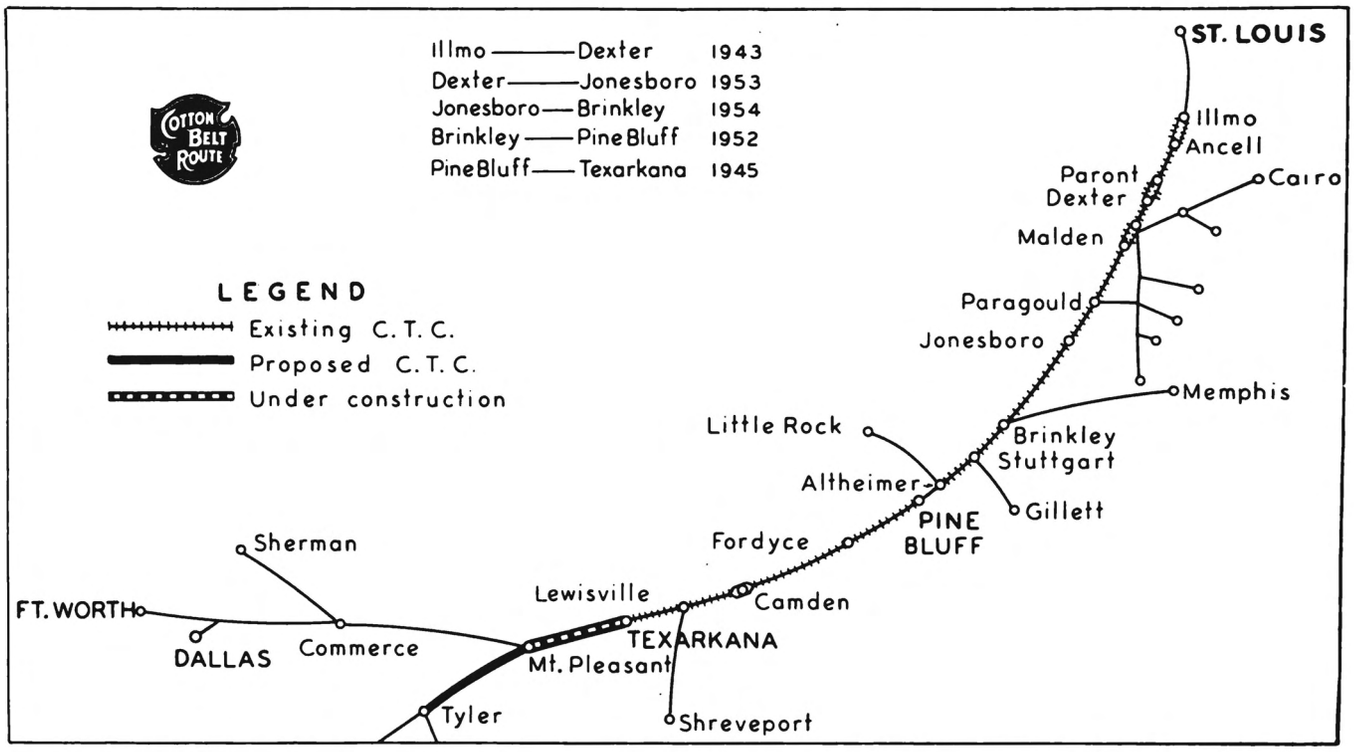
