outward-bound traffic begins to move.

In addition to the work on the freight tracks east from "Arsenal," two position-light pedestal type automatic signals are installed on the normally westward (No. 2 track) between "Arsenal" and "Zoo" interlocking plants to provide for the eastward movements toward the Stadium on this particular track, between the hours of 9:46 a.m. and 1:16 p.m. In this way the "football" trains from New York are operated between "Zoo" and "Stadium" without interfering with the trains to and from Washington. These trains, coming to Philadelphia in opposite directions, are then moved side-by-side from "Arsenal" to "Stadium," using both tracks, with the current of traffic the same on each. Trains returning from "Stadium" between 4:01 p.m. and 7:01 p.m., likewise operate side-by-side from "Stadium" to "Arsenal," and thence to New York, or to Washington, as the case may be, without interfering with each other.

The interlocking plants at "D-6," "Arsenal," and "Zoo" are in service throughout the year. Only minor changes are necessary to tie in with the operation of the freight line as a two-track passenger railroad in each direction on the day of the football game. After the movement has been completed at 7:01 p.m., the automatic signals are removed from "D-6" to "Stadium," and "Stadium" block station is closed. The tracks are again restored to their normal condition for the exclusive handling of freight trains to and from South Philadelphia, Greenwich coal piers, and the Girard Point grain elevator.