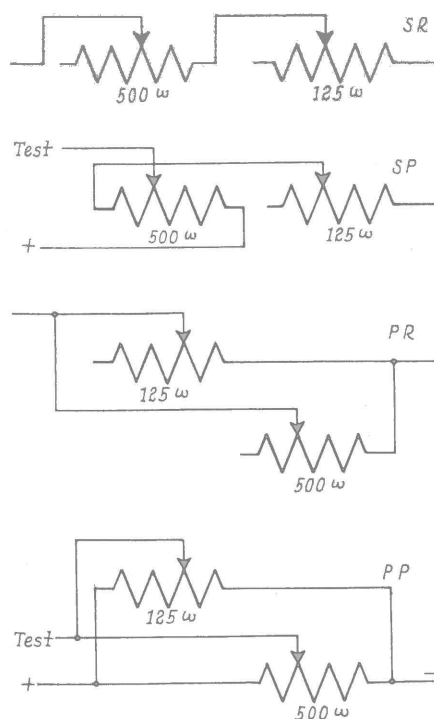


volts. A second voltmeter, of the thermo-couple type has three scales, 0 to 0.5, 1.5, and 5 volts.

The a-c. voltage for testing a-c. relays can be varied by a combination of equipment. A variable transformer of the Variac type is mounted behind the board and the adjustment is controlled by turning the hand wheel on the front of the board so that the output voltage can be varied from 0 to 135 volts in a constantly stepless increase. This transformer feeds an auto-transformer which feeds the test circuit, the voltage of which is adjusted in steps by a hand switch to give 0.2, 0.5, 1.0, 2, 5, 10, 20, 55, and 110 volts. By combined operation of the step switch and the



SR, SP, PR and PP circuits

variable transformer the test voltage can be gradually increased or decreased.

The idea of constructing this complete arrangement for testing a-c. as well as d-c. signal apparatus, as used on the Hudson & Manhattan, was developed by Ed Blake, Superintendent of Way and Structures, who has charge of the signaling on that railroad.

The detail plans and specifications were developed by Mr. Blake, with the co-operation and assistance of the engineers of the Western Railroad Supply Company and Associated Research Incorporated, which built and assembled the test equipment for Western Railroad Supply Company. The meter indicating units were manufactured by the Weston Electrical Instrument Company.

Southern Pacific Petition Denied

THE Interstate Commerce Commission has issued a decision denying a petition of the Southern Pacific, an abstract of which follows:

"The Southern Pacific Company filed nine applications with the Interstate Commerce Commission for approval of certain proposed modifications of the automatic block signal system on a total of approximately 609 miles of line, of which about 92 miles are double track and 517 miles are single track. On all of the lines covered by these applications trains are operated by time table, train orders and automatic block signal systems. One-arm two-position home signals, one-arm two-position distant signals, and two-arm two-position home and distant signals of the semaphore type are in general use throughout, and in parts of the territory two and three-indication searchlight signals are in use. In single-track territory, an overlap system of control is provided, and in general the signals are located and controlled as follows:

Distant signals to siding-entering signals are one-arm two-position semaphore or two-indication searchlight signals. These are ordinarily located from 2,000 ft. to 6,500 ft. from the siding-entering signals, the average spacing being about 2,500 ft. At entering ends of sidings, two-arm home and distant semaphore or three-indication searchlight signals are usually provided. The home controls for these signals extend one track section beyond the next home signals, and the signals indicate proceed when the next home signals are clear. At leaving ends of sidings, one-arm home semaphore or two-indication searchlight signals are used, with the controls overlapped one track section beyond the next opposing intermediate signals.

Sections 204 and 207 of the I.C.C. Rules Standard and Instructions relate to the spacing of signals in automatic block signal systems and read as follows:

204. Signals shall be spaced at least stopping distance apart or, where not so spaced, an equivalent stopping distance shall be provided by two or more signals arranged to display restrictive indications approaching signal where such indications are required.

207. On track signaled for movements in both directions, signals shall be so arranged and controlled that proper restrictive indications will be

provided to protect both following and opposing movements.

The proposed changes heretofore mentioned are in connection with signals at or near passing tracks and sidings. The distant signals to siding-entering signals and entering and leaving signals at sidings are to be respaced or relocated and the controls changed for the purpose of providing increased stopping distances for trains moving in the same direction, and also for opposing train movements at siding locations. These changes appear to be in conformity with the rules cited, and to promote safety. Objection to them was not raised, and they have been approved in accordance with our usual procedure.

Subsequent to the application for approval of the above changes, the Southern Pacific filed application for modification of sections 204 and 207 to permit continuance of the present spacing of intermediate home signals, i.e., those signals located between sidings but not at or near them, until such time as a more general modernization program is carried out. This application was in some respects amended at the hearing, where the Southern Pacific requested an interpretation rather than modification of these sections. Whether we consider the Southern Pacific's request as a modification or an interpretation of the rules is unimportant, as what is really desired is our authorization to continue in service the present arrangement of intermediate block signals which govern opposing and following movements in the territories heretofore mentioned. The issue before us for determination is whether or not we shall approve the present spacing of intermediate block signals without change.

