Signal Training Bulletin

COMMITTEE G: Education & Training
Communication & Signal Division, AAR

D-4 Stick Circuit

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The Signalman's Journal

Definition: "Stick circuit" is a term applied to a circuit used to hold a relay or other unit energized through its own contact.

Symbol: None.

Description: The stick circuit is divided into two parts: (1) the "pick-up circuit" and (2) the "holding circuit." The pick-up circuit is easily recognized since it is circuited directly to the coils of the stick relay. The holding circuit is made over a front contact of the stick relay, making it effective only after the stick relay has been energized through the pick-up circuit. The holding circuit will keep the relay energized as long as the holding condition exists.

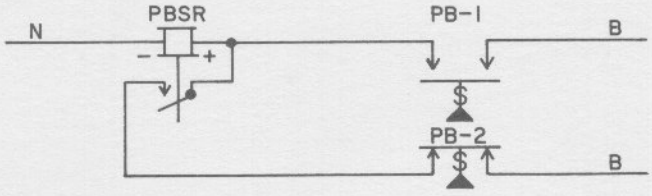

Figure 1 shows a stick relay operated by two pushbuttons.

Figure 1 shows a stick relay that is operated by two pushbuttons. The pushbutton stick relay (PBSR) is energized when PB-1 is closed; when PB-1 is released PBSR will stick up with energy over PB-2 and its own contact. The PBSR may be de-energized by pushing PB-2 and opening the holding circuit.

Stick circuits can be used to determine the direction a train is moving over the track circuits by detecting the order in which the track relays are shunted.

In Figure 2 a stick circuit is established using two track circuits. When a train is moving in a direction to occupy 2T first, the stick relay will be energized with energy over the back contact of 2TR and the front contact of 1TR. When 1TR is shunted, the holding circuit will be energized over the back contacts of 1TR and the front contact of the stick relay to the coils, holding the stick relay energized as long as 1TR is down.

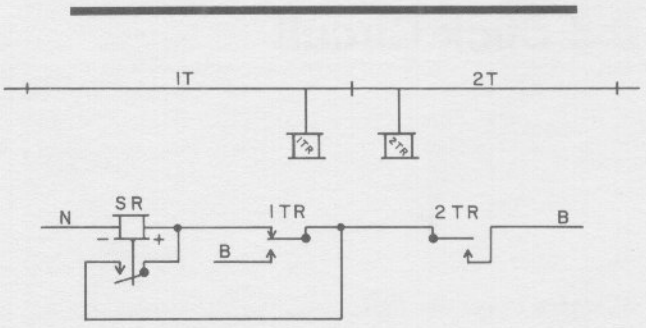

Figure 2 shows a stick circuit established by two track circuits

Purpose and Application: Stick circuits are used in various signal systems to perform many different functions. In traffic control systems and interlockings, the stick circuit is used in connection with timing relays on controlled signals to prevent the changing of routes until a predetermined time has expired.

In APB and CTC territory, stick circuits are used at intermediate signal locations to detect the direction of train movement and provide an approach indication for following trains.

In highway grade crossing warning systems, stick circuits are used to detect the direction of train movement and stop the operation of the warning system once the train has cleared the crossing.

Stick circuits are also used in time cut-out circuits in certain highway grade crossing warning systems to stop the operation of the warning system after a predetermined time has expired if the train stops in the start circuit equipped with a timing relay.

General Information: Most stick relays are slow release to bridge the open circuit time caused by the transfer of relay contacts.

(1) Ring-out is when the receding directional stick relay fails to stick up, allowing the warning system to operate until the train clears the receding approach track circuit.

(2) Lock-out, is when the receding directional stick relay stays energized after a train cleared the receding approach track. This condition is usually caused by track circuit failure during the train movement.

Detailed Operation: Directional stick circuits are used in highway grade crossing warning systems to detect the direction a train is moving and then stop the operation of the warning system after the train has passed the crossing. Shown in Figure 3 is a typical stick circuit used in connection with highway grade crossing warning system utilizing dc track circuits on the approach tracks and the center track.

In this scheme, the receding directional stick relay is energized when the train enters the center section (BT) with approach track (A) occupied and receding track (C) unoccupied. The stick relay will be held up through the back contacts of the receding track circuit as long as it is occupied. Opposing stick checks are provided to prevent energizing both stick relays during the movement of a train through the crossing.

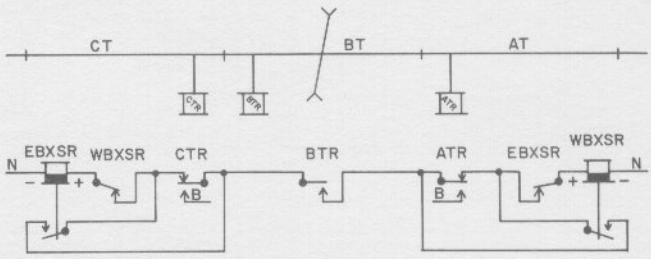

Figure 3 is a typical stick circuit for highway grade crossing warning systems using dc track circuits.

