SECTION 1-B
WINDSHIELD WIPER AND WASHER ASSEMBLY

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1-5 DESCRIPTION AND OPERATION SINGLE SPEED

The one speed wiper consists of a rectangular shaped shunt type 12 volt motor attached to a gear box containing a gear and shaft assembly and parking switch. The motor armature has a worm shaft which drives a gear and shaft assembly. A crank arm, attached externally to the gear and shaft assembly, drives the two wiper transmissions through connecting link arms. See Figure 1-11.

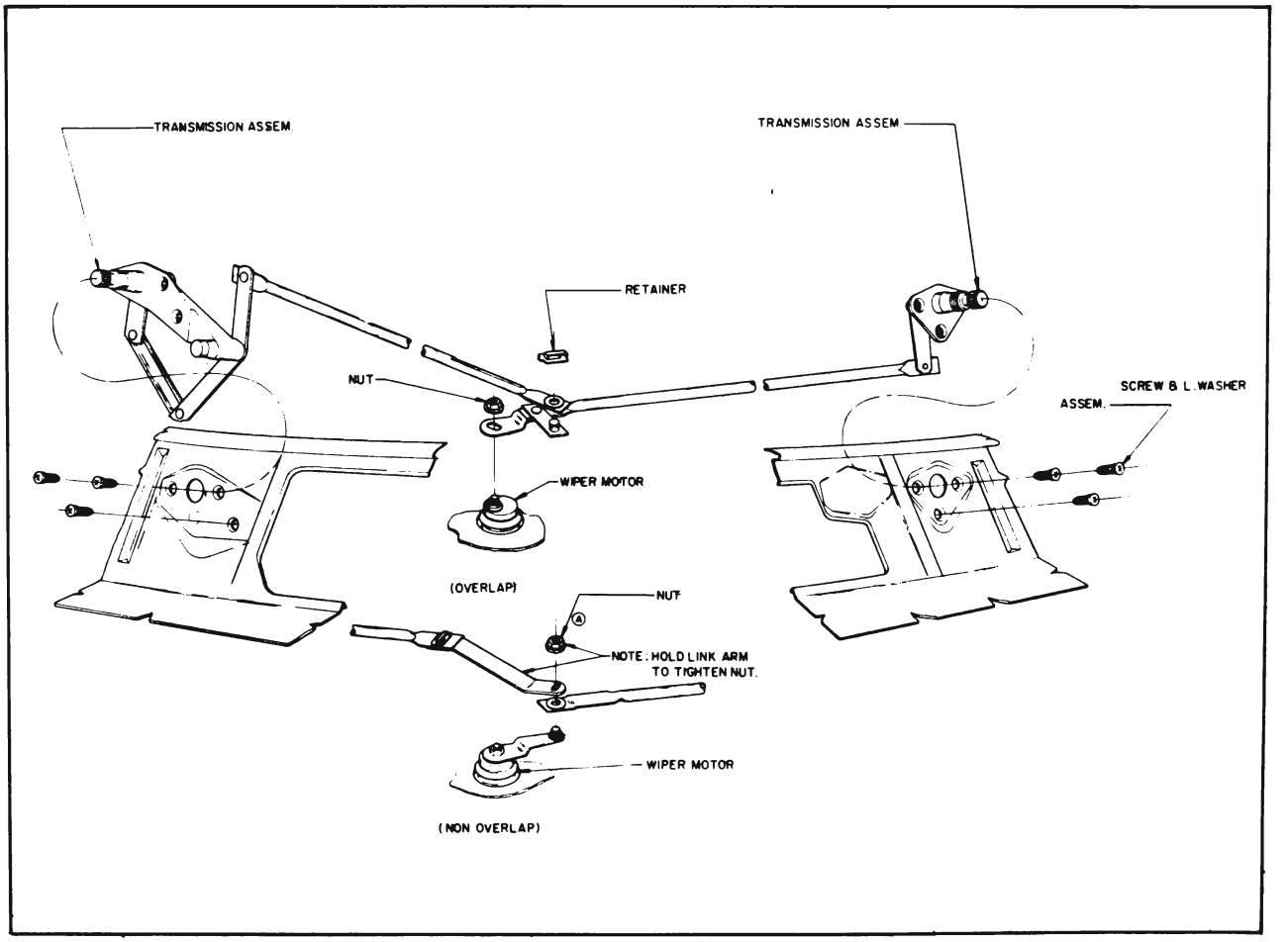

Figure 1-11—Windshield Wiper Motor Installation

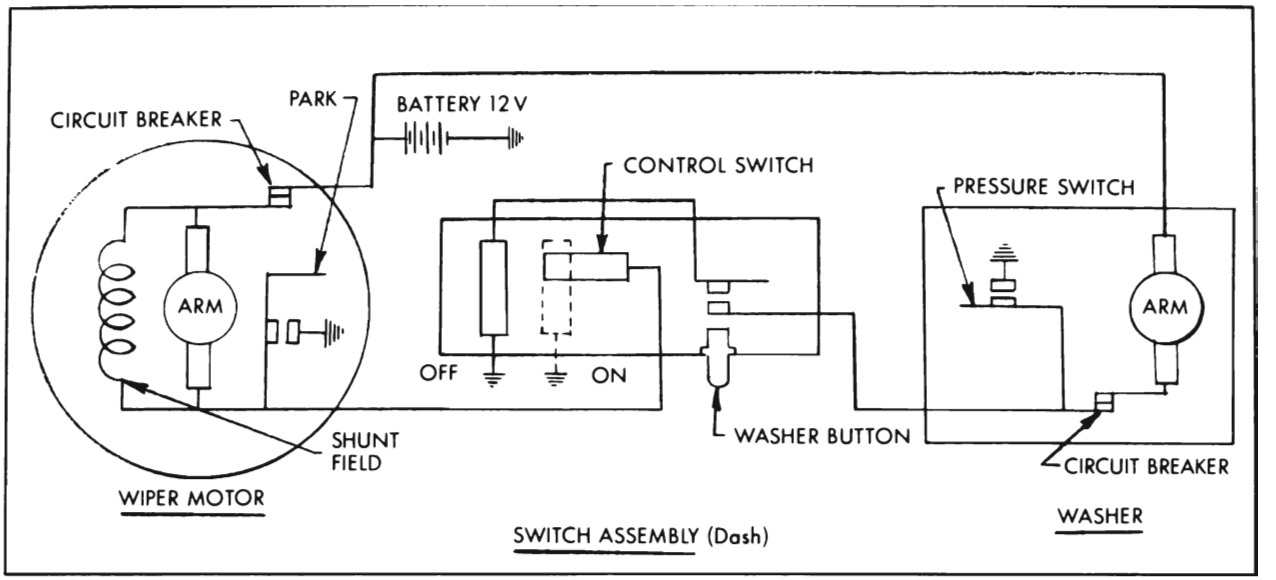

Figure 1-12—Wiring Diagram Single Speed System

An automatic reset type circuit breaker located internally on the motor brush plate protects the motor windings from overheating.

