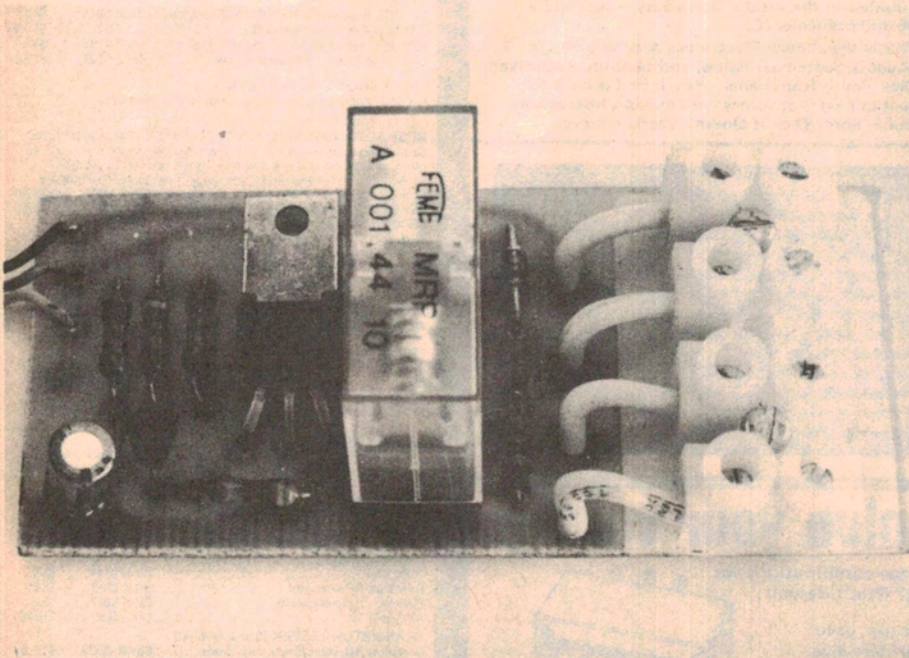


Vari Wiper mk2

This pulsed windscreen wiping circuit can be used on cars fitted with most types of modern wiper motors.



WHEN OPERATING IN heavy rain windscreen wipers often have difficulty providing adequate visibility. However, during light rain or mist all that is necessary is an occasional sweep of the blades at intervals of a few seconds.

Turning them on and off repeatedly takes the driver's concentration off the road, and his hands off the wheel, increasing the risk of an accident. Alternatively, if the wipers are kept working all the time in such conditions the blades tend to scrape on dry glass, wearing out the rubber inserts, your nerves, and worse still, the screen itself.

The answer is obvious; have the wipers operate intermittently at a duration which can be varied to suit the conditions.

This project is an updated version of the popular ETI 301 Vari-Wiper which appeared in the May 71 edition.

Figure 1 shows the circuit of a modern wiper assembly. Dynamic

braking is achieved by applying a short across the armature, by a cam-actuated change-over switch synchronised with the wiper blades. When the wipers are switched off, the change-over switch shorts out the motor armature via the main wiper ON/OFF switch.

The circuit of fig. 2 is suitable for use with negative earth cars fitted with permanent magnet motors. Some early model cars are fitted with wound field coil motors and are not suitable for use with this circuit (more about them later).

Some types of permanent magnet wiper motors, especially those on British cars, have a fifth wire extended to the wiper switch. These motors are designed to operate independently of an earth to allow for their use on either positive or negative earth vehicles. The circuit of fig. 2 can also be used with these motors provided they are fitted to a negative earth car. However, some

more expensive imported cars have wiper motors which are reversed in the parking sequence to lower the blades below the bottom of the windscreen when not in use. The Vari-Wiper unit described cannot be used with these wipers.

Before installing the Vari-Wiper unit make sure that you have one of the types of permanent magnet wiper motors described. If necessary remove the cover of the motor and identify the wire to the centre contact of the cam-operated switch.

Normal Wiper Operation

Conventional operation of the wipers is obtained by using the vehicle wiper switch in the normal way. Figure 2 shows the sliding contacts of this switch in the correct position for each function. Note that in the off position the switch shorts lead B to lead C. In the SLOW position the short is removed and an earth is extended to B, while in the FAST position the earth is removed from B and extended to A. For single speed wipers slide contact A will be omitted.

