

Trains Directed

View at Lick looking north toward the end of double track showing first C.T.C. signal

As a part of a project including new passenger station facilities at San Jose, Cal., the Southern Pacific built a section of new line, made extensive additions to an interlocking, and installed centralized traffic control so that all train movements in either direction on a 4.5-mile territory are directed by signal indications.

The old station was located in the central part of the city, and the tracks crossed several important streets at grade, thus requiring reduced train speeds, as well as causing delays to street traffic. The new passenger station was constructed at a location more remote from the business section of the city, and certain track changes were made to route the through main line by way of the new location. Underpasses or overhead structures were built to separate the grades of the railroad and all of the important streets, and crossing signals were installed at four light-traffic streets which cross the tracks at grade.

New Layout Signaled

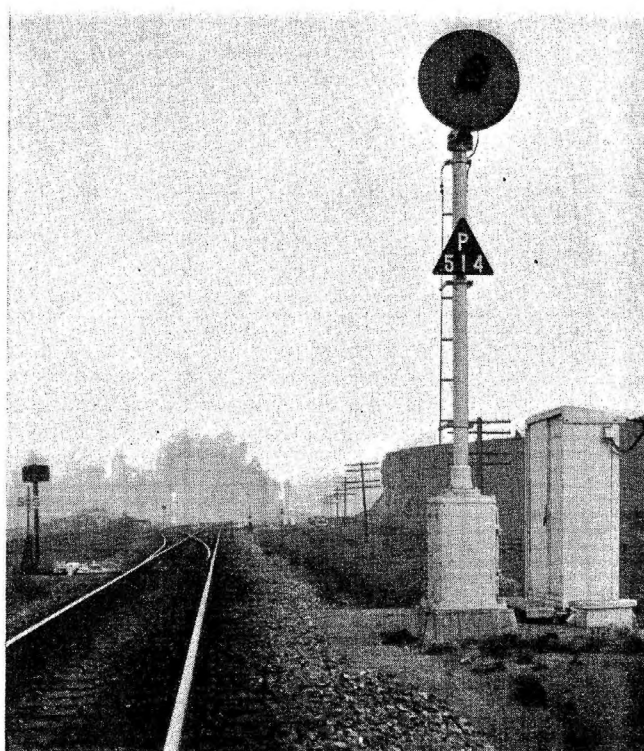
The new track layout involved in the signaling system starts on the north in the College Park interlocking, and extends as a three-track line for about 4,500 ft. to the north end of the station layout. Track No. 3 on the west side, which is used by freight trains in either direction, runs to the west around the station layout. The other two tracks, each of which is used by passenger trains in either direction, continue through the platform layout of the station. At a point 2,000 ft. south of the station, the three tracks converge into a two-track line, and, at this point also, a secondary line branches off to Santa Cruz, Cal. The two-track main line con-

tinues south for 1,250 ft. to an end of double track, and the single track extends 3.5 miles to another switch at Lick, Cal., from which the double-track main line extends south toward Los Angeles.

Interlocking Changes at College Park

The previous track layout at College Park was controlled by a 40-lever General Railway Signal Company Model 2 unit type electric interlocking machine. The track changes to connect the three new tracks into the layout, as well as to interlock the cross-over and turnouts at Lenzen street and

Julian street, called for so many changes in the interlocking that the old machine was replaced with a 72-lever G.R.S. machine of the unit-lever type, using 62 working levers. The addition to the plant required 10 new Model-5A switch machines, 29 signals and 4 electric switch locks. The three tracks between College Park interlocking and the north end of the passenger station layout are signaled for directing train movements in each direction, by signal indication, and the control of these signals is handled by levers in the machine in the College Park interlocking tower. Electric switch locks on derrails, located on four turnouts, to industry sidings between College



View at Lick looking south showing spring switch. Note the triangular marker plates

by Signal Indication

at San Jose, Cal.

Train movements facilitated in congested area including a section of three-track line, platform station tracks, a junction, and sections of double and single track on the Southern Pacific

Park and the station, are also controlled by the machine at College Park. This portion of the line has 69 scheduled passenger trains daily plus a large number of freight switching and engine movements.

