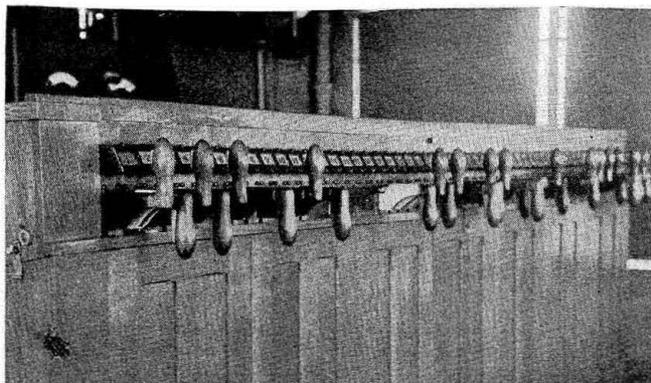


An Electric Interlocking on the Southern Pacific



Searchlight signals are used



Plant at Los Angeles includes modern construction—Signal aspects of special interest

A 56-LEVER electric interlocking has been installed by the Southern Pacific at Dayton avenue in Los Angeles, Cal. The track layout in this plant includes a junction between the double-track main line, entering the city from the north, and a double-track freight cut-off line diverging to the southeast, as well as the switches leading to the south end of both the inbound and outbound freight yards. A large percentage of the freight and passenger trains entering and leaving Los Angeles pass through this plant so that it is very busy 24 hours a day, approximately 30 through trains and 250 switching movements being handled daily.

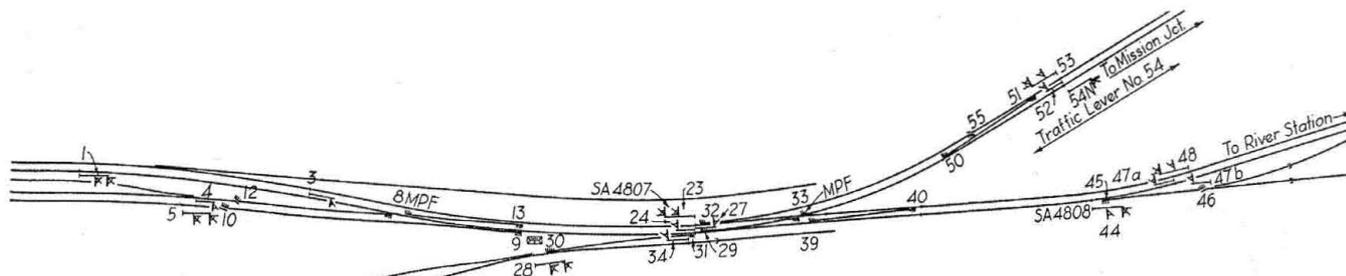
The 56-lever General Railway Signal Company Type-2A interlocking machine includes 14 levers for 26 signals, 10 levers for 4 derails, 11 switches and 2 movable-point frogs, and one traffic lever, or a total of 25 working levers. In addition, there are 7 active spaces, 8 spare levers and 16 spare spaces. Where the two ends of a crossover or a switch and a derail operate simultaneously, the two levers are attached to each other and are operated by one handle. The standard G.R.S. system of switch controls, employing dynamic indication, is used.

The most modern arrangement of individual cross-protection relays, circuit breakers, forced-drop lever locks, and ground-testing apparatus, forms a part of this installation. Each lever is equipped with an illuminated number plate. For a switch lever, the lamp behind the

number will light when the lever latch is pulled, providing the lever lock is released. In other words, this is an indication that the switch is free to be operated. When a signal lever is reversed, the number-plate lamp is lighted and stays lit until the signal moves to the position corresponding to the lever. This indication is accomplished by checking the position of the searchlight signal mechanism. The signals are controlled by separate two-wire circuits. Complete electric locking is arranged in the usual manner, using seven clockwork releases which are mounted below the illuminated track diagram.

A large illuminated track diagram is mounted on two-inch pipe posts at the rear and above the interlocking machine. The lamps in the diagram are normally dark, being lighted when the corresponding track section is occupied. These lamps are rated at 3 c.p., 6-8 volts, and are normally burned at 5 volts from an a-c. supply, but in case of a power outage, they are switched over automatically to a local low-voltage battery.

