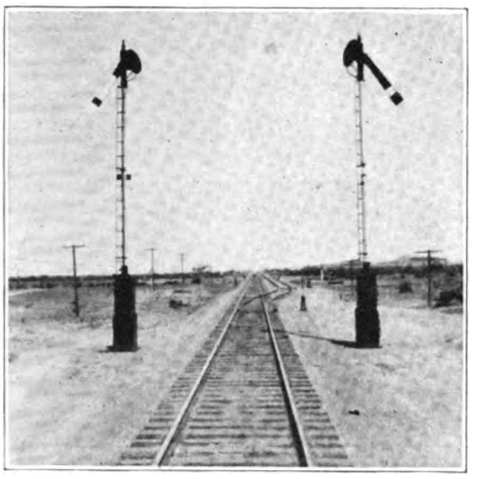

On the Southern Pacific

Introducing Economies in Signal Operation

Storage Batteries Replaced by Primary Battery, Electric Lights Installed, and Maintenance Force Reduced

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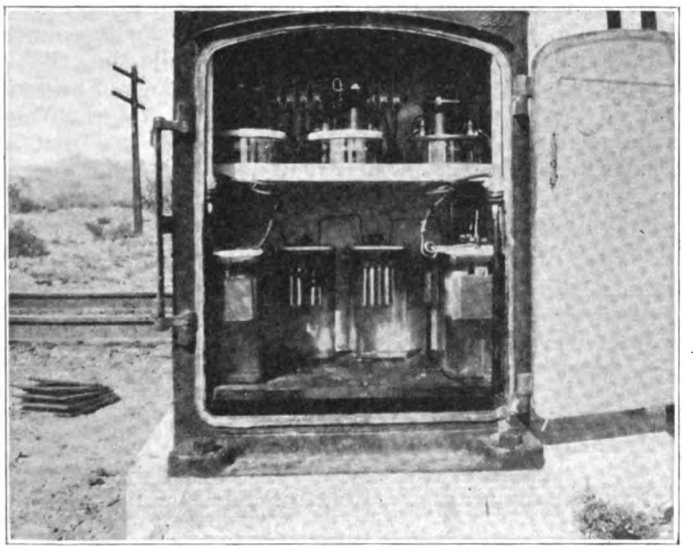
ON the Southern Pacific between Niland, Cal., and Yuma, Ariz., there is an old installation of automatic signals to which some new ideas have been applied that are proving very successful and show clearly what can be done in the reduction of the cost of signal operation. This installation covers 65.7 miles of single track and consists of 129 single arm and 8 double arm Union Signal Switch & Signal Co. Style B signals, arranged for standard automatic block signaling. These signals were installed several years ago at a time when the Southern Pacific equipped automatic signals with oil lamps and operated the mechanisms with energy supplied by portable storage batteries. A battery charging plant was built at Niland as a part of the original installation and placed under the charge of a batteryman whose entire time was devoted to the charging and distribution of the batteries. The 65.7 mile section was divided into four maintaining sections and a maintainer assigned to each section.



Battery Is Housed in the Lower Part of the Double Signal Cases

The increasing necessity for greater economy that has so urgently held the attention of the railroads in recent years, ruled that this arrangement could not be considered as sufficient. As the signals on this district offered an excellent opportunity for experimentation, various schemes that seemed to hold a promise for improvement or economy were tried out here.

The operations of the battery charging plant at Niland had been confined entirely to the signals between Niland and Yuma, on account of a non-signaled district of 65 miles immediately to the west. This condition lent itself admirably to the scheme and plans were made for abandoning the charging equipment entirely.

Edison caustic soda batteries were installed throughout, replacing all storage battery, as well as gravity battery, which had been used on track circuits. When this work was completed the batteryman at Niland was eliminated and the battery charging plant converted into a motor car repair shop.

