With Self-Adjusting Rectifiers

W. H. Miller
Supervisor of Signals, Chesapeake & Ohio,

To properly adjust an a-c. primary track circuit, using the new type RT-10A self-adjusting rectifier, requires patience as well as certain information that does not enter into the adjustment of ordinary track circuits. In order to assure proper operation of the track relay under the most adverse conditions, the adjustments should first be made with the primary battery connected in the circuit, shunted down to its lowest working voltage with the a-c. power cut off, after which the a-c. power should be cut on and the rectifier adjusted, with an ammeter in the battery circuit between the battery and rectifier, until the desired amount of current is flowing from the battery. This method allows for proper adjustment for voltage at the relay. Any other way may cause a failure with the a-c. power off and the circuit working from the primary battery.

To adjust the rectifier so that the current flow from the battery will remain at, or near, the desired discharge when the battery has dropped to its lowest voltage, you must know what the average a-c. voltage is, as well as what the lowest voltage the battery will drop to, and the current flow to the track on the rectifier side, because any change in either of these readings may materially affect the battery discharge.

We have found by experience, if the average a-c. voltage is 115 volts and the battery voltage is 0.8 volt per cell, with two cells used in series, and if adjustments are made for an 0.01 amp. discharge from the battery, that a rise of 5 volts in the a-c. supply, from 115 to 120 mils, will cause the discharge from the battery to be reduced approximately 0.005 amp., or 0.001 amp. per volt rise in a-c. voltage. If the gas voltage drops off the primary battery, the amount of discharge from the battery will be much less. Also, a drop in the a-c. voltage from 115 to 110 volts would tend to increase the discharge from the battery in the same ratio. Should the gas voltage drop off the primary battery, it would have a compensating effect and the reading of the battery discharge might be the same as when first adjusted. Therefore, the discharge from the battery should be adjusted on the basis of the average a-c. voltage and the value the primary battery voltage will fall to with the adjusted discharge. The battery should be shunted down to this voltage and the adjustment made accordingly. When the shunt is removed, the discharge will be considerable more than that adjusted for, but in due time, as the voltage settles, the battery discharge will reach the value for which adjustment was made.

The current flow to the track should also be known and recorded at the time the original adjustments are made, as any change in the current may affect the discharge from the battery. If it is necessary to change the resistance of the track circuit, the a-c. power should be cut off and adjustments made as outlined above. Also, re-adjustment of the rectifier should be made, with power on, to maintain the proper discharge from the battery.

The above clearly demonstrates the necessity for proper recording of the a-c. voltage, the current flow to the track, the voltage of the primary battery, and the current flow from the battery to the rectifier, so that, in making further tests, these records can be reviewed to determine what, if any, readjustment is necessary. Where a-c. primary is used, either on line or signal circuits, the rectifier should be adjusted so that the battery will have an average discharge of approximately 0.01 amp., in order that the battery may be kept active. Where the discharge is below this, a resistance unit which will permit a discharge of 0.01 amp. should be placed across the battery.

Route Locking Circuits

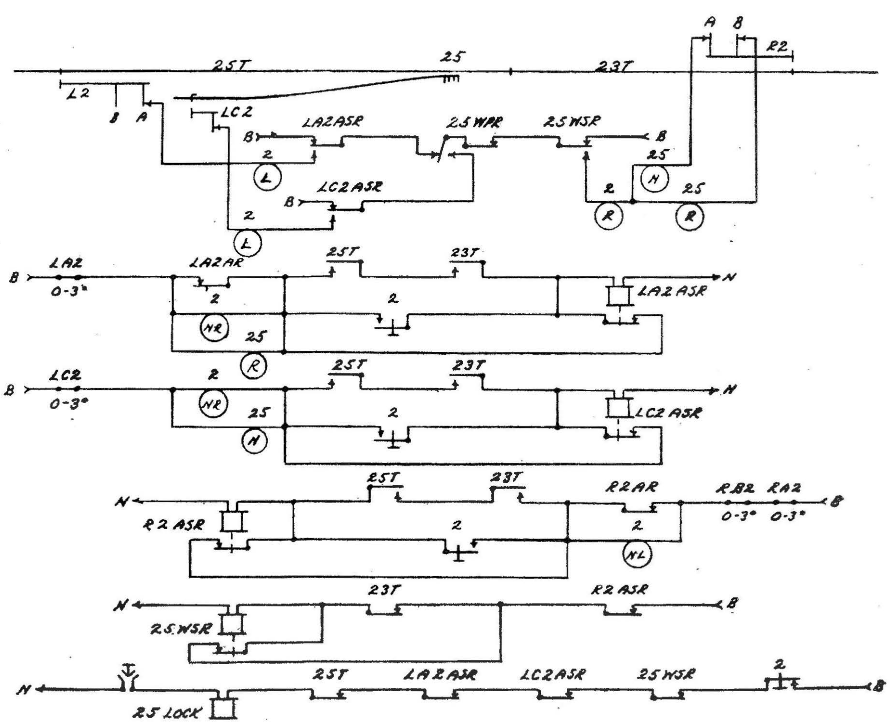
"With one type of route locking, the route-locking relay is de-energized when the signal lever, controlling moves over the route involved, is reversed. In another type, the route-locking relay is de-energized when the train enters the interlocking limits by passing the home signal. Explain the advantages and disadvantages of each method."

