Frisco's Light-Traffic C. T. C. Uses Power Switches and Spring Switches

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Trains normally enter a siding at the end with dispatcher-controlled power switch and signals

Trains normally depart from the end of the siding which is equipped with a spring switch

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Automatic block signaling on 137 miles of single-track replaced by simplified centralized traffic control with power switch and C.T.C. controlled signal at one end of each siding, and spring switch at the other end with dwarf signal at clearance point

By using a spring switch at one end and a power switch with signals at the other end of each siding, the St. Louis-San Francisco has cut the cost of an experimental installation of centralized traffic control recently completed on 137 miles of light-traffic single-track line between Springfield, Mo., and Thayer on the route between Kansas City and Memphis.

On other single track divisions, which handle heavier traffic, this railroad has 528 miles of conventional C.T.C. with a power switch and dispatcher-controlled signals at both ends of sidings. On the Springfield-Thayer division, however, the schedules include only 10 to 18 trains

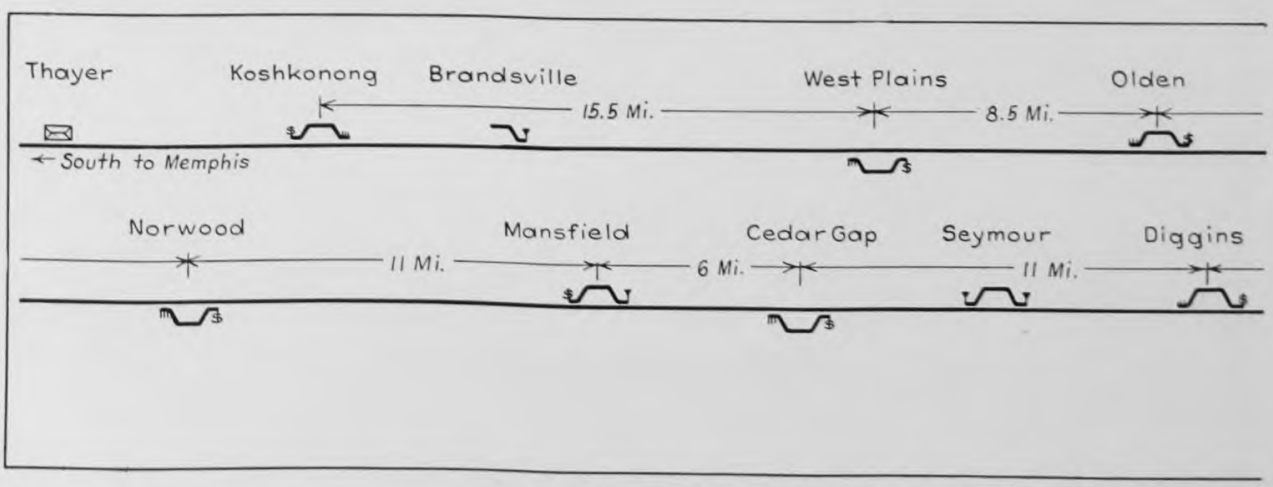


Fig. 1—Track plan of entire 137 miles of centralized traffic control territory

daily—two passenger trains and two through freight trains each way with several extras, and a local freight each way daily except Sunday. Even with this comparatively light traffic, the operating officers were anxious to obtain the benefits of authorizing train movements by signal indication, rather than by train orders.

To minimize the cost of the C.T.C. installation, in proportion to the number of trains operated, a decision was made to make an experimental installation of a modified form of C.T.C. in which a power switch and conventional arrangement of signals would be installed at only one end of each siding, while at the other end there would be a spring switch and only two signals, directing trains either to (1) leave siding or (2) to stop, throw the switch and enter the siding. The original estimates indicated that this arrangement would save about $3,000 per siding, compared with the usual provision of a power switch and conventional arrangement of three signals controlled by line coding at each end of a siding.

C.T.C. Applied to 11 Sidings

This project starts at "MK" Junction, 1 mile from the passenger station at Springfield. The "MK" layout includes a junction of the Ozark branch with the main line, and a junction between the main line to the passenger station and a belt line to the freight yards. An old mechanical interlocking formerly in service at this junction was removed, the new power switches and signals being included in the C.T.C. A siding, 6,500 ft. long, extends south from "MK" Junction along the main line. A spring switch, formerly at the south end of this siding, was removed, and a new power switch machine and signals are included in the C.T.C.