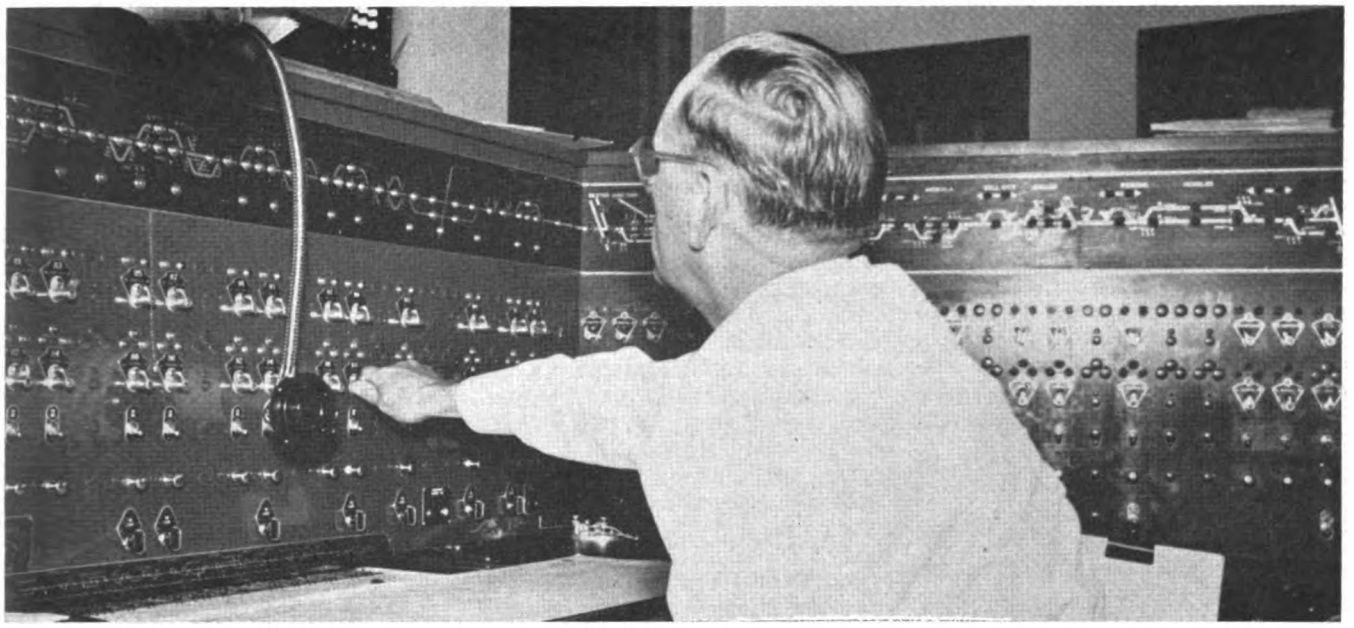


