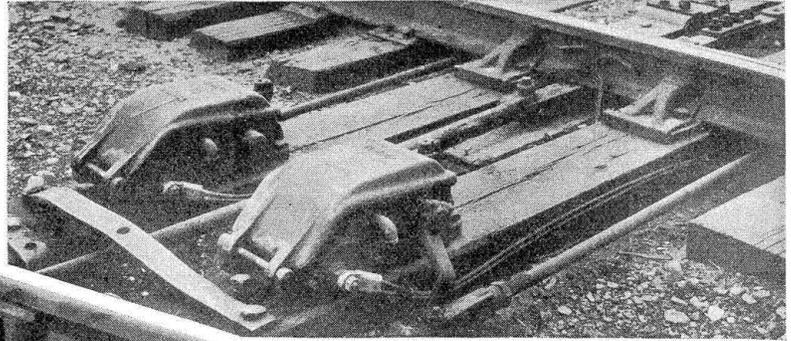
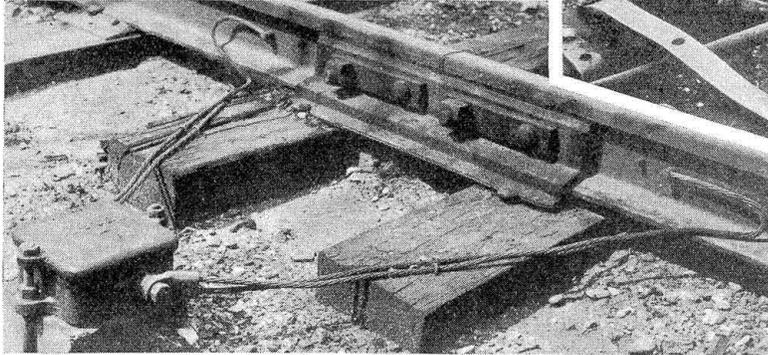


Illinois Central Installs Color-light Signals on 80 Miles of Single Track

*New type of rail connections
is feature*



By H. G. Morgan
Signal Engineer,
Illinois Central,
Chicago

The Butridge connector as used for rail and shunt connections

THE 80-mile installation of automatic block signaling between Ruslor, Miss., and Haleyville, Ala., completed signal protection for Illinois Central trains from Chicago to Birmingham. This section of signal track is used by the Illinois Central and the Mobile & Ohio. North of this section the Illinois Central trains use the M. & O. tracks; south of this section the I. C. uses the tracks of the Northern Alabama. This installation includes the junctions with the other two railroads, both of which have recently installed color-light signals, and our new installation closes the gap between them.

The necessity for automatic block signaling on this Ruslor-Haleyville section was brought about by the character rather than the density of traffic. The Illinois Central operates four passenger and six to eight freight trains daily during the entire year. The M. & O. operates two mixed trains and two freight trains daily. During the winter season, additional high-class passenger trains between Chicago and Florida are operated by the Illinois Central.

The signaling is of the APB type, using three-indication color-light signals. Owing to the fact that traffic is not dense, the blocks are fairly long, there being a total of 34 absolute and 77 permissive signals.

Illinois Central forces installed all foundations, track bonding, insulated joints and line wires. The Union Switch & Signal Company furnished and installed all other materials under contract. The signal cases were wired in the factory. Work started October 1 and the installation was completed in December, well in advance of the first trip for the season of the Illinois Central de luxe train, the Floridan, on January 1. Three maintainers without helpers are assigned to this section.

Power Supply

The signals are the Union Switch & Signal Company's Type-R, using 10-volt, 18-watt double-filament rebased lamps. The voltage is adjustable from 7.5 to 8.0 volts at the lamp.