Under the latest arrangement the caustic soda batteries at intermediate signals are housed in standard battery boxes, built in Southern Pacific shops according to drawing S. D. 719. These boxes are made of 2 in. creosoted redwood, the corners are well protected with metal and the lid is covered with No. 20 gage sheet iron. Twelve inch T-hinges with a brass pin and a hasp of the same character are used. The box has a capacity of 16 cells and costs approximately $18.50. At home signal locations the battery is divided, half being placed on each side of the track in the lower compartment of the signal cases. This arrangement affords ample opportunity for frequent inspection without lifting the elements or disturbing the cells in any way, and at the same time the cost of the battery housing is reduced to a minimum.

The Elimination of the Oil Lamp

Approach lighting circuits were installed at a small cost and each signal lamp equipped with a 2-watt, 8-volt, S-14 double-coil filament bayonet-base lamp. This lamp is mounted with a relay and push button on one self-contained block which can be slipped readily into the lamp body in lieu of the lamp fount. The relay serves the purpose of cutting in the second filament when the first burns out, and the push button is used by the maintainer to test the lamps.

The adjustment of the relay is such that with the approach circuit occupied it will pick up and cause both filaments to burn during the undesirable period of peak voltage that follows each battery renewal. This serves to bring the voltage to normal as quickly as possible and when this is done the relay will operate in such a way as to light up only one filament at a time. With the completion of the electric lighting system a reduction was made in the number of maintainers, leaving three on the district instead of four.

Line Relays Normally De-energized

Figure 1 is a complete wiring plan of special circuits showing scheme for energizing the slot-coils direct from

the line and de-energizing the line relays while the signal is in the clear position. The plan also shows approach lighting circuits and arrangement of battery at home signal locations.

The scheme, which is applicable to one arm as well as two arm signals, accomplishes its purpose by placing the slot coils in multiple with the line relay while the signal is clearing. When this position is reached the slot-arm

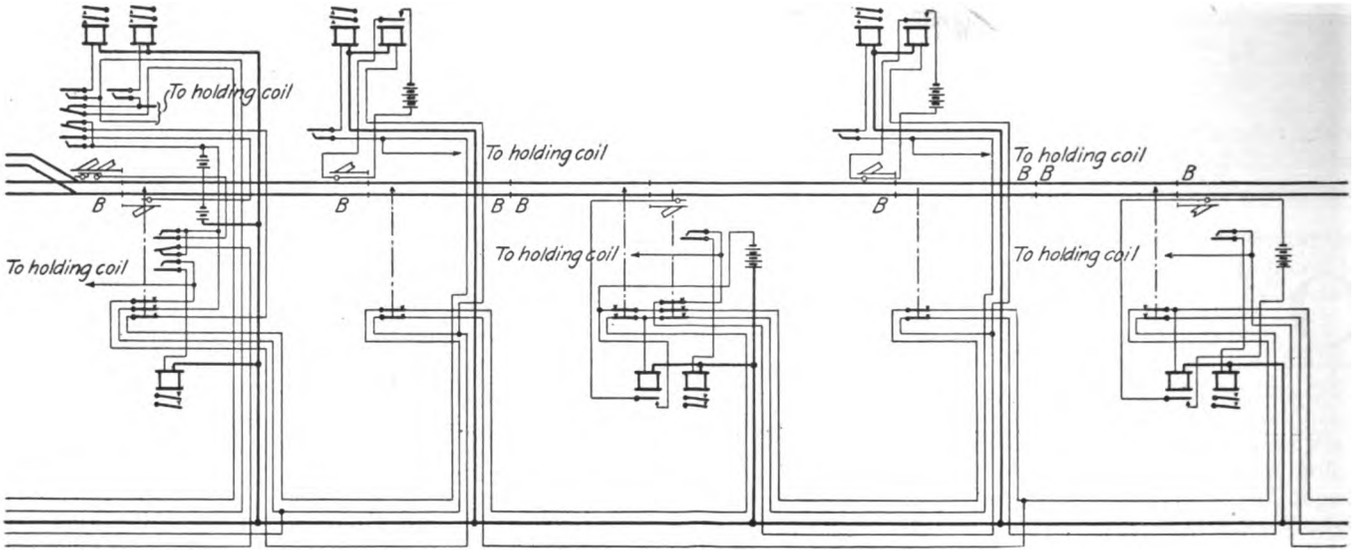


Fig. 1—Diagram of the Hold-Clear Slot Circuits and the Approach Lighting Circuits

operates a contact which breaks the multiple tap to the line relay de-energizing this relay and causing it to remain de-energized while the signal is in the clear position.

