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Effecting Time Delays for Relays

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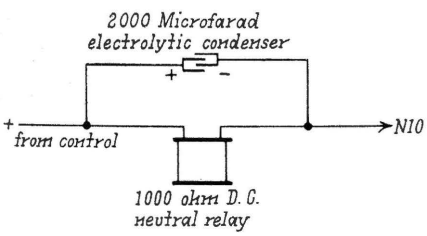
WHILE the addition of a resistance in parallel with a 1,000-ohm d-c. neutral relay will cause a time delay in the release of the relay, which is usually measured from the moment of cutting off the current to the breaking of the front contacts, this method is not to be recommended. Apart from the current consumed by the resistor, the time delay is only a fractional part of one second, and only compares with the method of shading the pole faces of the magnet.

With the introduction of dry metal rectifiers, enabling them to be placed in parallel with the relay (paying due regard to polarity) it is possible to



Use of condenser to effect retardation

obtain economy of current, but time delays are still limited to approximately one second.

However, several seconds delay and more can be obtained when low-voltage electrolytic condensers with high capacitance are used, and still retain economy of current. Three seconds delay was obtained when the current was cut off from a 1,000-ohm d-c. relay with a 2,000-microfarad electrolytic condenser (12 working volts—test) permanently connected in parallel with the relay. This is in accord with the well known formula for the discharge of a condenser:—

$$V = E\,(e)^{-t/CR}; \text{ or}$$

$$t = CR \log_e \frac{E}{V};$$

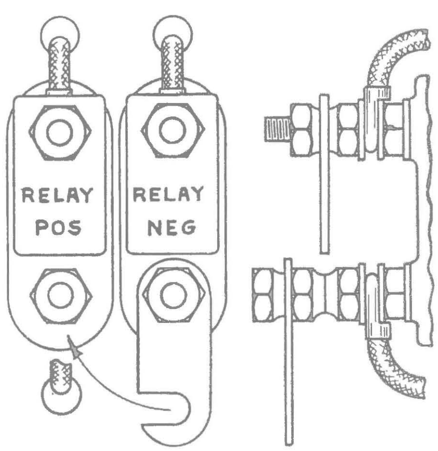
where, t=Time in seconds, C=Capacitance in farads, R=Resistance of relay in ohms, E=Working voltage of relay, V=Drop-away voltage of relay.

As the values of R, E and V are fixed for a given relay, the time delay is varied by altering the size of the condenser. The time delay being directly proportional to the capacitance, six seconds delay could be obtained by connecting two condensers in parallel, and so on since the limit would be determined by the cost of condensers. The pick up of the relay is effected in less than $1/5$th sec., so the desirable characteristics of a "fast pick-up, slow release" is obtained.

Shunting Straps for Testing

BY A MAINTAINER

IN ORDER to properly test automatic interlocking and highway crossing signal circuits, it is necessary to simulate a train moving through the installation. This is usually done with shunt wires by moving them progressively from one track relay to the next, in leap frog fashion. In order to facilitate this procedure I have installed permanent shunting straps, which are left attached to one terminal by a standard nut. These straps are made from terminal connectors, which have one hole cut out, to form a slot. From the illustration it can be seen that to make a shunt it is merely necessary to swing the strap to the left until it touches the adjacent terminal post. In this manner a "train" can be moved as rapidly as desired, or a shunt can be held as long as necessary by tightening the nut. When the test is completed, all straps should be firmly secured by the tightening nut.



Shunting straps utilized to simulate train movements

Low Voltage Test Socket

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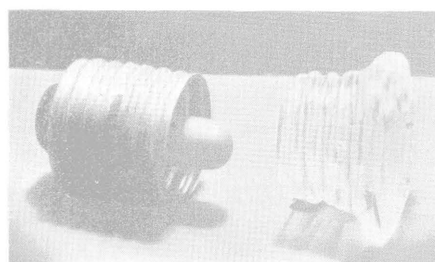
RECENTLY I made up a small, unbreakable test lamp suitable for testing low voltage circuits such as track, KR, etc., with a T3¼ or similar type bulb. This interchangeable test socket and lamp can be conveniently carried in a maintainer's pocket. The necessary material includes: Two standard glass-top house fuses, one Christmas tree socket (without the bakelite covering), solder, and sealing wax. It is assembled as follows: Disconnect both house fuses. Solder the Christmas tree socket base wire to one house-type fuse base; next solder ferrel to ferrel connections. Stand upright and fill with sealing wax. Next solder second ferrel to first ferrel (house types). Again fill with wax to the top of the inner Christmas tree socket. This allows ample space for one glass top to be screwed in the top ferrel for protection against lamp breakage.



Small unbreakable test lamp