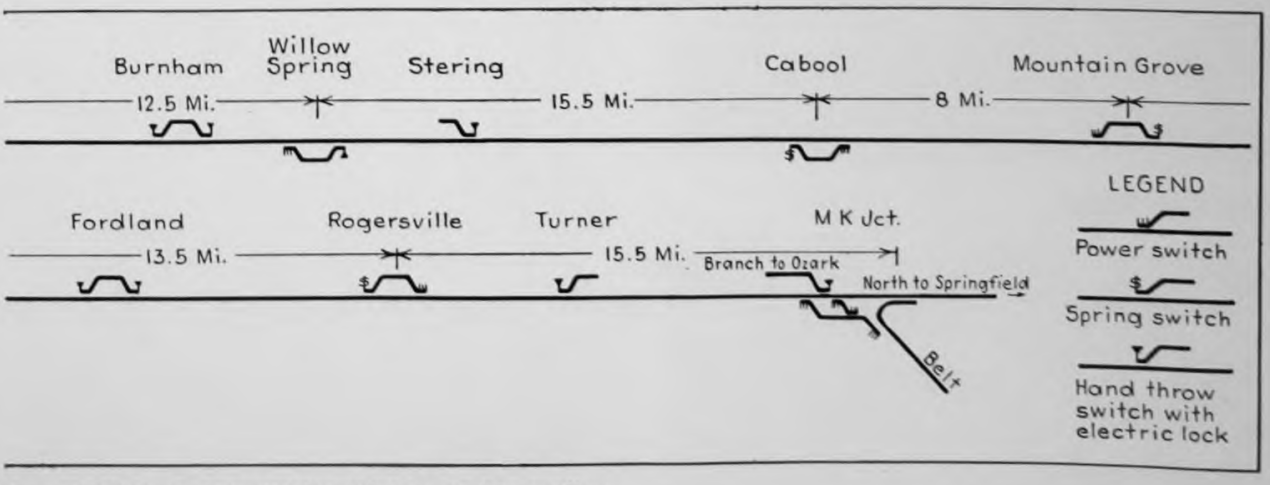
Between "MK" and Thayer, 136 miles, the previous automatic block signaling included 18 sidings at which the conventional arrangement of automatic block signaling applied. This includes the siding at "MK." Experience on various C.T.C. territories on the Frisco for several years has shown that fewer passing tracks are needed with C.T.C. Therefore, as part of the 1950 program on the Springfield-Thayer territory, six sidings were converted to house tracks or spurs with no provision for using them for train meets. At each of three such locations, Turner, Sterling and Brandville, one switch was removed, thus leaving a spur. At Fordland, Seymour and Burnham both switches were left in place, but no

If a train, approaching on the main track, is to be directed to enter a siding at the spring switch end, the indicator shown here is controlled to display the letter "S"

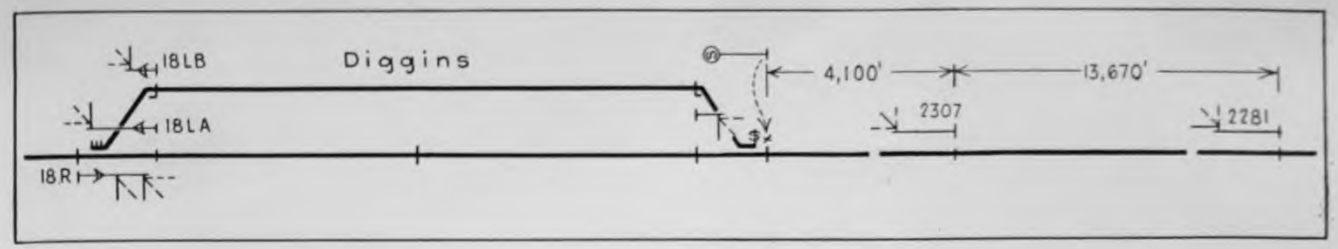
C.T.C.-controlled signals were installed. This left 10 sidings at which there is a spring switch at one end and a power switch and C.T.C. signaling at the other, and one siding with hold-out signals.

At Rogersville the power switch is at the north end and the spring switch at the south end. At Diggins, on the other hand, the power switch is at the south end and the spring switch at the north end. The operating practice, when making a meet, is to use the power switch to head in the train that is to take siding. Then, after the other train has passed, and the leave-siding signal has been cleared, the train on the siding heads out through the spring switch and proceeds without the necessity of stopping to restore the switch to normal. In this practice, no train stops are required for trainmen to operate switches, and, of course, all train movements are authorized by signal indication.

