

a binding pivot. On the other hand, the other bushings in the linkage may be a bit tight when the car is new but they tend to wear gradually and get loose and perhaps noisy as the car gets older.

OPERATIONAL CHECK OF THE WIPER MOTOR

If you suspect motor trouble, you can use a set of jumper wires to bypass all of the wiper wiring and the wiper switch. This will tell you whether or not the trouble is in the motor without removing the motor from the car. Since each of the three wiper motors has four electrical terminals, all you have to know to check out a motor is which terminals have to be connected to ground and which ones are connected to a positive battery lead for each wiper speed . . . including "OFF".

JUMPERS CHECK OUT MOTOR



Fig. 27—Use jumpers to diagnose motor and circuit

The following wiper motor tests were performed and photographed on the bench so that the jumper connections could be easily seen and identified. These same connections will enable you to check out a motor without removing it from the car. As a matter of fact, when checking a motor on the car, the motor ground strap jumper connection will not be needed if the motor is properly grounded to the firewall. Notice in the illustrations which follow that each jumper has a brass connector soldered to its motor end to facilitate connections and minimizing the possibility of accidental shorts.

TESTING TWO-SPEED NON-REVERSING MOTOR

To check low-speed operation, a positive jumper is connected to the "L" terminal and a negative jumper is connected to the ground strap of the motor. When testing on the car, this ground strap connection is not required. These connections should cause the motor to run at low speed.

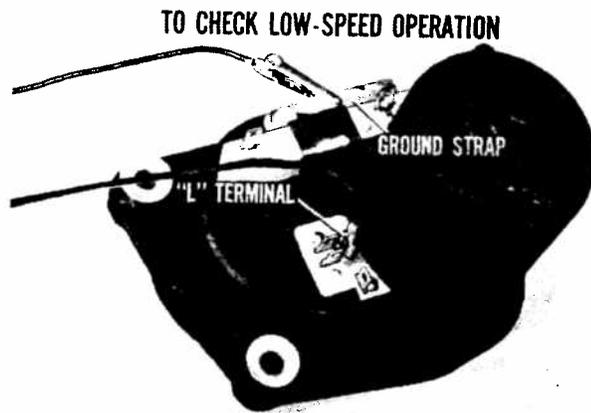


Fig. 28—Jumper connections test low speed

To check high-speed operation, connect the positive jumper to the "H" terminal and leave the negative jumper connected to the ground strap. Motor speed should increase noticeably.

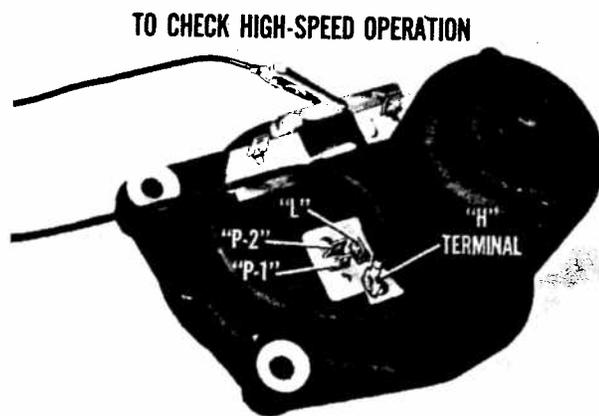


Fig. 29—Jumper connections for high-speed test

To make sure the motor goes through the park cycle when the wipers are turned off, use a short jumper to connect the "P-2" terminal to the "L" terminal. A positive jumper is connected to the "P-1" terminal. These connections route the feed circuit through the park switch built into the motor. The motor should run until it reaches the park position and then stop.

TESTING TWO-SPEED REVERSING MOTOR

Remember, the two-speed reversing and two-speed non-reversing motors look very much alike. However, since their internal circuitry is entirely different, the external test connections are different.

Make sure which motor you are dealing with before you start connecting test jumper wires. The two-speed reversing motor has only one brass connector terminal, the non-reversing motor has two brass connector terminals.

