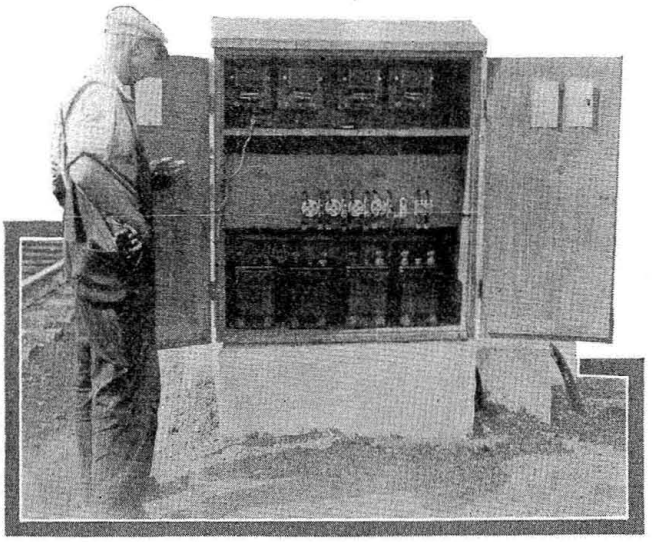
Maintenance Tests at Burlington Interlocker



Checking the charging rate of rectifiers which feed track circuit batteries

ROUTINE electrical tests of semaphore signal mechanisms, relays and switch machines at the Aurora electric interlocking plant of the Chicago, Burlington & Quincy, serve to ferret out trouble before any operating failures can occur. The interlocking machine installed in December, 1924, has a 128-lever frame with 120 working levers. The interlocking area comprises three distinct plants, but all of the control levers are in a common machine. Some idea of the magnitude of the interlocker may be gained from the fact that the distance between the extreme east and west home signals is 7,245 ft.

Aurora, Ill., is an important junction on the Burlington; the line to the Twin Cities, which carries the through traffic for the Great Northern and the Northern Pacific connections, joins the main line at the west end of the Aurora interlocking. The main line continues west toward Galesburg. A large amount of switching is handled within the interlocking limits, owing to the fact that Aurora is the western terminus of the Chicago suburban service, and also because two passenger trains each way daily are split and combined at Aurora. All switching movements during the rush hours are directed by signal indication.

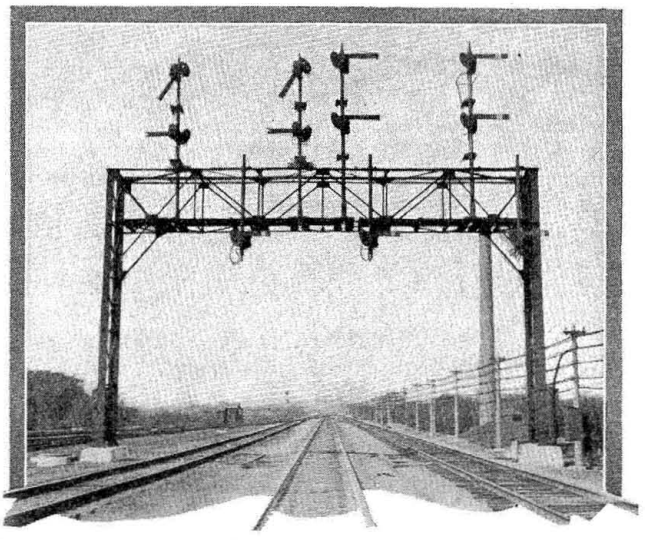
Maintenance Organization

The Aurora plant is maintained by two maintainers on week days, the first man reporting for work at 5:30 a. m. and remaining until 2:30 p. m., when the second man arrives. The second trick maintainer leaves at 10:30 p. m. and there is no one in attendance from then until 5:30 the next morning. On Sundays one man reports at the tower for a period of four hours, principally to be on hand in case of trouble.

