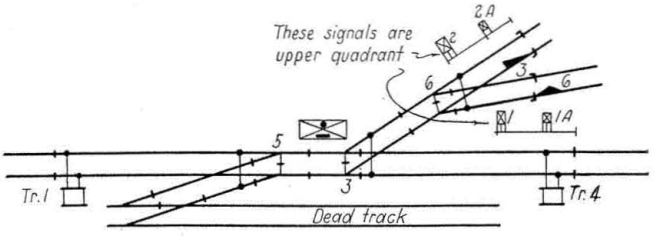
Multiplicity of Circuits for Operating Call-on Arms

"Can you design a circuit to obtain the desired operation of the call-on arms as indicated in the sketch below?"

Information Desired in Question No. 4

I would like to install a circuit to clear signal *1* and prevent call-on signal *1A* from clearing when a train passes No. *1*, such a circuit to use the same signal lever in the tower but not a middle position on the segement, using only the full normal and full reverse position. The same requisite applys to signals *2* and *2A*.

The present condition allows the operator to use the



Track and signal plan of interlocked junction with call-on signals at two locations

call-on signal under all conditions and I would like to change it so that when he pulls lever *1* or *2* (which ever route is set up) the train will receive full protection from the high signal. Signal *1A* must not be allowed to bob. I would also like to include signal repeaters for the call-on arms. Note that I do not want to use push buttons to clear the call-on signals, but want the same lever to clear both signals.

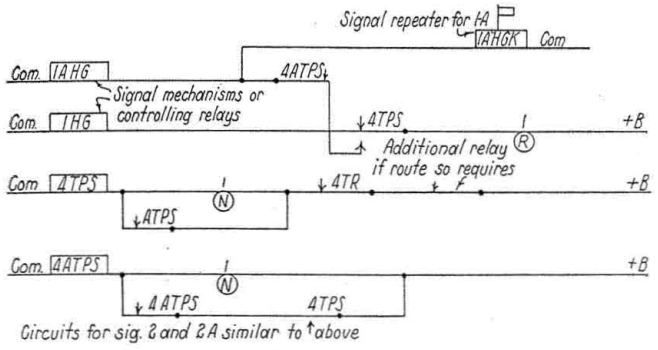
If a train approaches and passes either high signal and opens the track circuit, putting the high arm at stop I do not want the call-on arm to clear immediately.—P. H. W.

Prize Winning Solution

(Lack of space prevents publication of all of the solutions received for this question. Remaining solutions of merit will be given in the June issue.—EDITOR.)

Two Stick Relays Used in This Circuit

INFORMATION given in the question was not sufficient to make this circuit more complete, but the principle of the circuit should be as shown. The written circuits for signals *2* and *2A* would be similar



This control circuit employs two stick relays; one for each arm

to those shown from *1* and *1A*. It will be noted that this scheme employs two stick relays, *4TPS* to be energized before signal *1* can clear and *4ATPS* which must be energized before signal *1A* will clear. The two stick relays are so connected that *4TPS* must be down before *4ATPS* can remain energized through its stick circuit. In this way the call-on signals are governed by the track relays. When they are de-energized, the call-on signal will clear when the lever is reversed. However, the lower arm will not clear automatically when the top arm drops behind a train. It is necessary to return the signal lever to normal and then reverse it in order to clear either signal *1* or *1A*. When the lever is thus reversed and the track relay or relays are down, the call-on arm will clear.

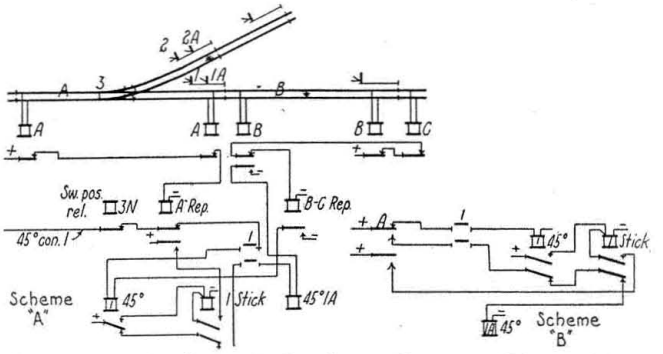
Nashville, Tenn. E. W. ANDERSON,
Signal Designer, Nashville, Chattanooga & St. Louis.

