View looking across Lincoln Highway and east along C. & N. W. tracks

Unique Highway Crossing Signals Solve Traffic Problem

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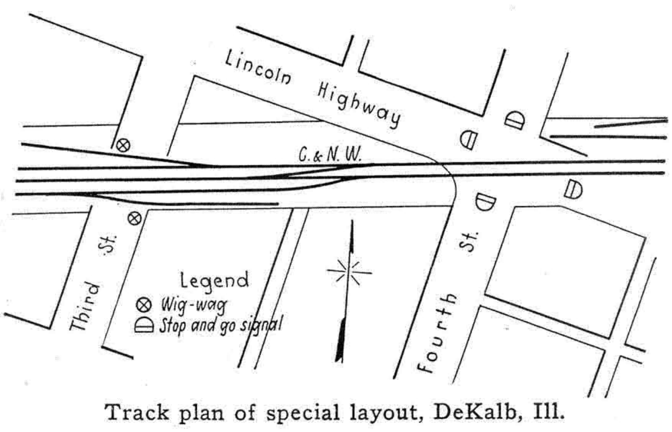
THE city of DeKalb, Ill., in conjunction with the Chicago & North Western has an unique installation of crossing protection signals at a point where two streets intersect at right angles with each other and at approximately 45 deg. with a crossing of the railroad. The main east and west street carries the heavy automobile traffic of the Lincoln Highway while the double track main line

Third Street looking north showing that wig-wag banners can be seen over cars parked at curb

of the Chicago & North Western handles about 80 trains a day in addition to switching movements in this growing industrial town. Crossing gates had been in service at the Lincoln Highway railroad crossing in addition to a flagman on the ground. The city of DeKalb installed automatic electric traffic signals at all of the crossings of the streets with the Lincoln Highway but was unable to solve the problem of automatic control of automobile traffic where Fourth Street crosses the Lincoln Highway on the railroad crossing on account of the railroad traffic introducing added complications. Crossing gates were not satisfactory at this point because the automobile traffic was so heavy that often the gateman could not lower the gates for fear of injuring automobiles or shutting cars in between the gates. A flagman was, therefore, required in addition on the ground, but all of this protection did not prevent the confusion between the heavy traffic on the two highways.

An agreement was therefore made between the city and the railroad to remove the crossing protection in service at the several crossings, including



Track plan of special layout, DeKalb, Ill.

gates at some crossings and flagmen at others, and to install wig-wags at all such crossings, except at Lincoln Highway, where a special arrangement was to be worked out. This change enabled the force required for protecting the crossing to be reduced from 27 men to 9.

Automatic track control of the wig-wags by the approaching trains could not be used because of the great amount of switching being done constantly on the main tracks. It was, therefore, arranged to control the operation of the wig-wags by switches placed in towers located centrally in each layout of crossings. By this arrangement one man can operate the wig-wags at several crossings, whereas two or three men were required in as many towers to operate the old gates. The wig-wags are all installed on the curb line at a height of 9 ft. from the base to the center of the light, this light being necessary to comply with the state requirements and to prevent the signals from being hidden by parked automobiles. The type of wig-wag used can be mounted either on the curb line or in the center of the street.

Combination Control for Traffic Signals

The special layout at the Lincoln Highway crossing includes four regular street traffic signals indicating "Stop," "Traffic Change" and "Go." Normally these signals operate the same as other such signals, under the control of an automatic timing device. However, when the Chicago & North Western signal controller in the tower, about 100 ft. from the crossing, sees a train approaching he throws a switch which sets all four of these traffic signals at "Stop" and in addition rings regular highway crossing alarm bells, one of which is mounted on each traffic signal. This "Stop" indication is effective until the train passes and the signal controller turns his switch, at which time the control reverts back to the automatic system. A flagman in police uniform, an employee of the Chicago & North Western, is on duty at this crossing to insure obedience to the indication of these special traffic signals.

Although the automobile traffic on this crossing is extremely heavy on both streets, the new signaling arrangement has proved satisfactory in several months' service and better protection is afforded than was experienced with the gates. The only change necessary from the ordinary highway crossing layout was to lengthen the time for the yellow or "Traffic Change" indication to allow more time for cars to get across the long diagonal distance between the signals.

Notes on Transformer Operation

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A LARGE number of transformers are used in railway signal work today and in view of this a number of interesting notes on the characteristics of transformers as applied to signaling service are given herewith. These relate to the proper method of drying out oil-cooled transformers, testing windings for phase relation, loading of double-secondary windings and precautions to observe when working on transformers.

Drying Out a Transformer

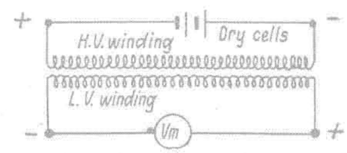
Every oil-cooled transformer should be dried out before being put into service. A simple method of doing this is to put a certain proportion of full working pressure on the high-voltage side and short circuit the low-voltage side. Percentage of normal voltage to be used can be approximately obtained from the impedance of the transformer. For instance, take a transformer of 2.5 per cent impedance. This means that 2.5 per cent of normal voltage on the high-voltage side with the low-voltage winding short circuited will produce full load currents in both primary and secondary.

The temperature should not exceed about 90 deg. C. as measured by the resistance method. For small transformers, say ½ or 1 k.v.a., about 25 per cent more than full load current will be required to give this temperature. For larger transformers the heating current will be proportionately less; for 5 k.v.a. about full load current will be found suitable and for larger transformers still less than this.

Periodical megger tests will show the condition of the winding. It will be found at first that the insulation resistance will decrease; then as time goes on this will slowly increase and finally increase very rapidly to infinity. The transformer should then be immediately filled with oil. Megger readings should be taken from the high-voltage winding to the frame, the low-voltage winding to the frame and the low-voltage winding to the high-voltage winding. The oil should be free from the slightest trace of moisture. Insulation has a negative temperature-resistance coefficient (resistance decreases with an increase in temperature). Hence the transformer will show a higher insulation resistance cold than hot.

Testing for Phase

The following is a simple and satisfactory method, and is best explained by a diagram. One or two dry cells and a d-c voltmeter or ammeter are required. Connect the meter on the low-voltage side with the



Simple method of testing a transformer for phase relation

positive terminal connected to the positive terminal of the transformer winding. Then connect up the dry cells on the high-voltage side with the positive terminal of the cells to the positive terminal of the transformer. On making the connection the needle of the meter should receive an impulse in the right direction if the transformer is correctly phased. It is easy enough to see how the above results are obtained. On connecting in the dry cells the current, as is well known, does not increase instantaneously to full value, but follows a rising curve called the exponential curve (due to the inductance in the circuit). This induces a uni-directional e.m.f. in the low-voltage winding which is read on the meter. The polarities are the same as if sine wave currents were used. Hence the method indicates correctly the phase relationship of the windings.