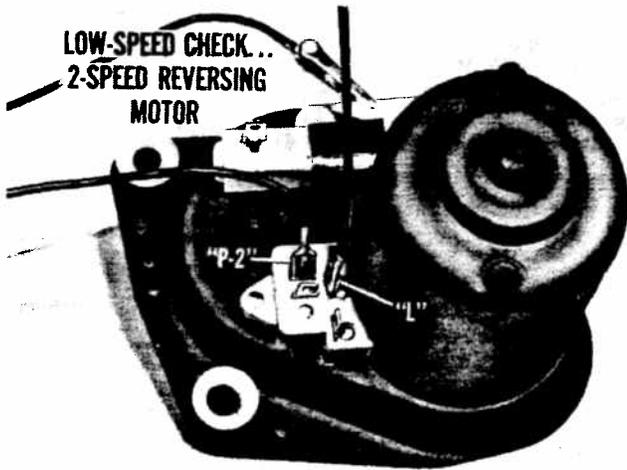


Fig. 30—Low-speed test of 2-speed reversing motor

For a check of low-speed operation, connect a negative jumper to the "P-2" terminal and a positive lead to the "L" terminal. If the motor operates at low speed, the motor and internal circuit is okay and the trouble is external.

To check high-speed operation, the negative jumper remains connected to the "P-2" terminal. Move the positive lead from the "L" terminal to the "H" terminal and motor speed should be higher.

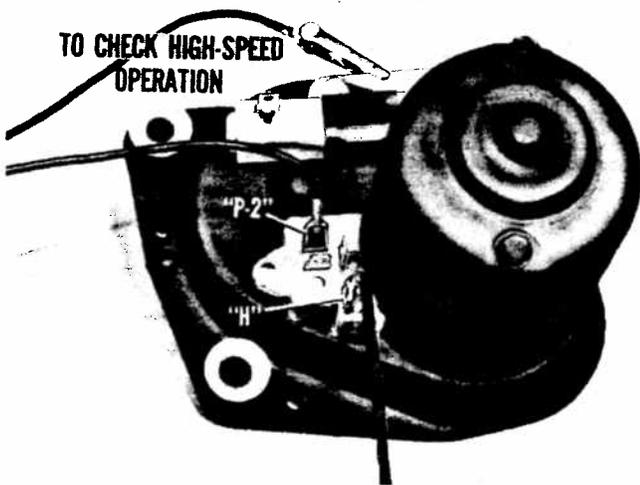


Fig. 31—High-speed test connections

To check out the park cycle, connect one negative lead to the "L" terminal and another negative lead

to the motor ground strap. A positive lead is then connected to the "P-1" terminal. The motor should reverse and then stop in the park position. Of course, the ground strap jumper isn't needed when checking a motor on the car if you are sure the motor ground is good.

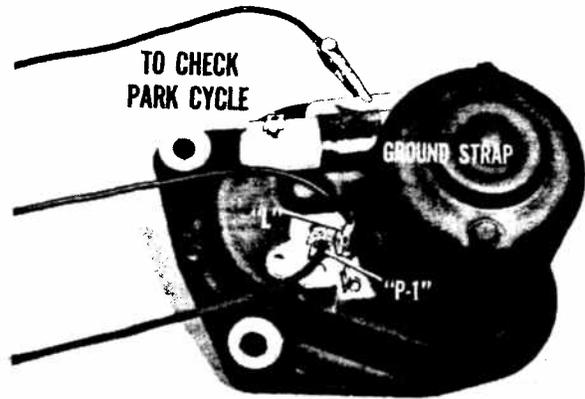


Fig. 32—Connections for testing the park cycle

And don't forget, if you don't have a good ground at the wiper switch, a two-speed reversing motor won't run on high or low. If the ground at the motor is bad, it won't reverse and move into depressed park.

THREE-SPEED OR VARIABLE-SPEED MOTOR TESTS

Since the wiring harness is part of the three-speed motor assembly, you'll have to remove the harness connector from the bulkhead disconnect to get at the motor leads. Three-speed and variable-speed

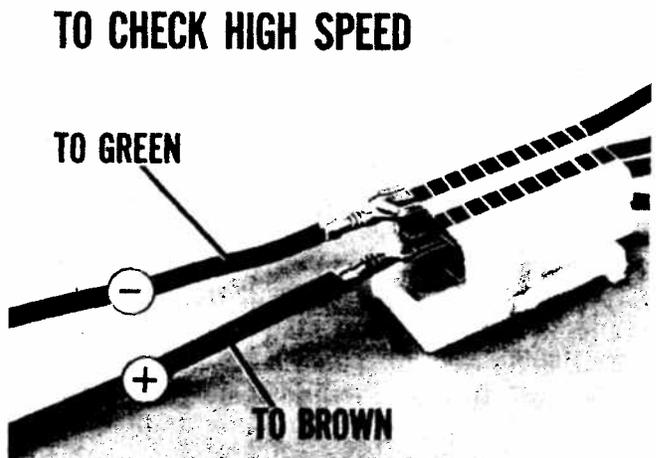


Fig. 33—High-speed check of 3-speed motor

applications use different bulkhead connectors, however, the same wire color code is used for the motor leads in all applications. So, the tests described in the following paragraphs will work regardless of the shape of the connector used.

