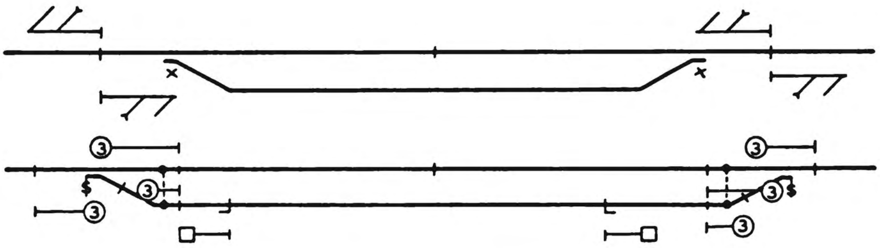
Railway Signaling and Communications

Modernized headblock location. Below: siding signals before and after

SP Modernizes



Automatic Block

On 47 miles in Arizona, old semaphores are replaced with searchlight signals and spring switch mechanisms with facing-point locks

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THE FIRST PHASE of a signal modernization program was recently completed on the Tucson Division, Southern Pacific Lines. The portion of the railroad involved, between Tucson and Picacho, Ariz., is of strategic importance, as it is the only rail link between Tucson and the west, on the Southern Pacific Sunset Route, which links San Francisco and New Orleans.

The territory includes 4.6 mi. of double track and 42.6 mi. of single track, over which are operated daily 11 regular passenger trains and 4 regular freight trains, in addition to numerous extra freight and regular local freight trains. At the peak volume of traffic, the number of extra freights will average approximately 8 daily.

When the sidings were extended, the signals at head-block locations were arranged in accordance with modern practice, as shown in Fig. 1. This necessitated widening of track centers at one end of the siding, in order to provide proper side clearance for the high signal, located between the tracks.

Where dwarf signals were located between tracks, a low wattage pilot light was mounted on the top of the signal for the protection of trainmen when alighting from trains in the dark. Where dwarf signals were located outside the tracks, they were mounted on a 7-ft. mast to provide better visibility.

A spring switch, equipped with US&S style S-20 facing-point lock and Pettibone-Mullikan mechanical switchman, replaced the former hand-throw switch stand. Switch points were equipped with US&S roller bearings.

Full protection for trailing moves through the spring switch was provided, as illustrated by the circuits shown in Fig. 2. Main line signals are normally clear, and siding signals are approach cleared, if the main line approach is not occupied by an approaching train. A receding stick circuit (MSR) is used to prevent a receding train from locking out the siding signal.

Push button circuits were used in preference to automatic timing-out circuits, as it was felt that the timing circuits should be used only when circumstances warranted, due to varying factors encountered in normal operation.

Lock over-travel protection was incorporated in the normal switch repeater circuit, in preference to providing a separate over-travel indication. This permitted the use of a reverse switch repeater circuit, which in turn was used in the control of an RWPS relay. The RWPSR figured prominently in the signal and approach circuits. A weekly inspection and test of spring switch adjustment and operation, with a written report is required of each maintainer, and the frequency of these tests and reports was deemed sufficient to offset the possibility of delays to trains on main line moves caused by overtravel of the lock rod.

Track circuits through the turnout are the standard series fouling

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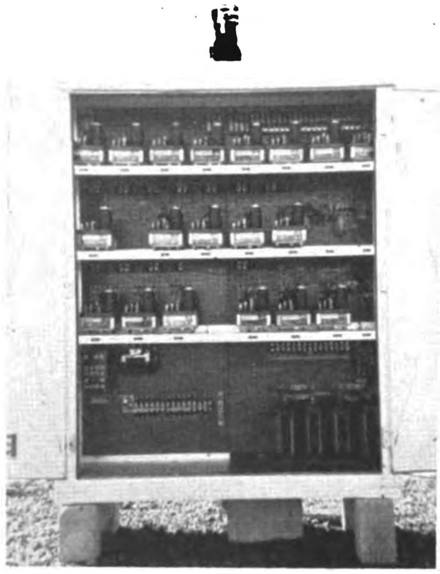
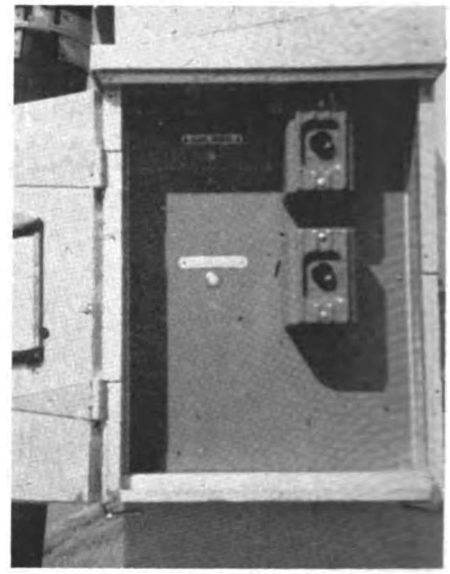
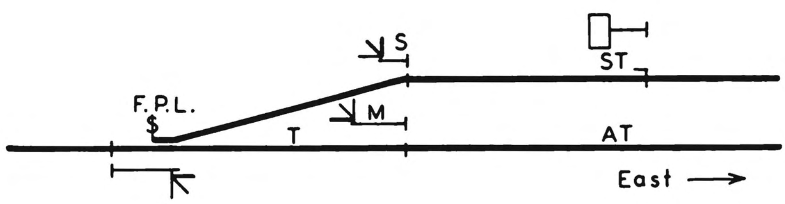
Style B instrument case used at signals