Suggests Third Type

W. T. Derr
Chief Signal Draftsman, N. Y. C. & St. L., Cleveland, Ohio

There is little advantage between one type of circuit and the other, except that in the first circuit the route relay would be down before the approach locking on the signal lever was released, obviating the chance that there may be a time interval between the release of the approach locking and the effectiveness of the route locking. With modern

(Continued on page 104)



Signals clear only after route locking is effective

relays, this is a remote possibility.

The accompanying circuit is suggested as being more desirable than either of the two circuits referred to. In this circuit, the signal can clear only after the route locking is effective.

Discusses Time Feature

F. B. Wiegand
Signal Engineer, New York Central, Cleveland, Ohio

The type of route locking which, when the signal lever controlling moves over the route involved is reversed, de-energizes the relay is usually used in connection with dwarf signals. The only disadvantage is the time feature and this can be overcome by operating the lever only for train movements. This disadvantage, in my opinion, is offset by the simplicity in the circuit. It avoids the necessity of providing approach circuits. At large terminals even the approach circuit would not overcome the time feature as the trains are invariably standing on such circuits, and this would immediately on the clearing of the lever set up the time feature.

The type of route locking in which the relay is de-energized when the train enters the interlocking limits is usually employed in connection with home signals. This type of locking has the advantage of permitting tests to be conducted with no train on the approach circuit without tying up the route. With a train on the approach circuit this type of locking has the same time feature as the type which immediately de-energizes the relay when the lever is reversed. In my opinion, this disadvantage is negligible in both instances.

Rectifiers in Flood Waters

"What methods should be used in rehabilitating rectifiers that have been submerged in river flood waters?"

Complete Tests Should Be Made

A. G. Moore
Advertising Manager, General Railway Signal Co., Rochester, N. Y.

The quickest and surest method in rehabilitating rectifiers that have been submerged in river flood waters is to return them to the manufacturer. By means of the proper testing equipment, personnel and repair materials, the manufacturer can readily determine the extent of damage and make such repairs as are necessary for satisfactory performance.

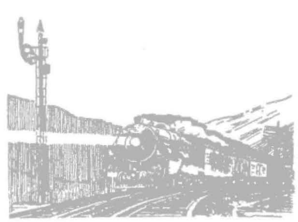
Electrolytic Rectifiers Not Permanently Damaged

Carl G. Howard
Manager, Rectifier Division, Fansteel Metallurgical Corp., North Chicago, Ill.

Normally the electrolytic signal rectifier is not damaged by complete submersion in flood waters and can be put back into service immediately after the water recedes. Where the rectifier is in a battery well which is submerged in back water, there is insufficient agitation of the water to mix it with the electrolyte. In this case it is necessary only to draw off the excess water in the top of the cell to lower the electrolyte level to the high line on the charger. If the oil is lost, a new coating of oil should be added.

Where rectifiers are in battery wells or signal cases surrounded by swift flowing water, there is a possibility of high contamination of the electrolyte. In such a case, the rectifier cell should be thoroughly cleaned and washed out and complete new electrolyte added. The cell cover and terminals should be carefully cleaned and dried.

Electrolyte is prepared from sulphuric acid of 1.175 to 1.250 specific gravity, adding one package of depolarizer salts and one bottle of oil which are available from the rectifier manufacturer. Emergency electrolyte can be prepared, however, by filling the cell with sulphuric acid and inserting one dozen ordinary carpet tacks or the equivalent in small iron nails, or even stirring the acid with an iron rod long enough for some of the iron to be dissolved. Regular depolarizer salts and oil can be added later.



Track Shunting Problems

"Has the operation of light-weight trains introduced any new problems in track circuit shunting on your road?"

No New Problems

J. P. Muller
Engineer Signals & Telegraph, Boston & Maine, Boston, Mass.

The operation of the "Flying Yankee" has not introduced any new problems relative to the shunting of our track circuits.

Operation Is Satisfactory

W. F. Zane
Signal Engineer, Chicago, Burlington & Quincy, Chicago

We have made numerous tests on the three-car Zephyr trains at high speed. These trains are articulated and a three-car train has only four pairs of two-wheel trucks; consequently, at high speed they are about as fast and as light a piece of equipment as normally passes over track circuits. All tests we have made have shown that the track relays function properly and that the armatures drop and stay down during the entire passage of the train over the track section. It is true that at high speeds these trains get into a track section farther before the relay drops than does a slower train. However, this is not a shunting matter but is a matter of the time interval required for the relay to become demagnetized sufficiently for the armature to drop. I would say that, insofar as our tests have shown to date, the shunting possibilities of these trains have been and are as they should be. Also, the effect of rust on the rails apparently does not change this shunting condition any more than it would with a train of standard equipment. This is probably due to the fact that the bulk of the weight is on the forward driving trucks, so that they possibly clean the rail while the following trucks assist considerably in shunting the track circuit. However, I believe that the train would properly shunt out the relays, even though the leading power trucks did not carry this surplus weight.