Within the limits of the station, and between the freight track and the two passenger main tracks, there are four tracks used for storing suburban passenger train equipment between runs. The switches connecting these tracks with the main line are hand-operated. On the east side of the two passenger main tracks and within the limits of the station are three tracks for interurban passenger service. The switches connecting these tracks to the main line, as well as the crossover, are hand-operated, but train movements off of these tracks are directed by signals controlled by the switch tender.

Area South of Station Controlled by C.T.C. Type Machine

The signals for directing train movements by signal indication in the area between the south end of the station and Lick, 3.5 miles, are controlled by a miniature-lever type C.T.C. machine in the operator's office in the San Jose passenger station.

At the south end of the station layout, the various switches and crossovers are hand-operated, with the exception of the switch No. 8 which connects the freight track with the southward main track, this switch being operated by an oil-buffer spring

switch mechanism. All of the signals for directing train movements into or out of the station at the south end are controlled by the C.T.C. machine in the office. Switch No. 6 at the end of double track is operated by a Union Switch & Signal Company Model M-20, dual-control, low-voltage switch machine, the operation of this machine, as well as the adjacent signals, being controlled from the C.T.C. machine.

Arrangement At Lick

At Lick, the end of double track switch is operated by a Pettibone-Mulliken mechanical switchman type oil-buffer spring switch mechanism which is equipped with a Union Switch & Signal Company mechanical facing-point lock. The signals at Lick for directing train movements are also controlled by the C.T.C. machine in the San Jose office. With the arrangements explained, it is evident that all main-line train movements are made through this area without the necessity of stopping to handle any switches. The use of power switch No. 6 permits northbound passenger trains to be routed to either of the two station platform tracks. Spring switch No. 8 is normally lined to route

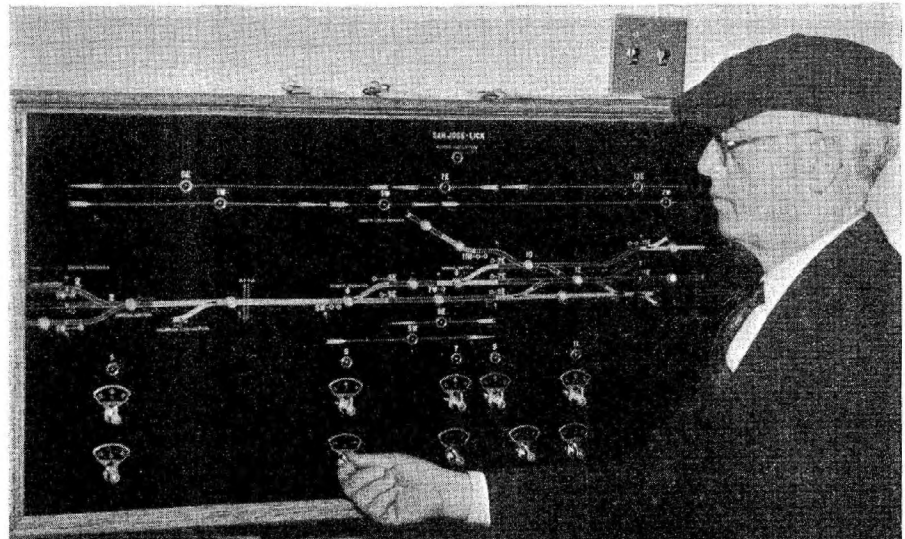
northbound freight trains from track No. 2 to track No. 3.

