USE AND IN-CIRCUIT TESTING OF SILICON DIODES
FOR SUPPRESSION OF RELAY COIL TRANSIENTS

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During construction of apparatus using Potter-Brumfield KHP17D11 24 v dc 4PDT compact enclosed plug-in relays, a problem of general interest arose. On release, relay coil transients were acting as trigger signals, spuriously actuating transistor timers connected to the equipment. An oscilloscope revealed a sharply rising pulse of short duration and of nearly 120 v peak amplitude. Various methods of arc suppression were tried; the reverse-connected silicon diode method was the one which gave complete suppression and also minimal prolongation of drop-out time. The arrangement is shown in Fig. 1. Because of the large peak amplitude, a 200 v peak inverse rectifier diode was used.

It seemed desirable to provide a simple way to check these diodes, once in place, every few months, without removing them from the circuit. A device was constructed (Fig. 2) which permits such a test as long as the dc resistance of the parallel relay coil is 100 ohms or more. Operation is simple. First, turn off all power to the relays. Connect the terminals "to diode

Fig. 1. Method of connecting diode. Diode is RCA 1N538.

Fig. 2. In-circuit silicon diode checker. Including battery, it can be built in a 4 by 5 by 6 in. box. Battery is Burgess F4BP, switch is Switchcraft 3037 or 13037, DPDT center-off spring-return non-locking both sides.

under test" to the diode under test, using clip leads. With a good diode, the light will light with the switch in one of its extreme positions and will be dim with the switch in its other extreme position. With a shorted diode, the light is dim both ways; with an open diode, the light will light both ways.

The device may also be used for out-of-circuit diode testing and for determining polarity of unmarked diodes. The device will not test other types of arc suppressors because they do not have the combination of very low forward resistance, very high back resistance, and one-way conductance characteristic of the silicon diode.

An alternative in-circuit tester is the Heath Model IT-10 Transistor-Diode Checker (Heath Company, Benton Harbor, Michigan). While the manual for this checker does not mention it, the IT-10 may be used for the present purpose. It is set up as for normal diode testing, but the "HI-LO/D" switch is set to "HI" instead of "LO/D". Again, relay coil resistance should be at least 100 ohms, and relay power must be off.