switches, skates and compressors. They also take care of the communicating system, and with the assistance of an acetylene welder and his helper these men are also overhauling on an average of five retarders per month.

There is one maintainer at each hump on the second trick. These men clean and lubricate the retarder mechanisms, switch mechanisms, skate mechanisms, motor-generator sets and compressors. They also take care of the control machines and the man at the northbound hump checks and adjusts the air pressure on the retarder regulators.

The repair and adjustment of skate machines and skates is a much larger item than that of switches and switch machines.

Our apparatus is of the earliest type built commercially and our maintenance is, therefore, probably somewhat greater than on the most modern installations.

Three Men, Two Shifts

By C. F. STOLTZ
Signal Engineer, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati, O.

WE have a 32-track hump yard equipped with about 900 ft. of retardation, 29 interlocked switches and 35 signals. The maintenance force consists of one day maintainer, one night maintainer, and a helper. The helper does the greasing and oiling. This yard has been in service about a year and unless business is unusually heavy, is operated two 8-hr. shifts each day, the maintainers covering these shifts, which generally are between 8:00 a. m. and 4:00 p. m. and between 8:00 p. m. and 4:00 a. m. The oiling and greasing is all done during daylight hours. This force has proved to be adequate, and sufficient to maintain the system, and we do not anticipate that it will be necessary to increase it in the future.

The switches and retarders are the electro-pneumatic type, equipped with the Zerk-Alemite system of lubrication. The greasing and oiling is all done by compressed air, which we consider a great labor saver in keeping the movable parts well lubricated, thus avoiding undue wear.

Pitcairn Yard on the Pennsylvania

By E. B. PRY
Superintendent of Telegraph & Signals, Pennsylvania, Pittsburgh, Pa.

AN electro-pneumatic car retarder installation has been in service at the eastbound classification yard, Pitcairn, Pa., approximately 15 mi. east of Pittsburgh, since November, 1929. The switches at this yard had previously been operated from a push-button machine and there had been a complement of car riders on three tricks daily. The grade of the yard was changed to accommodate the car retarders.

At the time the retarders were installed the existing switch operating mechanisms were continued, but their control was changed from the push-button machine to the separate car retarder and switch control machines installed at the same time as the retarders. There are 34 classification tracks in the yard, 25 double-rail retarders, 33 switches and 34 skates operated from three control towers. A loud-speaker system and teletype service is provided between the assistant yardmaster's office near the apex of the hump and the three control towers.

Since the retarders have been installed it has been possible to classify in two tricks a number of cars that previously required three tricks. As practically all of our freight trains are on a definite schedule, it was desirable to establish the two tricks from 7:00 a. m. to 3:00 p. m. and 7:00 p. m. to 3:00 a. m. About 90 per cent of the cars handled in this classification yard are loaded, the lading consisting principally of merchandise and manufactured articles.

To handle the maintenance at this point we believe it is necessary to provide a maintainer on each trick who will handle general maintenance work, renewal of worn parts, etc. In addition to this it is necessary to employ a helper on one trick, his chief duties being to clean and lubricate the retarders as well as to assist the maintainer with any work requiring the services of two men. Due to the continuous movement of cars through the retarders during the time the yard is in operation, we considered it desirable to establish the helper's hours from 11:00 a. m. to 7:00 p. m., which permits uninterrupted work of cleaning and lubricating for approximately the four hours from 3:00 p. m. to 7:00 p. m.

Depends Upon Traffic

By W. H. ELLIOTT
Signal Engineer, New York Central, Albany, N. Y.

THE maintenance organization for a car retarder installation should be based on the amount of apparatus to be maintained and the quantity and quality of traffic being handled. If the car retarders are being worked to capacity with important traffic which cannot be delayed without material loss, it is desirable that a maintainer be on duty continuously and the necessary night and relief men provided. If traffic is light and occasional delays are not objectionable a smaller organization will be sufficient.

An installation with 30 retarders, 30 power-operated switches and 30 skates with hump and trimmer signals should be properly taken care of with one leading maintainer, one maintainer, one assistant maintainer and one helper; relief maintainer and night maintainer may be provided in addition if required.

If it is planned to have the maintenance work done periodically by an extra gang and the maintainers cover only emergency trouble, a smaller organization can be used, although as a rule the greatest economy is obtained by having a leading maintainer in charge and keeping up with running renewals and repairs.