The Southern Pacific began installation of its present signal system about 1904, but it was not completed until about 1920. While the system is well maintained, it is not a modern type, and admittedly requires material modification to make it conform with present standards and operating requirements. The intermediate signals are single-arm two-position semaphore or two-indication searchlight type, generally spaced from 2,000 to 4,500 ft. apart, with an average spacing of 2,500 ft. Their controls extend to sidings without overlap. Ordinarily there is but one pair of staggered intermediate home signals between sidings, although when the distance be-

tween sidings is long, two pairs are used. These signals are not provided with approach indications. The rules involved require that proper restrictive indications shall be provided to protect both following and opposing movements, and that the signals shall be spaced stopping distances apart or equivalent stopping distances shall be provided by two or more restrictive indications. The authorized speeds of trains in one of the more important territories here involved are 75 m.p.h. for passenger trains, except that streamline trains are authorized to operate at a maximum speed of 90 m.p.h. over a portion of the line, and 50 m.p.h. for freight trains.

Tests have been made by the Southern Pacific to determine the distances required to stop freight trains moving at a speed of 50 m.p.h. and passenger trains with standard equipment moving at a speed of 70 m.p.h. As a result of these tests, the Southern Pacific has established as its standard the spacing of signals 6,000 ft. apart. The present average spacing of the signals here involved is less than one half that distance, or 2,500 ft.

The Southern Pacific admits that under certain conditions with the present spacing of signals, "it is conceivably possible for two opposing trains to leave adjacent stations simultaneously and approach the intermediate signals at Stop without an advance approach indication," but the "possibility of this occurring, and at the same time one or both trains running by the intermediate signals a sufficient distance to collide, is so extremely remote that the question of hazard is largely a theoretical one." It urges that because of the method of controlling the signals on its lines, the spacing of intermediate signals so as to provide twice the distance between them which is required to stop a train by means of service brake application, or the rearrangement of controls so as to provide approach indications for those signals would lower the efficiency of operation, and that changes resulting would provide blocks of excessive length for train operation.

The Southern Pacific Company (Pacific Lines) has 5,705 miles of track equipped with automatic block signals, of which 4,034 miles are single track. The respacing covered by the nine applications heretofore involved will entail an expenditure of \$228,000. Similar respacing of signals on the entire system as proposed by the railway company will require an expenditure of nearly \$2,000,000, and rearrangement of spacing or controls of intermediate signals in conformity with requirements of the Commission's order would entail an additional expenditure in excess of \$2,000,000

for the entire system. The Southern Pacific urges that this latter expenditure is not justified, and asserts that the hazard of collisions at intermediate points is negligible. In support of this it points to the fact that no collisions have occurred on its line between trains moving in opposite directions which could be ascribed to insufficient spacing of intermediate home signals.

Representatives of the employees oppose the modification or interpretation of the rules sought on the ground that safety of operation would thereby be decreased. The rules in question were established and are intended to promote the safety of employees and travelers on railroads. Time was provided in which to make the necessary changes. It is our duty to effect the greatest measure of safety at the earliest possible time. To "promote" safety means to "advance," "extend," "elevate" or "contribute to the growth or enlargement of" safety. *Johnston v. Atchison, T. & S. F. Ry. Co.*, 225 I.C.C. 519, 547. The rules in question contemplate continuing progressive improvement of the systems involved. These requirements apply to all railroads alike, and numerous applications covering proposed modifications which are designed to bring their signal systems into conformity with these requirements have been filed by other carriers and approved by us. This record does not indicate that the approval sought by the Southern Pacific would promote safety. The essential parts of the testimony in support of the application merely show that over a period of years in the past there have been no head-on collisions charged to the present spacing of the signals involved. Generally speaking, the speeds of trains have been substantially increased since this system was installed.

We are of the opinion and find that the proposed modification of sections 204 and 207 would result in a lower standard of safety than is prescribed by our order of April 13, 1939, and that the petition for approval sought should be denied."

An order to that effect was issued.

Illinois Central Order

ON August 1, the Interstate Commerce Commission issued an order directing the Illinois Central, and all other interested parties, to show cause on or before October 1, as to why the Illinois Central should not be required to adopt certain rules concerning automatic train stop and cab signaling devices. No such cause was shown,

and on October 1, the Interstate Commerce Commission issued an order directing and requiring the Illinois Central to establish and maintain the following rules:

"289-B. Automatic Train Stop Device:—Locomotive enginemen, upon leaving initial terminals, will make required departure tests and must know that all equipment is in proper operating condition before proceeding. Before entering automatic train stop territory, enginemen will cut in automatic train stop device and know it is in proper operating condition before proceeding. Locomotive firemen upon leaving initial terminals and upon entering automatic train stop territory will ascertain from enginemen whether automatic train stop device is in proper operating condition.

"C. Engine Cab Signal:—When the electrical engine device or the signaling current in the rails has failed, pneumatic device may be cut out, electrical device remaining cut in, and train will proceed at restricted speed, not exceeding 15 m.p.h., to the first available point of communication, where report must be made to the chief train dispatcher.

"D. Train will then proceed in accordance with instructions of chief train dispatcher and at a speed considered safe, taking weather conditions into consideration. Train will approach all home signals at interlocking plants prepared to stop, also approach all facing-point switches prepared to stop, unless the way is seen to be clear.

"Chief train dispatcher will notify all trains concerned, by train order. He will issue order providing that the train without automatic train stop protection will be protected by holding such train at open train order offices until preceding train has cleared next open train order office ahead. Under conditions not here provided for, chief train dispatcher will issue order that train without automatic train stop protection may proceed to a definite point at restricted speed not exceeding 15 m.p.h.

"E. In event train stop application occurs and engineman is unable to release brakes, the pneumatic device will be cut out, electrical engine device remaining cut in, and train proceed in accordance with engine cab signal indication. Report must be made to chief train dispatcher from first available point of communication, and chief train dispatcher will issue order providing that train with pneumatic device cut out and electrical engine device remaining cut in will be protected by holding such train at open train order offices until preceding train has cleared next open train order office ahead."