Two switches, a dash switch and parking switch control the starting and stopping of the wiper unit. The parking switch contacts, which are located internally on the wiper unit terminal board at the bottom of the wiper gear box, are actually connected across the dash switch and act as a set of holding contacts when the dash switch is turned "off." This keeps the wiper circuit closed so the wiper can keep operating until the blades reach their predetermined park position. When the blades reach the park position, the parking switch contacts, which are controlled through the wiper gear, are opened stopping the wiper. See Figure 1-12.

When the wiper is turned "on" current flows from the battery through the circuit breaker, through the motor field and armature to the dash switch to ground starting the wiper.

When the wiper is first turned "off" the wiper motor circuit is opened at the dash switch. However, current from the battery then passes through the circuit breaker, motor field and armature through the parking switch contacts to ground. When the wiper blades have reached the park position the parking switch contacts open stopping the motor.

1-6 TROUBLE DIAGNOSIS SINGLE SPEED

This section is divided into two parts: (A) Checking the wiper installed in the car, (B) Checking the detached wiper.

a. Checking the Wiper and Washer Installed in the Car

Checking an inoperative wiper in the car consists of first locating if the trouble exists in the dash switch, wiper unit or linkage. To check out the wiper system follow the steps below until trouble is located.

1. Connect a jumper wire from the wiper motor frame to ground and try operating wiper. If wiper operates, a defective wiper unit ground claw connection is indicated.

2. With ignition switch on check for 12 volts at feed wire terminal that connects to the No. 2 wiper terminal (Figure 1-12). No voltage reading indicates faulty car wiring.

3. If correct voltage is obtained in step 2, connect 12 volts to No. 2 terminal (Figure 1-12) and connect a jumper wire from the No. 1 terminal to ground. If wiper operates, a defective dash switch is indicated.

4. If wiper fails to operate in step 3, remove body parts as necessary to gain access to wiper transmissions and linkages. Disconnect

transmission link arms from wiper crank arm and recheck if wiper will operate. If wiper operates correctly trouble is located in the transmissions. If wiper still fails to operate, remove wiper from car for bench check.

b. Checking the Detached Wiper

There are three basic reasons for removing the wiper unit from the car for repairs: (1) Wiper Inoperative, (2) Wiper Blades Fail to Park (i.e., blades stop anyplace on glass when wiper is turned off) and (3) Wiper Fails to Shut Off.

1. Checking an Inoperative Wiper

Loosen armature end play adjusting screw and check if wiper will operate. If wiper operates adjust end play. If wiper fails to operate disassemble the motor section of the wiper (see Disassembly Instructions), and inspect or check the following items as required until trouble is located.

a. Circuit breaker contacts clean and closed.

b. All solder connection -- tight and not grounding to frame.

c. Brushes slide freely in their holders and brush springs are properly positioned (Figure 1-26).

d. Armature checks:

Open--Using a test lamp check from bar to bar. If lamp fails to light between any two consecutive bars an open armature is indicated.

Grounded--Using a test lamp check between armature lamina and the commutator. If lamp lights, a grounded armature is indicated.

e. Field checks:

IMPORTANT: Armature must be removed from motor and brushes must not be touching each other before making the following field checks.

Open--Using a test lamp check between terminals 1 and 2 (Figure 1-13). If lamp fails to light an open field is indicated.

Grounded--Unsolder motor lead from No. 1 terminal (Figure 1-13) and connect test lamp between disconnected lead and the motor frame. If test lamp lights a grounded field is indicated.

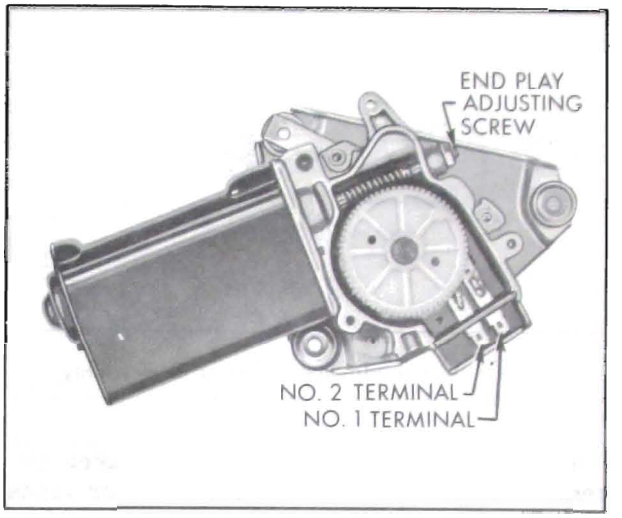

Figure 1-13—Checking Wiper Motor

f. Gear -- Disassemble gear box section (see Disassembly Procedure) and visually inspect gear for broken or stripped teeth.

2. Wiper Blades Fail to Park

This condition is caused by the parking switch contacts being dirty or broken. To inspect and/or clean contacts remove gear box cover, baffle and terminal board. (See Disassembly Procedure.)

3. Wiper Fails to Shut Off

a. Check that wiper motor lead that connects to No. 1 terminal (Figure 1-13) is not grounding on motor frame.

b. Remove gear box cover, baffle and terminal board and check that contacts are not frozen or burnt together.

1-7 DISASSEMBLY AND ASSEMBLY PROCEDURES SINGLE SPEED

The motor section of the wiper unit may be disassembled independently of the gear box section and vice versa.

a. Motor Disassembly

1. Unsolder motor leads from terminal board.

2. Remove the two tie bolts; remove end plate assembly and pull armature out of motor.

3. Tap the motor frame lightly to free it from the gear box.

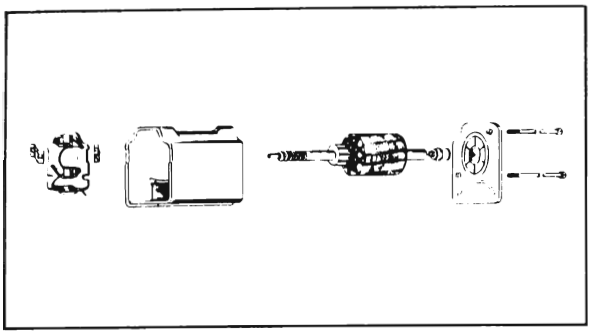

Figure 1-14—Single Speed Motor Disassembly

4. Lift brush plate and circuit breaker assembly away from frame and unsolder leads as required.

To assemble the motor section reverse the disassembly procedure.

b. Gear Box Disassembly

1. Remove crank arm retaining nut, crank arm, seal cap, retaining ring and end play washers.

2. Remove gear box cover, terminal board and baffle and slide the gear and shaft assembly out of the gear box.

To reassemble the gear box, simply reverse the disassembly procedure.

c. Wiper Adjustments

1. Armature End Play -- Loosen end play adjusting screw lock-nut (Figure 1-13) and tighten the adjusting screw until finger tight. Back off 1/4 turn and tighten lock-nut.