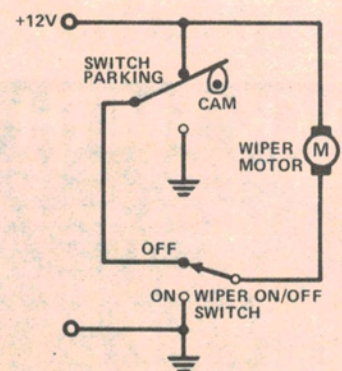


Fig. 1. Circuit of modern wiper motor assembly. Dynamic braking is achieved by applying a short across the armature.

HOW IT WORKS - ETI 319

The timing circuit is energized by operating switch SW1, which is part of switch/potentiometer RV1. This switch applies power to the unijunction/SCR circuit via the still-closed parking switch contacts.

Capacitor C1 charges via RV1 and R1, at a rate determined by the setting of RV1, until the unijunction 'fires', producing a positive going pulse which triggers the SCR into conduction. Resistor R4 ensures that the SCR latches on, thus energizing relay RL1.

Relay contacts RL1 (1) now change-over, removing the short circuit from the motor armature before energizing the motor by extending an earth via the now-closed relay contacts.

As the motor gathers speed, the associated cam-actuated switch changes over, removing power from the timing circuit (causing the relay to drop out) and extending an earth to the wiper motor via wiper switch contacts B and C, the now de-energized relay contacts, and the cam-actuated switch.

The wipers continue their sweep across the screen, but on their return the cam-actuated switch cuts in just before the end of the sweep. This removes power from the wiper motor and places a short circuit across the armature.

Operation of the ETI319A unit is similar except the motor, which does not require dynamic braking, can be driven directly from the SCR, saving the cost of a relay. Note that either D1 or D2 become redundant depending on the polarity of the vehicle.

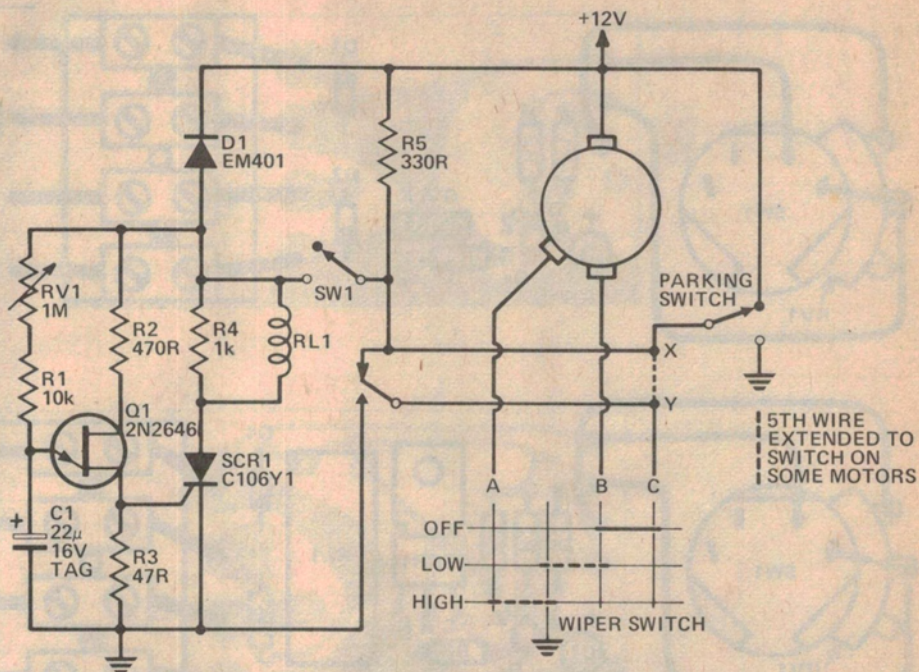


Fig. 2. The ETI319B Vari-Wiper circuit using relay output for use with permanent magnet motors.