Why Cotton Belt Installed CTC On 429 Miles of Single Track

Saves train time **Increases track capacity** **Reduces operating expenses**



The three control machines for 426 miles are located in one office at Pine Bluff

THE BENEFITS of centralized traffic control on extensive sections of single track, which were not previously equipped with automatic block, are being demonstrated on the St. Louis Southwestern. This railroad made its first installation of CTC in 1943 on 47 mi. between Illmo, Mo., and Dexter, Mo., and has been extending this system as fast as practicable for several years, so that about 429 mi. are now so equipped in one continuous section.

Reasons for Heavy Traffic

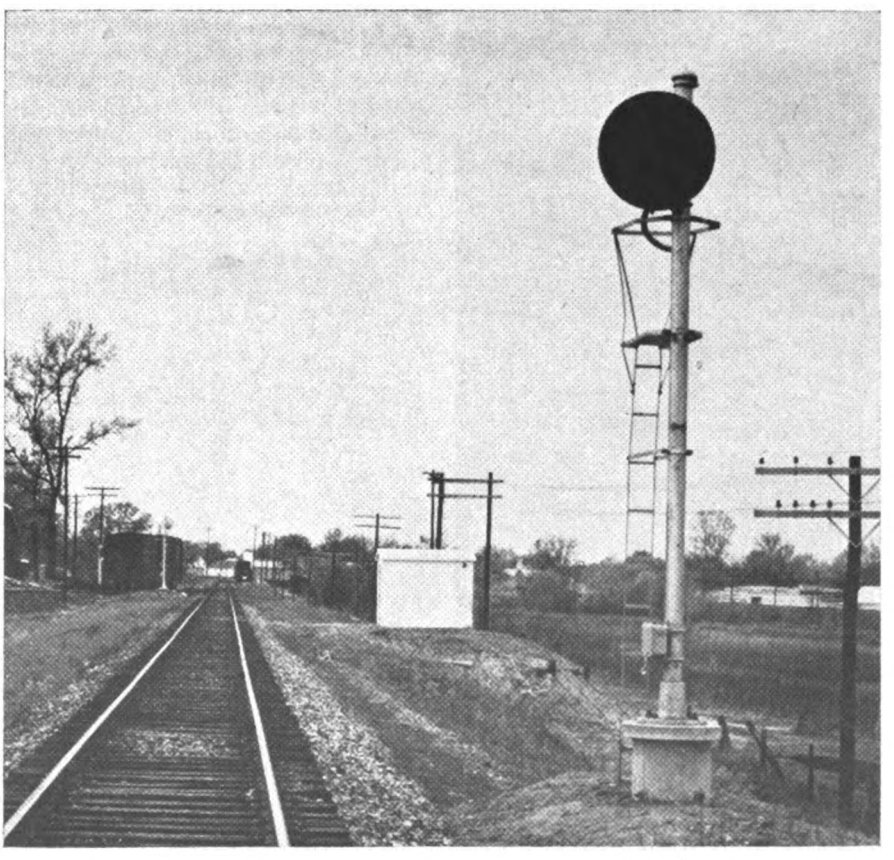
Between East St. Louis and Thebes, 121 mi., the St. Louis Southwestern and the Missouri Pacific operate jointly over tracks of the MP. The bridge across the Mississippi river at Thebes, and the tracks between Thebes and Illmo, 3 mi., are owned jointly by the two roads. Between Illmo and Dexter Junction, 47 mi., the MP and the StLSW operate jointly over tracks of the StLSW.

From Dexter, the MP has a line west for 25 mi. to Poplar Bluff, where a connection is made with the north and south main line of the MP from St. Louis directly south through Bismark to Poplar Bluff, and on south through Little Rock to points in Texas. The direct line between St. Louis and Poplar Bluff via Bismark includes heavy grades. Therefore, nearly all the MP through freight trains to and from St. Louis and Little Rock or points in Texas, are routed via Thebes, Illmo, Dexter and Poplar Bluff. Also, the MP through freights between East St. Louis and Memphis, as well as points in eastern Arkansas and Louisiana, use the low grade line via Thebes, Illmo and Dexter, and then from Dexter south on StLSW track for 63 mi. to Paragould, beyond which point the MP has its own lines.

Fast Freight Trains

The StLSW specializes on fast freight service. The Blue Streak, a fast freight train leaving St. Louis each evening, gives next morning deliveries in Fordyce, Camden and Texarkana, and second morning deliveries in various cities in Texas, including Dallas and Ft. Worth. Where curves and grades permit, the maximum speed for freight trains is 60 m.p.h.

Back in 1942, the section between Illmo and Dexter Junction, handled up to 50 trains daily. On this section, the schedule now includes 2 pas-



Hold-out signals, just north of Jonesboro, save train time

senger trains, 14 through freights and a local each way daily except Sunday. Extra trains bring the total to about 22 trains daily. On the section between Dexter Junction and Paragould, the schedules include 2 passenger trains, 12 through freights, and the local freight each way. Thus, including extras, there are about 18 to 20 trains. On the section between Paragould and Pine Bluff, the schedules include 2 passenger trains, 10 through freights and the local freights. Between Pine Bluff and Texarkana, the schedules call for 2 passenger trains, 8 through freights and the local freights.

Single Track 618 Miles

The map herewith shows the principal lines of this railroad, which extends, in general, between St. Louis and important cities in Arkansas, Tennessee, Louisiana and Texas. Double main track extends 7.3 mi. from Illmo to Frisco Jct., 3.1 mi. from Paront to Dexter Junction, 5.4 mi. through Malden, and 2.0 mi. through Camden, totaling about 17.8 mi. of double track. The remainder of the entire route of 618 mi. between Illmo and Dallas, as well as 196 mi. between Mt. Pleasant and Waco, is single track main line, handling through traffic.