To check high-speed operation, connect a negative jumper to the green-wire terminal and a positive lead to the brown-wire terminal. These connections supply current to the series field and to the armature but not feed current to the shunt field. As a result, the motor should operate at high speed.

TO CHECK LOW SPEED

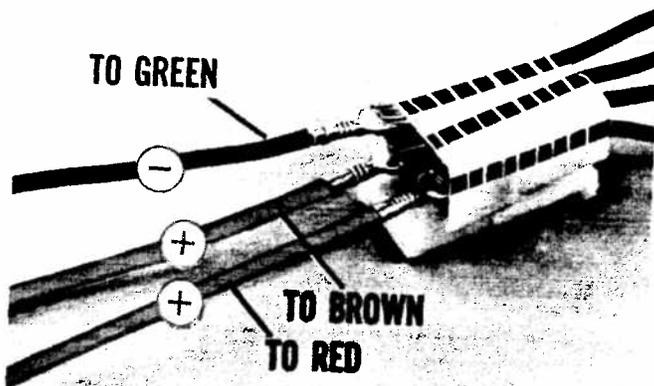


Fig. 34—Low-speed check of 3-speed motor

To check low speed, leave the jumpers connected to the green and brown wire terminals. Connect a second positive jumper to the red wire terminal. This feeds current to the shunt field. As was pointed out earlier, increasing the total field strength reduces motor speed. So, connecting the positive jumper to the red-wire terminal should cause the motor to slow down.

FOR THE PARK TEST

CONNECT BROWN TO GREEN

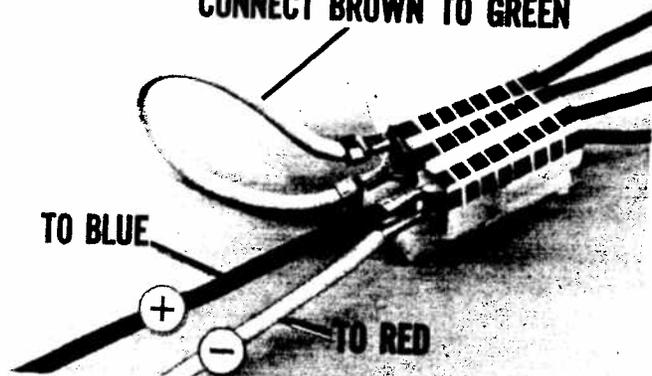
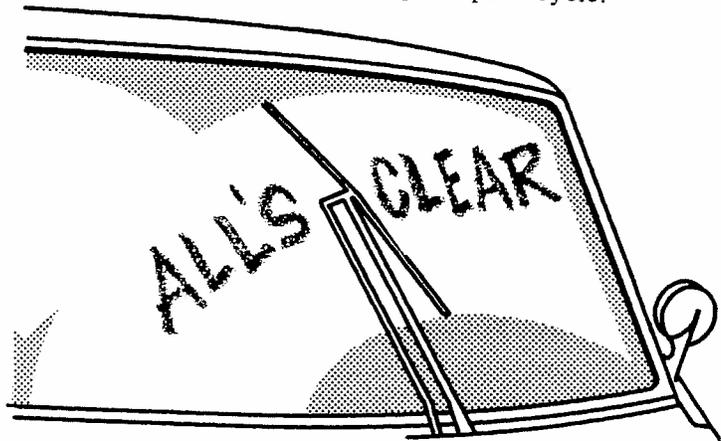


Fig. 35—Connections for testing the park cycle

For the park test, a positive jumper is connected to the blue-wire terminal and a negative lead is connected to the red-wire terminal. The green-wire and the brown-wire terminals are connected together by a short, third jumper. These connections duplicate the circuits provided when the wiper switch is turned off and should cause the motor to go through the complete park cycle.



HOT LINE NEWS FLASH

As you probably know, parts for repairing the 3-speed or variable-speed wiper motor have been available for some time. Just before press time Tech learned that parts packages for servicing both the 2-speed reversing and the 2-speed non-reversing motors have been authorized. Service instructions and service part numbers will be announced in a Service Bulletin as soon as material for these service packages is available.

Use the diagnosis and motor testing information in the Reference Book to determine whether or not the windshield wiper trouble is actually in the motor. As soon as service parts are available, you'll be able to make the necessary repair, whenever you find that the trouble is actually in the motor, instead of replacing the entire assembly. So keep your eyes open for that windshield wiper service bulletin and keep this Reference Book handy.