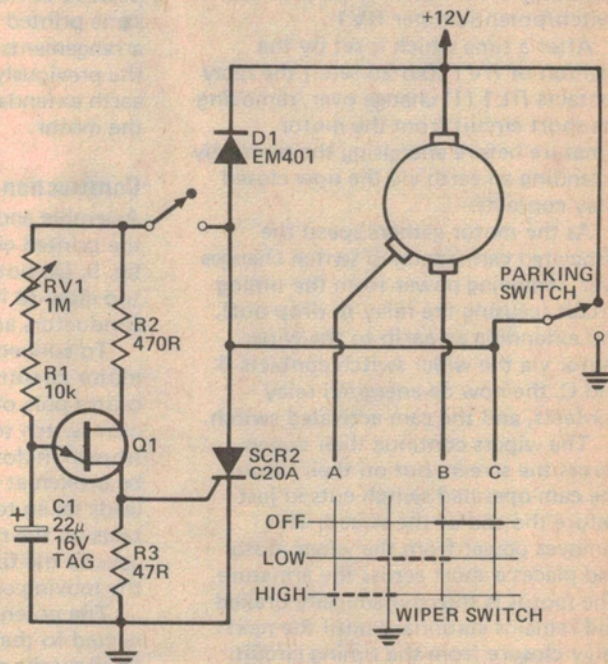
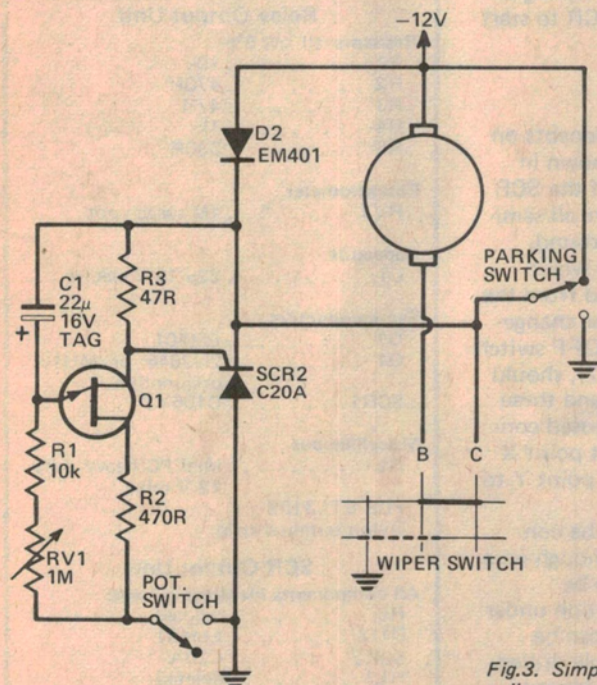


Fig. 3. Simplified ETI 319A Vari-Wiper for use with wound field coil motors. The right circuit is for use with negative earth vehicles, and the left for positive earth. Both share the same PCB.