2. Gear Shaft End Play -- Remove crank arm, seal cap and retaining ring and add end play washers as required to obtain .005" maximum end play.

1-8 DESCRIPTION AND OPERATION TWO SPEED

a. General Description

The windshield wipers used on all 1961 Buicks are electrically operated. See Figure 1-15. Single speed wipers are standard on 4400 and 4600 Series with two-speed overlapping system available as an option. The two speed overlapping system will be standard on all 4700 Models. Windshield washers are standard on all overlapping systems and will not be available on the single speed wiper. The two speed overlap wiper motor is larger and different in design from the single speed motor and will be equipped with a washer pump. The pump is bolted to the bottom of the wiper motor assembly and is driven by the motor. The pump is relay actuated by a switch on the instrument panel.

To operate the windshield washer, the button on the switch must be pushed in or forward. In so doing, the wiper switch knob is mechanically rotated by the button to the slow speed position. After the washer has stopped, the knob must be manually turned back to the off position to stop the wiper blades. The blades always return to the park position when the switch is turned to off. If a faster wiper blade speed is desired, the knob should be turned all the way in a clockwise direction.

The single speed wiper switch has no button and is only a single position switch. When the switch is turned to the off position, the blades do not return to a full park position, but a few inches away from the reveal molding. See Paragraph 1-6 for service procedures on the single speed windshield wiper.

All motors are held to the upper cowl by four bolts. The bolts come in from above and thread into special nuts located in "T" slots on the top of the motor body casting. The nuts are mounted in rubber for quietness of operation. A water deflector is used on the motor shaft and is located under the motor drive crank and park arm assembly.

Each wiper transmission is held to the upper cowl by three screws. Although the transmission links may appear to be the same they are different, and right and left transmissions are not interchangeable.

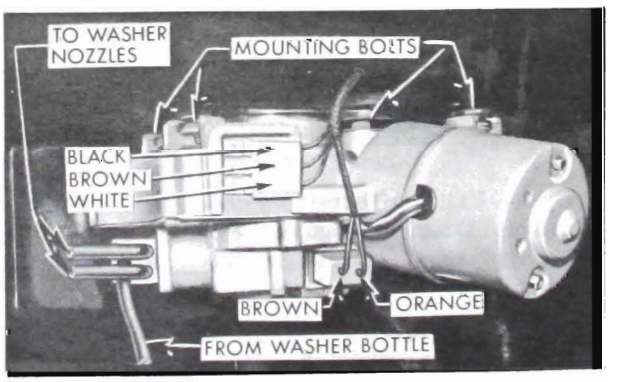

Figure 1-15—Windshield Wiper Motor

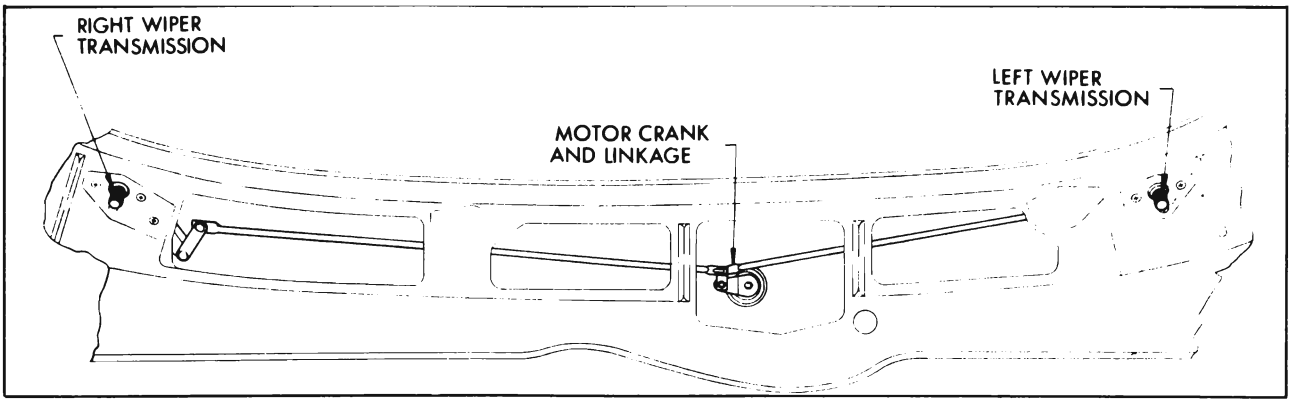

Figure 1-16—Wiper Transmissions and Links

The tubular drive links which are located under the air intake grille attach to the drive crank arm on the motor shaft on one end with the opposite end attached to the pin plate assembly on the transmission. A special washer faced nut retains the drive links to the motor drive crank arm. The transmission end of the drive link is retained by a special retaining clip. The linkage used with the "Overlap System" is different from that used on the single speed wipers and cannot be interchanged.

CAUTION: It is important that when the wiper arms of "Overlap System" are in the park position, the right arm must be positioned below the left arm. If the arms should be reversed the system will not operate because the left blade will lock into the right blade assembly. The reason for this is that the left wiper transmission has a mechanical advantage such that the speed of the wiper blade on the left arm is faster causing it to move away from the park position more rapidly. Should the blades become bound up for reasons mentioned above, the wiper should be turned off immediately. The blades can be freed only by removing the wiper arms from the wiper transmission or bending the blades to free them.

b. Wiper Motor Operation

1. Electrical

a. "Lo" Speed -- When the switch is turned to the "Lo" position current passes from the live feed (brown) through the circuit breaker, which is located inside the motor case to the green lead. See Figure 1-17. Current then flows through the relay coil, to the white lead

