

Head block location at west end of Ferguson—Signal at left set away from track on account of the curve



Signaling on the Wabash

Modern equipment and construction methods used on 13-mile territory on new line

THE WABASH has installed automatic block signaling on 13 miles of single-track between Ferguson, Mo., and St. Charles. This signaling is located on a section of new line which was constructed as a part of a project which includes a new bridge over the Missouri river at St. Charles, the 7 of the 13 miles of line being entirely rebuilt to reduce curvature and secure proper grades and alinement for the approaches to the new bridge. This territory is located on the main line between St. Louis, Mo., and Kansas City, St. Charles being 23 miles from St. Louis. This line handles 10 passenger trains and about 12 freight trains daily.

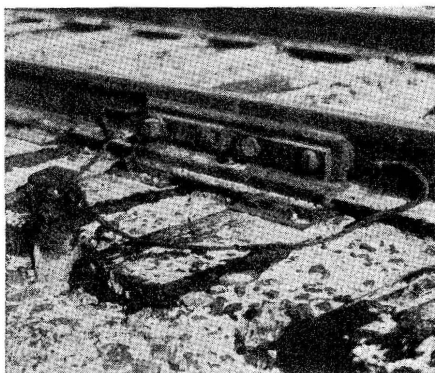
The 18 new signals are the H-2 searchlight type, for operation on 10 volts d-c. and are equipped with 10-volt, 5-watt lamps, except that the lamps for bridge signals are 11-volt, 11-watt to increase the intensity of the close-up indication. The signal units are mounted on masts to bring the center of the signal light 15 ft. above the level of the rail. The signals present the standard aspects of red, yellow and green. The signals are controlled by the absolute permissive block system, giving absolute aspects for opposing train movements between passing tracks and permis-

sive aspects for following train movements. Each station-leaving absolute signal, located at the end of a passing siding, is an absolute signal and is so designated by the absence of a number plate, and by a marker which consists of a circular metal disk 18 in. in diameter, upon which a cast aluminum letter A is mounted containing $\frac{7}{8}$ -in. red reflector buttons. The letter and a 1-in. border around the disk are painted red, while the background is painted yellow. This marker is mounted on the mast 5 ft. below the signal. The permissive automatic signals are designated by a number plate

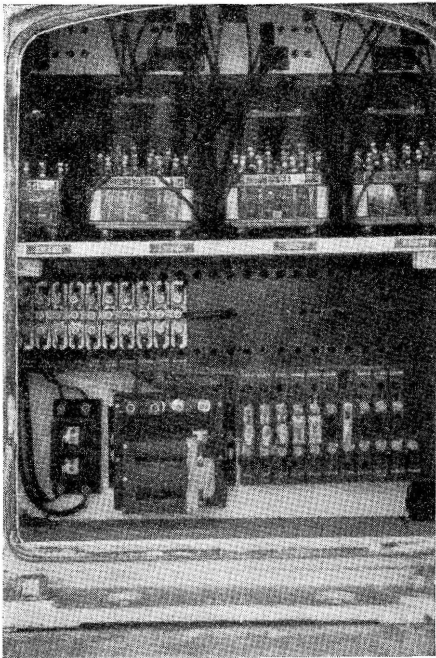
mounted on the mast. A telephone, connected to the dispatcher's line, is located in a box near each absolute signal, so that when a train is stopped by an absolute signal the trainman can communicate with the dispatcher.

The concrete foundations for these signals were poured in place. An unusual feature of these foundations is an open chase cast in the foundation to allow space for bringing the underground cables up into the case or pole. The chases for the instrument case are $7\frac{1}{2}$ in. deep and $6\frac{1}{2}$ in. wide, one located on each end of the foundation. On the foundations for signals on masts without instrument cases, one chase is used on the track side of the foundation.

The runs from the instrument cases to the rail connections are in No. 9 single-conductor cable having a non-metallic underground finish, using metal bootleg outlets and stranded Copperweld connection extending to $\frac{3}{8}$ -in. plugs in the rail, as shown in one of the illustrations. The cable is brought up through the riser and the insulated conductor is brought out through a small hole; the bare wire is set under the top edge of the clamp and back through the bottom edge along with the cable and the end of the wire is wrapped around the end



Parkway boot-leg outlets are easily inspected



Track side of case at a typical signal

of the cable and soldered, thus forming a good electrical and mechanical connection that can be easily inspected and readily repaired.

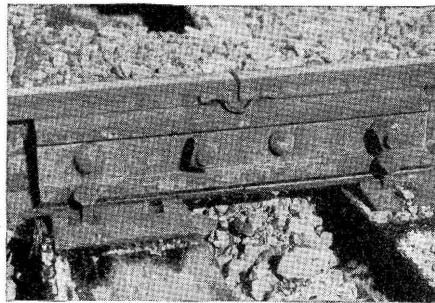
The control circuits from the case to the signal on the opposite side of the track are in a five-conductor No. 12 cable having a non-metallic underground finish, and the lighting circuit is in a two-conductor No. 9, run under the track and up to a cast-iron junction box mounted on the mast just above the base casting. From terminals in this box, insulated No. 12 and No. 9 single conductors extend up the inside of the mast and out through flexible conduit to the signal. From the instrument cases to the line connections, open wires are suspended on a stranded messenger in metal cable rings, No. 14 for control circuits and No. 12 for 220-volt a-c. power supply.