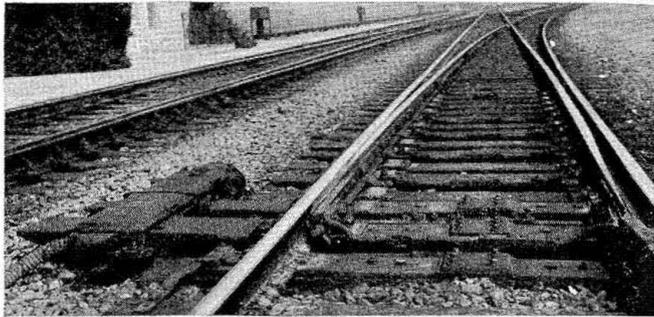
The tower, 23 ft. by 17 ft., is of unusual design, and is constructed of solid reinforced concrete. The first floor, including the heating plant, toilet, relay racks and battery cabinet, has a ceiling height of 14 ft. 8 in. The upper floor, with a ceiling height of 8 ft. 6 in., includes the operating room. The roof and ceiling are supported by the four concrete pillars at the corners, allowing clear



Track and signal plan of the Dayton Avenue interlocking

opening on all four sides for the hinged-type windows. The ceiling is covered with sound-absorbing material, to reduce the noise.

On the lower floor the battery is located in a cabinet along the west wall of the tower, removable sliding wood panels being used to enclose the cabinet. The



Three insulated gage plates are used at each switch

shelves are high enough to allow space above the cells, thus facilitating testing and inspection. The main battery for switch and signal operation, consists of 56 DMGO-9 Exide cells, on floating charge through a Union RP-81 rectifier, and a standby rectifier of the same type is provided. Two sets of low-voltage battery are provided. One set is for the lamps in the illuminated track diagram and the lever locks. The other set is for other low-voltage circuits. Both sets consist of four DMGO-9 cells on floating charge, using separate Union RT-21 rectifiers.

Relay Cabinets Enclosed

The relay cabinet is constructed of wood, using finished panels with tight-fitting glass doors, the entire case being varnished. The incoming wires terminate on porcelain-based A.R.A. terminals attached to 1 in. by 8 in. boards set out from the wall to permit wiring space in the rear. The jumpers are made of No. 14 flexible wire with Kerite insulation, using wire eyelets.

The main wiring distribution, between the tower and the various signal and switch locations, is in single conductor with 5/64-in. wall Kerite insulation, using No.

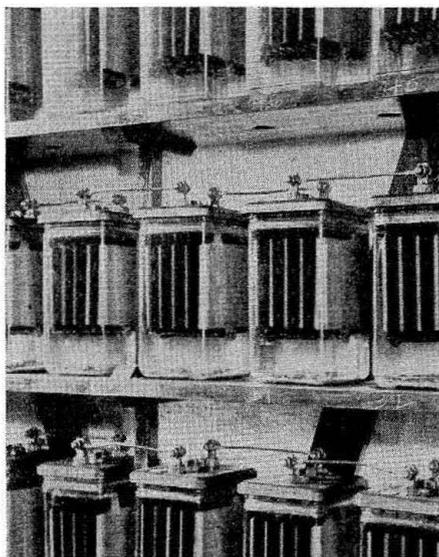
14, except for some of the outlying switches for which No. 10 is used. These wire runs are in trunking built up of creosote pine which was allowed to age six months before being used; this was done to allow the excess creosote to dry so as not to damage the insulation. The underground runs between junction boxes and switches or signals are likewise in buried trunking. At the home signal locations on the plant, the relays are housed in cases constructed of wood covered with sheet metal and supported by 2-in. by 2-in. by 1/4-in. angle-iron posts at each corner. The cases are made up in units, the lower case being used to terminate incoming wires on porcelain-based terminals, while the upper case is used for relays.

The signals at this plant are the Union Switch & Signal Company searchlight type designed for low-voltage operation, and are equipped with double-filament lamps rated at 13.5-3.5 watts.

