

or 4 in. fibre conduit that is placed inside the box or foundation at the time they are constructed. We have experienced no difficulty by reason of deterioration, the main purpose in concealing wires and cable being to eliminate the possibility of damage by outside parties or rodents.

Line Wire Protection

On pole lines that are uneven and located in rolling territory, i.e., where the crossarms on one pole are at a lower level than those on poles in either direction, what methods can be utilized to prevent a wire from coming in contact with other wires, located on upper arms, should it break away from a lower crossarm because of a broken insulator or pin?

Different Length Poles

By R. I. BECKSTED
Signal Engineer
Canadian Pacific
Toronto, Ont.

Up to the present time no method has been adopted to prevent the wire coming in contact with other wires located on the upper arm should it break away from the lower arm because of broken insulators or pins.

Our communication department when setting up poles in rolling territory, uses a longer pole in the low areas and a shorter pole on high ground to prevent too much uneven line wires. By doing this we have very few cases where the wires on the lower crossarms come in contact with the wires on the upper crossarms.

CTC into Service

When putting CTC into service, do you cut in short sections, i.e., from siding to siding, or do you cut in the whole project at once? What rules or procedures do you set up for the operation of trains when part of the CTC is in service, before the entire project is completed? Please explain fully.

Depends on Prior Layout

By T. W. HAYS
General Signal Engineer
Union Pacific
Omaha, Neb.

The method depends on the layout prior to cutting in traffic control. Where the territory was "non-block" prior to installation of traffic control, long sections can be cut in suc-

cessfully. Where the territory is signaled with a system similar to what will be used after the controlled system is in service; i.e., APB with intermediates located the same as required for the control system, fairly long sections can be successfully handled.

Where the territory was signaled with "overlap" system, and intermediate signals requiring relocation and changed to the APB system, or where territory was double track, signaled for one direction only and is to be changed to "two main tracks" and signaled for operation in either direction; our experience has been that short sections, one or two sidings, is about right for cutting into service. Of course all siding ends, as well as intermediate locations, are checked and double checked prior to the cutover, and rechecked as soon as the cut-in is completed.

As the project is being progressed and the traffic control territory is gradually extended over the district, the operating rules for traffic control territory apply within the territory placed in service, and operating rules for the remainder of the territory involved in the project remain in force.

The first bulletin covering the "cut-ins" generally state in part:

(Time) (Date)
"Effective ————, all present automatic block signals between "A" and "B" will be removed from service and centralized traffic control will be installed from west switch "A" to and including west switch "B" and controlled from dispatchers office at "A."

Subsequent bulletins read in part:
(Time) (Date)

"Effective ————, all present automatic block signals between "B" and "C" will be removed from service and centralized traffic control will be installed from west switch "B" to and including west switch "C," making continuous centralized traffic control from west switch "A" to and including west switch "C" and controlled from dispatcher's office at "A."

This type of bulletin is continued throughout the territory until the project is completed. All bulletins naturally include information regarding the new signal locations, power operated switches and electric locked switches.

Clearance forms for entering CTC territory are issued at "A" for movements from that station, and at some open office in advance of end of CTC for movements into the con-

trolled territory from the opposite direction. Clearance forms and orders for movements beyond the CTC territory are issued at "A," becoming effective at the end of CTC, or in case there are open telegraph offices within the CTC territory, the orders are issued at those points, becoming effective at the last CTC controlled station. The bulletins covering the progressive "cut-ins" designate stations where clearances will be issued and for what territory effective.

Cut in One to Three Sidings at a Time

By B. J. ALFORD
Signal Engineer
St. Louis Southwestern
Tyler, Tex.

Our practice is to cut in from one to three sidings each time we increase CTC territory. Our projects in the past have been from 50 to 125 miles in length and we do not consider placing the whole project in service at one time due to the number of control stations, power switches and signals.

Our uniform code of operating rules fully cover CTC operation. We issue a general order which covers in detail all special instructions. This general order states that the system will be placed in service progressively, and crews will be notified by train order date and time of cut in. This plan is used until completion of the project.