Two Far-Sighted Decisions

Prior to 1941, the train movements on this railroad had been authorized by timetable and train orders, and no automatic block signaling was in service. When faced with increased volumes of traffic, and the necessity to get trains over the road in shorter time, the management, in 1942 made two important decisions that not only proved to be correct but also were fore-runners of recognized developments that are coming to the front today. These 1942 decisions were: (1) not to add second main track, but to secure increase capacity of the existing single track. The management knew that the installation of automatic signaling alone would improve safety, but would necessitate the continued use of timetable and train orders. Therefore, the second decision was (2) to improve the single track by installing a complete system of centralized traffic control, including power switch machines and signals for authorizing train movements.

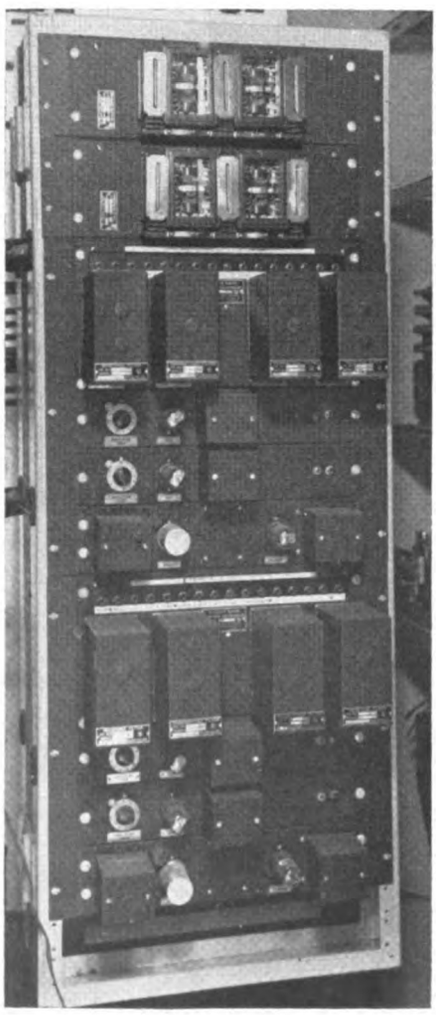
The first CTC project, completed in 1943, was on 32 mi. of single track and 15 mi. of double track, between Illmo and Dexter Junction, where traffic had increased to 60 to 65 trains daily. Other sections were equipped with CTC as fast as practicable, preference being given to sections where operations were affected by grades, curves and other local conditions. For example, on the 152 mi. between Pine Bluff and Texarkana, the railroad crosses four major rivers, and traverses some rough country including curves up to 4 degrees, and grades up to 1.17 per cent. Accordingly, this 152 mi. was the second project of CTC, being completed in 1945.

Because of shortages of men and materials, the program was delayed for a few years, and then in 1952 CTC was completed on 68 mi. between Pine Bluff and Brinkley; in 1953 on 84 mi. from Dexter to Jonesboro, and in 1954 on 74 mi. from Jonesboro to Brinkley. Construction of CTC is now under way on 60 mi. between Texarkana and Mt. Pleasant. A further extension from Mt. Pleasant to Tyler, 68 mi. is contemplated for 1955.