(Signal repeater does not give towerman information that signal has actually cleared.—EDITOR.)

Two Alternate Circuit Schemes Proposed Depending Upon Use of Approach Signals

HEREWITH is a sketch of a circuit which is proposed to take care of the conditions referred to in question 4 published in the April issue. The correspondent did not indicate whether or not approach signals were in service at the location shown, and for this reason I have prepared two circuit schemes. If it is assumed that approach signals are in service the circuit scheme *A* can be used. If, however, it is assumed that no approach signals are involved the scheme shown in *B* can be employed satisfactorily.

No attempt has been made in either circuit scheme to show the detail control features. It has only been



Alternative circuit control scheme for use either with or without approach signals

attempted to show the principle of a circuit that will prevent a call-on signal from clearing whenever it is possible for a high signal to be cleared.

Albany, N. Y. A. VALLEE,
Supervisor Signal Construction, Delaware & Hudson.

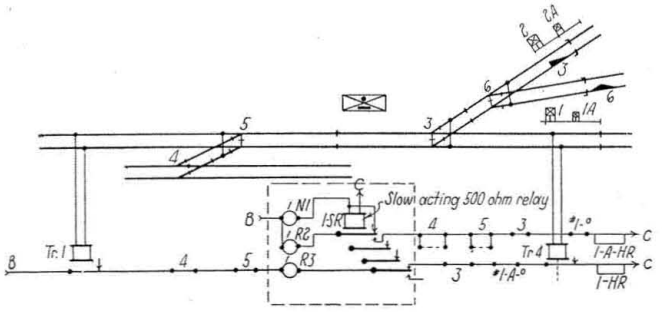
(Back contact No. 2 of *A. Rep.* relay would require adjustment so same would make before front contact No. 1 of same relay breaks in order to prevent 45 deg. No. *1* relay from dropping, which would break the pick-up circuit of No. *1* stick relay before the stick-up circuit was completed, or the 45 deg. No. *1* relay would have to be a slow-acting relay; otherwise the stick relay would drop, completing the circuit for 45 deg. No. *1A* relay, thus clearing signal *1A* which is objectionable.—EDITOR.)

Simplified Circuit Recommended Which Makes Use of a Slow Acting Stick Relay

THIS circuit plan is designed to cover question No. 4 in the April issue, and I think it is self-explanatory. I had never used this circuit previously; however, I have tried it out since the question was published and have obtained very satisfactory results, even from a mechanical interlocking lever. A similar cir-

cuit, of course, can be used for signals *2* and *2A* and it is also possible that all four of these signals could be operated from one lever by properly selecting the home relay circuit over switches *2* and *3*. It should be noted that relay *1-SR*, as shown, is a slow-acting 500-ohm relay and the circuit works in the following manner:

Number *1* lever normal picks up relay *1-SR*. Pulling



Slow acting stick relay circuit which will select between top and bottom arms by time delay in reversing signal lever

