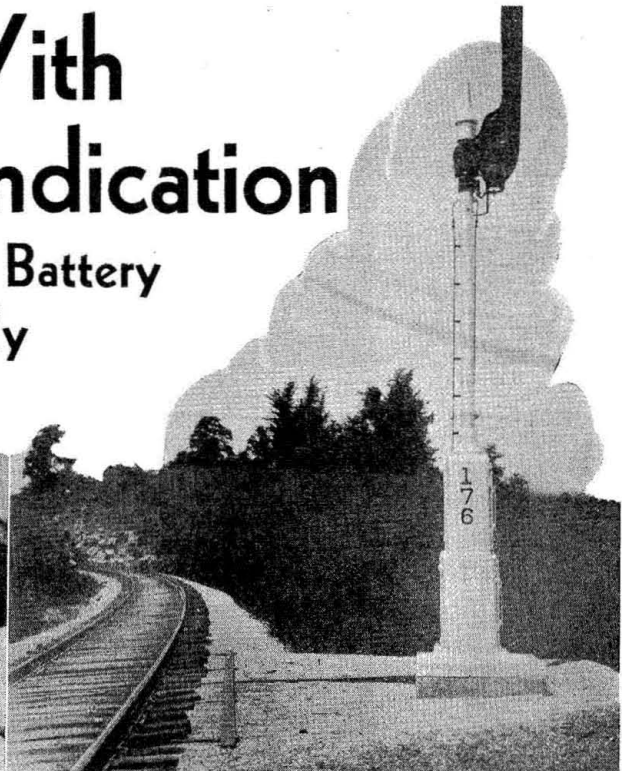
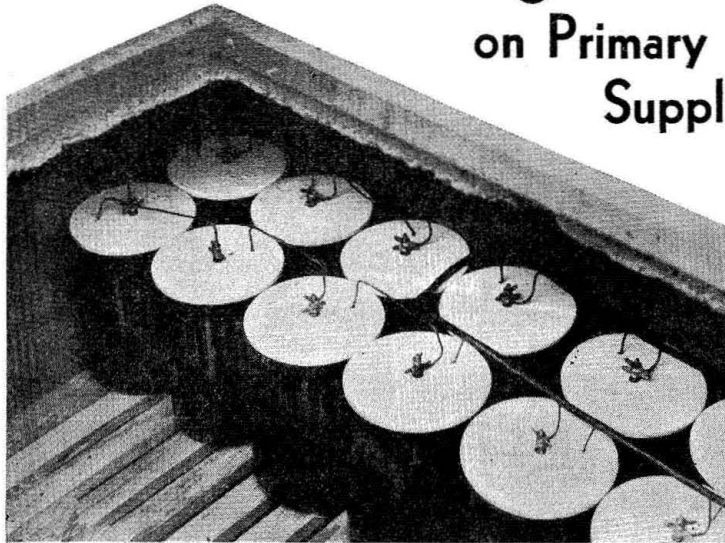


Frisco Uses

Semaphores With Color-light Indication

on Primary Battery
Supply



With approach control and lamp energized from operating battery, 16 cells have average life of 11 months 12 days

THE St. Louis-San Francisco, with 126 miles of double track and 1,082 miles of single track equipped with semaphore automatic block signals, has made an extensive study of electric lamps for such signals. The first extensive installations of signals on this road were made in 1910, between St. Louis, Mo., and Monett, 282 miles; between Kansas City, Mo., and Thayer, 339 miles; and between Armory, Miss., and Birmingham, Ala., 118 miles; a total of 739 miles. These signals were all equipped with oil lamps. During the years 1924 to 1930, signals were installed from Monett, Mo., to Tulsa, Okla., 142 miles; from Thayer, Mo., to Hoxie, Ark., 58 miles; from Tulsa, Okla., to Sapulpa, 14 miles; from Sapulpa to Oklahoma City, 103 miles; and from St. Louis, Mo., to Cape Girardeau, 130 miles; a total of 447 miles of line, all of which is single track, except the 14 miles between Tulsa and Sapulpa, which is double track. All the signals on the Frisco are the Union Switch & Signal Company Style-S upper-quadrant semaphores and are operated from primary battery, using the Edison 500-a.h. multiple-plate type.

Daylight Electric Lamp Indication

On the 447 miles of line equipped since 1924 the most interesting feature of the signaling is the use of long-range electric signal lamps designed to provide not only a night indication but also a daylight indication under the most adverse conditions. The operating department desired that semaphore signals be used in order that trainmen could observe the signals, and the maintenance of way department considered that semaphore signals assisted the men on motor cars and in their work, by giving to them an indication of approaching trains. However, the operating department desired

that the semaphore indication be supplemented at all times by the electric light. The signal department, therefore, made numerous tests to secure an electric semaphore lamp that would give a satisfactory daylight indication up to 5,000 ft., even under the adverse conditions of the sun shining on the lens. The electric lamp has a cast-metal body with fittings for mounting on an A. R. A., Signal Section, lamp bracket.

On the more recent installations the semaphores are mounted on short masts so as to bring the spectacle shaft 15 ft. above the level of the rail, the result being that the lamp and blade are more directly in line of vision of the engineman in the cab of a locomotive.