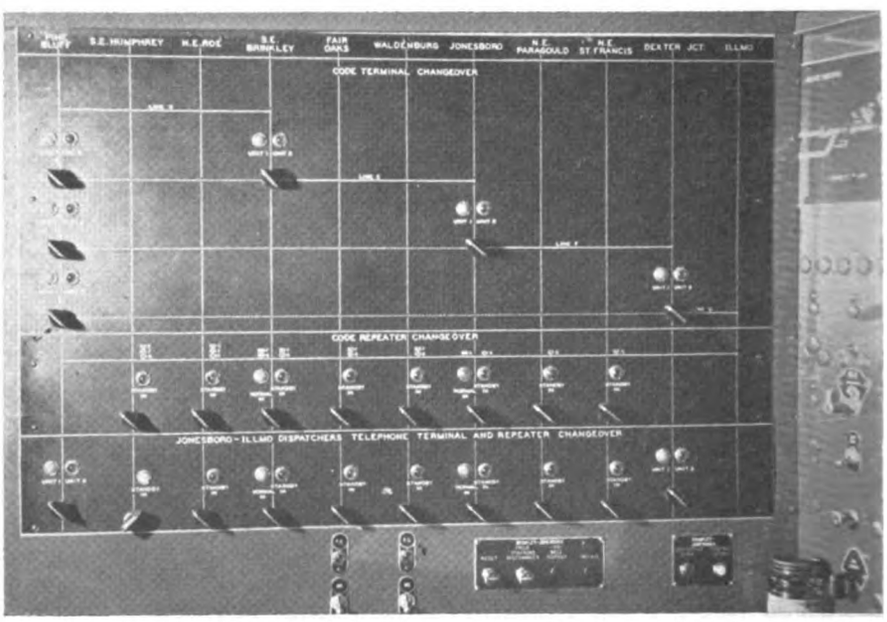
This program is proof that the CTC has been successful in attaining the benefits as foreseen by the management of this railroad in 1942, i.e. not to add second track, but to improve the existing single track by installing CTC.

Controls Are at Pine Bluff

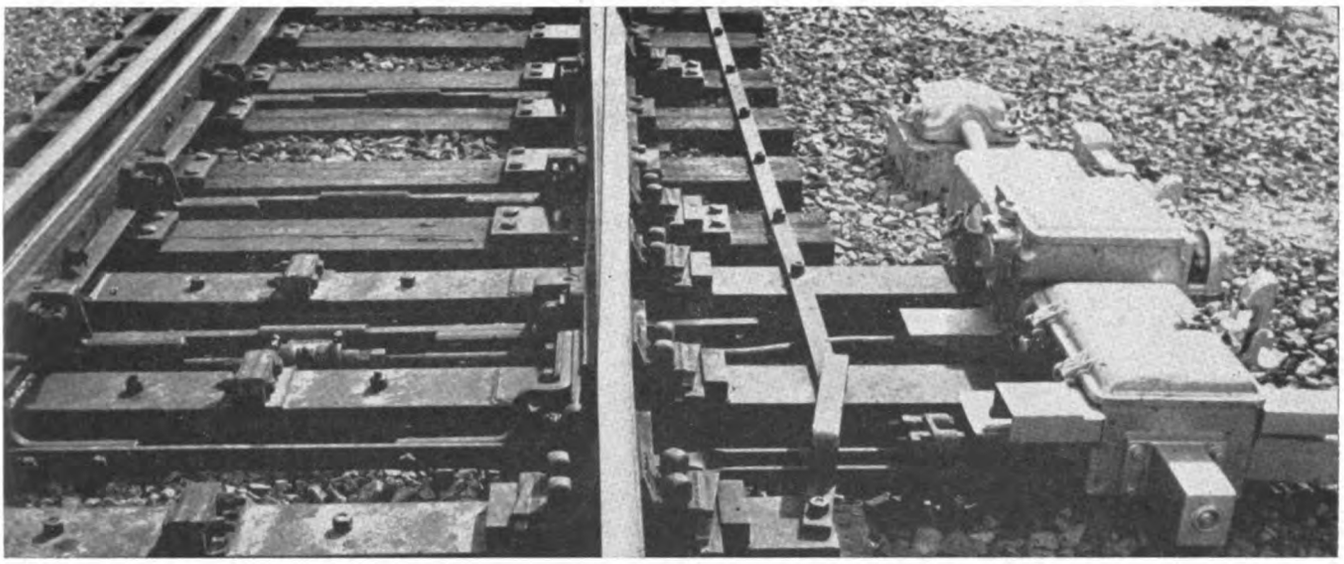
The division headquarters, including the dispatcher's offices, are in a new brick building at Pine Bluff. One CTC machine controls the 132 mi. between Illmo and Jonesboro; a second machine controls the 142 mi. between Jonesboro and Pine Bluff; and a third machine controls the 152 mi. between Pine Bluff and Texarkana. Line coding systems are used, so that outgoing controls and incoming indications are handled by one two-wire line circuit north from Pine Bluff, and another such circuit south from Pine Bluff. Carrier current, operating at different frequencies, is used to cut these line circuits into sections rang-



