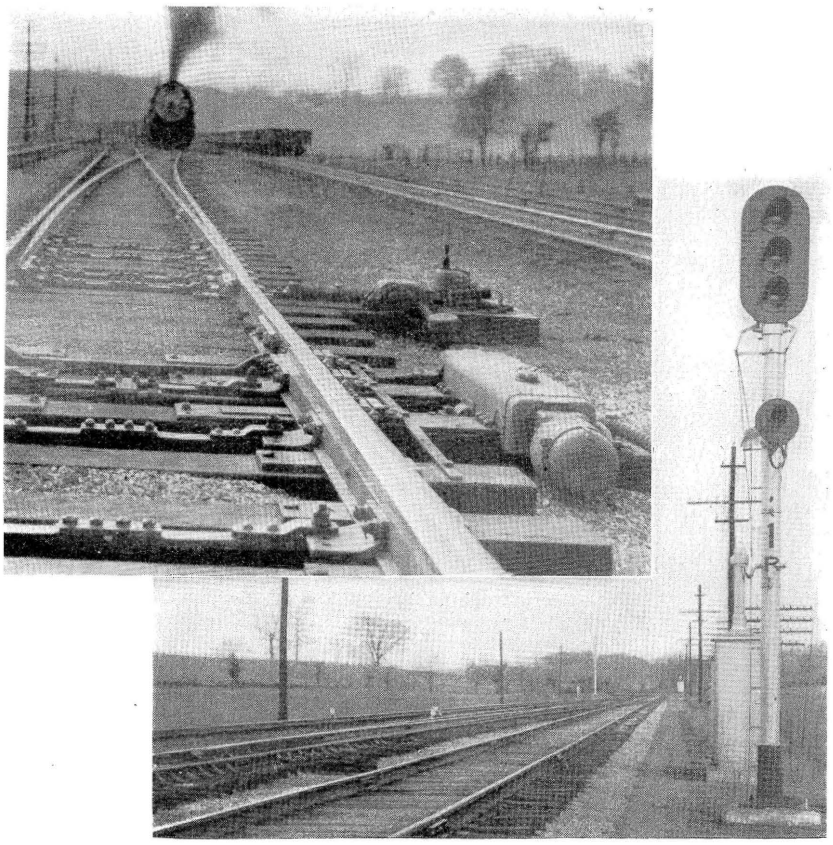


Right—View looking west showing eastbound train pulling out of the yard. Lower right—The eastward home interlocking signal

Remote Control On the Southern

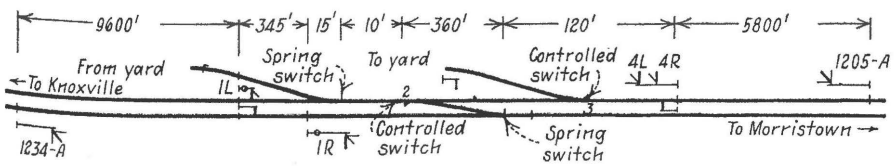
Installation at end of yard at Knoxville, Tenn., including two power switches, two spring switches, signals, and a yard-track indicator, saves numerous train stops and delays

AT THE east end of the John Sevier freight classification yards, near Knoxville, Tenn., the Southern Railway has recently installed a remotely-controlled interlocking including a yard entrance switch, a yard departure switch, and a crossover between the two main tracks, as well as three operative home signals and three non-operative dwarf home signals. Electric power switch machines are used on yard entrance switch No. 3 and on switch No. 2 at the west end of the crossover, while the yard departure switch and the east end of the crossover are operated by buffer type spring mechanisms. A device known as a yard indicator, consisting of an arrangement of numbers from 1 up to 6 which can be lighted individually, is located at the right of the yard entrance lead, and is used to inform the crews of incoming westbound trains concerning the yard track on which the train is to be pulled into. The switches, signals, and the yard track indicator are all controlled by an operator in the yard office located about one mile west of the junction.