Control of Lighting Circuit

The lamp bulb at each signal is rated at 5 watts, 10 volts, and is fed from the regular 16-cell primary battery, which serves also for the operation of the signals and the line-control relays. The lighting is on approach control with four different types of circuits. At double head-block signal locations, the light in each signal is controlled through an 0-5-deg. contact on the mechanism of the signal on the opposite side of the track. At single locations the lamp circuit is completed through a back contact of the approach track relay, providing that the track circuit is long enough and so located in the approach to the signal that the lamp will be lighted before a train comes in view of the signal. Where conditions do not meet this requirement, the lamp is controlled through a Union DNL relay which is connected in series with the line relay of the same-direction signal in the rear. In the event the control circuit is too long, extending over too many track circuits, thus causing the light in the

signal to remain lighted for too long a time, the approach control section is reduced by bridging a resistance, equivalent to that of the control relay, from the control wire to the negative return wire, including between the location of this resistance and the battery supplying the control wire, the number of track circuits over which it is desired that the light in the signal be lighted. When the other track circuits in the control are shunted, a return for the battery to keep the DNL relay energized is provided through this shunt. When track circuits are occupied between the location of the shunt and battery for control relay, the DNL relay is de-energized and the light in the signal is lighted.

The signal lamps are left in service for the life of the battery. Very few lamps fail in service, and, if one should burn out, no trains are stopped, because an engineman is permitted to accept the indication of the signal blade as authoritative, even though the lamp may be burned out.

Records are kept of the life of every battery. All track relays are the 4-ohm type, three cells of 500-a.h.

RECORD OF MOTOR BATTERY

DIVISION Southern DATE 5-10-32
 I HAVE THIS DAY RENEWED MOTOR BATTERY ON SIGNAL No. _____
 USING 16-Edison COMPLETE ☒
 RENEWALS ☒ JARS _____ COVERS _____
 THIS BATTERY WAS RENEWED April 15 1931
 WITH 16-Edison RENEWALS OF THE 505 TYPE _____
 HAS SIGNAL BEEN PUMPING? No No. OF HOURS _____
 GIVE BELOW CAUSE OF RENEWING BATTERY IN FULL.
Exhausted
Life - 12 months 25 days
One 10-volt 5-watt lamp
H. W. Wait

Reproduction of battery renewal report made by maintainer and sent to signal engineer's office

primary battery being used on each track circuit. Where the Union Model-9C relays are used, the track battery has an average life of 7 to 8 months, but where the Model DN-11 relays are used the average battery life is 12 months. The average life of a 16-cell operating battery on an electrically-lighted signal is 11 months 12 days. On the signals on which oil lamps are still in service, the life of the operating battery is about 13 months. In other words, the operation of the 5-watt signal lamp shortens the battery life only about 1 month 18 days. None of the maintainers on straight automatic territory have helpers, and where the signals are equipped with electric lights each maintainer has a territory from 25 to 28 miles long.

Data covering all factors, compiled by the Frisco, show that the use of an electric semaphore lamp saves an average of \$1.40 per month as compared with an oil lamp. A total of 335 of the signals installed in 1910

have now been equipped with electric lamps to replace the oil lamps, the average cost of the change-over being \$40 per signal. The material required includes the cast metal lamp with fittings, one-inch pipe conduit down to the signal case, wiring etc. On the average the saving effected by the change-over pays for the improvement in about two years.

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Burlington Train-Stop

IN THE Interstate Commerce Commission's decision of December 5 last, concerning the petition of the Chicago, Burlington & Quincy for relief from automatic train control orders, the Burlington was granted authority to discontinue the maintenance of the automatic train stop system between Creston, Iowa, and Lincoln, Neb. The commission's order, which includes an abstract of much detailed testimony presented by the road and considered at hearing held by the commission, follows in abstract:

The system, that of the Sprague Safety Control & Signal Corporation, is of the intermittent magnetic induction type and was installed from Creston, Iowa, to the Missouri river in 1925, and thence to Lincoln, Neb., in 1926, the total distance being 162 miles. The total cost of the installation, including locomotive equipment, was \$337,641 and the cost of maintenance from July, 1927, to February, 1929, averaged \$14,931 per annum. This cost is increasing because of the aging of the apparatus and also because of the necessity of equipping a larger number of locomotives, because locomotives are now run through between Chicago and Lincoln, 551 miles. Modern locomotives cannot economically be confined to short runs, but must make long runs in order to accomplish satisfactory returns on the investment in them.

The apparatus has functioned reasonably well and the company bases no claims on any defects in the apparatus. The Burlington never approved the use of automatic train control (although, says the report, it made no effort to contest the commission's order) but it has at all times endeavored to give the train stop a thorough trial. The petition is primarily prompted by the severe financial straits in which the company finds itself. The falling off in business has resulted in great losses and the reduction of train movements over this section of the road has brought the average traffic down to 1,699 trains per month as compared with 2,276 trains in 1928. Discontinuing the operation of the train stop will save about \$15,000 per annum; and the operating vice-president expressed to the commission his opinion that there would be no diminution of safety.

There is no record of any accident averted by this installation. Of 34 enginemen running on this territory, 28, when questioned by the superintendent of motive power, were in favor of removal of the device.

Within the past 38 months, the Burlington has installed centralized traffic control on 35 miles of line within this territory at a cost of \$207,367 and has put in interlocking at Lincoln at a cost of \$122,639. Since July 1, 1922, the Burlington has expended on signal improvements, other than the automatic train stop, \$5,536,565. The result of these expenditures, it is claimed, has substantially lessened any need for the automatic train stop.

The signal engineer testified that in his judgment train operation in this territory, without the automatic train stop, will be as safe as at present; and the money which it requires would be better spent for highway crossing protection and the extension of centralized traffic control.