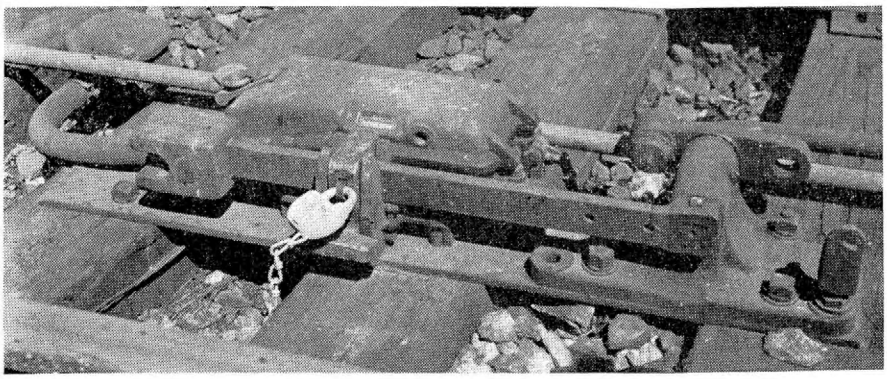
• What's the ANSWER? •

MAIN-LINE CROSSOVERS

"What arrangement of devices, including operating stands and bolt locks, do you use on hand-throw crossovers between main tracks in automatic block signal territory? Please furnish sketch if practicable."



An electrically-locked lever stand in the center of a crossover

Pipe-Connected Machines With Electric Lock on One

By A. S. HAIGH
Signal Engineer
New York Central, Albany N. Y.

IT IS the practice of the New York Central, Line East, to use G. R. S Model-9 hand-operated switch machines, equipped with Model-10 electric locks, on cross-overs between main tracks in automatic block signal territory, when new installations or replacements to existing installations are made. In installations of this kind, each end of the crossover is equipped with an individual Model-9 switch machine. The switch machines are pipe connected, one to the other. One of the machines is an independent machine, which mechanically locks, by means of a pipe run, the machine at the opposite end of the crossover in its normal position. The independent machine is equipped with an electric lock which is actuated by an electric timing relay. The timing relay is housed in a relay case adjacent to the switch.

The lock circuit is so arranged that, under normal conditions, neither switch can be moved from the normal position until the predetermined time has lapsed after the electric time locking circuit is initiated. At the instant the time locking circuit is initiated, the first automatic block signal to the rear of the crossover on each track is set to display its most restrictive indication, with subsequent signals to the rear of these signals displaying restrictive indications to the limits of proper braking distance. Automatic block signals involved will not again give a less restrictive indication until the switches and time locking devices have been restored to normal.

On the C. & O.

By T. L. CARLSON
Signal Engineer
Chesapeake & Ohio, Richmond, Va.

THE practice on the Chesapeake District of the Chesapeake & Ohio is to intall a center-lever interlock, with the operating lever located between the rails, at the mid-point of the crossover, as illustrated in the accompanying sketch. Our main-line switches are equipped with hand-operated switch mechanisms with facing point lock protection. These mechanisims are equipped with circuit controllers operated by either the lock bar or the point detector bar. The center-lever interlock device is pipe con-

To Be Answered In a Later Issue

(1) *In passenger terminals, where trains pull in on stub-end tracks, have you found it desirable to install color-light type signals to warn enginemen when they are approaching bumping posts? If so, what type lamp units and aspects do you use?*

(2) *Can a filter of any type be used on local battery telephones or the line circuits for the phones to suppress interference induced by high-voltage power circuits nearby? If so, what type of a filter should be used?*

(3) *With reference to the installation of a guy on a corner pole in a pole line, what method do you employ to determine the proper direction and pull of the guy?*

(4) *How do you terminate and connect to open pole line submarine type telephone and telegraph cables at the shore ends of the cable? Please furnish simple sketch if practicable.*

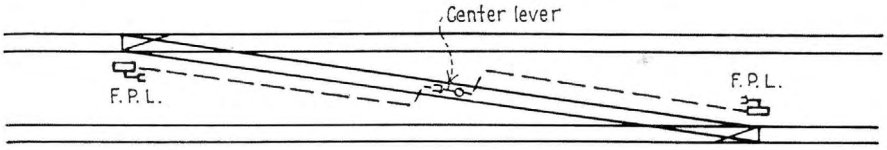
(5) *How do you control operative grade signal markers with reference to track occupancy? If practicable, please furnish simple circuit diagram.*

(6) *What are the advantages and disadvantages of using circuit breakers in lieu of fuses and manual switches in 110-volt a.c. power circuits which feed low-voltage transformers and/or rectifiers in signaling and communications systems?*

If you can answer any of the above questions, or, if you have a question you would like to have someone answer, please write to the editor.

nected to the locking bar of this standard switch mechanism. The lock bar in this case is changed to operate independently of the switch lever.