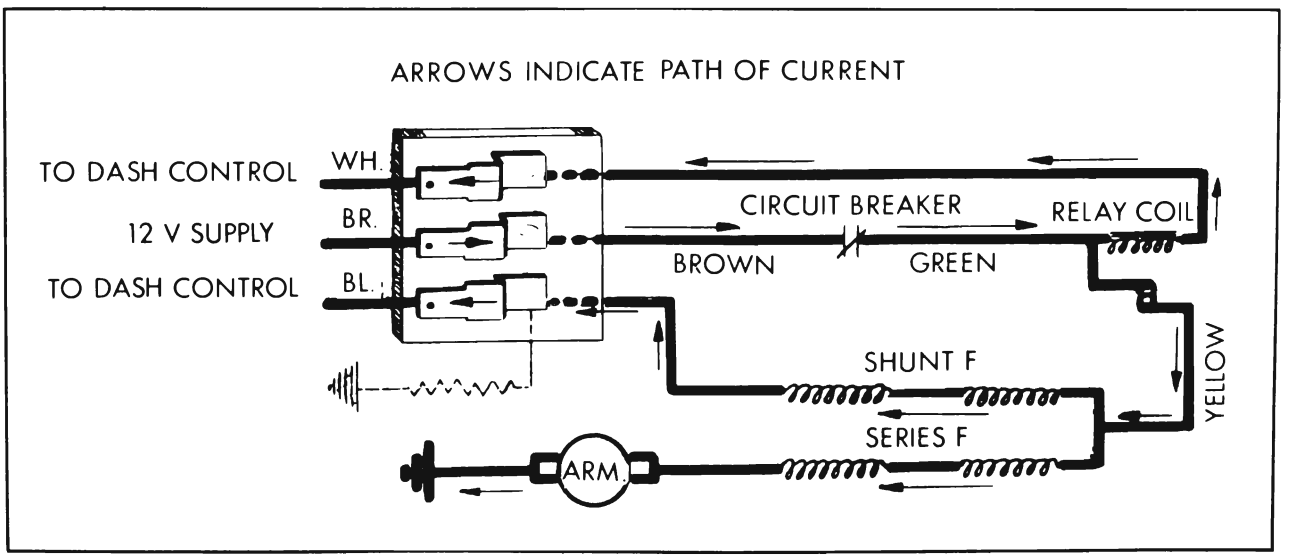

Figure 1-17—"Lo" Speed Operation—Wiring Curcuit

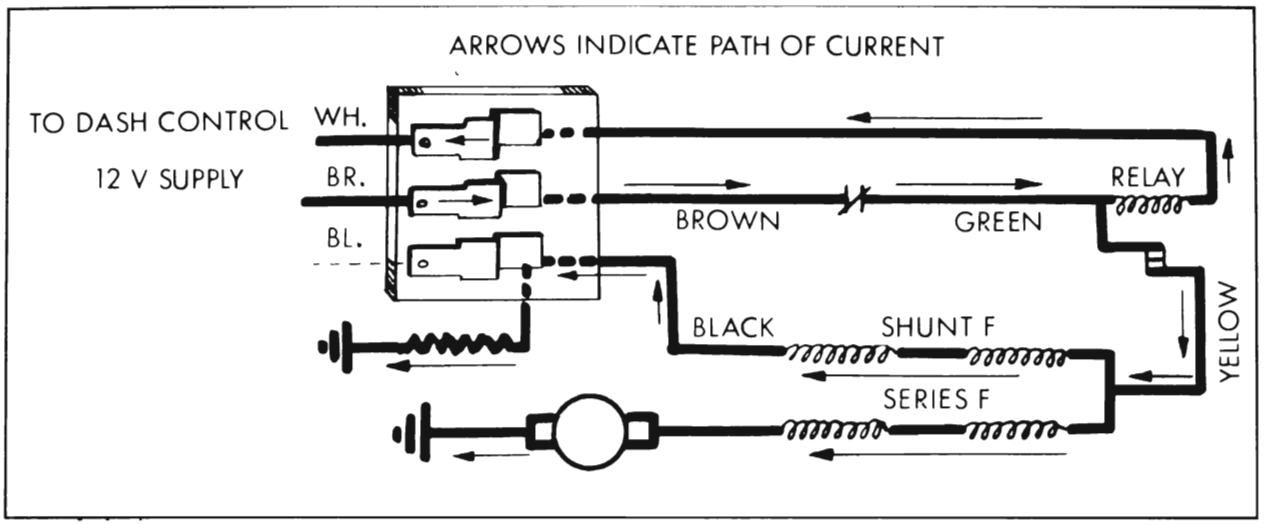

Figure 1-18—"Hi" Speed Operation—Wiring Circuit

on the terminal connector and to ground through the dash switch to complete the relay circuit. The relay coil is then energized.

As current flows to the relay coil, it also passes through the yellow wire to a split "t" type connection. Current divides with some current passing through the black lead to the terminal connector and to ground at the dash switch to ground out the motor shunt field circuit. The remaining current passes through the motor series field circuit, to the motor armature and to ground. The current flow through the switch to ground is greater than the amount through the armature. Therefore, the motor operates at a reduced speed.

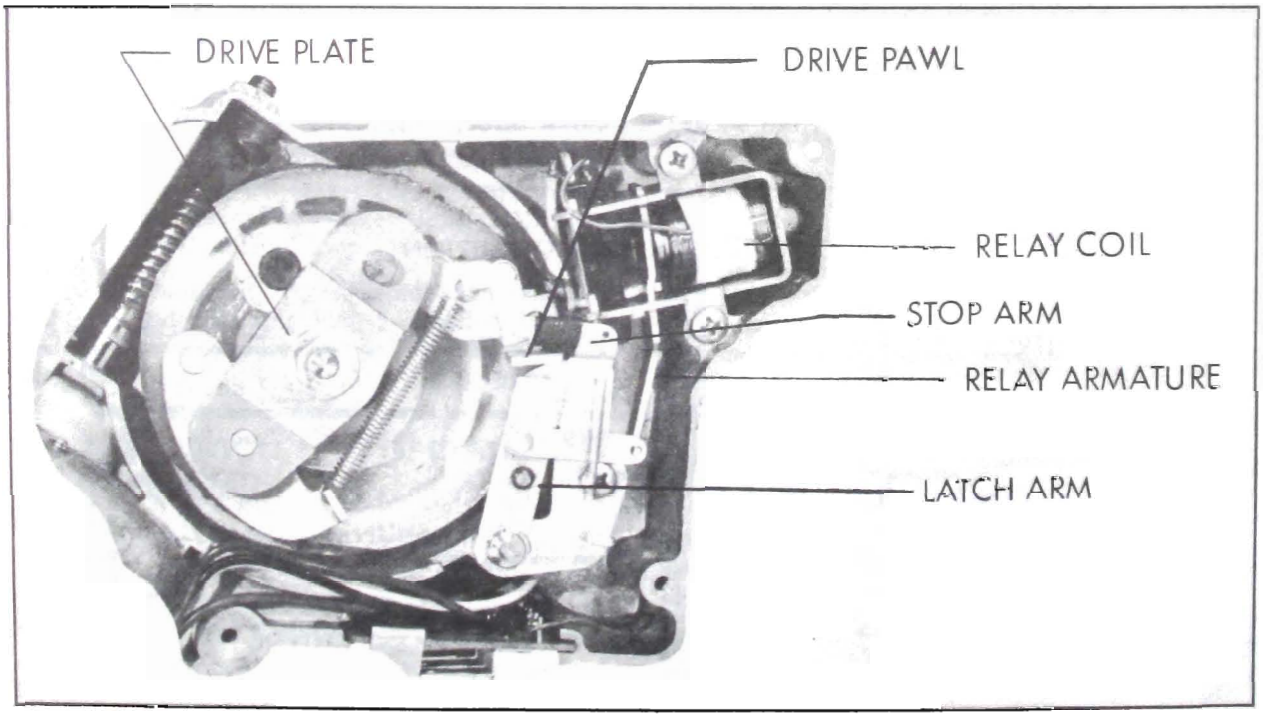

Figure 1-19—Wiper Motor Off

b. "Hi" Speed -- When the switch is turned to "Hi" position, the motor shunt field circuit is no longer grounded due to the switch position. See Figure 1-18. The majority of current then passes through the motor series field circuit, to motor armature and to ground. Some current does pass through the shunt field windings and to ground through a resistor located on the wiper unit terminal board. However, less resistance is offered to current flow through the series field circuit. Therefore, the greater flow of current through the armature increases wiper motor speed.

c. "Hi" or "Lo" to Off -- When the dash switch is turned to the off position, only the relay coil circuit is opened, stopping current flow through the relay. The motor circuit remains in operation until the relay switch control tab is mechanically opened by the drive pawl as the pawl contacts the stop arm. The relay switch control then opens the motor circuit and the motor stops with wiper blades positioned in park.