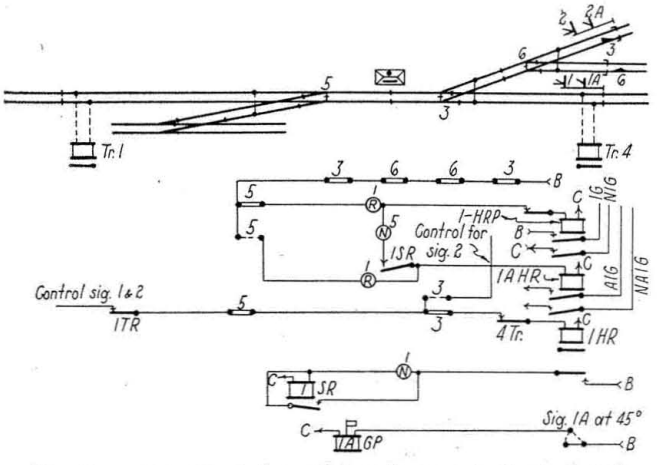
lever *1* quickly, will cause contact *1-R2* to make, causing relay *1-SR* to stick over its own point and will also close contact *1-R3* picking up relay *1-HR*, thereby clearing high-speed signal *1*. If the slow-speed indication is desired, regardless of whether track is clear or not, lever *1* must be pulled slowly from the normal to the reverse position, giving slow-acting relay *1-SR* time to open before closing contact *1-R2*. This will let relay *1-SR* open, which will pick up relay *1A-HR*, giving the slow-speed indication of signal *1A*.

Huntington, W. Va. W. H. MILLER,
Signal Cabin Inspector, Chesapeake & Ohio.

(Objectionable feature is that lever must be operated quickly for top arm and very slowly for call-on arm; otherwise takes care of all features required in question.—EDITOR.)

Stick Relay Control of Both Top and Bottom Arms Proposed—Signal *1A* Cannot Clear Until Lever is Returned to Normal and Then Reversed

THE circuits shown in answer to question 4 are controlled through switch boxes instead of repeater relays, as used on some roads. Signal *4* is controlled by *1HR* and *1HRP*. Relay *1HR* does not break through the lever but is controlled through the track relay to



Circuit arrangement for stick relay control of signals *1* and *1A*

the next signal ahead. It is not necessary to take it through switches *3* and *5* but this is an extra check. Signal *1A* is controlled by *1SR* and *1AHR*. Stick relay *1SR* will not pick up unless the track relay is open (causing *1HR* to drop) and lever *1* is normal. If *1HR* is open and lever *1* is normal *1SR* will pick up and remain picked up through its front contact after lever *1* is reversed..

If the route is normal and lever *1* is reversed signal *1* will clear because *1SR* will be open. When a train enters and shunts *4TR*, relays *1HR* and *1HRP* will drop, but *1AHR* will not pick up to clear signal *1A* because *1SR* will be open. It would be necessary to put lever *1* back to normal and reverse it again to clear signal *1A*.

With this arrangement it is impossible for signal *1A* to clear for a straight line movement when the track relay is picked up. Furthermore, it will not clear behind a train until the lever is put back normal and then reversed. It will always clear for a diverging route or when the track circuit is out. It is not really necessary to have *5 (N)* contact in the circuit but it is an extra check to cut the current off of the *1HRP* wire when switch *5* is reversed.

The circuits for signals *2* and *2A* would be similar. The signal repeater for calling-on arm is shown.

Richmond, Va. A. G. WALKER,
Circuit Draftsman, Chesapeake & Ohio.

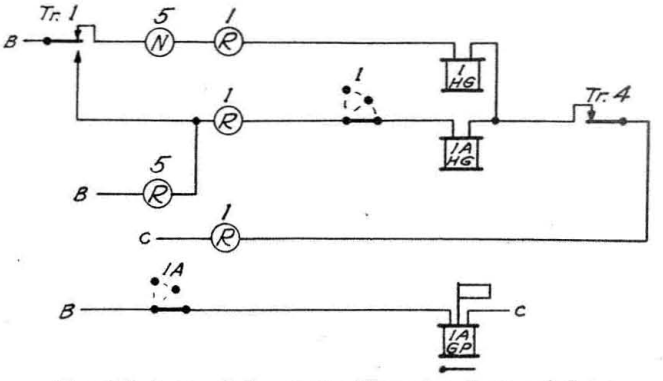
(Only objection is lower-arm is not a call-on, in the sense that a call-on arm can be used for any route at any time it is desired.—EDITOR.)