Before either switch can be reversed, the center lever must be reversed to withdraw the locking bars. The circuit controllers on both switch mechanisms are operated by the lock bars to either shunt the tracks or open the switch-repeater circuits. Normaling the entering switch of the crossover before the departing switch is reversed will not allow signals to clear, as the circuit controller contacts are operated by both the point detector and the lock bar. The location of center lever mechanism between the rails makes it inaccessable for operation with an engine or cars on the crossover.



Center-lever interlock on the Chesapeake district of the C. & O.

Crossover Center Locked

By B. F. DICKINSON
Engineer Telegraph & Signals
Pennsylvania, Pittsburgh, Pa.

OUR method, which is illustrated in the accompanying diagram is as follows: Each end of the crossover is equipped with a switch mechanism known as a locking switch stand. At the center of crossover a lever and stand is located between the two rails of the crossover. A pipe line extends from this center lever to the switch mechanism at each switch of the crossover. Normally, each switch mechanism is mechanically locked through the pipe line connected to the center lever. Under these conditions, it would not be possible to move either main-track switch mechanism to the reverse position. Each switch mechanism is equipped with a circuit controller, the contacts of which are actuated by the movement of the pipe line connected to the center lever.

When the crossover is to be reversed, the padlock on the center lever must be unlocked and removed, then the center lever moved to the reverse or opposite position. The first movement of the center lever causes the contacts in the circuit controller to close, placing a shunt on the track circuits which, in turn, place the protecting signals in their most restrictive indication. Further movement of the pipe line then withdraws the locking plunger in the switch mechanism from the slot in the lock rod connected to each hand switch, after which the switch mechanism can be operated and the switch moved to the reverse position.

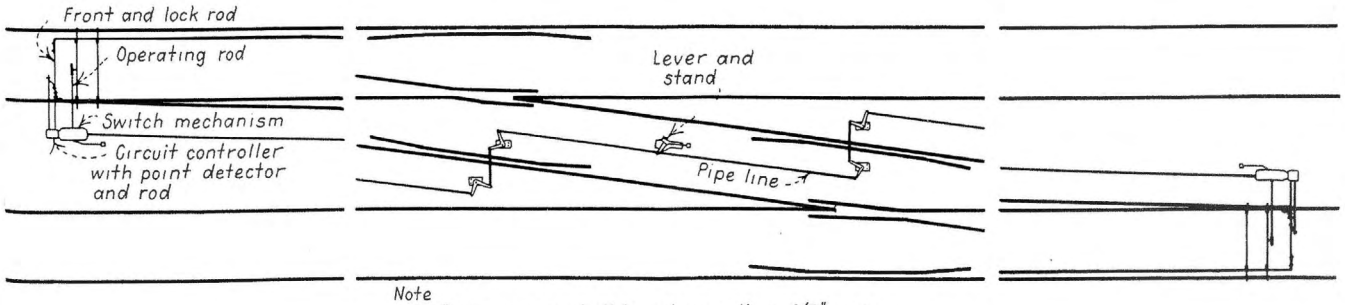
The center lever cannot be restored to the normal position to remove the shunt from the track circuits until the switches at each end of the crossover have been restored to the normal position, as these switches are mechanically locked in the normal position only. The locking lever is located in the center of the crossover, so that should a car be left standing on the crossover and the main-track switches placed in the normal position, the center lever could not be placed in the normal position.

Shows Arrangement With Electric Switch Lock

By W. R. BAKER
Wilmington, N. C.

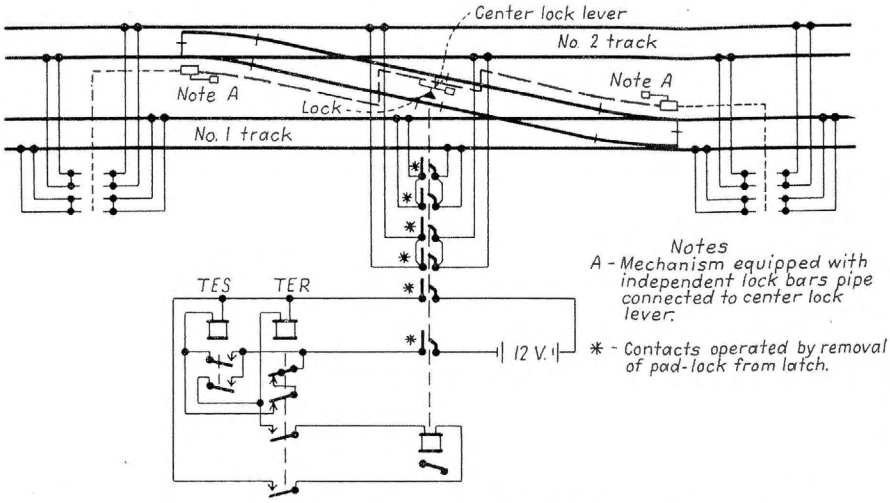
SEVERAL railroads have extensive installations of the so-called "center-lock" crossover device, with or without electric switch locks, depending upon requirements. These devices make use of handthrow switch-and-lock movements equipped with a loose locking bar on each crossover switch. In addition, a center stand with a lever traveling 180 deg. is placed between the rails in the center of the crossover. The lever is connected by means of cranks and pipe line to the loose locking bars in each switch movement. Before the switches can be thrown, the center lever must first be thrown to unlock the individual movements. The first movement of the center lever withdraws the lock bars from the lock rods, at the same time operating circuit controller contacts, which shunt both mainline track circuits. After movement of the center lever is completed, the switches may be thrown in the usual manner.