Instrument case at headblock location



Pushbuttons for manual signal control



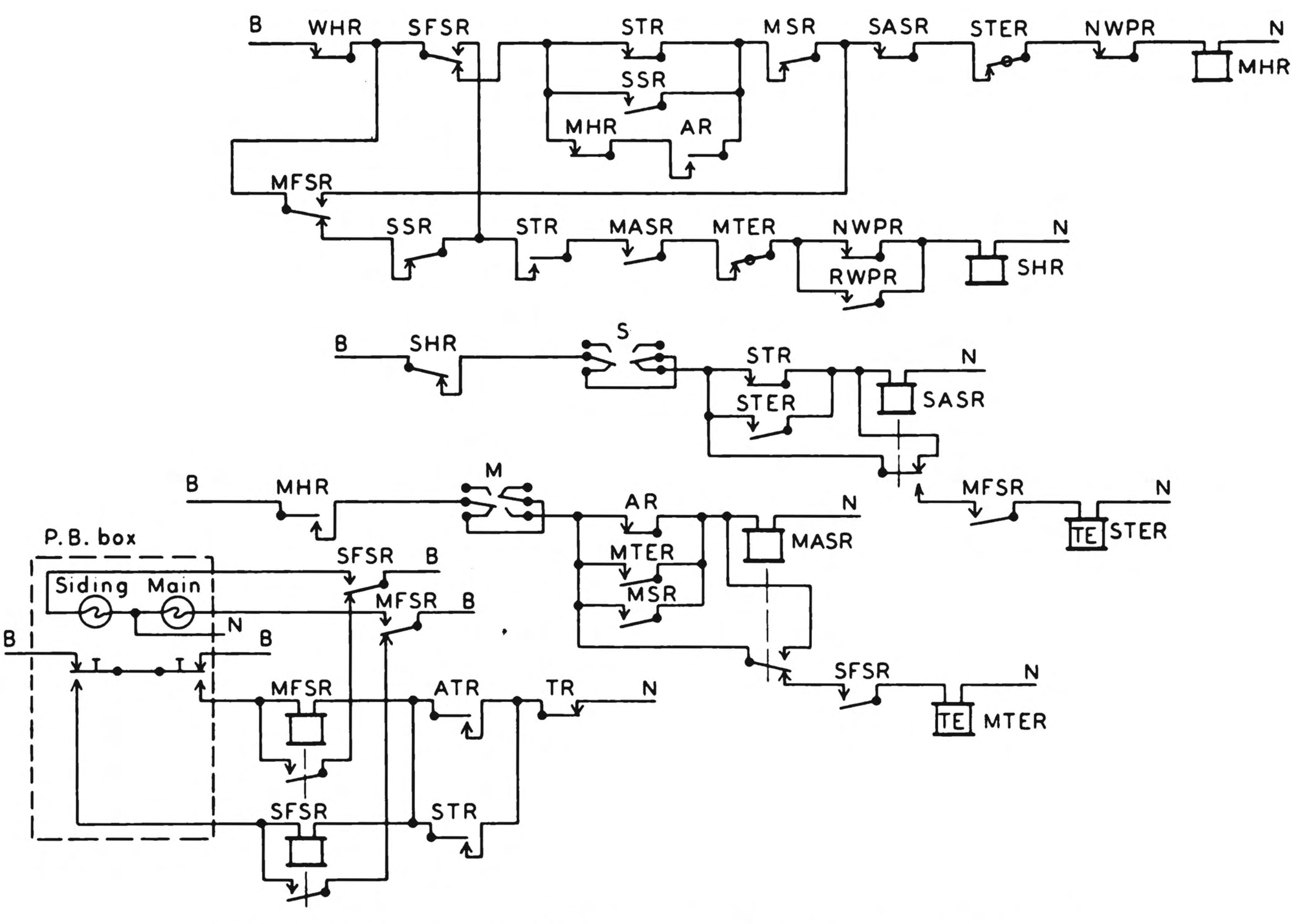


Fig. 2. Circuits for providing for full protection of trailing moves through the spring switch

circuit, other track circuits are of the conventional d.c. type, fed by four cells of 500 a.h. primary battery in multiple.

The style "B" semaphore signals were replaced with style H-2 three-position searchlight signals. As the style "B" cases were released, the style "B" mechanisms were removed, and the cases overhauled, repainted, and wired for H-2 signals, and returned to the field for installation. The semaphore masts were cut to proper length, and drilled and tapped to provide entrance for the flexible conduit connection from the signal mechanism.

At headblock locations a 4-ft. 11-in. sheet steel relay case was required for housing, with the bottom shelf utilized for the charging equipment, battery and termination of underground cables.

