and drain the current away directly through a metallic conductor. In the case stated I believe this latter method might be of some use if the cable insulation is in good condition.

If the traction company is a separate company from that using the cable it might pay to inquire if there are any laws in that state limiting the allowable voltage drop in the return and, if there are it would then be advisable to make tests to see if they are living up to these laws. Laws of this type have been passed in some places and are very useful.

Another point which might be of value to some readers is that it has been found by experience that lead-sheathed cables deteriorate due to vibration if they are buried too close to the running rails where they are subjected to the vibration of the trains on the line. For this reason it is good policy not to bury the cable too close to the rails.

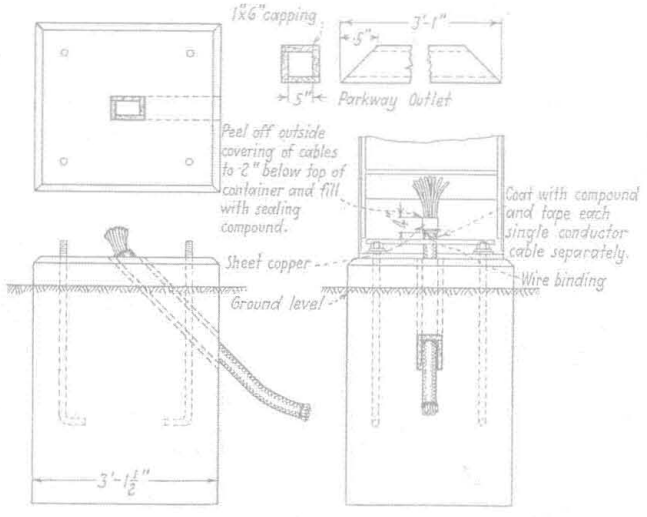
Wire Chase for Cables in Concrete Foundations

"Where passageways are left in concrete signal foundations to bring wires or cables up into the case from a point below the ground line, how are these chases or passageways formed in the foundation, and is any conduit used?"

Wire Chase Made of Capping

By C. H. Tillett
Signal Engineer, Canadian National, Central Region, Toronto, Ont., Canada

WHEN constructing a form for a concrete signal foundation, a chase is made up of pieces of capping and fixed in the position shown in the drawing. The lower entrance to this chase is below the ground line, while the upper end of the chase is about the center of the top of the foundation, the idea being to



Wooden capping is formed into a commodious wire chase inside the concrete foundation

allow space enough for the greatest number of cables that will ever be required. Our ordinary signal foundation carries eight single-conductor cables for track circuits, and one four-conductor for signal lighting. There is ample space for perhaps that many more.

The foundation form is made with the chase incorporated in it and the boards are left in place after the outside forms are taken away. No conduit is used, as it is easier to make the form out of wood, and an excess of space can be provided which would not be true if conduit were used.

C. & O. Uses Fiber Conduit

By George A. Washburn
General Signal Inspector, Chesapeake & Ohio, Richmond, Va.

IN all of the concrete foundations for signals it is our practice to leave a wire chase, extending from a point below the ground line to a point at or near the center of the top of the foundation. Originally this chase was cored out of the concrete, but later a piece of galvanized iron down spouting was used. On account of the possibility of the sharp edges of the metal cutting the insulation of the wires and cable, it was decided to use a piece of 3-in. fiber conduit instead of the galvanized iron down spouting. We have found that fiber conduit for chases in concrete foundations makes a satisfactory job.

In our concrete junction boxes where we end the parkway cable and splice on the flexible wire that runs to the switch circuit controller we also cast a piece of 2-in. fiber conduit in the side of the junction box for bringing the parkway cable up into the junction box.

Fiber Conduit Used

By L. S. Werthmuller
Assistant Signal Engineer, Missouri Pacific, St. Louis, Mo.

WHEN constructing concrete signal foundations, the Missouri Pacific uses a piece of three-inch Orangeburg fiber conduit to form a passageway for cables. For a single location one conduit runs from the center of the top of the foundation to a point one inch below the base of rail on the track side of the foundation where a hole is provided in which trunking is recessed.

Where cable is run from one signal across under the track to another signal, a second piece of three-inch conduit is run through the foundation from the top to a point two feet below the ground line on the track side of the foundation. We have found by test that a short piece of this conduit will accommodate 12 No. 10 single-conductor parkway cables by crowding, but in our construction work we have used additional conduits where more than seven parkway cables are required.

Elimination of Derails

"In 1924, the Signal Section, A. R. A., approved a report recommending that derails not be used in main tracks. Has this recommendation been of any benefit in securing permission, from state commissions, to eliminate main-line derails at new or rebuilt plants?"

Other Factors Have Also Influenced

By B. J. Schwendt
Assistant Signal Engineer, New York Central, Lines West, Cleveland, Ohio

FROM our experience, it is difficult to determine what benefit, if any, this recommendation has had in the way of securing elimination of derails. However, it would appear that other factors than this recommendation were the governing influence in the decisions we have had in the last few years, some of which are about as follows:

1. In one state, automatic interlocking plants have been authorized without derails, apparently largely upon

the understanding by the state commission that the governing circuits used are fundamentally the same as those used in automatic signaling systems, upon which all of our main-line trains depend for their usual operation and guidance.

2. In another state, the approval of the elimination of the derails was on the premise that automatic train stop was in use. This seemed the major determining consideration by the commission.

3. In another state the commission approved the substitution of an automatic plant for a manually operated plant, eliminating derails. In another case in the same state, approval was given but later withdrawn because a representative of the Brotherhood of Railroad Trainmen objected. More recently, the commission approved another installation without derails, our plea in this case being supported by a petition circulated among the enginemen in the territory involved and containing a large number of their signatures. As a whole I believe the recommendtion of the Signal Section has helped secure approval of the elimination of main-track derails at new or rebuilt interlocking plants.