Main-line hand-throw crossover switches are usually No. 10, on 13 or 15-ft. track centers, the distance between the points of the switches being 194 ft. for 13-ft. centers. Should an engine or car be left on the crossover, it would be impractical to bolt lock either switch by throwing the center lever, due to its



Note
1.-Pipe carriers shall be not more than 8'-0" centers
2-Where switches are protected by signal Crossover between main tracks shall be equipped as shown with lock lever in center of crossover

Arrangement used by the Pennsylvania on main-line crossover



Circuits for main-line crossover with electric lock on center lock lever

location. A careful study of all recommended devices reveals that the center-locked scheme provides:
(1) Increased protection.
(2) Rugged and simple construction with minimum maintenance requirements of equipment installed.
(3) Track circuit cut sections and /or line drops are not required. The accompanying sketch shows a layout applied to a main-line crossover with an electric switch lock.

CAPACITY UNBALANCE MEASUREMENTS

"With reference to quadded telephone and telegraph cables, what procedure is usually followed in making capacity unbalance measurements, and what test equipment is required?"

Special Test Sets

By C. J. COLOMBO

Gen. Trans. & For. Wire Rel. Engineer
Communications Dept., Canadian Pacific
Montreal, Que..

SPECIAL test sets are available for the measurement of capacity unbalance, such as the Western Electric 4A unbalance set. These sets require a source of single-frequency tone which can be supplied by any portable oscillator, such as the Western Electric 11A oscillator. It is general practice to use a frequency of 1,100 cycles.

Before making tests, the test splice is prepared by boarding out the cable conductors, starting from the tracer quad and boarding consecutively in accordance with layout and color code. One wire of each pair in a quad is cut shorter than its mate for identification purposes. The far end of the cable is cleared, i.e., all pairs are open.

In making the tests, the splicer connects the four test leads starting at the number 1 quad, and connects leads 1 and 3 to the long white and long black respectively, and two and four to short white and short black. The tester measures phantom-to-side one, side-to-side and phantom-to-side two, capacity unbalance and records the meaurements on a work sheet. Measurements are made and recorded for each quad per section in numerical order.

Quads Selected

Quads having approximately equal unbalance capacities are selected and spliced together with or without transpositions, whichever is required to obtain the minimum overall capacity unbalance. If the requirements cannot be met on all quads, it is common practice to use balancing condensers on the few number of remaining quads outside the limits. These balancing condensers are connected between the proper conductors of the pairs and adjusted to meet the unbalance requirements, after which they are tied to the quad with which they are associated.

Unbalances Defined and Manufacturing Requirements*

WITH reference to the accompanying sketch, capacitance unbalances are defined as follows:

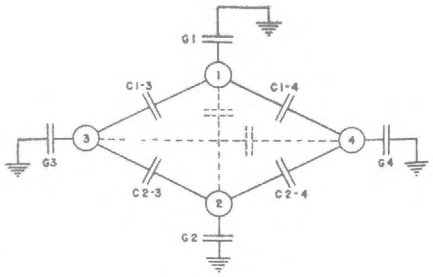
(1) Phantom-to-side—1, 2, 3 and 4 represent the four wires of a quad, of which 1 and 2 form one pair and 3 and 4 form the other pair. Unbalance between phantom and side 1–2=2 (C1-3 + C1-4–(C2-3 + C2-4)) +G1-G2. Unbalance between phantom and side 3–4=2 (C1-3+ C2-3–(C1+4C2-4)) + G3–G4.

(2) Side-to-side and pair to pair—1, 2, 3 and 4 represent the same as in preceding case. Unbalance between side 1-2 and side 3-4 = C1-4 +C2-3–(C1-3+C2-4).

(3) Phantom-to-phantom – 1 represents the two wires of one pair of a quad connected in parallel. 2 represents the two wires of the other pair of the quad in parallel, and 3 and 4 represent similarly the pairs of another quad. Unbalance between phantom 1-2 and phantom 3–4=C1-4 + C2-3–(C1-3 + C2-4.

(4) Phantom-to-pair—1 represents one pair of a quad; 2 represents the other pair of the quad; 3 and 4 represent the two wires of a pair not in same quad. Unbalance between phantom 1-2 and pair 3-4 = C1-4 + C2-3 – (C1-4 + C2-4).

These unbalances may be measured by means of capacitance bridge involving a considerable number of computations, both in determining the direct capacitance and computing the unbalances according to the definition. A special equipment was developed by the Western Electric Company, known as the 4A capa-



Capacitance unbalances

*The information contained in this item was received from the Western Electric Company and the American Telephone & Telegraph Company—Editor.