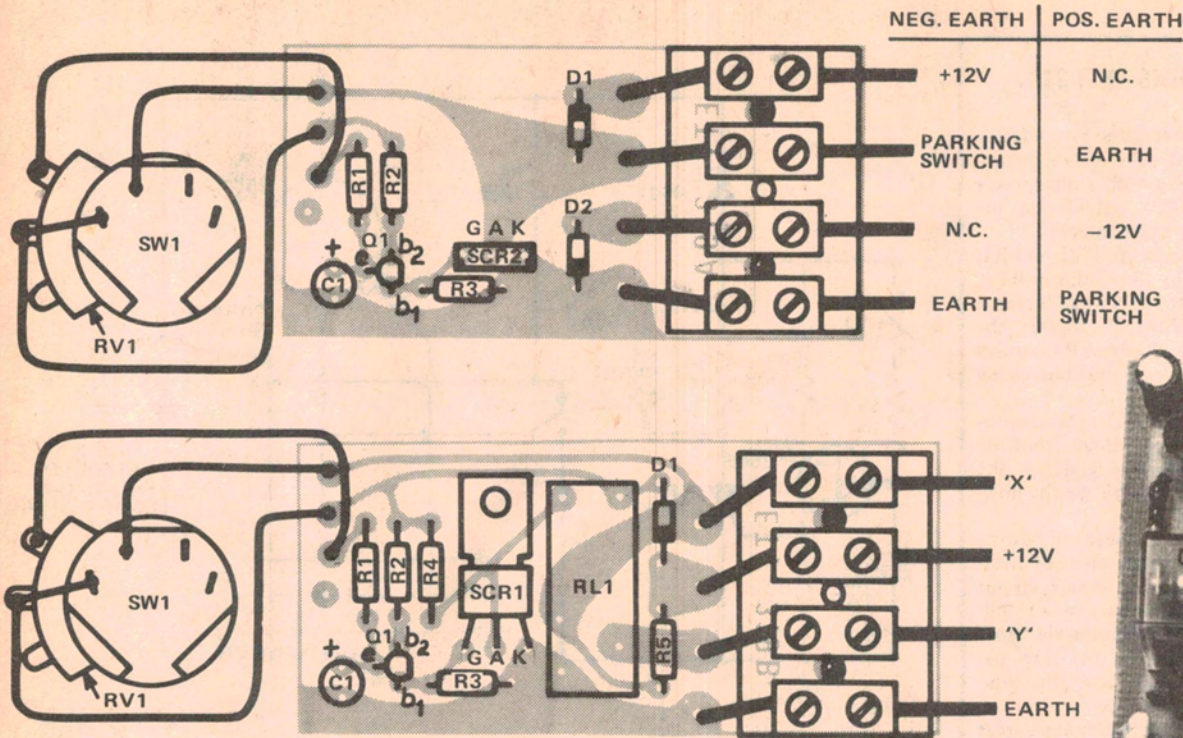


Fig. 5. Component overlays. Note that the same PCB is used for both earth polarities on the ETI 319A.

Delayed Operation

When delayed operation is required, the upper switch is left in the OFF position and the timing circuit energised by operating SW1 which is part of the switch/potentiometer RV1.

After a time which is set by the position of RV1 (0.5-25 secs.) the relay contacts RL1 (1) change over, removing the short circuit from the motor armature before energising the motor by extending an earth via the now closed relay contacts.

As the motor gathers speed the associated cam-operated switch changes over, removing power from the timing circuit (causing the relay to drop out), and extending an earth to the wiper motor via the wiper switch contacts B and C, the now de-energised relay contacts, and the cam-activated switch.

The wipers continue their sweep across the screen, but on their return the cam-operated switch cuts in just before the end of the sweep. This removes power from the wiper motor and places a short across the armature. The motor is thus dynamically braked and remains stationary until the next relay closure from the timing circuit. When this arrives the sequence is repeated.

Wound Field Coil Motors

Because wound field coil motors do not

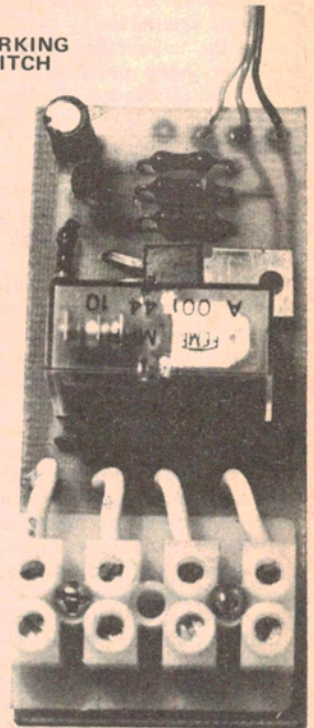
use dynamic braking, the Vari-Wiper can be made without a relay. Figure 3 shows the simplified Vari-Wiper circuit and its connections to either a positive or negative earth vehicle. The same printed circuit is used for both arrangements. Operation is similar to the previously described unit, having an earth extended through the SCR to start the motor.

Construction

Assemble and solder all components on the printed circuit board as shown in fig. 5. Do not bend the lugs of the SCR too close to its case and ensure all semi-conductors are the right way round.

To connect the unit to the wiper motor circuit, the existing lead from the centre pole of the wiper motor change-over switch to the wiper ON/OFF switch (shown in dotted lines in fig. 2), should be broken at points X and Y and these leads taken to the normally closed contacts on the relay. Ensure that point X goes to the fixed contact and point Y to the moving one.

The potentiometer should be connected to the unit with just enough wire to allow the printed circuit to be mounted in a convenient position under the dash. The potentiometer can be mounted through a 10 mm hole drilled in the fascia panel or by attaching it to a bracket mounted in a convenient place.



PARTS LIST – ETI 319 Relay Output Unit

- Resistors all 1/4W 5%
- R1 10k
 - R2 470R
 - R3 47R
 - R4 1k
 - R5 330R
- Potentiometer
- RV1 1M switch pot
- Capacitor
- C1 22μ 16 V electro
- Semiconductors
- D1 EM401
 - Q1 2N2646 or MU10 unijunction
 - SCR1 C106Y1
- Miscellaneous
- RL1 Mini PC heavy duty 12 V relay
 - PCB ETI 319B
 - Nylon terminal strip

SCR Output Unit

- All components identical, except:
- R5 deleted
 - D1/2 EM401
 - SCR2 C20A
 - RL1 deleted
 - PCB ETI 319A