Assisted in Securing Approval of Automatic Plants

By H. H. Orr
Superintendent of Signals and Telegraph, Chicago & Eastern Illinois, Danville, Ill.

We have not eliminated any derails from interlocking plants at grade crossings since the Signal Section, A. R. A., section was taken in 1924. I understand, however, that some roads in our territory have secured approval of the state commissions and have taken derails out. We did put in one automatic interlocking arrangement at Sullivan, Ind., governing the grade crossing of our line by the Illinois Central. No derails were used but we did install smash-boards on the home signals. The Indiana Commission approved the arrangement.

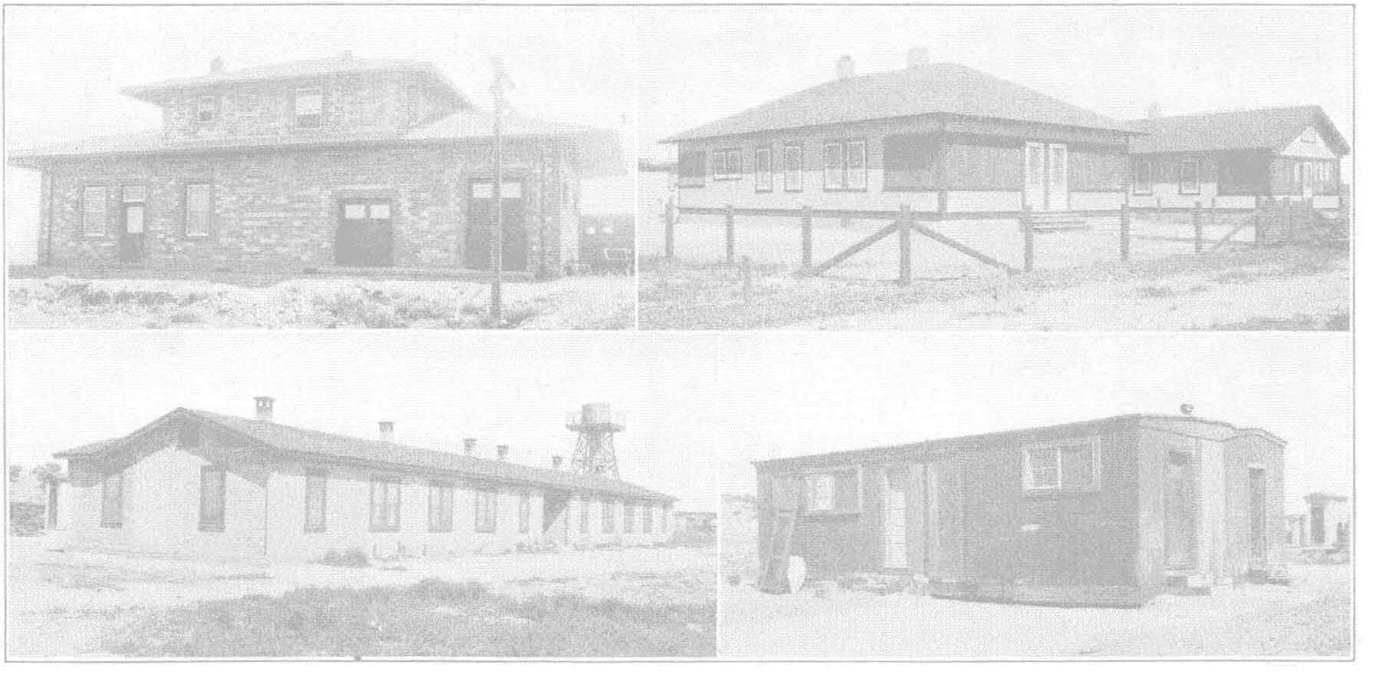
Primary Battery Connections

"When using primary battery for track circuits, is there any benefit to be gained in voltage regulation by using 3, 4, or more cells of 500-a.h. battery in parallel?"

Theoreical Benefits Offset by Practical Conditions

By L. S. Dunham
Chief Engineer, Thomas A. Edison, Inc., Bloomfield, N. J.

Theoretically, the greater the number of primary cells connected in parallel, the more constant will be the voltage across the output leads of the battery. This general rule applies to track batteries in the same way that it applies to batteries used for any other purpose. However, in the last analysis of a track circuit, a slight improvement in voltage regulation at the battery is not nearly so important as it might appear for the reason that variations in voltage through the track circuit itself are much greater than the variations in voltage across the battery, no matter how many cells are connected in parallel. The voltage at the relay is the important thing, and the voltage across the relay fluctuates very much more by reason of changing conditions in the track circuit than it does by reason of the small changes which occur in the voltage of the track battery. Thus, while voltage regulation may be, in theory, somewhat better when 4 or 5 cells are connected in parallel on a track circuit than when 1 or 2 cells are used, the improvement is not of much practical importance on the general run of average track circuits. The real practical advantage of increasing the number of parallel cells on a track circuit is to extend the time between renewals. It is quite possible, for example, to make the life of a track battery one year or more, on practically any ordinary circuit, by the simple expedient of fitting the number of cells connected in parallel to the life which it is desired that the track battery have.



Living quarters furnished by a transcontinental railroad for employees stationed in desert territory—All four buildings at same location

Upper Left—Housing accommodations for station agent above depot—(Upper Right) Houses for section foreman and water station attendant—(Lower Left) Mexican laborers' quarters—(Lower Right) Signal maintainer's "house"