2. Mechanical

a. Motor Switch Turned to "Lo" or "Hi" -- Previous to the switch being turned to either "Lo" or "Hi," the drive pawl is in contact with the stop arm. See Figure 1-19. As the switch is turned on, the relay coil is energized. This moves the armature into the relay and the latch arm out of the path of the drive pawl. At the same time, the motor circuit is also completed.

As the motor begins rotating, only the nylon gear and eccentric shaft start to turn. The drive plate is prevented from turning by the drive pawl which is held against the stop pawl. When the nylon gear and shaft have turned approximately 180 degrees, guide pins on the drive pawl and lock pawl drop into their respective pockets in the nylon gear. This action moves the drive pawl away from the stop arm as well as locking the entire drive assembly together. The drive plate, drive pawl, lock pawl, nylon gear and eccentric shaft then turn as a unit. See Figure 1-20.

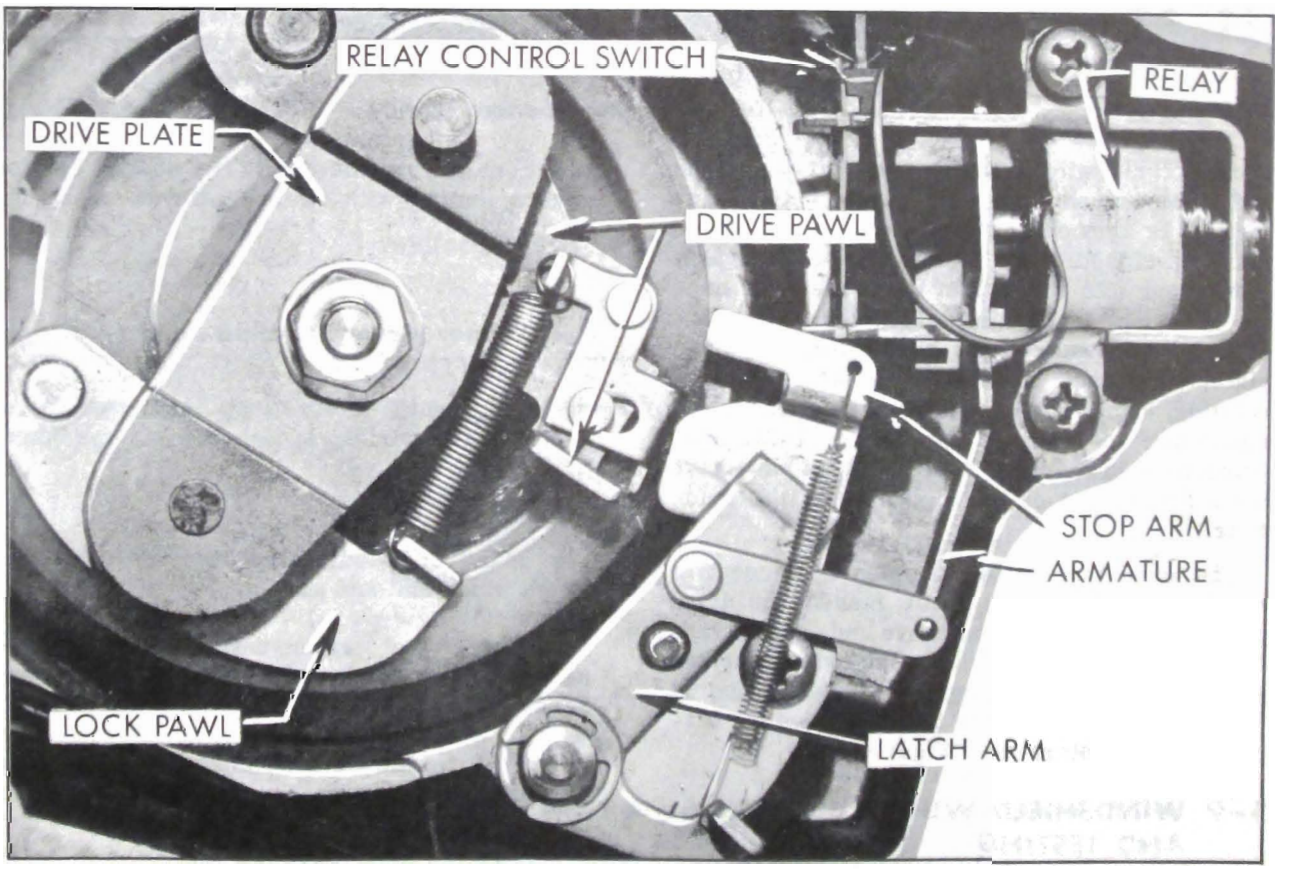

Figure 1-20—Wiper Motor in Operation

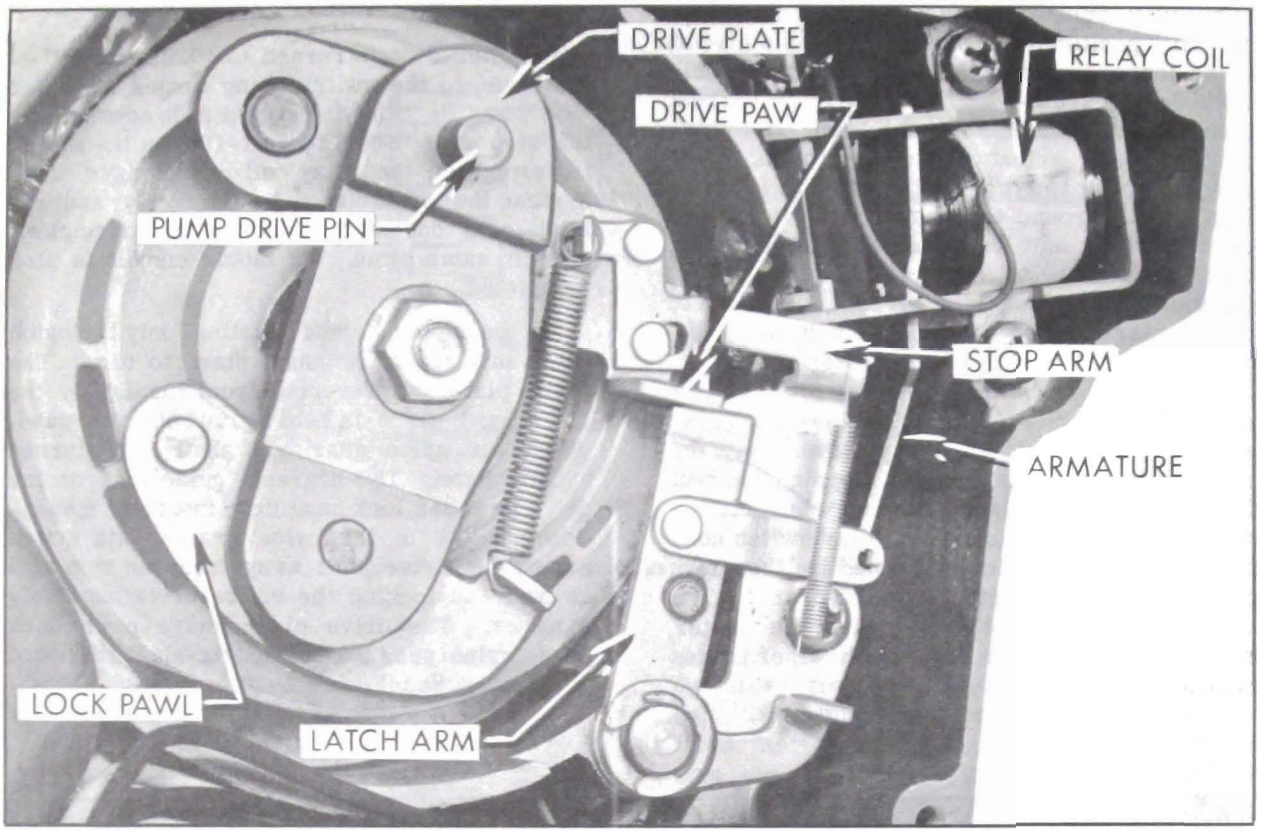

Figure 1-21—Drive Plate Stopped—Motor Running

b. Motor Switch Turned to Off -- As the switch is turned to the off position, the relay circuit is opened with the motor circuit remaining closed. The spring loaded latch arm moves out into the path of the drive pawl since the relay is no longer energized. When the drive pawl contacts the latch arm, the drive plate, drive pawl and lock pawl are held from rotating with the nylon gear and eccentric shaft continuing to rotate. See Figure 1-21. The guide pins in the drive pawl and lock pawl have been forced out of their pockets in the nylon gear.

The cam type action between the eccentric shaft and drive plate shaft makes the drive plate and related parts move outward toward the relay control switch as the nylon gear and shaft turn. The drive pawl then pushes against the relay control switch tab and opens the circuit to the motor. See Figure 1-21.

1-9 WINDSHIELD WIPER DIAGNOSIS AND TESTING

Testing is divided into two testing sections. The first section is testing to be done with the wiper motor on the car. The second section covers testing with motor removed. See Figure 1-22.

a. Wiper Motor Installed on Car

Testing with motor installed consists of checking the wiring, switch and wiper linkage.

1. Wiring.

a. Make sure wiring is properly connected to the wiper unit and switch.

