ranged for convenient wall or shelf mounting. Their Textolite terminal boards give maximum accessibility and ample spacing for terminals. Both types are equipped with diagrammatic nameplates, showing connections and arrangements of leads and terminals.

Coded Track Circuit Control

A NEW SYSTEM of track-circuit coding for controlling wayside, cab and highway-crossing signals, is announced by the Union Switch & Signal Company, Swissvale, Pa. The new coded-track-circuit control system is a further development of the coded continuous cab-signal system. Coded energy is fed to the track circuits at all times and is used to control the wayside signal. Or, in other words, one form of track energy, namely coded track energy, is used to control either wayside signals, cab signals, or both. The same decoding equipment is used to decipher the code at wayside signal locations as has been and is being used on the coded locomotive equipment, except that this apparatus is differently assembled to make it suitable for housing in wayside signal instrument cases.

A new development in connection with the new coded-track-circuit control system is the code-following relay. Years of experience with the master relays of coded locomotive equipments, which operate continuously while the locomotive is in service, is convincing proof that a continuously-operating code-following track relay is not only practical, but that it has marked advantages and a definite additional factor of safety.

The coded-track-circuit control principle may be applied to almost any type of signaling, such as in either steam or electric-propulsion territory; wayside signals or/and cab signals to two-block, three-indication signaling; three-block, four-indication signaling; or even a greater number of signal indications. This system can also be used in connection with different forms of track-circuit energy supply.

The coded-track-circuit control system has several distinctive features. It provides for three or four indications without the use of line wires between signals for signal control. Further distinguishing it from the cab-signal track circuit is the dual function of the coded track circuit, as it controls both the wayside and cab-signal circuits. This system has a number of other distinctive and important features.

Snubbing Rectifier for 2A Signal

A SNUBBING RECTIFIER has been developed by the General Railway Signal Company to improve the operation of Model-2A signals. It is used instead of a fixed resistor and contacts in the snubbing circuit of low-voltage, d-c., Model-2A signal motors. The purpose of the rectifier is to eliminate sparking at the commutator, which often results in commutator troubles, and to provide easier, smoother snubbing action throughout the full movement of the semaphore arm.

The new snubbing rectifier comprises a small copper-oxide rectifier unit, 1½ in. in diameter and 2⅜ in. through the center bolt, with suitable leads and attachments for easy mounting on a terminal post of the circuit controller of the signal, as shown in Fig. 1.

The rectifier is permanently connected across the motor terminals but, on account of its action as a valve,

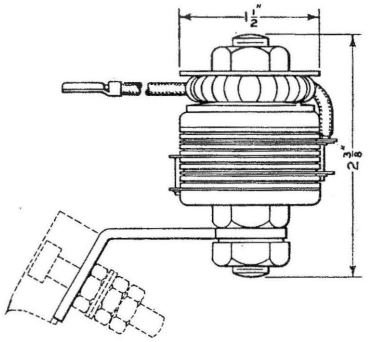


Fig. 1—Side view of snubbing unit

allowing current to pass through it only in one direction, the rectifier is connected so that the motor-operating current cannot pass through it. When, however, the motor circuit is opened, and the semaphore arm falls by gravity, causing the motor armature to rotate in the opposite direction and to operate as a generator, the snubbing

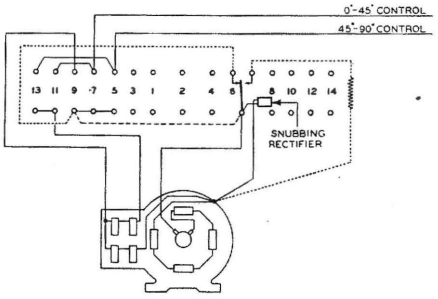
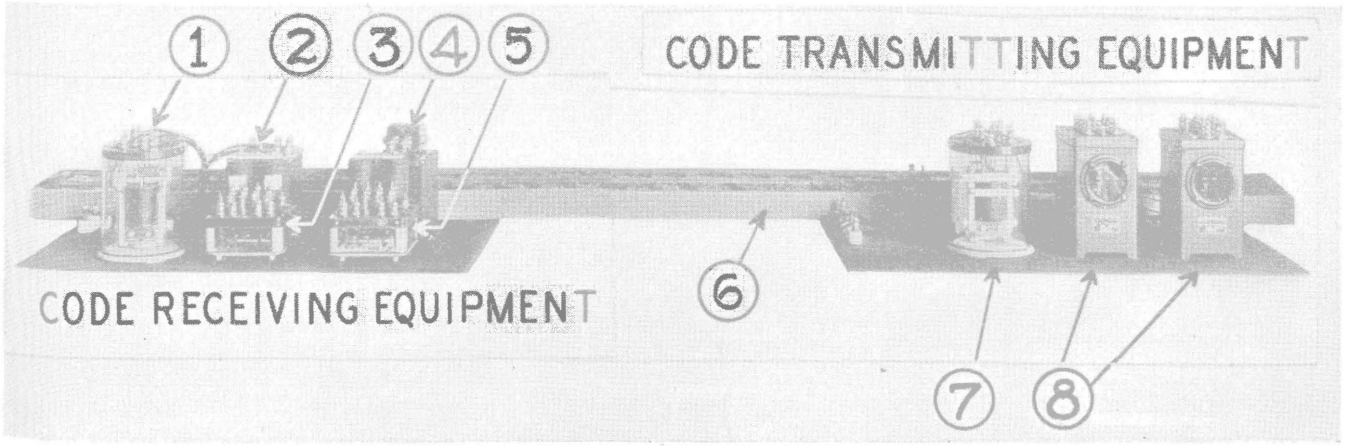


Fig. 2—Circuit for Model-2A signal

circuit is established through the snubbing rectifier, as shown in the circuit diagram, Fig. 2.

