so that the cells can be removed and replaced by a man standing on the floor. This eliminates chances of breakage or spilling of solution due to having to stand on ladders, stools or boxes.

I find that the use of either "Square-D" or pipe conduit installed underneath the shelves is satisfactory, as it permits the use of properly located outlets through which the wire may be dropped vertically, directly to the binding post of the cells, thus eliminating a large portion of exposed wire. With this type of construction it is possible, also, to join the horizontal leads of conduit under the shelves with a vertical piece at the end of the rack, in which the wires may be carried to other floors or functions of the interlocking plant.

Racks of heavy wood construction, thoroughly painted with acid-resisting paint, are preferable as they will outlast any type of metal construction. The end timbers of the rack should be securely fastened to the floor and ceiling and, if it is impossible to fasten them to the ceiling, the top of the rack should be securely braced in order to provide rigid nonvibrating housing for the battery.

Ease of Maintenance

C. B. McCormick

Field Engineer, Electric Storage Battery Co., Chicago, Ill.

The most satisfactory storage-battery rack I have ever seen is a single rack made of angle iron of a size to accomodate the battery used, the width of the rack just exceeding the width of the single cell. The rack should not have more than two tiers and there should be adequate clearance between shelves to allow sufficient headroom for taking specific-gravity readings with a syringe-type hydrometer. The rack should have suitable shelving, for which purpose an asbestos and slate combination similar to Transite, of approximately ½ in. thickness, is frequently used. The rack should be painted with two or three coats or acid-resisting paint. It has been our experience that the most effective is a simple asphaultum paint which may be purchased cheaply in the bulk. Such a rack provides ready access to both sides of all cells, which facilitates inspection from time to time.

Cells Should Be Accessible

W. M. Overly

Signal Maintainer, Indianapolis Union, Indianapolis, Ind.

The first requirement in building a battery rack is to provide ready access for proper maintenance. The rack should permit cleaning the jars on all sides. Ample overhead room allows testing and servicing the cells. The life and service of storage batteries depend a great deal on the kind of care they are given, and the average maintainer will give batteries their proper care if they are installed so as to permit maintenance without unnecessary inconvenience.

Double-Tier Wooden Racks

Frank R. Schmidt

New York Edison Company, New York, N. Y.

Where adequate space is available, the use of two-tier wooden racks may generally be recommended because of their economy and long life, especially with sealed-in batteries. Other methods worthy of consideration are the mounting of cells on slabs of soapstone in either single-tier or double-tier arrangements. Some companies favor a mound of concrete or brick with a semi-plastic coating upon which the cells may be set.

E. B. Smith, assistant signal engineer, New York Central, says that "A table should be used so that the cells can be so spaced and arranged that visual inspection can be made of the cell, especially in the case of the lead-type storage battery, although the same arrangement is convenient for any type of battery."

Testing OS Track Circuits

"In C.T.C. installations, what special equipment and what precautions are required to avoid the transmission of indications when the maintainer is testing OS track circuits?"

No Special Equipment Should Be Provided

C. S. Snavely

Engineering Department, Union Switch & Signal Company, Swissvale, Pa.

The indications of C.T.C. systems are intended to give the controller at all times a "television" picture of the status of all wayside equipment involved in train dispatching. The fact that wayside equipment such as track circuits, switches, etc. is to be manually tested does not of itself guarantee that train movements can not be interfered with; accordingly, the procedure is of mutual interest to the controller as well as to the maintainer and the "television" view should not be obstructed.

The opportunity for misunderstandings and disputes is minimized when the C.T.C. system is permitted to function naturally at all times and is not interfered with when testing wayside equipment, the controller thus being automatically kept informed as to all happenings in his territory.

In addition the automatic train-graph sheet provides an impartial record for consultation in cases of accidental or careless interference with train movements caused by testing of "detector" ("OS") or "approach" track circuits. Thus the C.T.C. system keeps the controller informed at all times not only regarding the progression of train movements, but also regarding all irregularities such as would affect train operation whether due to natural causes such as wet ballast, broken rails, etc. or to manual operations, such as testing, etc.

For this reason no special equipment is provided nor should any special precautions be taken to avoid transmission of indications when the maintainer is testing "OS" track circuits.

Co-operation with Dispatcher Is Necessary

J. D. Reames

Signal Foreman, Missouri Pacific, Leavenworth, Kan.

In the maintenance of centralized traffic control on this road the maintainer requires no special equipment other than that normally required in signal maintenance involving power switches.

In testing OS circuits the same precautions are required that are necessary in testing almost any other part of the equipment where an open or shunt circuit test is desired—that is, close co-operation with dispatch-

er so that the maintainer will not break into a circuit after a line-up has been established.