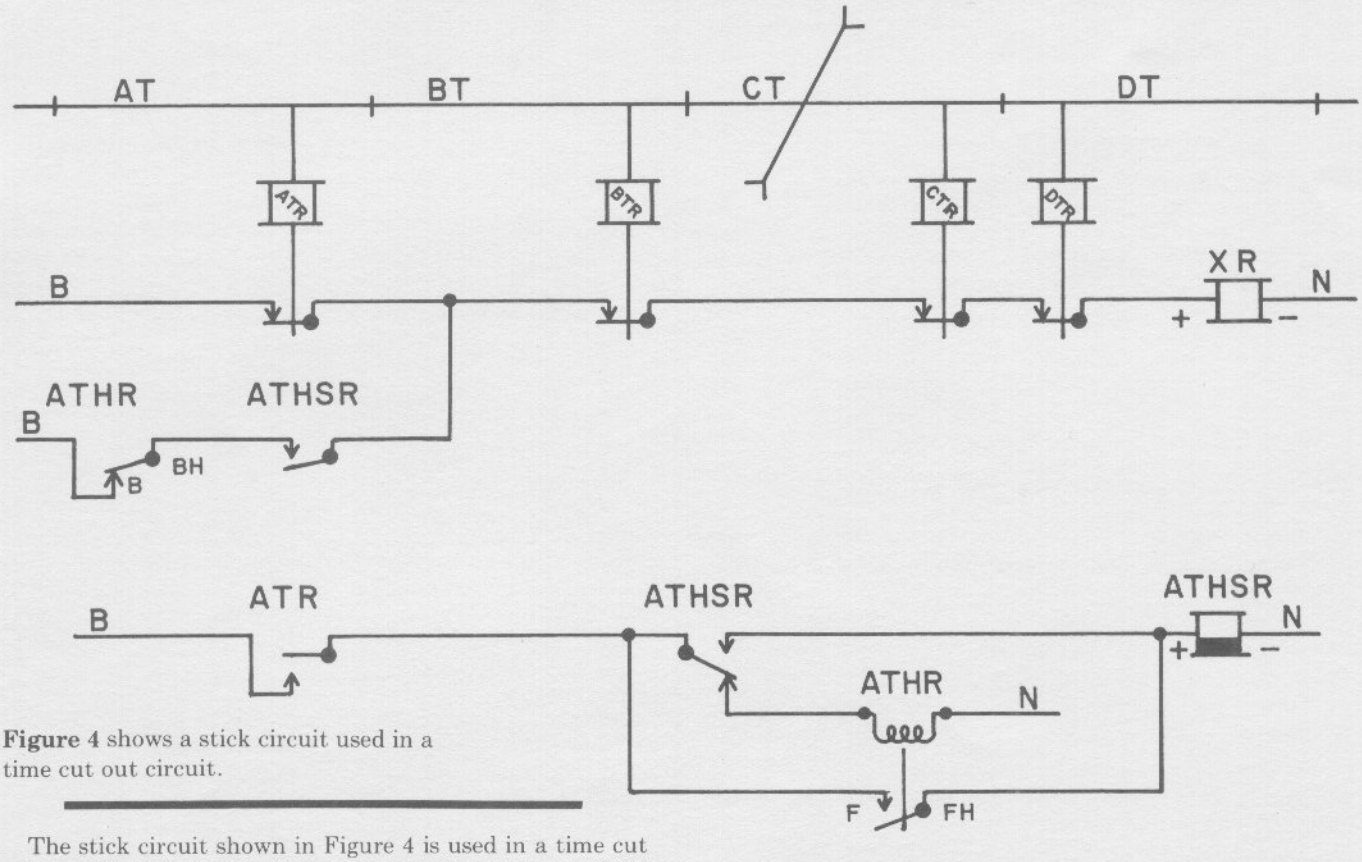

Figure 4 shows a stick circuit used in a time cut out circuit.

The stick circuit shown in Figure 4 is used in a time cut out circuit to stop the warning devices at locations where trains may stop in the approach track circuit to do switching or at stations. When a train enters AT section, ATR will be de-energized, allowing current to flow to the heating coil of ATHR. As the coil heats it will close contacts F-FH picking up ATHSR. When ATHSR picks up, energy is removed from the coils of ATHR allowing it to cool closing its contact B-BH, which stops the warning system. The warning system will start operating again when the train moves toward the crossing occupying restart section B.

Note: This Bulletin is for general information only. For specific applications consult the rules, standards and instructions published by your railroad.