The snubbing unit is easily installed



Coding and receiving equipment for one block in steam-road territory

1—Code following track relay, 2—Decoding transformer, 3—H relay, 4—Clear decoding unit, 5—D relay, 6—Track, 7—Code-following repeater relay, 8—D-c. code modulator.

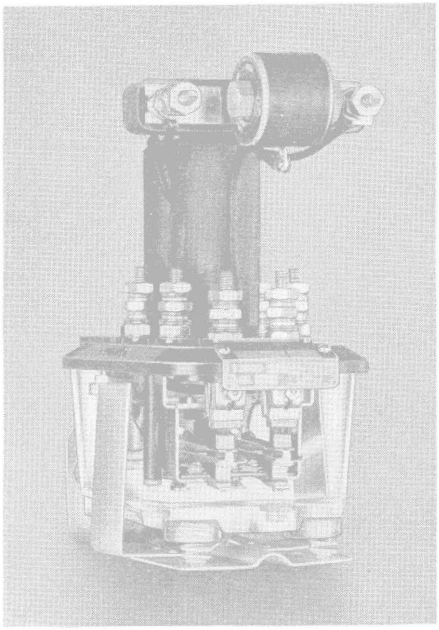
in place of the snubbing resistor and contacts in accordance with the instructions which appear with the circuit diagram, Fig. 2. It is furnished for 8-, 8-10, 10- and 20-volt Model-2A, d-c. signals.

Power-Transfer Relay

THE General Railway Signal Company's Type-K, Size-2, power-transfer relay provides a dependable and economical means for maintaining the efficiency of a signal system upon extreme voltage fluctuations and interruptions in the normal power supply. When referred to primary or line voltage values, the ratio of the release to the pickup is exceptionally high and of the order of 85 to 90 per cent over a temperature range of 150 to —19 deg. F.

The accompanying circuit shows how this power-transfer relay is connected to the secondary or low-voltage side of the transformer, while the copper-oxide rectifier, an integral part of the relay, is mounted as shown in the illustration of the relay.

Based on a nominal line potential of 110 volts, the pickup and release values, at 85 deg. F., are 74 volts and 86 volts respectively. This is true for either the 8, 9, or 10-volt relay provided the transformation ratio is 110 to 8, 9, or 10 respectively. Of course,

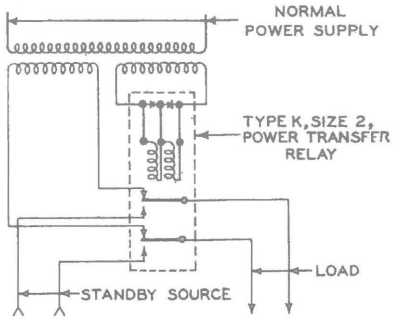


Type-K size-2 power-transfer relay

if the primary or high-voltage potential is greater or smaller, while the secondary or low-voltage potential corresponds to the rated voltage of the relay, the pick-up and release values will be proportionately higher or lower.

During one half of each cycle, current flows through one relay coil and that leg of the rectifier in parallel with the second relay coil, while during the second half of each cycle, current flows through the second relay coil and that leg of the rectifier in parallel with the first relay coil.

Notwithstanding this alternating action, the relay is absolutely quiet in operation, since the inductance of each leg of the circuit causes the current flowing therein to have a direct-current component and a superimposed alternating-current component



Circuits for the new transfer relay

having an amplitude less than, but of practically constant percentage relation to, that of the direct-current component.

Less than 0.25 watt is consumed by this relay, which feature is of value since a power-transfer relay is energized practically all the time.

Once the armature of this relay starts to pick up or to release, it follows through to the stops. There is no possibility of the armature "floating"; therefore, the universal contacts mounted on articulated fingers are not subjected to unnecessarily severe service as is the case where the contacts can float slightly away from their seats while carrying a load sufficiently great to cause destructive arcs.

Capacitor Units

THE TYPE-CE capacitor, for maintaining high power factor on signal power-transmission lines, has been announced by the General Electric Company. It is Pyranol filled, small and compact, hermetically sealed, and insulated according to A.A.R. Signal Section requirements. The Pyranol insulating and cooling medium is non-explosive and non-inflammable, and the capacitor can safely be installed in the housing with signal devices. The new unit is provided with feet for convenience in mounting, and the porcelain bushing-type terminals afford excellent creepage insulation. A metal nameplate securely attached to the case insures a permanent reference record, and the case is finished with weather-resisting lacquer.

Four convenient ratings are provided, with uniform dimensions and terminal arrangement so that any desired capacitance may be obtained with combinations of these standard sizes.

Maintenance of high power factor is best accomplished by the installation of capacitors on the low-voltage side of each signal power transformer since, when so installed, transformer losses are reduced, and the line current is reduced to a minimum. The voltage drop, proportional to the line current, is likewise reduced to a minimum. This improves operating

General Electric Pyranol capacitor

conditions by raising the voltage toward the end of the line, so that a more uniform voltage is provided for all signal devices. The cost of power is reduced to such an extent that in many instances the saving pays for the installation in a year. Reducing the voltage drop makes it possible to add more load to the line or to increase the permissible transmission distance.

Ground Detector Relay for Instantaneous and Automatic Detection

THE General Railway Signal Company announces that a Type-K relay is available for instantaneously and automatically detecting grounds on positive and negative low-voltage buses fed from either single or center-tapped batteries where the ground current flow is not less than 0.002