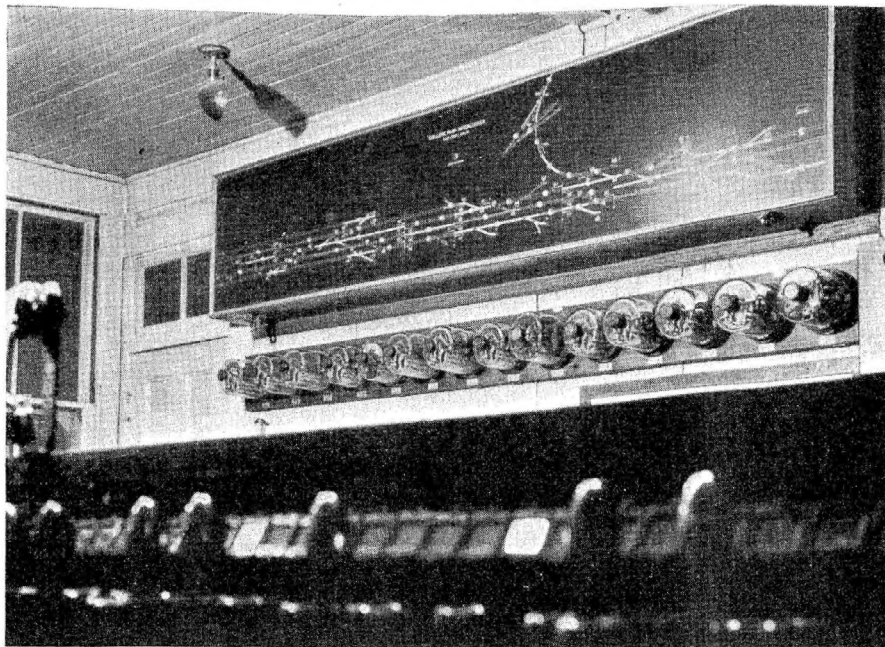
By means of the control system, train movements in either direction on all tracks in the 4.5 mile area between College Park interlocking on the north, and Lick on the south, are directed by signal indication.

Control Machine in San Jose Office

The control machine in the San Jose office is of the cabinet type with a panel 19 in. high and 42 in. wide. The track diagram, with lamps which indicate the occupancy of each track section, occupies the central portion of the face of the panel. The three-position levers, which control the signals, are arranged in a row below the track diagram. Switch lever No. 6, which controls the power switch, and switch levers 8, 10 and 12, which are operated in connection with their respective hand-throw switches and crossovers, are in a second row at the bottom. Above each signal lever there is an indication lamp with a green lens which is lighted when the corresponding signal clears. Above the track diagram, there is a set of indication lamps, each of which is in the center of a long arrow marked on the panel. Each set of these lamps and arrows

The C.T.C. type control machine, located in the San Jose office, includes traffic, direction indications





At College Park a new interlocking machine and illuminated track diagram were installed

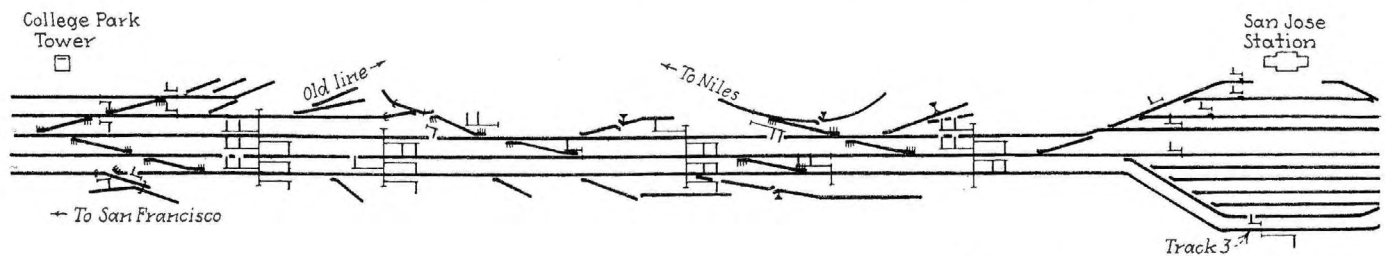
interlocking with hand-throw derails, electric locks and signal control was installed at this crossing.

Signal and Derail Control

A semi-automatic color-light signal is located on the Southern Pacific 700 ft. in each direction from the crossing. On the Western Pacific, a two-position semaphore home signal is located 250 ft. in each direction from the crossing. Split-point derails are located on the Western Pacific 200 ft.

is used to indicate when the traffic-direction locking is established for a certain direction on each of the tracks in certain sections. The traffic-direc-

by a single-track industrial branch line of the Western Pacific. The Southern Pacific line handles 14 scheduled passenger trains and a num-