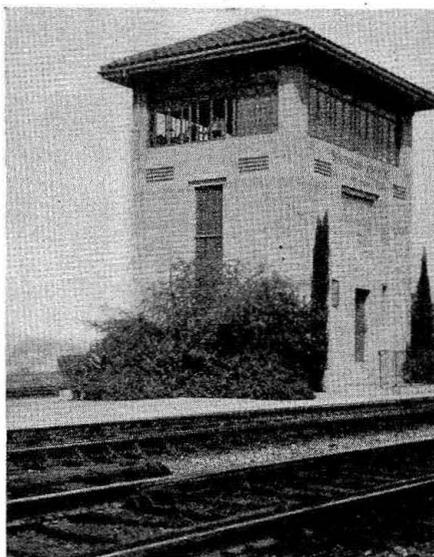
Signal Aspects of Special Interest

In addition to the three-indication top unit, each high signal has a bottom unit, consisting of a searchlight signal operating to two indications. For a main route, the top unit only is used, the lamp in the bottom unit being extinguished. For a diverging route the aspect is red in the top unit and green in the bottom unit. If the filaments in the top unit should burn out, the lamp in the bottom unit is lighted to show red only, on the approach of a train. This result is effected by using an ANL-2 relay in series with the filament of the top unit to control the light in the lower unit. No provision is made at this plant to display a call-on signal except at one location. On such rare occasions as the plant may be tied up, a rule provides that the towerman can give hand signals with a yellow flag or lantern. The one call-on signal, mentioned above, is located on the approach of a curve, a considerable distance from the tower. It consists of a low-voltage lamp in a metal housing, equipped with a yellow lens. A low-voltage flasher button is connected in series with the lamp. If, after the signal lever is reversed, the signal does not indicate "proceed," the call-on signal will flash yellow, provided the track circuits within the interlocking are energized, the switches are properly in position and locked, the signal lever is reversed and the signal operator is pressing a pushbutton.

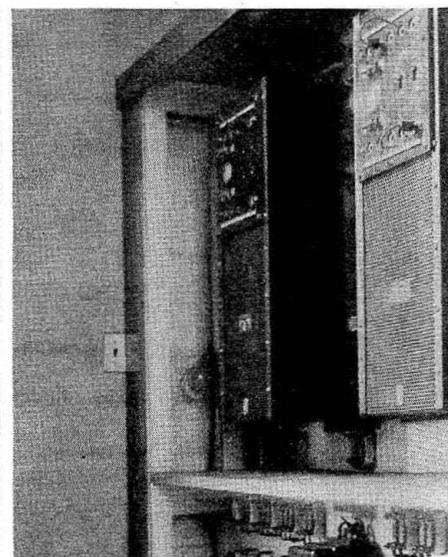
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Space above the cells permits inspection



The tower is of concrete construction



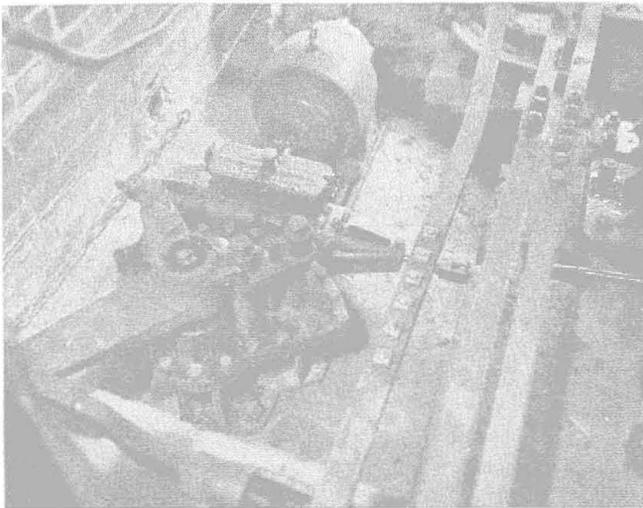
Rectifiers for the main battery are in duplicate

prises the control of the gates. One advantage claimed for this oil-pressure system, with the slide-valve control, is that the gateman by manipulating the valve properly can utilize the momentum of the electric motor armature for stopping and reversing the gates.

The motor for the gate mechanism is operated from a 220-volt supply, which is used also to operate the traffic signal lamps and to charge a storage battery, which serves as a standby supply for the signals and gate-detection circuits in case of an outage of the 220-volt circuit. The drive rod from the gate motor to the gates is provided with a selector, for use in case of a power-supply failure, which when operated by the lever in the locking frame provided for that purpose, disconnects the gate from the motor and connects it to a gate wheel in the signal cabin.

