compartments, and a room with necessary sleeping and toilet facilities for the cook. It could be heated with stoves. The second car, a sleeper, should have 10 good-sized lockers, 2 washbowls, 2 shower baths, 2 chemical toilets, 10 beds, and should be equipped with electric fans and heated from a hot-water heating plant. The third car, recreational, should be equipped with several double seats facing each other and spaced so a table could be placed between them. There should be a few additional comfortable chairs for lounging or reading. The foreman should have a room in this car fitted as an office and bedroom with necessary conveniences. The car should be heated from a hot-water heating plant. The entire outfit should be equipped with a power plant to take care of the lighting and other electrical equipment when located where electric power is not available.

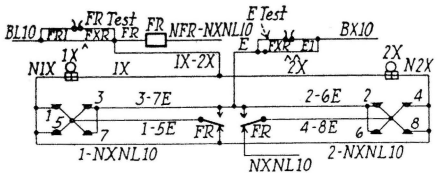
Reducing Current at Flashing Relay Contacts

"What circuit arrangement can be used for feeding flashing-light signal lamps so as to reduce the current at the relay contacts?"

Provides Alternate Shunting of Lamp Circuits

J. C. Mock
Signal & Electrical Engineer, Michigan Central, Detroit, Mich.

The accompanying sketch shows an arrangement which prevents the usual make and break for the flashing lights controlled by the flashing relay. The circuit is arranged to shunt two of the



Circuit doubles the contact life

lights while the others are lighted. The reduction of the current from maximum to minimum is half what it would be with make and break contacts, thus increasing the life of the contacts almost double.

Explains Shunt Method

Philip P. Ash
Chief Signal Draftsman, Louisville & Nashville, Louisville, Ky.

We have been using a flashing-light relay with contacts connected as illustrated, and after a little study it will be appreciated that the relay contacts do not break the full load current at any time. This is what we term the shunt method. The nomenclature we use for representing this type of relay is as shown in Fig. A. The operation of the relay is as follows: When the relay is in the position as shown and energy applied, the coil on the right is energized and pulls the armature up, closing the contacts on the right-hand side and energizes the coil on the left, so that the left armature is pulled up, closing the contacts on the left-hand side.

The contact never breaks the full load current of the lamp load, but breaks about one-half the full load current. For proof of this, refer to Fig. B. In order to simplify the calculations, we will assume that the

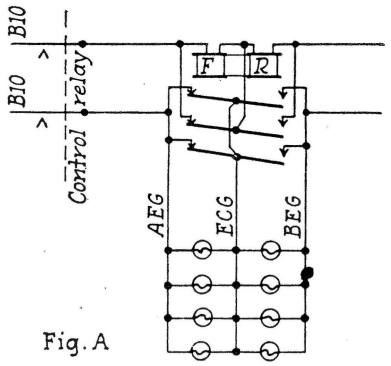


Fig. A

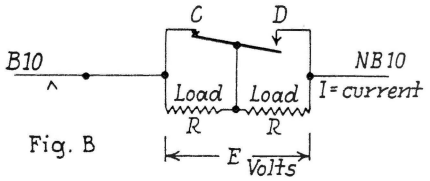


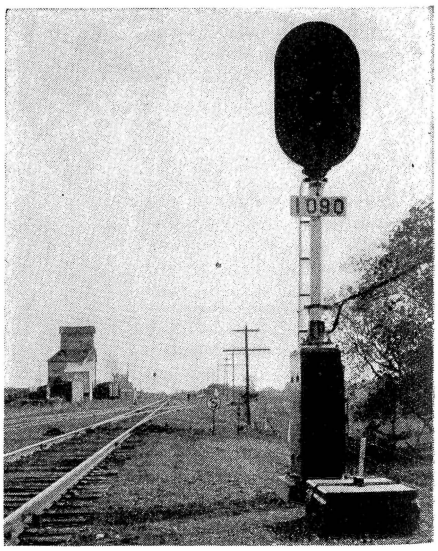
Fig. B

Another shunt wired circuit with an explanatory diagram

lamp loads are of equal resistance, and that when contacts C or D are closed they carry all the current. When contact C is closed, $I = \frac{E}{R}$. When contact C is just opened, $I = \frac{E}{R}$. Therefore, current broken by contact C is: $I = \frac{E}{R} - \frac{E}{2R} = \frac{2E-E}{2R} = \frac{E}{2R}$.

It is to be understood that contact C opens before contact D closes. Now $\frac{E}{2R}$ is the current and it is one-half of $\frac{E}{R}$. Therefore, if the relay is loaded with four 10-volt, 10-watt lamps on each side, the amount of current broken is 4 — 2 = 2 amp. The above figures are approximate only. Actually the current broken by contact C will be less than $\frac{E}{2R}$, because the filament of lamps R on the left would not be heated at the instant contact C is opened, and the resistance would, therefore, be less than when heated. In addition, there is some advantage obtained by the use of the lamp resistance in parallel with the contact, since it aids in suppressing the arc and thus eliminates, to a certain extent, the burning of the contacts. It also decreases the radio interference.

Another practice we follow, is to control heavy currents through high-current carrying front contacts on a special relay, this relay being controlled by the interlocking relay or control relay. This eliminates the heavy current over interlocking relay contacts, so that there is less maintenance on the interlocking relay due to burned contacts.



Signal protecting spring switch layout on the Union Pacific