Fuel, Water and Time Saved

Prior to the installation of this interlocking, westbound freight trains had to stop on the main line to permit trainmen to operate the yard entrance switch. Likewise, eastbound freight trains departing from the yard had to stop to permit trainmen to line up the yard departure switch and the crossover, and stop when out on the eastward main track to permit these switches to be placed normal and for the trainman to board the caboose. From this yard eastward, an ascending grade of about 1.17 per cent extends for a mile or more, and, therefore, serious delays and wastage of fuel and water were incurred by this operation. A rough estimate is that the elimination of these stops saves at least a ton of coal for each eastbound tonnage train operated out of the yard. Prior to the installation of the interlocking, practically all eastbound freight trains stopped at Jefferson City, 20 miles east, for water; but now that the stops at the leaving end of the yard are eliminated, at least 90 per cent of these trains are not stopping at Jefferson City for water. This is adequate proof of the water saved.

A westbound train can pull into the yard at least 10 min. more quickly



Track and signal plan of interlocking

Left—The desk-lever control machine with switches for control of the track indicator

than was previously the case when the switches were operated by trainmen, and this 10 min. is used to an advantage. On numerous occasions, a freight train is running ahead of a passenger train. With the previous operation, the freight train would have to take siding at Keister, the first passing track east of the yard, to let a closely following passenger train pass. Now that the freight train can keep moving, and roll into the yard without stopping, about 30 min. is saved on the freight train.

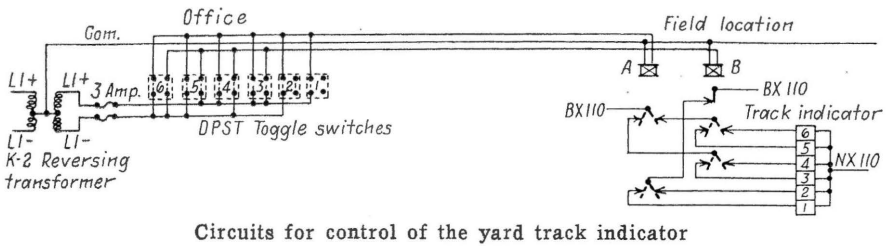
Saving on Eastbound Trains

An eastbound freight train can pull out of the yard and get up to speed at least 20 min. more quickly than was previously the case. An eastbound red ball freight train is scheduled to leave the yard about 6:15 a.m. so as to clear the main line at New Line Junction, 30.3 miles east, ahead of eastbound passenger train No. 4. If the freight was not ready to go exactly on time, under the previous arrangement it was held until after No. 4 had passed the yard, thus losing about 30 min. time. With the interlocking making 20 min. more available for the freight train, it can, in the vast majority of cases, make the movement from John Sevier yard to New Line Junction well ahead of No. 4.