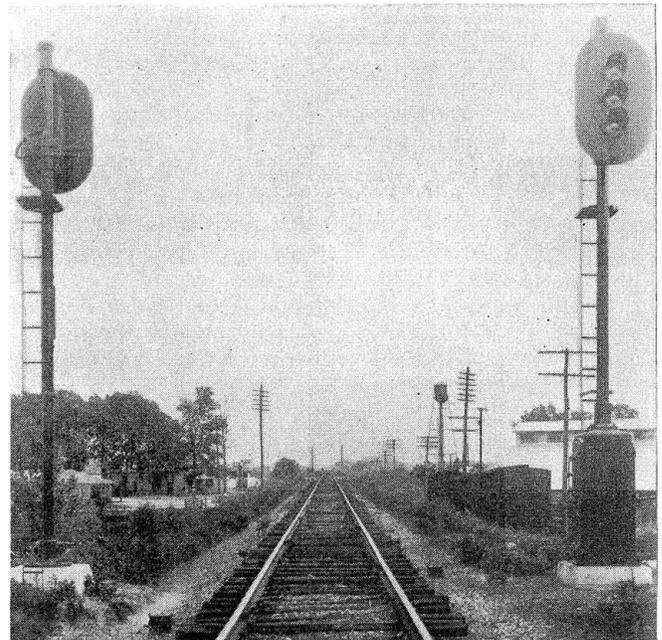
The floating charge system is used, lighting signal lamps directly from the alternating-current supply line, using the storage battery for line circuits and as

a reserve for signal operation. Track circuits are operated from storage batteries on floating charge.

The transmission line consists of two No. 6 AWG hard-drawn copper triple-braid weatherproof wires strung on the two end pins on the track side of the signal crossarm on the telegraph pole line.

Commercial power is secured at six locations, and transmission voltages of 440 volts and 220 volts are used, depending on the length of the line. The line transformers are of two types. The 220-110 volt transformers are G.E. Type-M, 100-v.a. capacity. The 440-110 volt transformers are G.E. Type-Y, 100-v.a. capacity. All transformers have 5 and 10 per cent taps inside the primary winding.

For the lighting of signals U. S. & S. Co. Type-NL transformers are used, having 110-volt primary winding and secondary winding with taps giving a selec-



The use of parkway cable eliminates trunking

tion of voltages. In case of interruption to the a-c. power supply, U. S. & S. Co. Style ANL-30 cutover relays switch the signals to the line batteries.

Rectifiers and Storage Batteries

The rectifiers are of the copper-oxide type manufactured by the Union Switch & Signal Company, each rectifier having a transformer for operation from the 110-volt supply in the instrument case and an adjustable limiting reactor. Line rectifiers have a maximum rating of 0.350 amp. and track rectifiers a maximum rating of 1.5 amp.

Line batteries consist of five cells of Exide Type-DMGO-9, track batteries consist of one cell of the same type. Only one line battery is used at double signal locations. All batteries are housed in instrument cases, which are located on the line side, no line circuits crossing the tracks.

Control Circuits

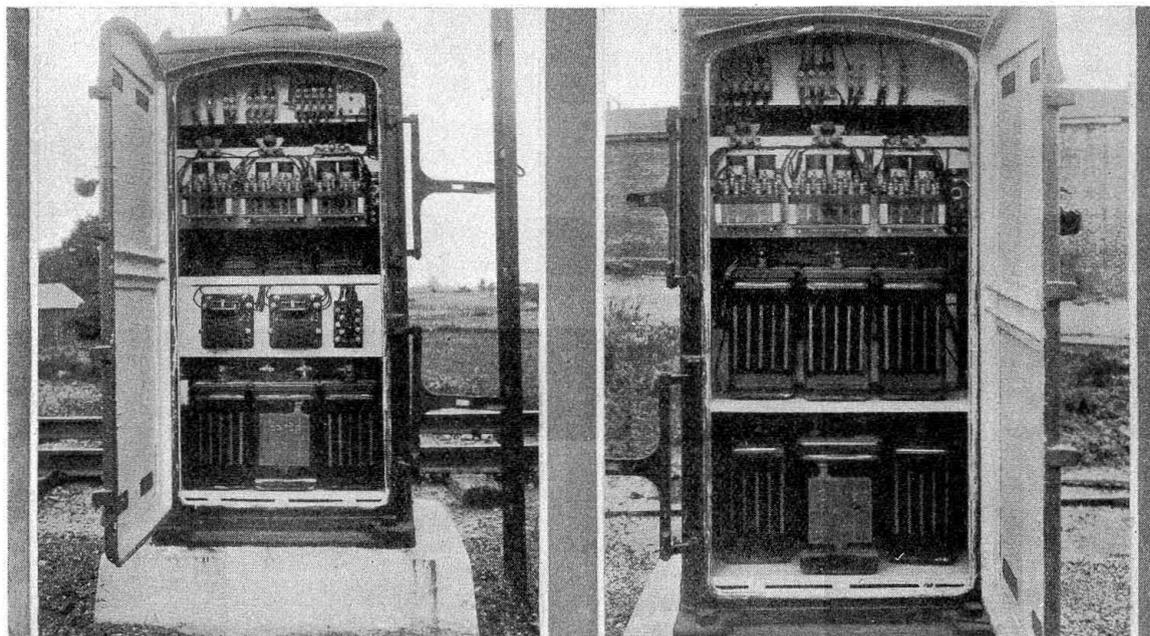
The control circuits are of the APB neutral type, employing a stick relay. Thermal units are employed