Panel mounted carrier



Carrier cut-over controls are on a separate panel of new design



Switches include heavy plates, adjustable braces, vertical-pin rods and roller bearings

ing from 40 to 50 mi. Thus controls can go out to, or indications return from, different sections simultaneously, thereby facilitating operations.

Special Board for Carrier

The electronic equipment to produce the individual carrier frequencies for the different sections are all in duplicate, so that if the set in service fails, the dispatcher can turn a button to cause the standby unit to be cut in. In previous projects, these carrier cutover control buttons were on the CTC control panel. However, as the number of the carrier sections increased, the StLSW, in the 1954 project, used a separate panel on which are mounted the control buttons and indication lamps for the carrier. On this panel, white lines extend through the names of the towns and the changeover levers, so that the dispatcher can easily know the correct button to use to cut in the proper standby carrier equipment.

Fewer Sidings

During the last 10 years, numerous changes have been made in sidings. Those to be equipped with power switches and CTC signals were lengthened to capacities ranging from 120 to 160 cars. Short sidings, that were not to be needed for meeting or passing trains with CTC, were either removed or converted to spurs for serving freight houses or industries. The main track switches that were left in service, with hand-throw stands, were equipped with electric locks, controlled by the dispatcher.

Prior to the installaion of CTC, this railroad had several lap siding layouts. Studies indicated, however, that with CTC, there would be very few instances in which the lap sidings would be used effectively to hold two trains while a third train passed. Therefore, considering the fact that to additional switch machines and signal layouts, as well as new No. 16 turnouts, would be required, the lap sidings, as such, were eliminated. The tracks were thrown to connect the sidings through as one long siding.

The short track cirucits, such as the OS switch detector circuits, are the conventional steady energy d.c. type, using 4-ohm relays. The remainder of the track circuits, ranging up to 11,000 ft. long, are the d.c. coded type, normally operating at 120 code, and are for track occupancy controls only. The signals are controlled to display the yellow or green aspects by polar line circuits. One such two-wire circuit serves for either northward or southward signals, depending on direction set up by CTC control between two sidings. Track codes at different rates, 120 or 180, are used as required in intermediate blocks, so that there are two track-occupancy indication sections and indication lamps for each siding-to-siding block. Thus the dispatcher knows of the progress of a train in such a block.

Track circuits were installed on sidings, not only to control the signals directing trains to enter but also to control track-occupancy indication lamps on the control machine, so that the dispatcher is informed of the locations of trains when on sidings.

Sidings Are Signaled

Each station-entering signal has two heads. When a power switch is reversed for a train to enter a siding that is unoccupied, the signal can be cleared to display the red-over-yellow aspect. If the siding is occupied by a train of the same direction, the signal can be cleared to display the red-over-lunar aspect. If the siding is occupied by a train of the opposite direction, the signal cannot be cleared to display an aspect to enter.

Special Signaling Features

This project includes some special signaling features, in addition to the conventional signaling of such installations. For example, a double location of dispatcher controlled "hold-out" signals are located 0.5 mi. north of the station at Jonesboro. By controlling these signals to display the Stop aspect, the dispatcher thus sets up a switching zone through the Jonesboro industrial area, so that the local freight crew can be authorized to use the main track when serving industries in this area for a given time, such as 30 minutes, and then get in the clear. In the meantime, a line up can be made for a southbound through train to depart from Brookland, 8 mi. north, and proceed toward Jonesboro. Then, when the local freight leaves the switching area, the dispatcher can clear the southward holding signal for the through freight to go on south without stopping. Thus, time is saved for through trains.