The sheet steel push-button box was mounted on the end of this case. These push-buttons, in addition to providing a timing-out feature, also serve to allow a back-up move by cancelling the receding stick, and are operated in the case of a train of such length that it cannot occupy the siding and clear without entering the 500 ft. approach circuit. In this instance, the main push button is depressed, energizing the MFSR and restoring control of the signal to the main line.

Lightning protection is provided by Premier spark-gap type arresters mounted in the pole-top box and discharged to ground, and supplemented by Raco Clearview arresters in the case, discharged to the rail. All signals are approach lighted from the normal a.c. supply, with d.c. standby when the power is interrupted.

Power Supply

The storage batteries are the Exide DME5A. Cables are of the Flamenol insulated type furnished by General Electric; relays are the US&S style DN-11 neutral, DP-20 retained-neutral-polar, DNL-4 for approach lighting, ANL-2 for light-out protection and ANL-30 for power transfer. All major items of signaling equipment were furnished by the Union Switch and Signal Division of Westinghouse Air Brake Co.

Work was performed by the division signal forces under the direction of H. A. Garrett, signal supervisor. Overall planning was under the direction of H. B. Garrett, signal engineer, and A. C. Krout, principal assistant signal engineer.

Primary Battery Feed For Electric Switch Lamps

AN EXTENSIVE TEST PROJECT, to determine the practicability and efficiency of replacing oil switch lamps with electric switch lamps, fed by primary battery, has been conducted by the Lehigh Valley.

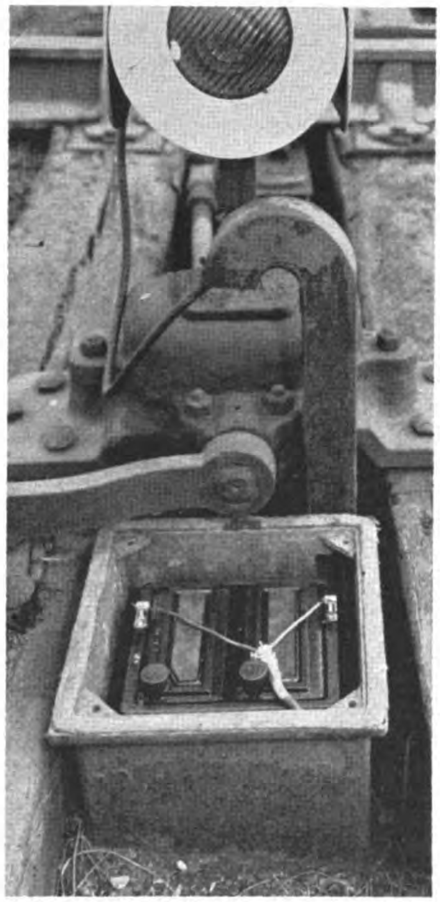
When changing from oil to electric operation, the lamps are cleaned and painted inside. The oil is replaced by a special unit consisting of a cylindrical wooden block, on which is mounted a special receptacle that places the filament of the electric bulb at the focal point of the colored lenses in the switch lamp.

A cast iron box, with inside dimensions of approximately 9½ in. by 9½ in. and 18 in. deep, is set in the ground between the switch ties on the "field" side of the switch stand, as shown in the picture. Normally this box is covered by a cast iron cover, and tightened in place by ¼ in. set screws against a gasket, to make a watertight connection. This box was designed to be installed between the switch ties, with the top of the box flush with the top of the tie. The snorkel is between the switch stand handle and the switch stand proper, which places it in a position so as not to increase the hazard. The snorkel opening provides ventilation, as well as a wire outlet at a point well above any water which may accumulate around the switch. This tube, about 2 in. square, is attached to the "track" side of the box, and comes up and over at a 180 deg. curve behind the handle of the switch stand, as shown in the pictures. The circuit between the lamp and battery box is made with a cable containing two No. 12 flexible insulated wires which form a weatherproof flexible cord.

In this box is a type 25J1 two-cell Carbonaire type of primary battery, made by Thomas A. Edison, Inc., Primary Battery Division. This battery, which is rated at 2½ volts, has a capacity of 1,000 a.h.

The two cells of the battery are sealed in a hard rubber container. To place this battery in service, water is poured into each cell to the prescribed level. Then the battery is placed in the box, and the two wires are clipped to the battery terminals. This battery is capable of continuously lighting the electric bulb in the switch lamp for from 10 months to a year. Then the battery, as well as the lamp bulb, are replaced. Although the bulb might give longer life, good practice dictates that it be replaced when changing the battery, to avoid failures in service.

The price of the battery is about $12.50 and the bulb about 50 cents. The labor for replacing battery and bulb, and for inspections from time to time, totals about $3.00 annually,



Box is between the ties

thus totaling about $16 annually for maintenance and operation of the switch lamp, with the electric bulb, as compared with about $40 annually for a similar switch lamp using oil.

The Lehigh Valley has thus replaced oil lamps with electric lamps in about 300 switch stands in yards near Newark, N. J., at Richards, Pa., and Sayre.