The first task in the morning is to look for any trouble reports from the towerman and to make a ground test by means of two knife switches mounted on the illuminated track diagram. By means of these switches the maintainer can determine whether or not there is a ground either on the positive side of the machine or on the common wire. The ground is measured by means of a zero-center voltmeter reading from 0 to 150 volts in each direction from center. A third knife switch on this panel makes it possible to measure any voltage existing between the machine frame and either the common wire, or the positive control wires, of the interlocker. Ground readings in excess of 50 volts usually lead to an investigation to determine the cause. On Saturday of each week all of the switches in the plant are oiled in order that everything will be in readiness for the Sunday traffic. No definite maintenance schedule is adhered to on the other days of the week, there being such a large amount of maintenance work required at this plant that the maintainer plans his own work each day.

Testing Polarized Interlocking Relays

Each switch machine, or derail mechanism, is controlled through a circuit which employs a polarized relay mounted on the interlocking control machine. These relays are for the purpose of protecting the plant against foreign current or crossed wires which would impress current of improper polarity on the switch machine. For the purpose of checking their integrity, the maintainer employs a test set which comprises a 0 to 5 amp. ammeter, mounted on a panel with a small compression-type rheostat of 130 watts rating, the rheostat being connected in series with the ammeter. With this test set the maintainer makes a connection between the "normal control" and "reverse control" binding posts of the power switch machine mechanism on the ground. The test is accomplished by adjusting the rheostat until the shunt current is about 2 amp. At this value the polarized relay on the control machine should kick over and open the circuit. At the same time the maintainer also inspects the operating and indicating contacts in the switch machine mechanism, and inspects the switch point adjustment to see that



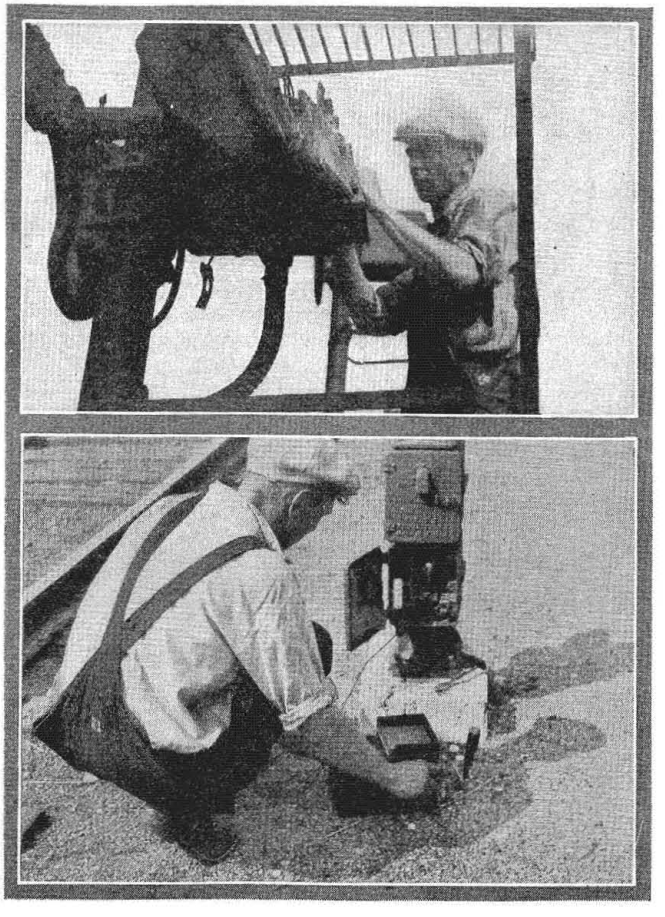
Semaphores signaling just west of the tower—Note aerial cable line to the right

the "KR" circuit is opened when the point is open more than ¼ in.

