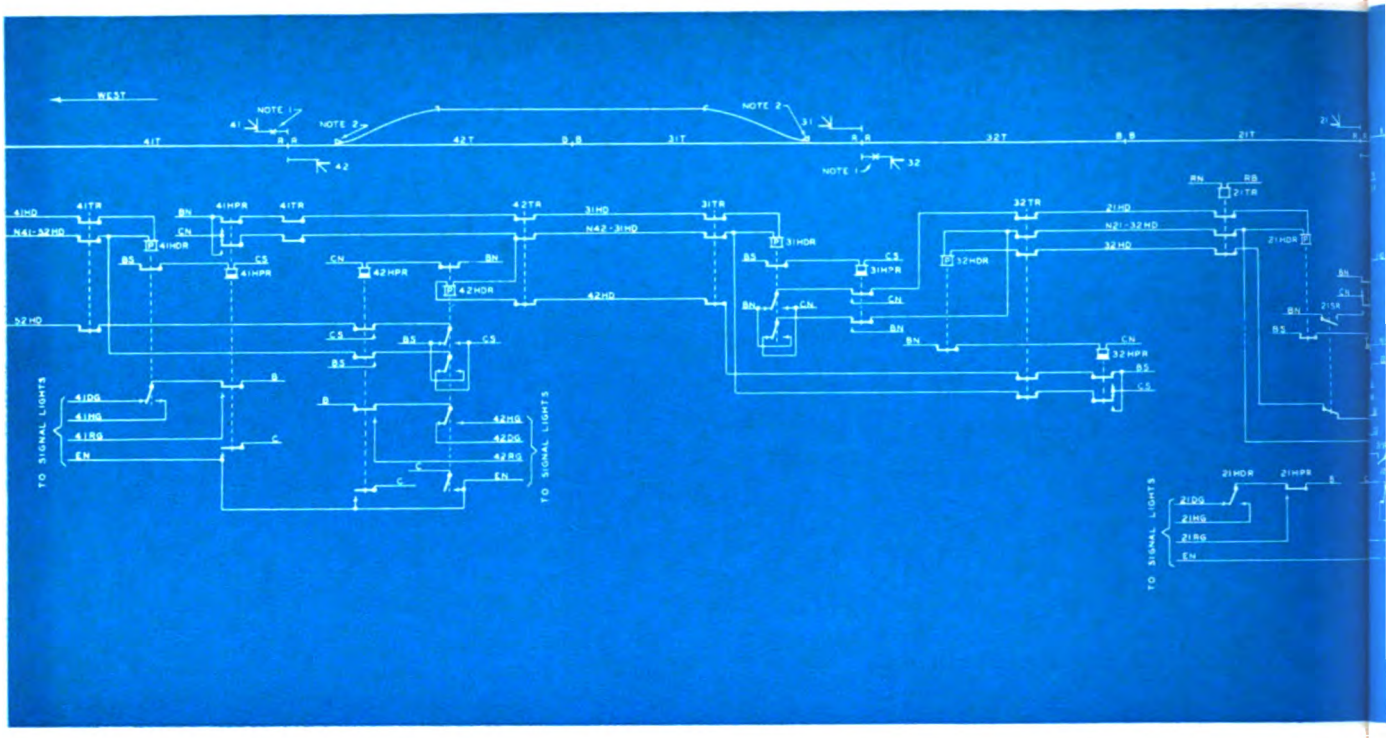
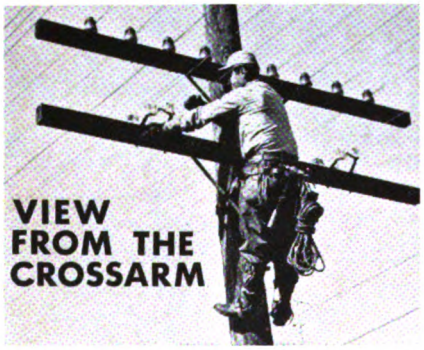




Block Signal Systems

What is a block system? What protection does a manual block system provide? What is "permissive blocking" and "absolute blocking?" What is an automatic block signal system? Can you differentiate between the terms "in advance of a signal" and "in approach of a signal?" What are the three schemes for control of signals on single track? What is meant by "traffic locking?" Is approach or time locking required for controlled signals and electric locks on hand-operated switches?