An experimental installation of this circuit was made in 1920 and this was soon extended to all signals on a 13 mile section. The operation has been decidedly satisfactory and the system is now being extended to other signals on the district.

The appealing feature of this circuit is, of course, the great saving of energy. Where the average life of the

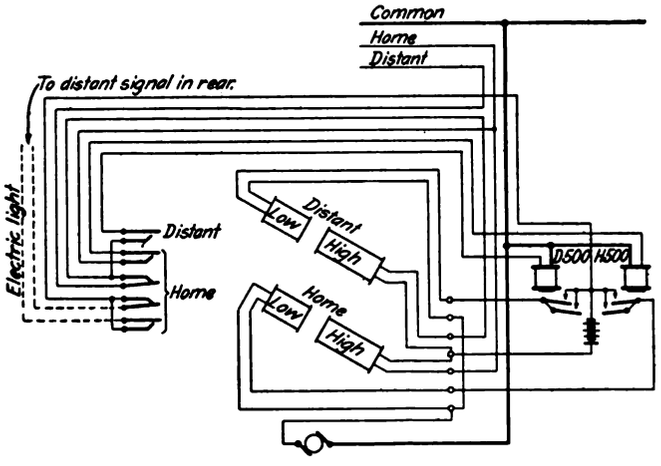


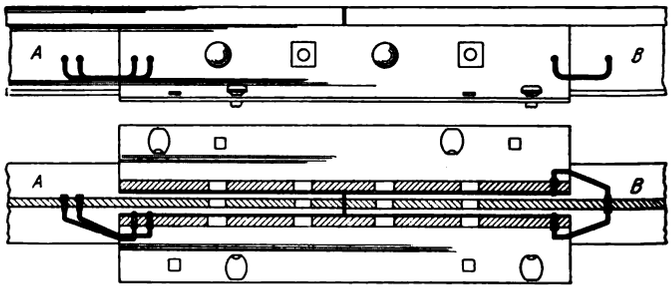
Fig. 2—Slot-Coil Energized from the Line With the Relay Normally Deenergized

battery was seven months the use of this scheme will approximate a saving of 21 per cent of the battery. Stated another way, the actual saving of current that otherwise would be used to energize the line relays in a standard automatic signal layout is 181 a. h. per battery per year. This is a substantial bit of economy and if made over any considerable territory would amount to quite an item.

New Methods of Bonding

A method of bonding with a 17 in. flexible galvanized iron wire from the rail to the angle bar is shown in the sketch. This wire is prepared for bonding in the shop, where it is taken off the reels, cut into 17 in. lengths, and thoroughly tinned at each end and in the middle where channel pins make contact. See B in sketch.

The holes are drilled somewhat lower in the angle bars so as to bring them through the thinnest part, making it possible to drive out a channel pin in case it is necessary to rebond. All holes are chamfered with a starting punch which removes the sharp edge around the hole, thus allowing the wire to follow the pin without cutting. The pins are all driven with a special punch. One of the advantages claimed for this method of bonding are that it places the angle bars in the circuit and gives some degree of protection against broken angle bars. As the cable is one-third the length of an ordinary iron bond wire connected around the angle bars in the usual manner, the



The Two Methods of Bonding Being Tested

bonding resistance is materially reduced. With these new bonds there is less possibility of failure resulting from bond wires being torn out by dragging equipment due to the fact that it places wires on both the inside and the outside of the rail. Although 13 miles of this bonding has been installed the experiment has not progressed far enough to indicate any definite results. It is expected that the trial will justify further use and that several miles more will be bonded in this manner. In the drawing A shows another method which is being tested out.