Each main line switch is equipped with a U-5 switch circuit controller equipped with a return spring device so arranged that if the connecting rod becomes disconnected, the spring will operate the controller to set the signals at stop. Circuits are connected through each controller and are arranged so that when the switch is open, a series connection for the track circuit is open and the track circuit is shunted. The circuits open when the point is open $\frac{3}{16}$ in. and shunt when the point is open $\frac{1}{4}$ in.

The instruments and battery at each location are housed in a sheet metal case located on the pole line side. This case is equipped with a door on the track side as well as on the field side. The incoming wires and cables are terminated on a board in the lower shelf on the track side.

Western Railroad Supply Company No. 5a arresters are used on the line control circuits. The remainder of the wires are attached to posts in a Raco gang-block set of terminals. The jumper wiring between the terminals or arresters and the relay posts is No. 14 flexible with $\frac{5}{64}$ -in. wall tape and braid. The incoming 220-volt a-c. circuit is connected to a Raco fused-plug cut-out, all 220-volt posts being equipped with Raco insulated nuts to prevent accidental contact with this circuit. The neutral relays are the DN-11 type and the GYP slow-release, slow-pick-up relays for the green-yellow repeaters are 350-ohm, Type DN-18. The approach lighting relays are the 60-ohm DN-22 type. The track relays are the DN-11 type rated at 4 ohms.

At each signal location, a set of five cells of Gould lead storage cells is used to feed the line circuits and to act as a stand-by supply for the signal lamps in case of an a-c. power outage. These batteries at head-block locations are rated at 60 a.h., but those at intermediate locations are rated at 50 a.h. Each set of battery is on floating



Plug-type rail-head bonds are used at joints

charge through an RT-21 rectifier. Each track circuit is fed by three cells of 500 a.h. Edison primary battery, with the exception of the two track circuits over the Missouri River bridge which are about 4,000 ft. long and are fed by storage battery on floating charge through an RT-10 rectifier. New rail was laid throughout most of the territory, and all joints were bonded with Ohio Brass mechanically-applied rail head bonds as shown in one of the illustrations.

Line Construction

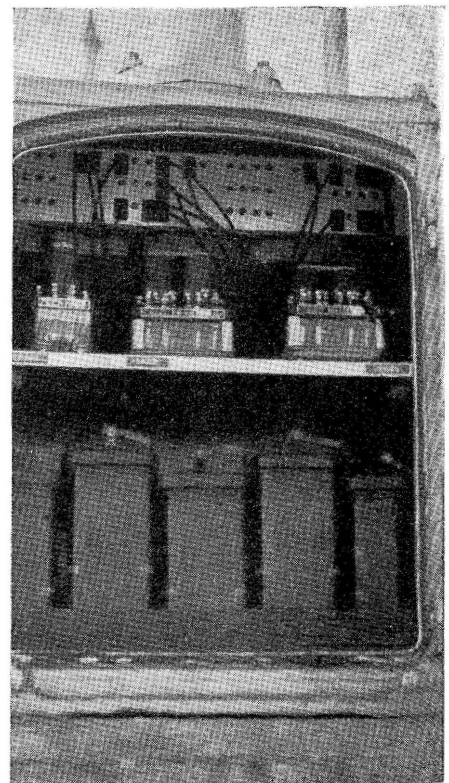
The line circuits were installed on a lower arm on the pole line. Two No. 8 solid copper, weatherproof wires on pyrex glass insulators carry the 220-volt a-c. distribution line. Power is connected to this line at Robinson to feed four miles east to Ferguson and nine miles west to St. Charles. At each signal location, this

line is protected at the pole by Western Railroad Supply Company Type R2030 arresters. The ground rods are $\frac{1}{2}$ in. by 8 ft. Copperweld with ground wire clamps. The line control circuits are on No. 12 Copperweld weatherproof wire and No. 8 wire of the same construction is used for the common line.

Train Order Signal Lights

At each station in this territory, the semaphore type train order signal was equipped with a-c. lights as a part of the new construction. An NL-15 type transformer is used to reduce the 110-volt a-c. to 10 volts to feed the 10-volt, 5-watt lamp in the train order signal. As a check so that the operator can know that the lamp in the signal is burning, a 3.5-volt, 150-m.a. lamp is connected across an adjustable 5-ohm resistance in series with the feed to the signal lamp, so that this 3.5-volt lamp is lighted whenever the train order signal is lighted. The transformer, resistance, etc., is assembled in a sheet-metal box with the indication lamp on top and is mounted on the wall near the operator's desk. A snap switch is provided to turn the light off and on.

This automatic signaling project was planned and installed by signal department forces of the Wabash, the principal items of signal equipment being furnished by the Union Switch & Signal Company.



The battery is housed in the field side of case