THE PARKING SWITCH APPLIES THE BRAKES
 When the feed is through the parking switch, the armature continues to rotate until the wiper blades reach their "park" position. At this point, a cam mechanism incorporated in the output gear opens the parking switch. This cuts off the armature feed.

In addition to cutting off the feed circuit, the parking switch connects the low-speed brush to ground. In other words, there are now two ground brushes and no positive brush. This is the same as connecting the low-speed brush and the ground brush together in a closed-loop external circuit. When this happens the motor becomes a generator as the armature cuts across the lines of force in the permanent-magnet field. Since there is no mechanical power applied to the armature to keep it turning, it stops right now instead of coasting to a stop.

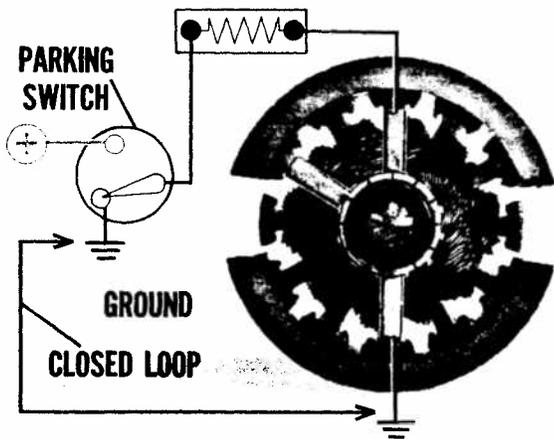


Fig. 8—Parking switch grounds low-speed brush

TWO-SPEED REVERSING MOTOR

The two-speed reversing motor is also a permanent-magnet motor and it looks exactly like its non-reversing near-twin. However, the reversing and non-reversing motors are not interchangeable and, because of differences in the internal circuitry, different wiper switches are used for these two wiper motors.

THE BRASS TELLS THE TALE

Here is how you can identify these two look-alike motors. The two-speed, non-reversing motor has two brass and two gray metallic terminals for the wiring harness connector. The two-speed reversing motor has one brass and three gray terminals.

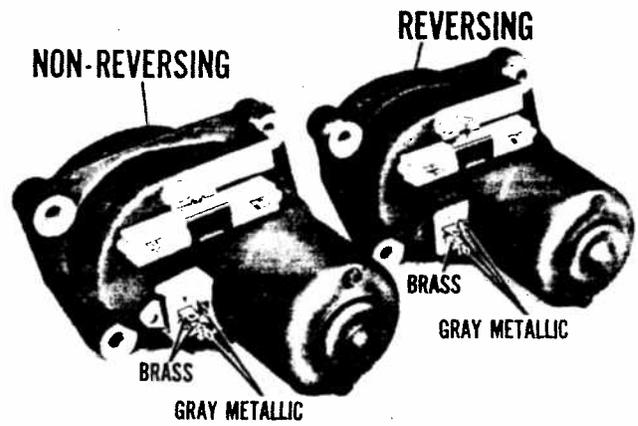


Fig. 9—Reversing and non-reversing 2-speed motors

INSIDE THE TWO-SPEED REVERSING MOTOR
 In the reversing-type motor, all three brushes are insulated . . . there is no permanent ground brush. Instead, the lower brush is grounded through the wiper switch for both low-speed and high-speed operation. That's why a two-speed reversing motor will not run if there is a poor ground connection at the wiper switch.

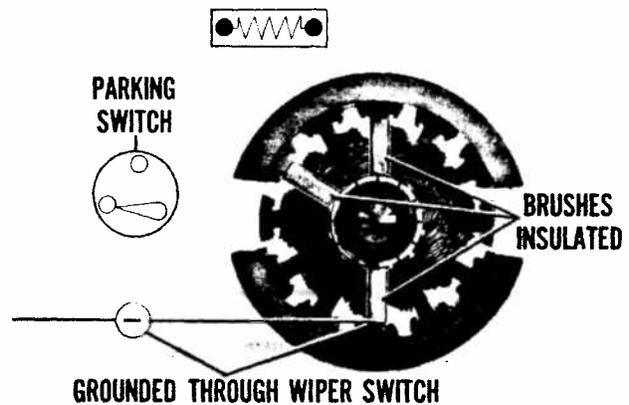


Fig. 10—Two-speed reversing motor components

LOW-SPEED OPERATION

When the wiper switch is turned to "Low", the positive feed circuit is through the torque-reducing resistor and then to the low-speed brush. The wiper switch also completes the ground circuit for the lower brush. Except for the external ground circuit through the wiper switch, the low-speed setup is the same as for non-reversing motor.