Track and signal diagram of the complete

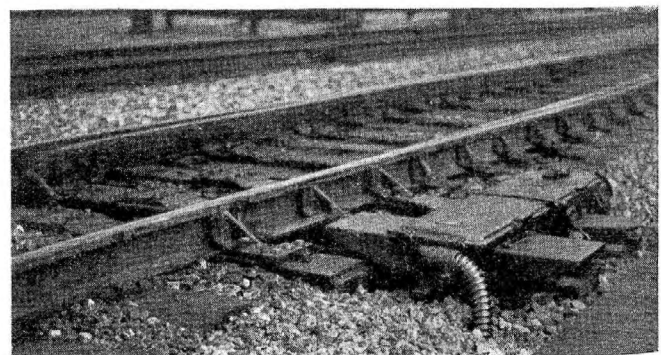
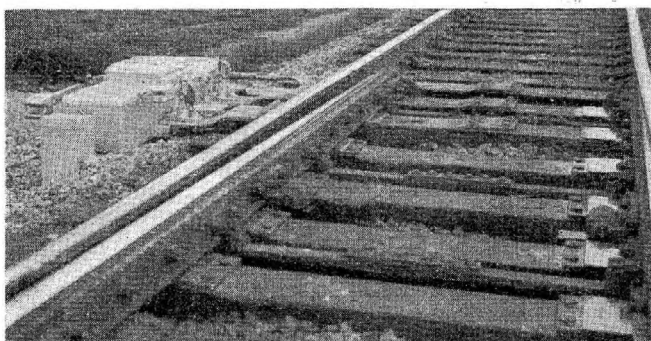
tion locking is controlled by the operation of the signal levers. The leverman in the San Jose office and the leverman at College Park must cooperate in establishing the direction of traffic on the tracks through the station, as well as between the station and College Park.

ber of extra freight trains and switching movements over this crossing daily, while the Western Pacific line handles switching moves at intermittent intervals. As a part of the new construction, a modified form of

from the crossing; no derails are used on the Southern Pacific. The two Western Pacific derails are both pipe-connected to a regular hand-throw switch stand located at the crossing and just east of the Southern Pacific

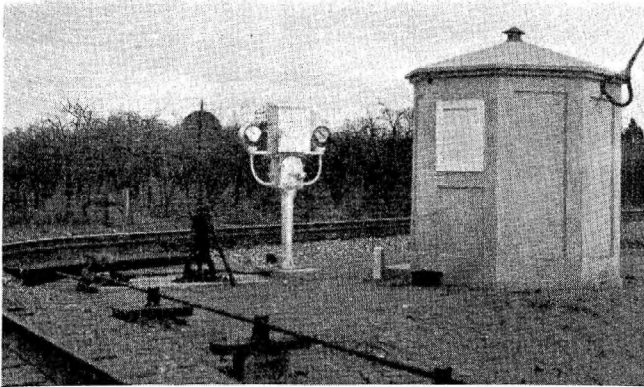
Special Protection at Western Pacific Crossing

At a point 2.5 miles north of Lick, the single-track main line of the Southern Pacific is crossed at grade



Above—One of the new power switch machines in College Park interlocking plant
Left—Power switch machine installed at the No. 6 switch

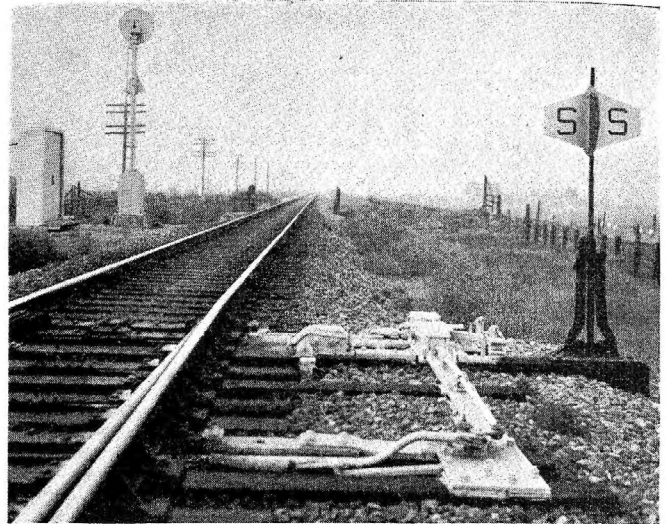
Right—Close-up view of the spring switch equipped with mechanical facing-point lock. Below—Indicators, electric locks and stand for operating derails and controlling signals at W. P. crossing



track. A connection from the lever stand extends as a lock rod into the base of an electric switch lock machine located adjacent to the stand, as shown in the illustration. Visible-