b. Check that wiper unit ground strap is securely connected under wiper unit cover screw and to body.

c. With ignition switch turned on, check for 12 volts at center or No. 2 terminal of wiper unit terminal board. See Figure 1-23. If unit is equipped with washer pump, check also for 12 volts at the brown lead terminal which connects to washer pump.

DIAGNOSIS CHART

Condition	Possible Cause	Remedy
Wiper Inoperative	1. No power supply (12V) at wiper. 2. Wiper ground strap loose or disconnected. 3. Defective dash switch. 4. Wiper unit latching mechanism binding. 5. Defective relay control. 6. Defective wiper motor.	1. Check circuit from power source to wiper. 2. Connect ground strap securely to body. 3. See dash switch checking procedure. 4. See wiper latching mechanism checking procedure. 5. See relay control checking procedure. 6. See wiper motor checking procedure.
Wiper Will Not Shut Off	1. Wiper unit latching mechanism binding. 2. Relay control switch defective.	1. Free up latching mechanism and lubricate as required. 2. See relay control checking procedure.
Excessive Speed in "Hi" speed range but operates normal in "Lo" speed.	1. Loose solder connection between motor black field lead and wiper terminal board. 2. Resistor on wiper terminal board open. 3. Motor shunt field open.	1. Repair as required. 2. Replace terminal board assembly. 3. Check shunt field per motor checking procedure and replace as required.
Wiper operates in "Lo" speed only.	1. Defective dash switch. 2. Black lead between dash switch and wiper terminal board grounded. 3. Wiper motor black lead internally grounded.	1. See dash switch checking procedure. 2 Check body wiring to locate grounded condition and repair as required. 3. Disassemble wiper as required to locate and repair grounded condition.
Wiper operates in "Hi" speed only.	1. Dash switch defective. 2. Black lead between dash switch and wiper unit open.	1. See dash switch checking procedure. 2. Repair black lead as required.

Figure 1-22—Wiper Motor Trouble Diagnosis Chart

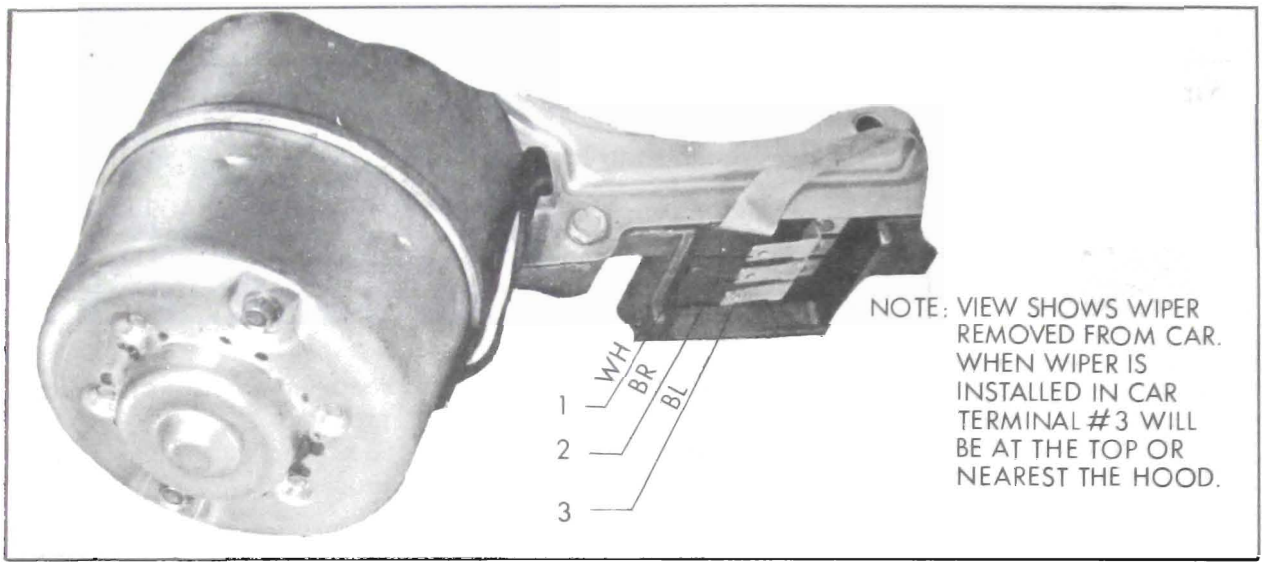

Figure 1-23—Motor Terminal Connector

2. Switch.

a. Check switch mounting. Loose mounting can cause an intermittent operating condition when using the wiper.

b. To determine if switch or wiper is defective try operating wiper independently of switch as follows:

Connect 12 volt supply to center or No. 2 terminal of wiper terminal board and connect a jumper wire from terminal No. 1 to ground. Wiper should operate in "Hi" speed.