Switches Well Constructed

In order to minimize the time for trains to enter or leave sidings in CTC territory the StLSW installed new No. 16 turnouts with 30 ft. points at the end of sidings. Insulated gage plates, 1 in. by 7 in. are used on the No. 0, No. 1 and No. 2 ties. Racor adjustable braces are used on these three ties and on the No. 4, 6, 9, 11

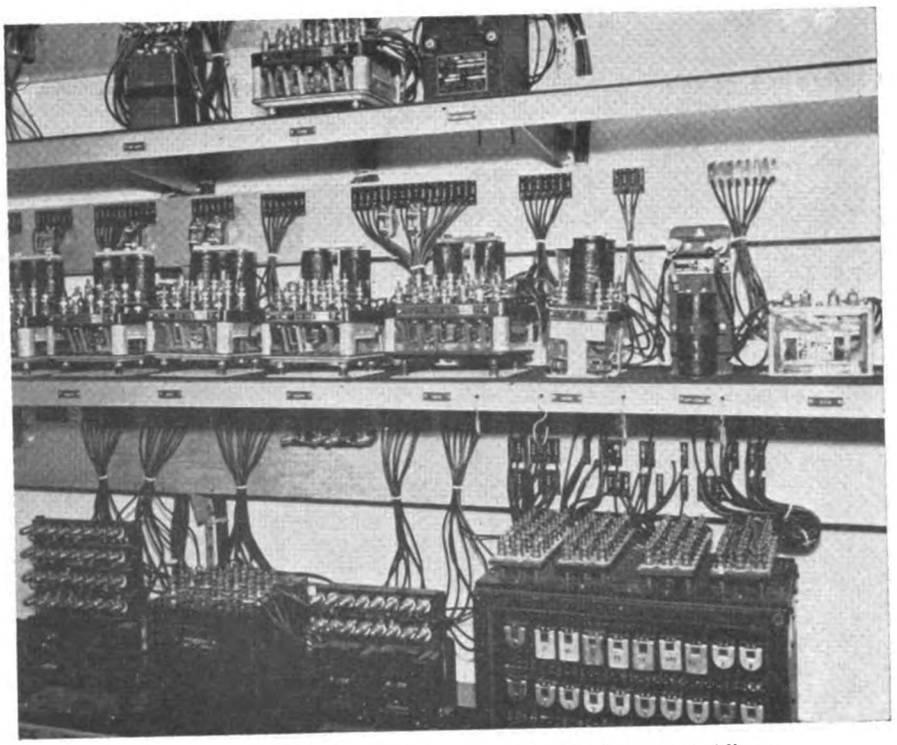
(Continued on page 45)

(Continued from 41)