These questions, and many others are answered in Chapter XV—Block Signal Systems, American Railway Signaling Principles & Practices.

The Chapter, using illustrations and typical circuits, explains the functions of manual block, ABS, APB and TCS systems.

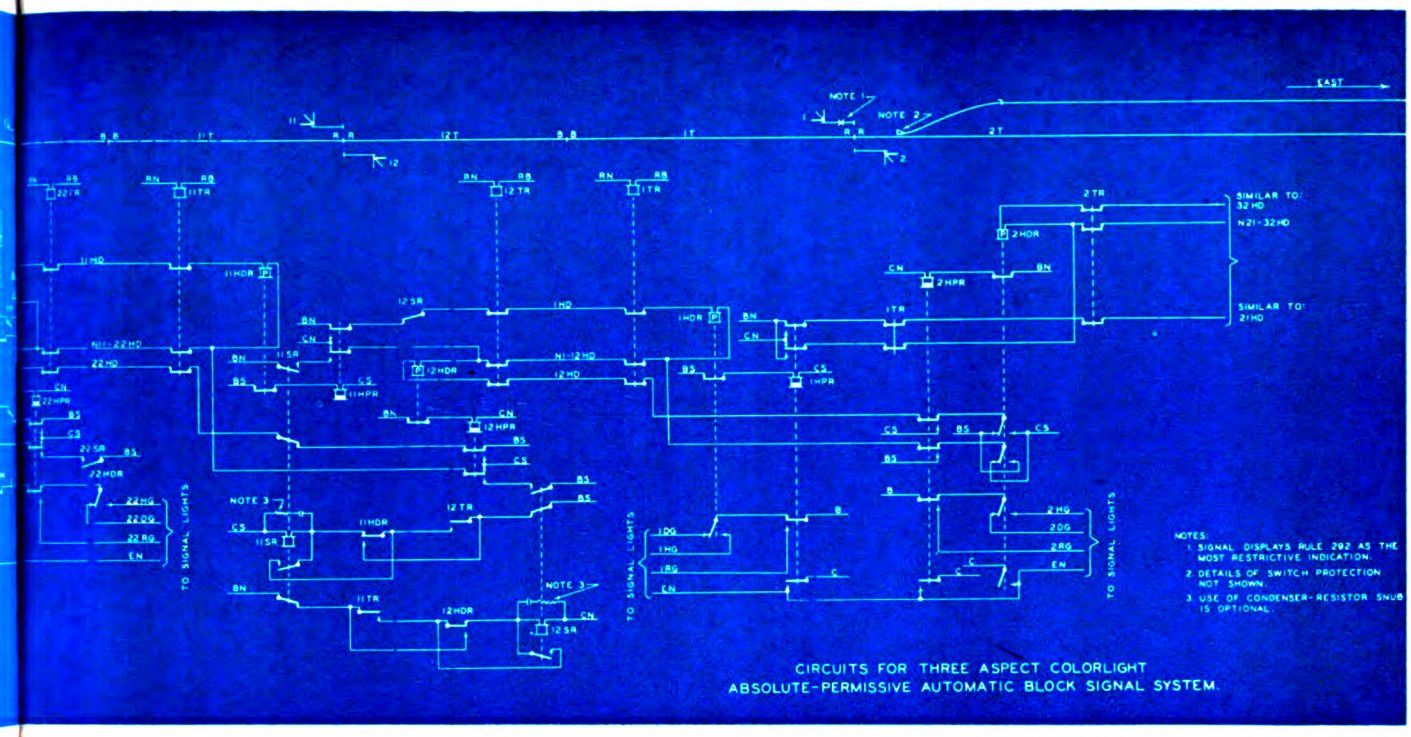
ABSOLUTE PERMISSIVE BLOCK

In APB, the chapter explains, the block is from siding to siding for opposing movements and the signals governing entrance to this block indicate stop when the block is occupied by an opposing train. The chapter also explains and illustrates controls for the system. Control circuits for a section of track, shown in the accompanying diagram, illustrates how an opposing train would be held at the siding by a stop signal.