With careful planning of the work to be taken care of each day, it will not be necessary to break into a line-up except under rare circumstances. By securing authority from the dispatcher to work on a given switch or OS circuit for a given length of time, the possibility that the dispatcher will receive confusing OS signals is eliminated. Of course, it should be understood that in this type of C.T.C. no signals are transmitted to the control machine unless a line-up has been established and the machine levers are in position to receive same.

The normal amount of testing within each OS circuit should not exceed 10 minutes daily. This includes the adjusting and testing of switch machines and the routine track-voltage and current tests. It does not include oiling or cleaning of switches and machines, nor the routine work on other circuits, batteries, lamps, etc., located at or near the OS track. Ordinary tests, however, may be made on track or other circuits, without in any way affecting the line-up or the signals received by the dispatcher, excepting that care must be taken when making voltage tests in "Z" and "Z.C.L." or control wires, while a train is passing through the OS circuit, as the voltmeter will serve to close the circuit and transmit an improper indication to the machine.

If care is observed to avoid opening the circuit in advance of a train movement, if close co-operation between dispatcher and maintainer is practiced, and if the maintainer is careful about observing the position of the Z or control relay while working in signal cases there will be no likelihood of improper indications being transmitted to the dispatcher.

R. D. Moore, signal engineer, Southern Pacific, replies as follows: "We do not provide any special equipment; however, we do require the maintainer to get in telephone communication with the dispatcher before he tests O.S. track circuits or works on switches."

Approach-Lighting

"What are the advantages of approach-lighting automatic signals from headblock to headblock, as compared with approach-lighting from opposing signal to opposing signal?"

Avoid Unnecessary Lighting

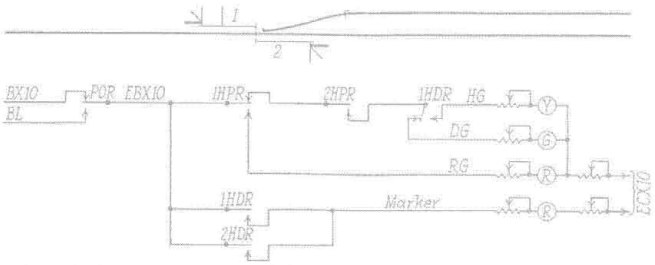
J. H. Oppelt

Signal Engineer, New York, Chicago & St. Louis, Cleveland, Ohio

There is no advantage to be gained by approach lighting all signals from headblock to headblock unless the indications on the intermediate signals are desired for the benefit of roadway forces.

There is some advantage in having the opposing headblock signal lighted from the time a train passes the headblock signal in the direction of traffic. Frequently there is a telegraph office nearby from which the operator can see the headblock signal and furnish advance information to the dispatcher. It is also good information to a train waiting on the passing siding.

We have approach lighting so arranged that it is effective from signal to signal in the usual manner and in addition the opposing headblock signal is lighted from the time the train passes the headblock in the direction of traffic. With this scheme there is no unnecessary lighting of intermediate signals. The accompanying



Sketch showing approach lighting of absolute signals at ends of passing sidings

sketch shows the circuit scheme used for lighting the opposing headblock signal.

A Controversial Subject

C. J. Kelloway

Superintendent of Signals, Atlantic Coast Line, Wilmington, N. C.

The question is a rather broad one, as there are various practices in approach-lighting. Two of these practices are: (1) To approach-light the signals in A.P.B. territory from head-block to head-block, lighting all opposing signals as the train passes them. (2) To approach-light each signal as the train approaches it, at the same time lighting the opposing signal as the train passes it.

Either of these methods is much more expensive from an operating standpoint than the practice on this road, which is to approach-light only the signal governing the movement of the train. Using this method as the basis for a reply to the inquiry, it is my opinion that the interest and depreciation on the cost of the additional line wires, attachments, cable, relays, etc., would probably offset the small saving in battery.

Field Mice

"What is the best method to use in order to keep field mice out of relay cases and instrument housings?"

Kills Them With Rat Poison

Everett B. Luse

Signal Maintainer, Great Northern, Wilson Creek, Wash.

When I first notice that field mice are getting into relay cases I close all the places through which a mouse could enter, with asphaltum petroleum, a black tarry material. Then I poison some wheat with strychnine or rat poison and place a portion of this inside of the relay case in such a place that it will not be in the way or in sight. I leave this poisoned wheat in the case and at times I look at the container, and if there happens to be very much gone I fill it up again. I have had only one case where a mouse died inside the relay case, and after the first year of feeding them with the poisoned wheat, I have had no more trouble with mice.

Uses Plaster of Paris

Harold W. Link

Signal Maintainer, Pere Marquette, Plymouth, Mich.

After having considerable trouble with field mice getting into relay cases, etc., I have found a good way to