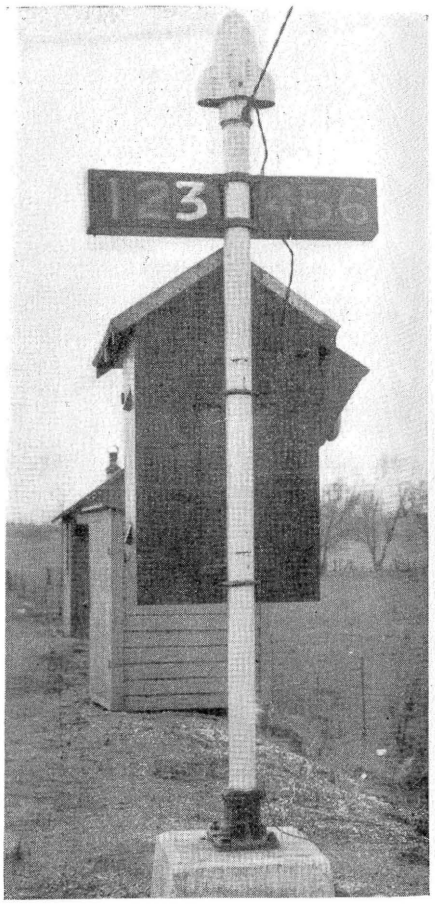
Field Equipment

The two power switch machines are the General Railway Signal Company's Model 5, equipped for operation on 20-volt d-c. The direct current power for operation of each switch machine is furnished by a Type B, Size 432 G.R.S. Co. rectifier, which is fed by a transformer connected to the signal department a-c. power distribution line. The rectifier is rated at 13.5 volts, 2.4 amp. Under average conditions a switch machine will operate in about 10 sec., and takes not to exceed 6 amp. The switches at the east end of the crossover and on the departure lead are operated by Pettibone-Mulliken Company oil-buffer type spring mechanisms.

The operative signals are of the color-light type. The westward signal No. 4 has a three-aspect upper "arm," 4L, for directing through moves on the westward main line, and a two-aspect lower "arm," 4R, displaying either red or yellow for directing diverging moves from the main line into the yard lead. Signal 1R has a three-aspect upper arm for directing through moves on the eastward main track, and a fixed red lamp is mounted on the mast of this signal to designate it as an absolute stop interlocking home signal, Rule 292. Signal IL on the yard departure track has a top "arm" displaying two aspects, red or yellow, and also a fixed red marker below the operative signal head. This signal IL is used to direct trains to pull out of this track, through the crossover to the eastward main line.



Circuits for control of the yard track indicator



The yard track indicator

The three fixed dwarfs, for governing reverse or backup moves into the interlocking home signal limits, are of the semaphore type with constant burning purple lamps. Color-light automatic block signals 1205-A and 1234-A serve also as main line approach signals for the high home signals.

The Control Machine

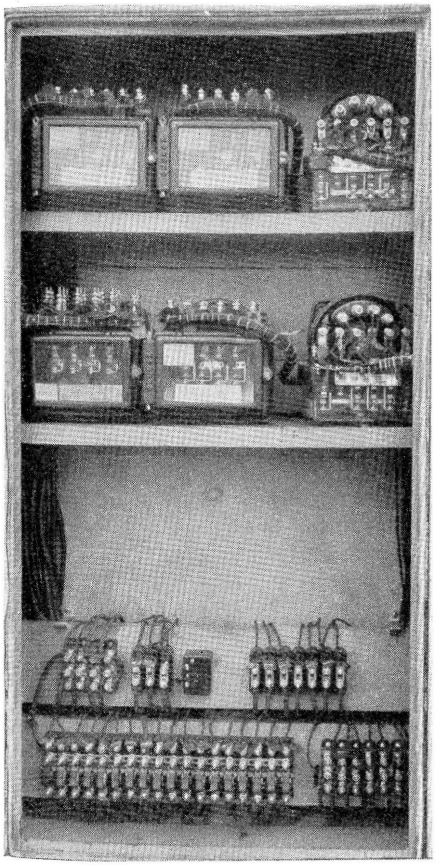
The control machine in the operator's room in the yard office consists of four table-lever units, which are equipped with indicators and electric lever locks, but no mechanical locking between levers is used. The two signal levers, 1 and 4, normally stand

in the center position, and are operated to the L or the R position to clear the respective signals. Electric locks on these levers prevent the levers from being placed full normal until the corresponding signal assumes the Stop aspect. Indicators on the panels above the lever repeat the Clear aspect of the signals. The two switch levers operate to two positions. By means of electric locks on these switch levers, complete approach, route, and detector, electric locking is provided.

An illuminated track diagram on the wall reproduces the track and signal layout with track indication lamps repeating occupancy of the track circuits in the home signal limits and on the approaches.

Yard Track Indicator

The yard track indicator, as shown in one of the illustrations, consists of a metal case with six separate compartments, each containing an electric



Instruments at signal

lamp. As only five yard tracks are now in service, the sixth lamp is a spare. The east face of each compartment is covered by a panel, with a figure cut out of the metal, and backed by white glass. Any one of the six figures can be illuminated, and, when so lighted, can easily be seen day or night by the engineman and head brakeman of an incoming westbound train when entering the yard entrance lead track.