Light-out Protection

"In light signaling what are the advantages and disadvantages of the various methods of preventing signal failures that are caused by lamp failures?"

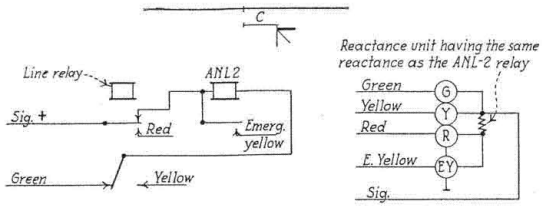
Auxiliary Light-Signal Unit Controlled by Light-Out Relay

By J. A. JOHNSON
Signal Engineer, Missouri-Kansas-Texas, Denison, Tex.

THE May issue of *Railway Signaling* describes the method we used in our recent installation of color-light signals. An auxiliary light-signal unit, with a yellow lens, is mounted on the signal mast 2.5 ft. on centers below the lower unit of the main signal. An ANL-2 relay, connected as shown in the sketch, performs the following function: If the lamp filament in the green or yellow unit of the main signal should burn out when the clear or caution circuit, respectively, is set up, the auxiliary unit will be lighted through a back contact of the light-out relay, since

the latter will then be de-energized. An engineman or trainman, finding the auxiliary light unit burning instead of the regular unit, notifies the dispatcher, who, in turn, notifies the signal maintainer. The latter replaces the burned out lamp bulb during his regular working hours. Thus, the expense and hazard of calling the maintainer out during the night hours are eliminated.

This arrangement permits the lamp bulb to be left in service until its full life is obtained and the saving



Circuit diagram for special unit

thus effected pays for the additional light-signal unit. The principal advantage, however, is to eliminate the slowing down or stopping of trains, which is otherwise caused by the failure of lamp bulbs in the green or yellow units. With the existing arrangement, the only occasion for a train being required to stop for a dark signal is when the bulb in the red unit is burned out, in which case the stop is necessary anyhow. It should be noted that this new arrangement does not add to the number of aspects or introduce any new complications for the enginemen to learn. The only delay is that occasioned by running at caution speed rather than at normal speed when the green bulb is burned out.

Reserve Unit Used

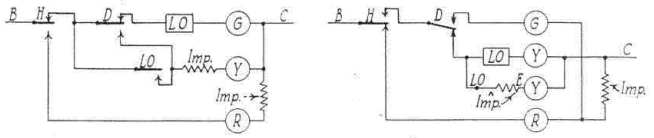
By R. A. SHEETS
Assistant Signal Engineer, Chicago & North Western, Chicago

TRAIN delays because of lamp failures in color-light signals are undesirable, but the absence of a signal where one should be, because of a lamp failure, is a hazard. Color-light signals are only as good as the lamps are reliable. All types of reserve battery are useless if the lamp burns out and all schemes of regular renewal are useless if a filament fails. Signals with two lights burning need cause little concern with reference to being overlooked on account of filament failures, but those with only one light burning must have some sort of an emergency light.

The circuits shown illustrate customary practice on the Chicago & North Western. Separate lights and light units are used for each indication. A light-out relay in series with the filament of the normally-burning light is de-energized when the filament fails, and the signal indication is changed to the next more restrictive indication or to a specially provided reserve unit.

The light-out relays are designed for operation in series with the filament either at 10 volts 18 watts, or 10 volts 10 watts, and a compensating impedance is used in series with the other filaments. The relay will operate on either a-c. or d-c.

A special adaption is being arranged for use in single unit two- or three-indication signals whereby



Left—Typical circuit in which the yellow unit is used as a reserve for the green

Right—Here an auxiliary yellow unit is used as a reserve for the yellow, which in this case is the normal indication

a double-filament bulb will be used with the light-out relay in series with the normal filament which is in focus. In case of a filament failure the energy will be transferred to the second filament which is out of focus but is satisfactory for an emergency. In either case the signals are sure to be reported and proper repairs can be made promptly.

W. J. Eck, assistant to vice-president, Southern, replies that very few signal failures have been caused by lamp failures on the above mentioned road. He continues, "We have not considered it necessary to install any extra apparatus for detecting such failures. We burn the lamps slightly under the normal-rated voltage and the maintainer keeps a close check on the number of hours burned by each lamp and in this way is able generally to anticipate the failure. We find that if the lamp does not fail almost immediately after its installation, it will last for a very long time."

Boston & Albany freight train, hauled by Berkshire-type locomotive