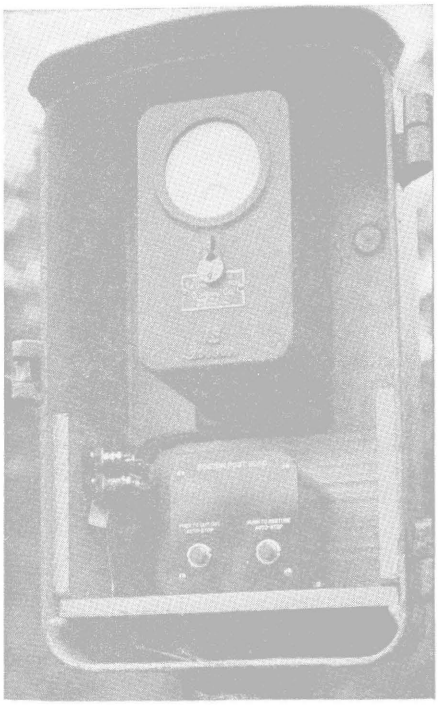
the train crew fail to push the "cut-in" button after once cutting out the apparatus, the stick relay will be de-energized as soon as the train clears the occupied track circuit and the apparatus will be automatically restored to normal operation.

Circuit Emergency Features

Various emergency features are also provided by the Auto-Stop control circuits. Chief among these is the feature provided for those cases where a following train enters the approach circuit almost immediately after the first train has cleared the same approach circuit. In such a situation the possibility arises that the retarding-barriers will have already started down. To assure that they will continue down and then immediately come to the warning position again, rotary circuit controller contacts 4 close just as the units leave their full height, at nine inches on the descending movement, and remain closed until the units are again at the four-inch height on the ascending movement. From the level position, normal operation, as described above, ensues.

Another feature of distinct interest is the provision made for chattering or intermittent de-energization of the control relay XCR from any causes whatsoever. Such action might



Cut-out pushbuttons and indicator

cause the barriers, through rotary circuit controller contacts 4 and 3, to rise to some position between level and their 9½-in. height and remain there. In order to overcome this, rotary circuit controller contacts 1 and 5 were provided. Contacts 1 provide for energization of the motor control relays, AMCR and BMCR, and thus allow the barriers to be driven uniformly to their four-inch height if, for any reason, they should rise above the road surface when XCR is not de-energized due to the passage of trains. Rotary circuit controller contacts 5 provide the proper hesitation time at the 4-in. height by feeding battery to the thermal timing relay, and also provide for the operation of the barriers to the 9½-in. height through rotary circuit controller contacts 3. The retraction of the Auto-Stop units is then accomplished through rotary circuit controller contacts 2.

Housings and Cable

The major portion of the relays and other instruments used at this project, as well as the main 16-cell battery, were housed in a Union Switch & Signal Company sheet steel instrument case. This case is 6 ft. 1½ in. high, 23 in. wide, and 9 ft. 8 in. long. It has a front section with floor and two shelves 13⅞ in. in width. The rear section of the case is for cable distribution. The case has two double doors on both front and rear, and is mounted on a concrete foundation which extends about one foot above the ground level. All cables are brought into the bottom of the case through a chase in the foundation. An interesting feature of the instrument case construction is the use of ½-in. (5-ply) plywood for the terminal boards.

The circuits between the instrument case and each Auto-Stop were run in 23-conductor, 3 No. 8 and 20 No. 12, Simplex rubber-jacketed underground cable. The wiring through the Auto-Stop units was single-conductor No. 12 run in conduit. Traffic light controls were run from each barrier unit in 7-conductor, No. 12 underground cable.

Most of the electrical operating equipment for this installation was provided by the General Railway Signal Company, the wire and cable being furnished by the Simplex Wire & Cable Company. The Eagle Signal Company installed the traffic lights for the state, while the railroad signal work was done by the railroad signal department forces. Baker & Co., contractors, built the pits housing the barriers and installed the units under the direction of the state highway department and a field representative of the Evans Products Company. Descriptions of other Auto-Stop installations will be found in the October, 1934, June, 1935, and August, 1936, issues of *Railway Signaling*.

Electric Signal Lights in Austria

THE Railway Gazette, London, reports that the Austrian Federal Railways have been seeking to improve the efficiency of the signal lights during the last few years, and to reduce the maintenance charges, which were very heavy with the old system of oil lighting and one-day burners. Herr Ortner has described in the press the steps taken to introduce electric lighting. Where an efficient electric supply is available, there is, of course, no great difficulty in doing this, but it is possible only at certain places. Accordingly, two systems of low-voltage lighting have been developed, and applied to the mechanical signals with good results since 1929. Approach lighting has not been adopted; instead, time switches have been used to switch on the signal lights during certain hours only, according to the period of darkness and the train service. On lines where there is an interval at night without trains, the lights are extinguished during the interval, effecting a considerable saving in energy. A certain number of signals have been fitted with flashlight equipment and storage cells, recharging being necessary on the average every 90 days, while others have been provided with steady lights and primary batteries, as a comparison. As a rule, the batteries are found to last about six months. The electric lights give a very clear indication and the new arrangements are stated to pay for themselves in about 2½ years.

Rule for Crossing Protection

To the Editor:

I note in the December issue of *Railway Signaling* on page 629, instructions for crossing protection in New York, quoting rules adopted by four railroads which apply in the state of New York only. The Pennsylvania has system rules applicable everywhere, and the rule corresponding with those quoted on page 629 is as follows:

"When shifting movements are made in the vicinity of a highway crossing protected by automatic highway crossing signals, or when a train is stopped, thereby operating the signals unnecessarily, every effort must be made by trainmen to avoid delay to highway traffic. When it is safe for vehicles or pedestrians to cross the track, the trainman will say 'all right' and beckon to cross."

A. H. Rudd,
Chief Signal Engineer, Pennsylvania