Include One or Two Passing Sidings

By P. P. ASH
Signal Engineer
Louisville & Nashville
Louisville, Ky.

On one of our CTC installations we placed the entire section of 92 miles in service at one time. However, this involved having men on the entire territory at every power switch and at other points for cutting the equipment in service. This also involved turning the entire installation over to the control machine operator at one time.

Since that time we follow the practice of cutting in the CTC installations in shorter sections, making the sections include one or two passing sidings. This gives the control operator time to familiarize himself with the equipment, and also does not require as many men when the installation is cut in.

In regard to the rules or procedure for the operation of trains in cases where an automatic block signal system is replaced by CTC, there is an



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interval of time in which we have to cut out the automatic block signals in order to make the necessary inspections before the CTC equipment is placed in service. In order for train movements to be protected during this interval of time when the automatic block signals are out of service, we establish manual block in such sections in addition to timetable and train order operation. After the CTC is cut in in these sections, manual block is discontinued.

Experience Based on 1300 Miles CTC

By A. L. ESSMAN
Chief Signal Engineer
Chicago, Burlington & Quincy
Chicago, Ill.

We, on the Burlington, have tried practically every method known to use in placing in service of approximately 1300 miles of CTC which we have on our property, and in my opinion this is something where a set rule cannot be followed because there are too many variables which must be considered. Of the items that affect the methods used in cutting in are principally density of traffic, type of signal system being replaced by CTC, the forces available that may be used for cutover purposes, and the desirability of hav-

ing the improved type of operation as quickly as it can be made available.

In territories where automatic signals are in service, an advantage, if traffic conditions will permit, is to remove signals from service at the beginning of the work day, placing into effect some form of manual blocking with train orders which should then permit available forces to concentrate their efforts on making changes to permit the new system to be placed in service. We have, in placing sections in service, gone from siding to siding, and in some cases have taken as much as four sidings at one time. This depends largely upon traffic conditions and forces available, and to my knowledge we have never waited until an entire project is completed to place in service as we wanted to obtain the benefits from the system as quickly as possible. Then, too, this method permits the re-use of some of the material released from some of the earlier sections placed in service, and does not require tying up too much material that will ultimately be released at the completion of a project.

Just prior to the placing in service of a CTC project where train and engine men have not had experience in operating with this type of system.

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we start holding classes with the train and engine men. Such classes are conducted by both the operating and signal representatives going over all of the CTC rules, and affording each and every member opportunity of asking any number of questions which may occur to them so as to be assured of a definite understanding of the signal requirements before it is placed in service.

As each section is placed in service, operating bulletins are issued to cover the limits of such changes and, in addition, such limits are designated by signs. A signal diagram, which shows all of the signals, controlled switches, electric switch locks, mechanical time locks and other signal equipment, accompanies each bulletin and is colored to show that portion going in service.

Train order offices are maintained as near the end of the CTC territory as possible so as to take full advantage of changing conditions that might occur in the CTC territory, and by such an arrangement, we prevent any overlapping of methods of operation wherever CTC begins or ends, and have found such a method to work out entirely satisfactorily.

**No Previous Signaling
Cut in 25 Miles CTC**

By J. R. DePriest
Superintendent Communications & Signals
Seaboard Air Line
Norfolk, Va.

On lines where no previous automatic type of signaling is in service and CTC is to be placed in service, we endeavor to place about 25 or 30 miles of signals in service initially. Under these conditions operators are located at the ends of the section, and this fact is given due consideration in determining the initial signal limits. After the initial installation is made, trains are operated under time table, train orders and automatic block signals with power operated siding switches. After the signal system has been in service as automatic block signals for a period of a week or ten days, and all concerned are familiar with the operation, then centralized traffic control is placed in effect and trains are operated by signal indication.

After the initial installation is made, signals are placed in service from siding to siding, and operated as automatic block signals with remote switches until a convenient point is reached usually where operators are located, then centralized traffic control is extended to include this territory.



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