Referring to Fig. 2, if circumstances with reference to



showing locations of power switches and spring switch at sidings



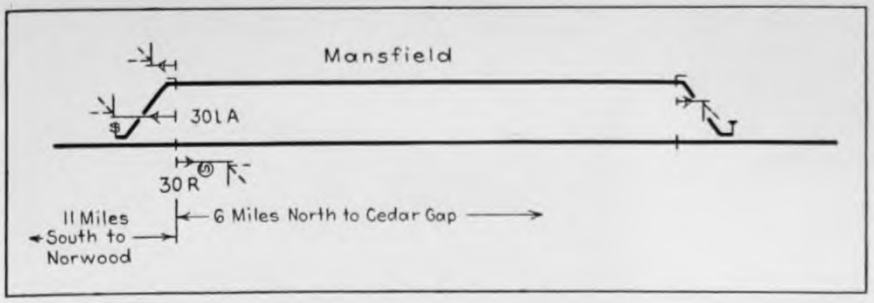


Fig. 2—Track and signal plan for layout at the siding at Diggins

Fig. 3—Hold-out signals for cutting long overall C.T.C. block

tonnage of trains and time of arrival are such that the dispatcher wants a southbound train to take siding at the hand-throw switch at the north end of Diggins, he sends out a control that causes a letter "S" to be displayed on a take-siding indicator, located at the right of the track approaching the facing point of the spring switch at the north end of this siding. At the same time, the Approach aspects are displayed in the intermediate signals 2307 and 2281, located 4,100 ft. and 17,700 ft., respectively, in approach to the switch. These aspects direct the engineman of a south-bound train to stop short of the switch. Then the head brakeman goes to the switch and operates the hand-throw stand to line the switch for the train to enter the siding. When the train is in the clear, a trainman restores the switch to normal.

Each take-siding indicator consists of a lamp unit with a 14-in. ground-glass cover, as shown in one of the illustrations. The unit is on a mast to bring the center of the glass cover 10 ft. above the level of the base of rail. Normally the lamp is dark. When the dispatcher sends out a control, the letter "S," in white, is outlined in black on the ground glass cover, as shown in the picture. The "S" is the only aspect displayed by such a take-siding indicator, the lamp in the unit being dark normally, so that no aspect is displayed. Referring to Fig. 2, the H control of approach signal 2307 extends to signal 18LB. The signaling arrangement at Diggins, as shown in Fig. 2, was applied also at Rogersville, Cedar Gap, Norwood, Olden and Koshkonong.

Hold-Out Signals

Another special arrangement was installed at Mansfield. Ordinarily, this siding is not to be used for passing trains, and, therefore, a conventional arrangement of C.T.C. signals and power switches did not seem to be justified. But in switching at Mansfield a local freight frequently may occupy the main track for some time. If the overall C.T.C. control block extended for the 16 miles from Cedar Gap through Mansfield to Norwood, trains could not be advanced, for example, north from Norwood, 11 miles toward Mansfield, if the local freight was on the main track at Mansfield. The C.T.C. overall block was cut by installing a double location of C.T.C. controlled signals, 30LA and 30R, on the main track opposite the fouling point at the south end of the siding at Mansfield, as shown in Fig. 3. With this arrangement, if the local freight is switching at Mansfield, a northbound train can be advanced to that siding. As the through train approaches, the local freight gets in the clear. Then the dispatcher clears signal 30R, and the train proceeds without stopping. In rare instances, when it is necessary to direct a northbound train to take siding at Mansfield, the dispatcher sends out a control to light the "S" indicator mounted on signal 30R.

Switch Operation

The power switches are operated by Union Switch & Signal Co. Style M-2, 20-volt d.c. switch machines. Each spring switch is equipped with a Pettibone-Mulliken oil buffer unit. At each such switch the old hand-throw stand was replaced by a U. S. & S. Co. Type S-21 hand-throw switch-and-lock mechanism. No lock rods are used, and in the mechanism the bar and facing-point lock are welded to the block operated by the lever. If the lever is raised as much as 10 in., the point detector opens, and serves also as a switch circuit controller. At each spring switch, there is a circular disc sign with letters "SS." In this territory, there are 79 hand-throw main track switches which were equipped with electric locks.

The lamps in the new searchlight signals are the double-filament type rated at 13 + 3.5 watts. These signal lamps are normally fed from a transformer at about 8 volts. When a train enters an approach circuit, or when a head-block signal clears, the voltage is increased to 9.2 volts. This practice has increased the life of the lamps more than twice what it was previously on continuous burning at 9.2 volts. The signal lamps are burned constantly to give employees using motor cars some information concerning the approach of trains.

This C.T.C. project was planned and constructed by railroad forces under the direction of R. W. Troth, superintendent of communications and signals, the major items of signaling equipment being furnished by the Union Switch & Signal Co.