To check "Lo" speed operation connect an additional jumper wire from terminal No. 3 to ground.

c. To determine if washer pump unit or the washer button switch is defective operate washer pump independently of washer switch as follows:

Operate wiper unit as explained in Step b. above and connect 12 volts to either of the washer pump terminals. Connect a jumper wire from the other terminal to ground.

3. Wiper Linkage.

a. Remove necessary body parts to gain access to wiper unit crank arm and drive links. Disconnect drive links from the crank arm and manually operate each wiper transmission. The test should determine if transmission or linkages are binding or damaged.

b. Wiper Motor Removed

Testing with the motor removed consists of bench testing the relay control-latch mechanism and the motor. Remove gear box and washer pump. Disconnect the yellow lead from the relay control switch.

1. Relay Control and Latch Mechanism.

a. Manually operate the relay armature to check for a binding or hanging in the latch arm and attaching parts.

b. Circuit to Relay Coil--Connect 12 volt supply to wiper as follows: (+) to center or No. 2 terminal and (—) to housing. Check for 12 volts at switch terminal to which the green lead is attached. No voltage indicates an open circuit breaker or a broken brown or green lead.

c. Relay Coil--If circuit to relay coil checks out, leave 12 volt supply connected as explained in Step b. above and connect a jumper wire from terminal No. 1 to housing. Failure of relay armature to pull in indicates a weak or open relay coil. (Recheck for a binding condition in the latching mechanism.)

d. Relay Switch--If Steps b. and c. above check out correctly proceed as follows:

(1) Leave battery and jumper wire connected as described in Steps b. and c. and check for 12 volts at switch terminal to which the yellow lead attaches. If relay pulls in properly and no

voltage reading is obtained a defective switch is indicated.

(2) Disconnect jumper wire between terminal No. 1 to ground and check that relay armature moves away from coil pole. (NOTE: If wiper gear mechanism is in full park position, disconnect the coil spring that connects between the gear assembly drive and lock pawls to release the pressure of the drive pawl switch actuator against the switch tab.) Check for 12 volts at switch terminal to which yellow lead attaches. No voltage reading indicates a defective relay switch.

(3) Leave voltmeter connected as described in Step (2) above and manually push the switch stop tab toward the relay coil. If voltage reading is still obtained a defective switch is indicated.

2. Motor Testing.

Disassemble the motor but leave the field coil assembly in the housing.

a. Check armature for open or short circuit with the use of a growler.

b. Use a growler test light to test for grounded commutator bars.

c. Inspect the case and brush assembly for worn or defective brushes and brush springs, loose solder connections and dirty or defective circuit breaker contacts.

d. Disconnect yellow lead from relay control switch and connect an ohmmeter between the yellow lead and the brush holder to which the internal field lead connects. No reading indicates an open series field.

Next connect the ohmmeter between the yellow lead and the terminal to which the black motor lead attaches. No reading indicates an open shunt field.

e. Disconnect yellow lead from relay control switch. Be sure steel case and brass ground strap are not touching the housing. Then check between the yellow lead and field lamina with a test light. If bulb lights, field is grounded.

f. Bench test motor after assembling in the following manner. Be sure brass ground strap is connected to wiper housing.

(1) "Lo" Speed -- Connect 12 volt supply to center, or No. 2 terminal, and ground housing. Connect jumper wires from No. 1 and No. 3 terminals to ground.

(2) "Hi" Speed -- Disconnect jumper wire from No. 3 terminal.

(3) Stop -- Disconnect jumper wires from No. 1 and No. 3 terminals.

1-10 DISASSEMBLY AND ASSEMBLY

a. Disassembly of Motor

1. Remove the two motor tie bolts. See Figure 1-24.

2. Remove the armature end-play adjusting screw.

3. Strike the steel case lightly with a mallet to partially loosen it from the die cast housing and motor field.

4. Insert a tool through the armature adjusting screw opening and push against the end of the armature shaft to back off the case. This will retain the armature commutator in position between the brushes until ready to separate the armature from the case.

5. To separate armature from case while still retaining the brush springs and brushes in place, fashion a spring similar to that shown in Figure 1-25 and insert behind the brush leads as shown.

6. Pull the armature out of the case and install brush retainer spring, Part Number J-7890, as shown in Figure 1-26.

7. Remove the felt washer, thrust plate, and rubber thrust disc from the case assembly bearing as required. Refer to Figure 1-24.

8. The field assembly is pressed in the housing under light pressure and should be carefully checked prior to removal. To remove the field proceed as follows:

a. Cut the black and yellow leads that extend through the case assembly rubber grommet in a location convenient for splicing.

b. Cut the internal field leads enclosed in black plastic tubing approximately two inches