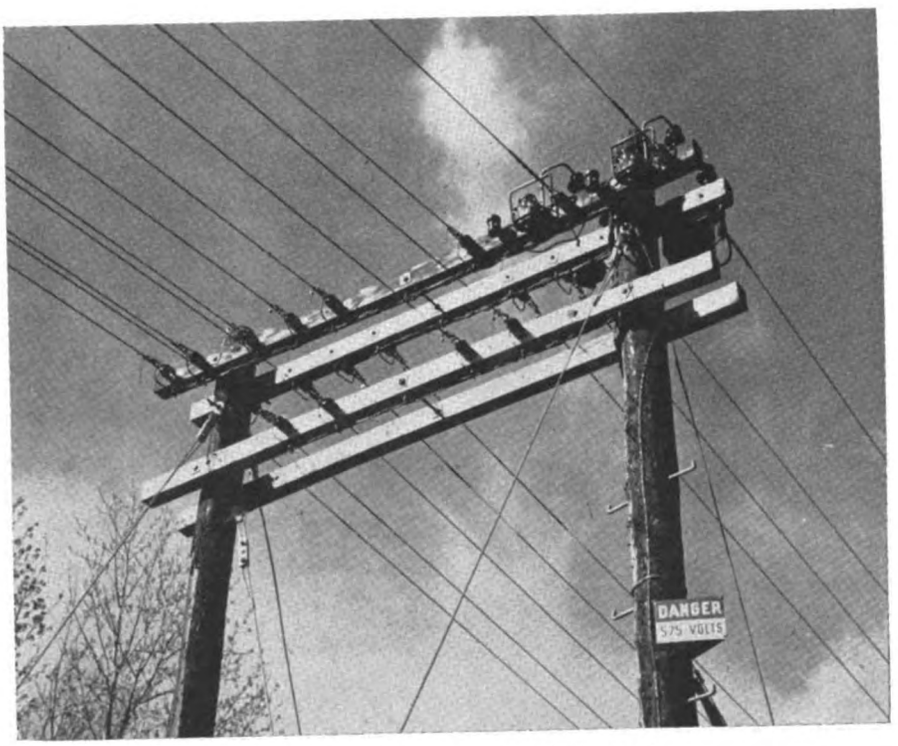
and 14 ties. On the No. 0 tie, braces are used on both sides of the rail. The four switch rods are the Racor vertical pin type. Roller bearings, to ease the operating of the switch points, are located between the No. 10 and No. 11 ties.

The plates, on the No. 1 and No. 2 ties, extend and are attached to the switch machine, thus maintaining position of the machine with reference to the rail. The switch machines are the electric type with 24-volt d.c. motors. The machines installed in 1954 are the dual-control type, but those installed previously are not dual control.

Telephone service between the dispatcher's office at Pine Bluff, and the various phone booths at switches along the railroad, was secured by superimposing, on the two CTC line wires, a system of frequency modulation carrier which ranges from 45 kc to 65 kc. Thus, without adding any line wire, this phone circuit extends to 65 booths or offices north of Pine Bluff. To minimize interference of the phone circuit, the two line wires are transposed every seventh pole.



Relays and code equipment are on shelves in houses at sidings



A double-pole H fixture is at each signal

New Signal Pole Line

The old communications pole line had only one crossarm on short poles, so that it was not practicable to add another arm for signal wires, unless the pole line was completely reconstructed, which was estimated to cost more than a new separate pole line for signal wires. This new pole line, built by signal forces, includes 25-ft. poles with a minimum of 17½ in. circumference at the top, these poles being Southern pine, creosoted full length, 8½ lb. to the cu. ft. The poles are set 30 to the mile, which is about 176 ft. apart. The crossarms are 10 ft. long, with 10 pins. A double-pole H fixture is located at each signal location.

A power machine, on caterpillar tracks, was used to dig the pole holes and set the poles with crossarms in place. Where ground is level, this machine can be used by three men to dig the hole and set the pole in about 2½ to 3 minutes.

The two line wires for the CTC code are No. 8, 40 per cent Copperweld, with weatherproof covering, and the two line wires for the control circuit for the automatic signaling are the same kind of wires except that they are No. 10. The two line conductors for the 550-volt a.c. power distribution circuit are, No. 6 Copperweld, or strand consisting of a No. 10 Copperweld and two No. 10 solid copper, twisted together to form the equivalent of No. 6 solid copper. These wires are bare. The 550-volt a.c. power is fed in sections of 15 to 25 mi. from a feed point to the far end, and the voltage on the low side of the line transformers range from a maximum of about 118 volts to a minimum of about 105 volts at the far end. On a typical section of 25 miles, with 8 power switch layouts, the power for a typical month was 1300 kwh. The 550/110 volt line transformers are rated at 250 watts at power switch layouts, and 150 watts at intermediate signals.

These CTC projects on the StLSW were planned and installed under the direction of B. J. Alford, signal engineer; the major items of signal equipment were furnished by Union Switch & Signal.