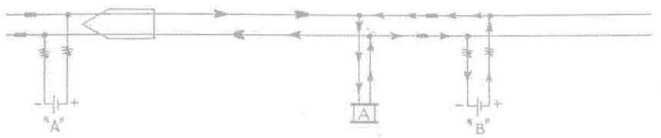
would be when the train shunt is poor and battery *A* current tends to flow by the train, thus reducing the voltage at relay *A*. Poor train shunting is a very undesirable condition in any event and should be remedied but not by transposing the track circuit polarities.

I do not know of any improper operation due to this cause but I do know of a few cases where a



Track circuits with same polarities at adjacent rails to illustrate foreign current action on relay *A*

train approaching a signal shunted the track relay on the other side of the joints due to leaky or broken down joints and thereby tripped the signal in the face of the train. It seems remote that any improper operation that might result from leaky or broken down joints, would be overcome by transposing the polarity of adjacent track circuits. Hence, the benefit derived from transposing the polarity of adjacent track circuits, at the expense of simplicity and uniformity, is questionable.

Albany, N. Y. F. X. REES,
Circuit Engineer, New York Central

Transposed Polarities Enable Maintainer to Check Condition of Insulated Joints More Easily

AMONG the benefits derived by transposing the polarity of adjacent track circuits, the most important is the check on broken down insulated joints at the signal location. The transposed polarity gives a maintainer an easy check on the condition of the insulation in the joints. By placing a jumper around the insulated joints (first one, then the other) it is possible for him to detect broken down insulation, because if both joints show a leakage or breakdown the signal will display a restrictive indication.

Should both insulated joints break down at the signal, it will give a stop indication if a two-position track relay is employed and with three-position polarized circuits, the signal will show a caution indication. This feature in itself has proved the necessity of providing transposed polarity of circuits at all automatic signal locations.

St. Augustine, Fla. W. A. HOFFMAN,
Signal Engineer, Florida East Coast

How Many Signal Aspects and Indications?

"What is the distinction between signal aspects and signal indications? How many are needed for efficient operation?"

Lackawanna Employs Six High and Two Dwarf Signal Aspects for Interlocking and Automatic Signal Indications—Cab Signaling Requires Fewer Aspects and Indications Than Wayside Signaling

THE distinction between signal aspect and signal indication is best shown by the following definitions of these terms:

Signal Aspect—The appearance of a signal conveying the indication as received from the direction of an approaching train.

Signal Indication—The information or command conveyed by the aspect of a visual signal.

We are primarily concerned with the safe, and secondarily with the expeditious, handling of trains. To this end (1) Signal aspects and indications should be limited to the minimum necessary for conveying the required information; (2) An aspect should have but one indication; (3) Both aspects and indications should be developed along a line of logical reasoning so as to be easily comprehended by enginemen and trainmen, and easy to fix clearly and indelibly in their minds.

Color-light signals have been used for any extensive installations on the Lackawanna since 1920. Six high and two dwarf signal aspects serve for both interlocking and automatic signal indications, as indicated by the accompanying chart. There is one apparent inconsistency in that, aspect *2* without number plate means

Form S. E. 3
11-25

THE DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

COLOR LIGHT SIGNALS

NAMES, ASPECTS AND INDICATIONS

FIG.	COLOR GIVEN BY	INTERLOCKING HIGH SIGNALS NAME	INTERLOCKING HIGH SIGNALS INDICATION	AUTOMATIC BLOCK SIGNALS NAME	AUTOMATIC BLOCK SIGNALS INDICATION
1.	One Red Light	Stop Signal	Stop		Legend ● Red ◒ Yellow ◍ Green
2.	Red Light over Yellow Light	Slow Speed Signal	Proceed at Slow Speed Prepared to Stop	Stop and Proceed Signal	Stop and proceed (under limitation given in Book of rules)
3.	One Yellow Light	Approach Signal	Approach next signal prepared to stop	Approach Signal	Approach next signal prepared to stop
4.	Yellow Light over Green Light	Approach Restricting Signal	Approach next signal at restricted speed	Approach Restricting Signal	Approach next signal at restricted speed
5.	Red Light over Green Light	Clear Restricting Signal	Proceed at restricted speed		
6	One Green Light	Clear Signal	Proceed	Clear Signal	Proceed
		SLOW SPEED SIGNALS			
7	One Red Light	Stop Signal	Stop	NOTE:— An automatic block signal is distinguished from an interlocking signal by a number plate.	
8.	One Yellow Light	Slow Speed Signal	Proceed at slow speed prepared to stop		

Chart giving names, aspects and indications of color-light signals on D. L. & W.

"Proceed at slow speed prepared to stop;" and with number plate means "Stop and proceed" (under limitation given in book of rules). There is no hazard to traffic due to misinterpretation of this indication, in fact, it is expected that eventually the automatic and interlocking indications will agree and be "Proceed at slow speed prepared to stop." On new installations aspect figure *1* with number plate will have the automatic signal indication as shown for figure *2*.

An entirely new factor must now be considered as it has a material bearing on signal aspects and indications—cab signals are being adopted very generally in connection with automatic train control of the continuous type. It is desirable that these agree both in indication and aspect with wayside signals, except the interlocking stop and slow speed signals which need not be reproduced in the cab. When speed control is automatically enforced, the cab signal indication must necessarily be confined to action required on the part of the engineman as soon as received.

A slight rearrangement of D. L. & W. standard