What's Wrong Here?

(Can you locate the weakness in any of the following replies to question No. 4, page 152 of the April issue? These were received as answers to the question but for one or more reasons were not considered as practical solutions to the problem.—EDITOR.)

Non-Stick Control for Call-On Signal *1A* Selected Through Track Relays *TR1* and *TR4*

IN the following solution I have assumed from the track circuit layout that signal *1* may be cleared if track sections *TR1* and *TR4* are unoccupied. The circuit will function as follows: Should the operator reverse lever *1* with track sections *TR1* and *TR4* unoc-



Simplified circuit for controlling signals *1* and *1A*

cupied, signal *1* will clear. The circuit for signal *1A* is open and there is no possibility of a "bob" on the signal. When the train passes the signal, relay *TR4* will de-energize, opening the circuit for signal *1*, causing it to return to the stop position. As the rear of the train clears section *TR4* the control circuit for signal *1A* is completed through the back contact of *TR1* and the front contact of *TR4*, causing signal *1A* to clear automatically. When the train clears section *TR1* the circuit for signal *1A* is opened and that for signal *1* is

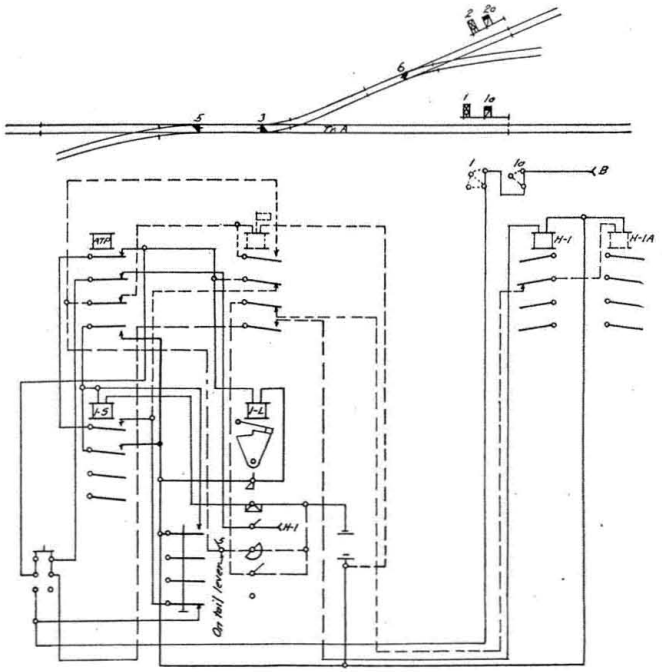
closed, causing signal *1* to clear and *1A* to return to the horizontal position.

Control of signals *2* and *2A* can be effected in the same manner, using the track relay at the signal location (not designated in original signal plan) and relay *TR1*.

CIRCUIT ENGINEER.

Standard Circuit Scheme Modified Slightly to Obtain Desired Operation of Call-On Signals

THE drawing shows in dotted lines what will be necessary to add to a standard circuit to control a call-on signal without a push button or other mechanical device. Indicator on indicating relay will show clear when switch *5* is normal, track relay energized and signal lever reversed. The indicator on indicating relay will show stop when signal lever is reversed and either switch *5* reversed or the track relay de-energized.

