active device (a four-layer diode), two resistors, one capacitor, and a 12-volt relay. Everyone breathed a sigh of relief.

But lo—the villain still lurks in the shadows! It seems that Huber's circuit, while simple, inexpensive, efficient, and reliable, does not work too well on the ever-popular "bug," at least according to Volkswagen owner Richard C. Gabbey (2002½ N. Wisconsin St., Racine, WI 53402). Dick writes that VW's, unlike American cars, use a unidirectional wiper motor controlled by a special conductive timing disk. As a result, Huber's circuit "kicked" the windshield wipers over a mere one-third of their normal travel distance.

Like most of our readers, Dick is inventive by nature. Instead of hanging his head in despair, he promptly modified Huber's design to achieve the arrangement shown in Fig. 6. Huber's original circuit is enclosed by the dotted line, with the only new component being a dpdt "Kick-Normal" switch. Except for the switch, the only other major change is the use of relay *K1*'s NC contact to furnish power to the wiper motor's "down position hot lead."

O.K., Beetle owners?

New Hobby Kits. Two new construction kits have been announced by Motorola HEP through its distributors. They are the HEK-3 Radio Amateur Kits retailing at $5.95 that contain two r-f/i-f linears IC's and an RTL logic IC, and a project brochure showing how to make transmitters, amplifiers, etc. The other kit is the HEK-4 Home Handyman Hobby Kit at $4.95 containing an SCR, a UJT, a silicon rectifier, and a silicon npn transistor. The brochure that comes with this kit illustrates 11 different and useful home applications for the semiconductors.

Manufacturers' Circuits. Designed for use as a variable-speed control for low-power universal motors of the type used in sewing machines, mixers, blenders and similar household appliances, the circuit shown in Fig. 7A was abstracted from the specifications brochure for GE's type C106 SCR. According to GE, the design may be used as a direct replacement for carbon-pile or rheostat type controllers and is suitable for any universal (ac/dc) motor requiring up to 1.5 amperes. Unlike many simple SCR control circuits, this version includes a speed-dependent feedback arrangement to insure adequate torque at all speed settings.

In operation, RC network *R1-C1-R2* provides an adjustable ramp-type reference voltage superimposed on the dc voltage developed by diode *D1*. The combined voltages are applied to the SCR's gate as a control signal through diode *D2*, but the reference voltage is balanced within the gate by the

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motor's residual counter-emf, coupled back through *C2*. If the motor slows down due to heavy loading, its counter-emf drops, permitting the reference ramp voltage to trigger the SCR earlier in the ac cycle, applying more power to compensate for the load and thus speeding the motor back up to its preset speed.

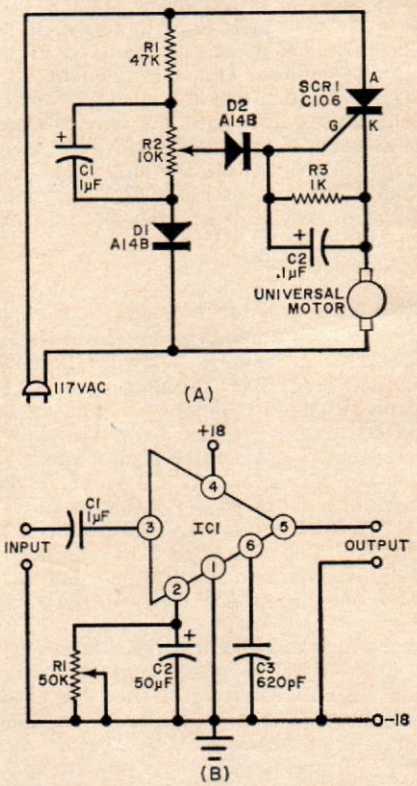

Fig. 7. Circuit at (A) uses SCR to control the speed of low-power universal motors used in appliances. Circuit (B) uses new electronic attenuator IC in remote volume control with 13 dB gain.

Featuring inexpensive components, the speed control circuit can be duplicated at modest cost. Except for linear potentiometer *R2*, the resistors are half-watt types, while both capacitors are 50-volt electrolytics.

With neither layout nor lead dress critical, the control circuit can be assembled on a perf board, small chassis, or etched circuit board. The SCR should be heat-sinked, of course, and all dc polarities must be observed. If adequate space is available within