The six track indication lamps are each controlled by a two-pole, single-throw toggle-type electric switch, which is mounted in a row on a panel just below the interlocking desk levers. All of the switches are normally in the DOWN position. To cause lamp No. 1 to be lighted, the toggle switch No. 1 is thrown to the UP position, and the operation is the same for the remainder of the lights; no two switches, however, are to be in the UP position at any one time. Two positive connections from a split secondary 110-volt transformer extend through a combination circuit in contacts of these switches, and two wires extend to the field location where two 110-volt three-position a-c. polar relays are controlled by these wires, with connections to common, which is the center connection to the split secondary. Circuits through contacts in these relays feed the lamps in the yard indicator. Relay A poled to the left and relay B de-energized, causes lamp No. 1 to be lighted; relay A poled to the right and relay B de-energized, lights lamp 2; relays A and B both poled to the left, lights lamp 3; relay A poled to the left and B to the right, lights lamp 4; both poled to the left, lights lamp 5; and relay A to the right and B to the right, lights lamp 6.

The control and operating circuits throughout the interlocking installation are of the a-c. type. Kerite insulated wire and cable is used, and the low-voltage arresters are the G.E. Thyrite type. The installation was planned and installed by the signal forces of the Southern Railway, and the major items of equipment were furnished by the General Railway Signal Company.

Route Type Interlocking

(Continued from page 268)

braces, are used on the first three ties under the points as well as on the tie ahead of the point, and, on the tie last mentioned, rail braces are used also on the gage side to prevent "rolling" of the stock rails. The gage plates on two ties extend and are attached to the switch machine to prevent lost motion.

The derail on the St.L-S.F. switching track is the split-point type with standard tie plates and rail bracing. Each of the two switches and the derail is operated by an M-2 electric switch machine equipped for operation on 24 volts. A switch will operate from one position to the other in about 16 sec. The standard arrangement of lock rods is used on each machine.

Power Supply System

The two machines on switches No. 1 and 2 are operated from two 12-cell sets of storage battery in multiple, and derail No. 13 is operated by a 12-cell set of the same type. The M.P. color-light signals are normally fed from the a-c. supply, but, in case of an a-c. outage, they are fed from storage battery. Signals No. 10, 12 and 14 are fed from 5 cells of the storage battery at the derail location. Signals 2, 4 and 6, in case of power outage, are operated from 5 cells of the switch operating storage battery at the junction. A separate set of 5 cells of storage battery of the same type is provided for operation of signals No. 22 and 24 in case of power outage. A set of 5 cells at the control station feeds relays, and signal No. 8 in case of power outage, and also acts as standby for the indication lamps on the control machine which are normally fed a-c. The normal load on this battery requires a constant floating charge of 2 amp. The battery leads extending to the control machine include 5-amp. fuses which are provided to protect high currents from damaging the wiring in the machine. The storage batteries are of Exide manufacture, the DMGO-9 type being used for the switches and the DMGO-7 for other purposes. Each track circuit is fed by one cell of Edison 500 a.h. primary battery, with an RTA rectifier floated across the battery.

Wiring Distribution

The wiring distribution over the plant is in underground cable buried at least 18 in. below the surface. The cable which has no metal in the protective covering but has an outer covering known as "mummy" finish, was furnished by the Kerite Insulated Wire & Cable Company. For control circuits the conductors are No. 14 copper, and for battery circuits, No. 9. Also, No. 9 conductors are used for connections from instruments or batteries to track connections using Union bootleg outlets and stranded Copperweld rail connections. The 110-volt a-c. circuit is distributed over the plant in No. 12 two-conductor underground cable.

This interlocking was planned and installed by the signal department forces of the St. Louis-San Francisco under the direction of R. W. Troth, acting signal engineer, the major items of equipment being furnished by the Union Switch & Signal Company.