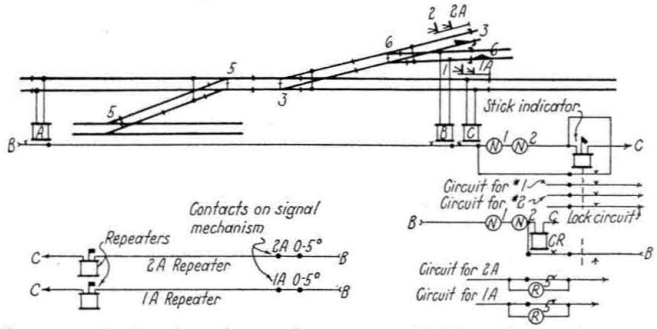


Modified circuit plan to obtain operation of call-on arms *1A* and *2A*

CIRCUIT DRAFTSMAN,

Circuit Scheme Employs One Stick Relay and an Additional Track Circuit

IN the following circuit arrangement in answer to question 4 in the April issue, I have not shown any wiring for signals *1*, *1A*, *2* or *2A* as they can be wired to suit the practice of any individual road. The top signals, *1* or *2*, must be controlled through a stick indicator. For simplicity, however, I have shown only one stick indicator circuit to control both high signals. This is possible because the position of switch *3* determines which of these signals should be cleared, on account of the mechanical locking of the machine. Inspection of the circuit showing the control of stick relay *CR* will show that after a train passes signal *1* or *2* (according to the lineup) and the signal has returned to the stop position closing the lock circuit, returning the signal lever normal, will pick up stick relay *CR*, after which this relay will be held up by the back point of the stick indicator. As the control circuits for signals *1A* and *2A* are broken through the front points of the stick relay *CR*, either of these signals can be cleared only when desired by the operator through reversal of the corresponding signal lever. Repeater circuits are shown for signals *1A* and *2A*. Although the stick indicator is shown as taking battery at track relay *A*, this can be extended as the stick indicator should control as far as the signal ahead.



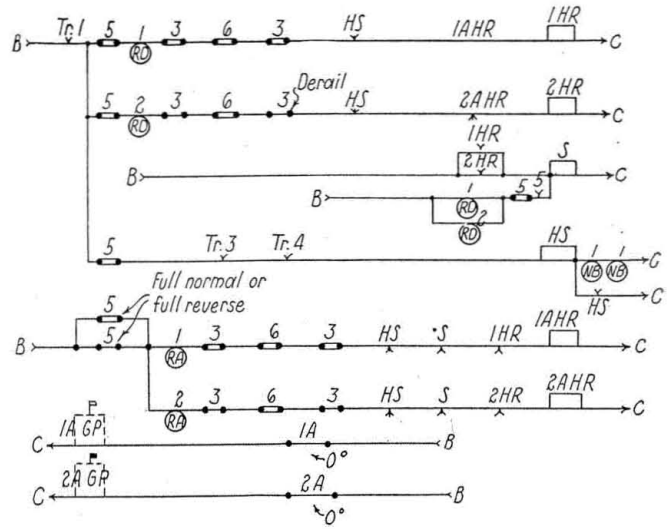
Suggested circuit scheme for accomplishing desired operation of call-on signals

Owing to the fact that signals *1A* and *2A* control the route over switch *5* reversed, the contact on stick relay *CR* controlling signals *1A* and *2A*, must be shunted by a multiple jumper when switch *5* is reversed.

GENERAL SIGNAL FOREMAN.

Control Scheme Utilizes Additional Short Track Section

IN this solution to question No. 4 in the April issue I have added *TR3* in the short track section extending from a point midway between switch *3* and switch *6*, and signals *2* and *2A*. The signal to be cleared is selected through a front or back contact on a stick relay *(HS)* which is picked up through front contacts on the track relays in the block but which is open when switch *5*, leading to the dead tracks, is reversed. With this scheme it is impossible to use the call-on signal when the block is clear. An additional stick relay *S* is provided to prevent the call-on signal from clearing immediately after a train passes through the interlocking limits. In this circuit relay *S* picks up over a front contact on either of the high signal home relays and is held up until the signal is restored to normal. The pick-up circuit of this relay is through a circuit controller on switch *5* and this enables a follow-up move to be made through switch *5* reversed before the first train clears the interlocking limits, by opening the stick relay circuit *S* and allowing the call-on signal *1A* to clear.



Written circuit for call-on signal control

E. W. R.