within the case. The signal control wires are protected by Brach Type-2020 arresters, located in the instrument case, while track wires are protected by Brach Type-110 arresters. One galvanized iron ground rod, 1 in. in diameter and 9 ft. long, serves for all the wires in one case.

Bonding and Track Wiring

Each rail joint is bonded with one single $\frac{5}{16}$ -in. stranded bond, composed of six extra galvanized steel wires and one annealed copper wire, all No. 12 BWG. The bonds are 34 in. long with $\frac{3}{8}$ -in. plugs attached. Each bond is installed outside the gage and lies along the top of the angle bar, being secured in place by a bond protector. Fouling bonds are single $\frac{5}{16}$ -in. strand Copperclad made of seven No. 10 AWG bare wires and are equipped with $\frac{3}{8}$ -in. plugs. The bonds are stapled to the sides of the ties, 2 in. below the rail.

Each switch is equipped with two circuit controllers, one attached to each point, arranged for shunting only. Switch circuit controllers are equipped with Buttridge heavy duty outlets, manufactured by



Two views showing the line and track sides of the same case

to give a satisfactory time interval between the release of home control and track relays. Track relays are Union DN-11, of two ohms resistance; line relays are type DN-11, of 670 ohms resistance. The absolute signals are lighted constantly, and the permissive signals are approach-lighted through the relays for opposite signals.

All line wires are No. 10 AWG cadmium copper alloy, with double-braid weatherproof protection. The conductor has 85.9 per cent of the conductivity of hard drawn copper and 123.5 per cent the breaking strength.

Lightning Protection

The transmission line is protected by Westinghouse Auto-valve arresters, Type-LV, one being connected to each side of the line at transformer locations, which average one-half mile apart. Both arresters are connected to one ground rod located at the base of the telegraph poles. The 110-volt secondary wires from transformer to instrument case are protected by Brach Type-R20124 arresters located

the Union Switch & Signal Co. These outlets consist of a brass stud mounted in and insulated from a cast-iron plate, which is mounted in place of the usual outlet. This stud forms a binding post inside the circuit controller to which controller wires are attached by nuts and washers. Outside the switch circuit controller, bare shunt wires similar to the fouling bonds, are equipped with terminal lugs to fasten to the circuit controller outlet terminals and plugs to fasten to the rail.

Battery and relay connection are single-conductor parkway cable composed of one No. 9 AWG soft-drawn solid copper conductor with a $\frac{5}{64}$ -in. wall Kerite insulation, one braid, one layer of jute, two layers of steel tape and one layer of impregnated jute over all.

Rail connections are made from a cast-iron box mounted on a concrete riser. The box is equipped with two Buttridge outlets and two $\frac{5}{16}$ -in. stranded Copperweld bonds, one being 40 in. long and the other 48 in. long. The bonds run to each rail and are bonded into opposite sides.