General Considerations

The installation of road-traffic light signals at a large number of street and highway intersections during the last few years has resulted in educating the average road-vehicle driver in the meaning of the aspect of these color-



The gate mechanisms includes an oil pump driven by an electric motor

light signals. Therefore, it seems certain that economies can be effected by the railroads taking the fact of this education into account in solving their problem of grade crossing protection, as has been done in this case.

This scheme of protection was developed in collaboration with and to meet the requirements of C. M. Jenkin Jones, superintendent N. E. Area, L. & N. E., and the work has been carried out under contract by the Westinghouse Brake & Saxby Signal Company. The scheme was installed under the instructions of John Miller, B.E., L.L.D., engineer, to the designs and under the supervision of A. E. Tattersall, M.I.E.E., F. Inst. P., signal and telegraph engineer.

Interlocking on the S. P.

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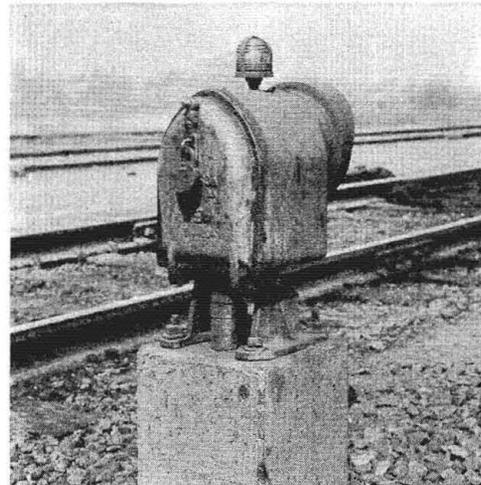
The home interlocking signals, which are semi-automatic, carry a number plate, under which is an additional plate with the letters "SA," which means that this is an interlocking signal which is track-circuit controlled in the automatic block beyond the interlocking limits. The rules require that an engineman encountering such a signal indicating "stop," must stop and not proceed until he

gets authority to do so from the signal operator; also that beyond interlocking limits, automatic-signaling rules apply.

The dwarf signals are also of the searchlight type, operating to two positions with a red or a green aspect. The signals are mounted on concrete foundations which raise them as high as possible without interfering with clearances. Where clearance is not limited, the signal mechanisms are mounted on an iron mast so as to bring the center of the signal 7 ft. 6 in. above the level of the rail. As a safety marker to prevent trainmen from injuring themselves when alighting, each dwarf is equipped with a small lamp, consisting of a mounting screwed into the top of the case which holds a 3-in. conically-shaped fresnel lens enclosing a 3-watt 6-8-volt lamp. This is lighted continuously from the a-c. supply at a greatly reduced voltage.

Power Supply

The signal mechanisms at each location operate from a local battery of four cells of DM-GO-5 battery. The signal lamp is fed normally from alternating current but is cut over to the battery automatically in case of a power outage. All signals are on approach lighting. The 110-volt d-c. supply is used for the line control of the signal relays, with a 7,000-ohm resistance in series with the 500-ohm relay to reduce the voltage to about 7 volts. Each track circuit is operated from a battery of four cells of 500-a.h. Edison primary battery using 4-ohm track relays.



A small lamp on top of each dwarf assists in preventing accidents to trainmen

The switch machines are the G.R.S. Model-5A equipped for operation on 110 volts d-c. The wires coming to a machine are brought up through a trunking riser and out through a flexible metal conduit to the switch machine so as to allow for vibration. The rail through this plant is 110-lb., with good ties and crushed-rock ballast. Insulated gage plates, $\frac{7}{8}$ in. by 9 in., are used on three ties including the one ahead of the points. The $\frac{1}{4}$ -in. riser plates are welded in place and machined to fit the base of the rail. The malleable-iron rail braces are bolted to the gage plates which in turn are spiked and bolted to the ties. In order to prevent excessive rail running, a sufficient number of anti-creepers is used at each switch layout. These are placed on both sides of each tie under the rails in both directions from the switch.

This interlocking was designed and installed by signal forces of the Southern Pacific.