With no train approaching in either direction all signals would indicate proceed. Assuming, however, that a westward train is approaching signal 1, signal 2 will display stop and proceed due to the approaching train occupying the block controlled by signal 2. With signal 2 at stop and proceed, signal 12 will be displaying an approach aspect.

When the front end of the train passes signal 1, it will cause signal 12 to display stop and proceed due to relay 1TR being de-energized. This will de-energize signal control relay 12HDR this in turn will open the control of signal control relay 22HDR causing signal 22 to display stop and proceed. With relay 22HDR de-energized it will open the control circuit for signal control relay 32HDR, causing signal 32 to display stop, which would provide an absolute stop for any approaching eastward train.

The circuit arrangement in this installation uses polarized HD relays and neutral slow release HP relays with three-wire HD control between signals. The control circuit of signal 22 is as follows: with everything normal positive battery BS is taken over a front contact of relay 12HPR, back contact of stick relay 11SR, front contact of track relay 11TR, wire 22HD, front contact of track relay 22TR, through coils of relay 22-HDR, front contact of relay 22TR, wire N11-22HD, front contacts of relays 11TR and 12HPR, to negative battery CS. With current flowing through the coils of relay 22HDR in this direction it will cause the left-hand polar contacts of this relay to close completing a circuit from positive battery B, front contact of relay 22HPR, left polar contact of relay 22HDR, wire 22DG to lamp in green or proceed aspect unit, wire EN, through back contact of relay 21-HPR, wire C to negative battery. An eastward train approaching signal 22 would have signal control relay 21-



CIRCUITS FOR THREE ASPECT COLORLIGHT ABSOLUTE-PERMISSIVE AUTOMATIC BLOCK SIGNAL SYSTEM.

HPR de-energized, which permits approach lighting of signal 22 as soon as the train occupies the track controlled by signal 21.

When an eastward train passes signal 22 it will de-energize relay 22TR which will de-energize signal relay 22HDR, which will in turn extinguish the green light and light the red unit by receiving positive battery B, through back contact of relay 22HPR, wire 22RG to red unit, wire EN through back contact of relay 21HPR or 22HPR, wire C to negative battery. With relay 22HPR de-energized it will continue to keep the red unit displaying stop and proceed as long as this block is occupied.

As the train passes signal 12, stick relay 12SR will be energized by receiving positive battery BN through back contacts of relays 11SR and 11TR, front contact of relay 12HDR, through coils of relay 12SR, wire CN to negative battery. The stick circuit will keep relay 12S energized through back contacts of relays 11SR and 11TR, through front contact of relay 12SR, then through the coils of this relay to negative battery CN. When rear end of train passes signal 12, relay 12SR will still remain energized by the circuit tapping off between relays 11SR and 11TR, through back contact of relay 12-HDR, through front contact of relay 12SR, through coils of this relay to negative battery CN. Under this condition signal 22 will then display an approach aspect to an approaching train by its controlling relay 22HDR being energized from positive battery BS through front contact of relay 12SR, back contact of relay 12-HPR, front contact of relay 11TR, wire N11-22HD, front contact of relay 22TR, through coils of relay 22HDR, front contact of relay 22TR, wire 22HD, front contact of relay 11TR, back contacts of relays 11SR and 12HPR to negative battery CS. With current flowing through the coils of relay 22HDR in this direction it will cause the righthand polar contacts of this relay to be closed thereby completing the circuit to display the approach aspect by receiving positive battery B through front contact of relay 22HPR, right-hand polar contact of relay 22HDR, wire 22HG to yellow or approach unit, wire EN through back contact of relay 21HPR to negative battery C. When rear of train passes signal 2, relay 12HDR will be energized, relay 12SR de-energized and the circuit for displaying the proceed aspect of signal 22 will be as previously explained.

There are other arrangements of control circuits for signals in absolute permissive schemes, but the principles are much the same as illustrated here. **RS&C**