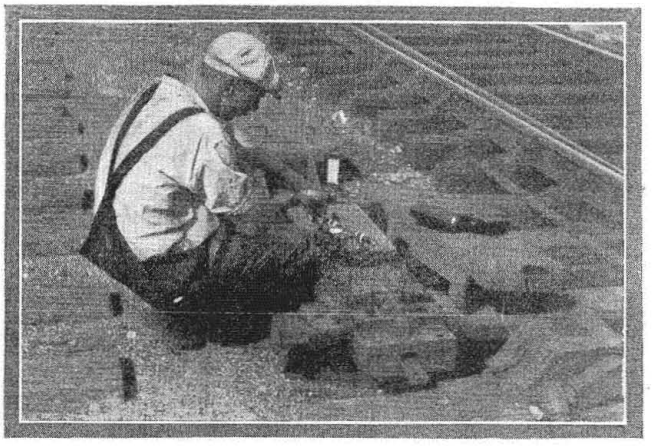
Most of the signals are Federal semaphores, and periodic release tests are made of these. In making this test the maintainer connects his voltmeter across the terminals of the hold-clear coil of the signal. If he should find a signal releasing at a voltage less than two volts, he will make a note of it so that the signal can be sent to the shop for repair. The release value of a signal can be increased by inserting a new set of stop pins below the armature of the hold-clear coil, in order to increase the air gap in the magnetic circuit.

The circuit controller contacts on the semaphore signals are examined to see that there are no loose contacts or binding posts, and the commutator and brushes of the motor are inspected and, if necessary, the commutator is cleaned. On a few of the semaphore signals the shaft supporting the spectacle has been removed and cleaned with emery cloth. The necessity for this is usually indicated when oil will not run down the oil pipe on the shaft.

All of the control relays, both in the tower and the instrument shelters outside, are tested about once a year for pick-up and release. A card record is maintained, each card showing the date of the test and the pick-up and release value of the relay as well as other identification data, such as the relay circuit reference number and serial number. These record cards are filed according to serial number. It is now the policy of the Burlington to renew all signal relays once every six years. A card record is also maintained of the semaphore signals.



Top—Inspecting commutator of semaphore motor
Bottom—Checking insulation resistance of dwarf signal circuit wire



Obtaining check of polarized cross-protection relay on control machine in the tower, by shunting terminals at the switch machine with a rheostat and ammeter

In testing the wires for grounds, the maintainer employs a Standco megohmer which comprises a small hand-driven generator and a voltmeter with a scale calibrated to read directly in ohms. It is necessary, of course, to disconnect both ends of the wire from the circuit when making an insulation resistance test. The greatest use of the megohmer is in hunting trouble on grounded circuits.

Batting Averages for Signal Maintainers on M. P.

SIGNAL performance records are compiled on every railroad equipped with automatic block signals, and while these records undoubtedly lead to better signal performance, the Missouri Pacific, in an effort to stimulate rivalry between the signalmen on a division and also between the respective divisions of the system, has established what is known as the Missouri Pacific Railroad Signal Performance League. Each of the seven divisions of the road equipped with automatic signals constitutes a team in this league. Every signalman on a division is a member of the team, the number of players varying with the number of signalmen on the division. All delays to trains at signals, which are caused by other than broken rail, train in the block, open switches or other interruptions which are creditable to the signal installation, are charged against the signalman who is maintaining the particular territory.

In computing the "batting averages," the number of train delays is divided by the number of signals on the territory. A perfect record for a month would be 1.000. If a signalman has 40 signals on his territory and encounters one train delay which is of a non-creditable nature, his "batting average" drops to 0.975. If his record is clear the following month, his rating goes up accordingly. These percentage ratings are carried from January 1 of each year. In computing the division averages, the total number of signals on the respective divisions are used. Thus there is no partiality shown as between divisions even though some have considerably more signaling than others.

The individuals holding perfect scores are listed in each monthly report issued by the signal engineer who acts as "official scorer." The performance league is striving for a 1929 goal of 50,000 signal operations per failure. Thus far, the record indicates that there have been 47,982 operations per failure. In June of this year however, there were 76,585 operations per failure.