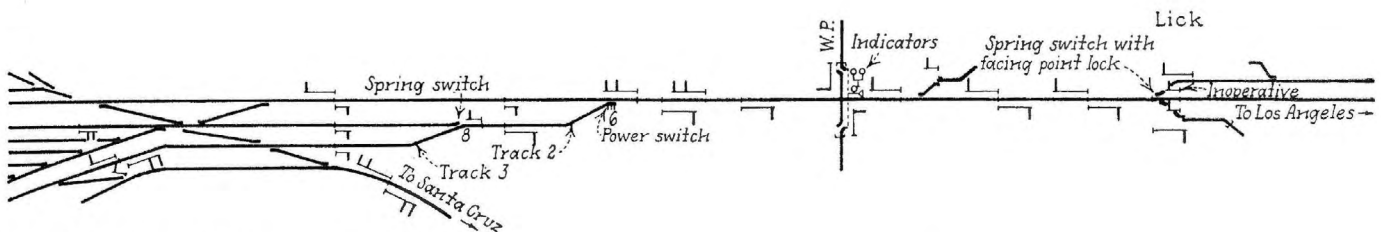
the door would not cause any change to take place in the circuits.

The trainman would then have to wind the clock work release to the full reverse position, if he desired to put



are both No. 20 turnouts with 30-ft. points. In order to ease up the operation of these switches, Union roller bearings are used as shown in the illustrations. Insulated continuous gage plates $\frac{3}{4}$ in. by 9 in. are used on each of these switches.

Each track circuit is fed by 3 cells of Edison primary battery, using a



installation between College Park and Lick

type indicators, mounted on each side of the locks, indicate the approach of trains in the two directions on the Southern Pacific track.

Normally the Western Pacific derails are set in the derailing position, the plunger of the electric lock is through the lock rod, the Western Pacific signals indicate stop, and the Southern Pacific signals operate as automatic block signals depending on track occupancy. When a Western Pacific train approaches, it is stopped short of the signal. A trainman goes to the crossing and opens the door to the lock case. With no train approaching on the Southern Pacific, the signals on the Southern Pacific will at once display the stop indication. After the signals have been checked in the stop position, the electric lock will immediately be energized, which is indicated to the trainmen by a small semaphore blade in the lock case. If a train had been on the approach circuit of the Southern Pacific, which would have been indicated by either one of the two approach indicators located on each side of the lock case, opening

the Southern Pacific signals to the stop position. When the release, set at two minutes, has run down, the electric lock will be energized. The trainman can then operate the crank to withdraw the plunger from the lock rod, and reverse the lever on the stand to close the two Western Pacific derails; after which the electric lock crank must be restored to the normal position, thus locking the derails in the closed reversed position, and then the Western Pacific signals will be clear. After the train has passed through the plant limits, the trainman reverses the crank of the electric lock, throws the switch lever to replace the derails in the derailing position, operates the crank in the lock to the normal position, closes and locks the doors of both cases, and the plant is then again normal so that the Southern Pacific signals again clear.

Details of Construction

The switch at the south end of single track at Lick, and switch No. 6 at the north end of double track,

4-ohm relay. Four cells of DMGO-5 storage battery are used at each signal, in the territory between Lick and the station. A battery of 12 Exide DMGO-9 cells furnishes power for operating the M-20 dual-control machine at switch No. 6. The machine is equipped with a thermal magnetic cut-out, so that if the switch stalls, the cut-out will open the motor circuit. The battery, rectifiers, and relays at switch No. 6 are housed in an octagonal concrete house. The identification tags used in this house, as well as in other cases, are made of leatheroid, and, instead of stenciling the tags, the numbers are printed on the tag with a pen, using India ink. After the ink is dry, a coat of shellac is applied to prevent absorption of moisture.

The wiring distribution south of the station to Lick is in a Kerite aerial cable, run on a $\frac{5}{8}$ -in. stranded messenger using Raco cable straps.

The installations explained herein were planned and installed by signal department forces of the Southern Pacific.