

proceed, must be limited to display either the approach or proceed indication.

14. Circuits shall be so arranged that in no case will a stop signal, or a stop and proceed signal indicate approach until the rear of a train is under the protection of the next signal governing in the same and approach direction.

15. The positive and negative sides of track circuit repeating relays used for controlling signal apparatus shall be broken by the controlling track relay where relayed cut sections are used, the track relay at the cut section shall open the control circuit of and shunt the other relay.

16. The positive and negative sides of signal slots or holding coils shall be broken by a relay, or relays, protecting the entire block.

17. The control of signal shall be such as to provide:

(a) That each train is protected in the rear by at least one stop, and one approach indication, or by one permissive signal denoting block occupied by a train running the same direction, and one approach indication.

(b) That where a track is signaled in both directions, each train is protected against opposing movements by at least one approach and one positive stop signal.

(c) An approach indication before reaching a stop indication, excepting at the first signal of an installation or at the starting signal from meeting points, where traffic direction signaling is used, when trains may receive a stop indication without previously receiving an approach indication.

(d) Against misplaced switches or derails by at least one stop and one approach indication in each direction signaled.

(e) That where traffic direction signaling is used, the reversing or misplacing of a switch located between meeting points will set all signals governing toward the switch between it and both meeting points to the stop position.

(f) That two opposing signals governing over the same track will not display approach or proceed indication, simultaneously authorizing two trains to move opposing each other.

(g) That the proceed indication of each signal will be directly controlled by the next signal governing in the same direction.

(h) That, as far as practicable, apparatus shall be so constructed and circuits so arranged that the failure of any part controlling the operation of a signal shall cause it to display its most restrictive indication.

(j) That the battery or power supply for line circuits be placed at the end of circuit farthest from the function operated.

18. Circuits controlling permissive signals, which denote block occupied, shall provide:

(a) A slow speed indication to follow a train into an occupied block.

(b) A stop indication against opposing trains in the same block where tracks are signaled in both directions.

(c) That opposing signals governing over the same track shall indicate stop when a permissive signal indicates approach.

19. Take-siding indicators, when displaying an indication to take siding, shall cause the next signal in the rear to indicate approach and the automatic signal on the same mast to indicate

### Discussion

Mr. Rudd moved an amendment to paragraph No. 6 to make the first line read *hand thrown* derails and that the last two words in the third line should be cut out, making the clause read ". . . normally closed point or with a plunger-locked circuit controller."

This motion was carried. The committee accepted the suggestion that paragraph 9 should read "Each track circuit shall, as far as practicable," etc.

On motion of Mr. Fugina paragraph 11 was cut out. A proposal to eliminate the last three words in paragraph 10 was voted down.

The committee accepted suggested changes in paragraphs 16 and 17; and, on motion of Mr. Rudd, paragraph 17a was amended to read "that each train is protected in the rear by at least one stop and one approach indication, or by one permissive and one approach." There was a long discussion on paragraphs f and g but it resulted in no action. Paragraph 19 was cut out, as dealing with a point which is covered elsewhere.

The report was accepted for submission to letter ballot for inclusion in the Manual.

## Report of Committee X—Signaling Practice

**T**HE committee submitted a report on the various types of light signals for day and night indications.

### Position Light Signals

Since the last report all position light signals on the Pennsylvania System have been changed from four lights to three lights in a row, 18 in. centers. This signal is entirely satisfactory as to visibility and a decided reduction in cost of construction, maintenance and operation has been effected.

The large unsymmetrical and somewhat unwieldy background, which had been adversely criticized by many signal engineers, is reduced to a circle 54 in. in diameter, so that it requires less clearance space than a semaphore. With this reduced background size, the large platform is unnecessary, and the wind pressure is lessened, so that, instead of special 7 in. and 8 in. masts, the A. R. A. Signal section standard masts, ladders and platforms (with a slight modification in the railing) are used, thus reducing cost of construction.

The elimination of three lamps in a three-position unit reduces the cost of maintenance and, as the current consumption is reduced 25 per cent, the cost of operation is less.

The availability of the signal where primary battery with approach lighting employed has been greatly extended, in that the cost of maintenance and operation is less than that of a motor, if the approach lighting circuit is not occupied more than 6 hours per day, and very few, if any, circuits are occupied more than two or three hours

per day, while, on account of the small current consumption, tricklers or small farm lighting outfits make them available for use as interlocking home signals.

Lamps are 12 volt, 7½ watt, burned under voltage. The total energy required for three lights is 18 watts. The dwarf signal uses two 6 volt 12 watt lamps under voltage; actual consumption for the signal, 16 watts. There is no peak load as required by motor signals—the consumption being practically constant.

Advantages, as previously set forth, are four positions vs. three positions of motors and three distinct colors in colored-light signals; saving in economic waste of transmitting light through colored lenses or roundels; elimination of dangers due to color blindness; failure of two lights before signal ceases to be distinctive; extinguishing of lights resulting in less favorable indications, and reductions of "improperly displayed proceed indications" due to elimination of moving parts.

### Color Light Signals—Unit Type

A comparatively recent addition to the field of color-light signal was made when the single unit type was placed upon the market.

This signal uses but one lamp and lens for the three indications, thereby considerably reducing the size and weight of the signal case and hood.

The lamp which is varied in candle power according to the range required is of the concentrated filament type, and is mounted in a special bayonet base, in order to insure proper focusing. The filament may of course be doubled to protect against burnouts if desired.