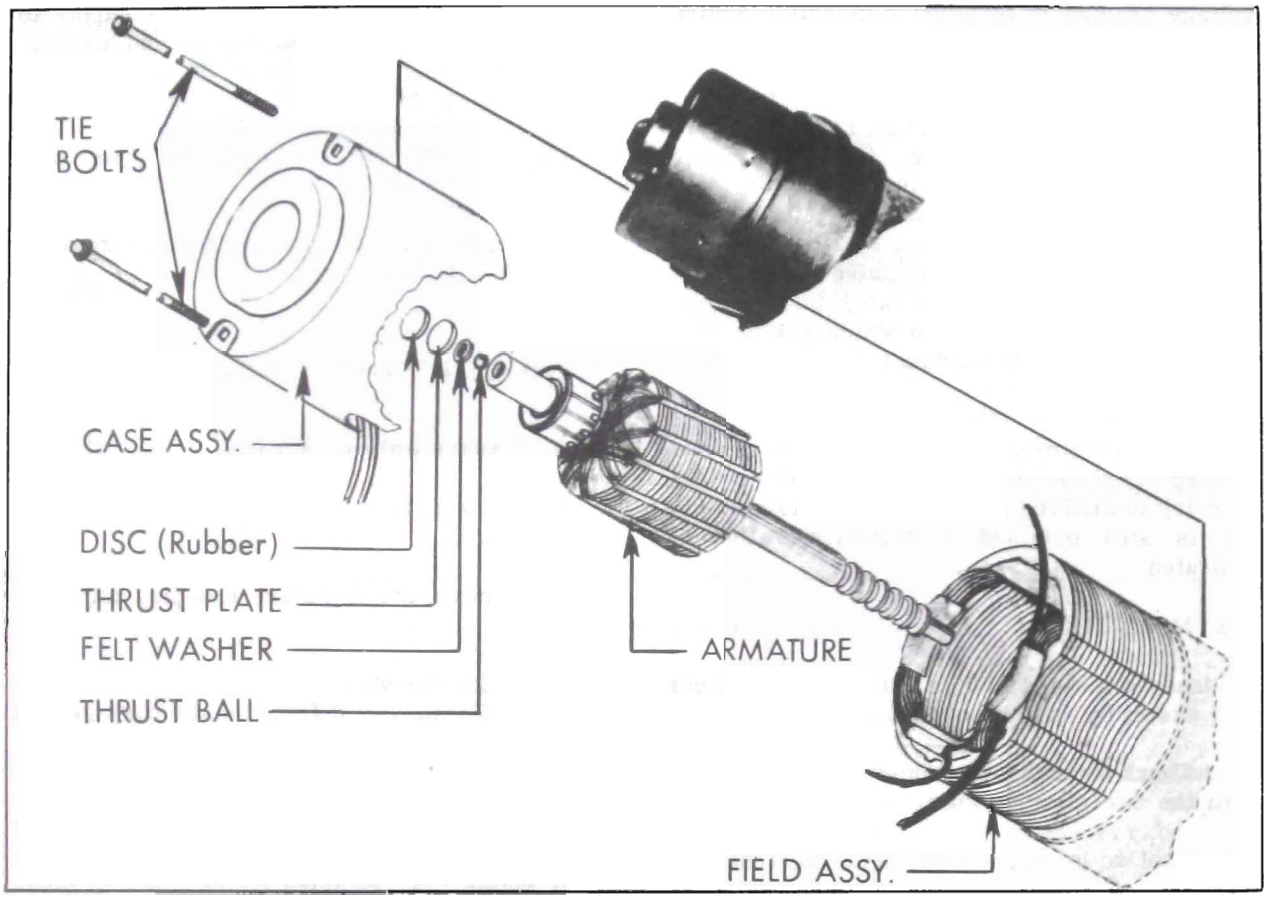

Figure 1-24—Motor Disassembly

from the brush holder to which they are attached.

c. Scribe a reference line along the side of the housing and field for reassembly purposes.

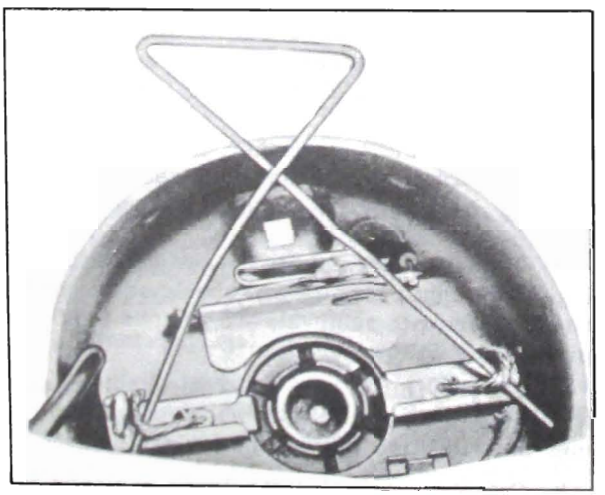

Figure 1-25—Holding Brush Leads

d. Refer to Figure 1-27 and remove field from housing as shown.

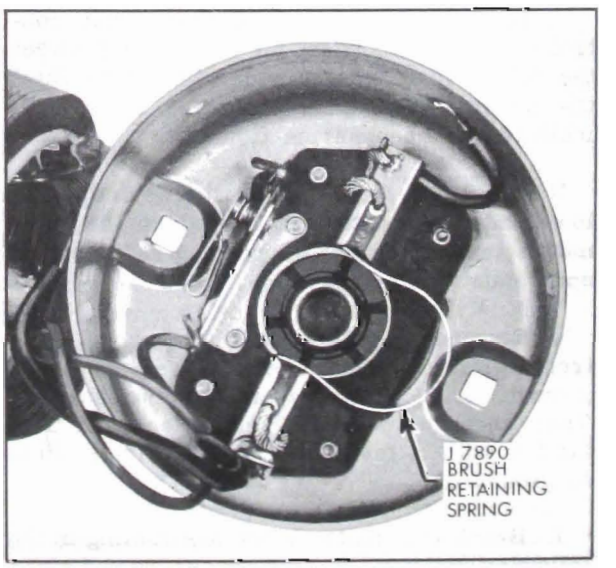

Figure 1-26—Brush Retainer Spring

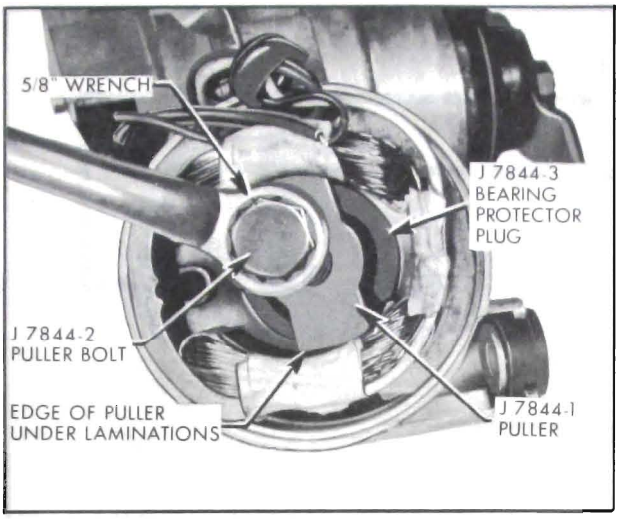

Figure 1-27—Removing Field Coils

b. Assembly of Motor

1. Install field assembly as follows:

a. Shorten as required and splice the replacement field leads to those leads cut in Steps 8 a. and 8 b. under motor disassembly.

b. Scribe a reference line on the replacement field in the approximate same location as the one scribed on the original field (Step 8 c. under motor disassembly).

c. Align the field and housing according to the reference lines and start the field in the housing. A further check to insure alignment is shown in Figure 1-28.

d. Push the field in the housing until it bottoms against the machined ridge.

2. Assemble the rubber thrust disc, steel thrust plate and felt washer in the order indicated. Refer to Figure 1-24.

3. Be sure steel thrust ball is located in the commutator end of armature shaft, lubricate armature shafts and thrust ball with a high melting point grease and install armature shaft in case assembly bearing.

4. Remove the brush retainer spring.

5. Maintaining the armature in its assembled position in the case start the armature worm shaft through the field and housing bearing until it starts to mesh with the worm gear.

NOTE: It may be necessary at this point to rotate the armature slightly before the worm will engage with the worm gear.

6. Rotate the case as required to align the holes in the case with those in the housing.

7. Being very careful not to pinch any of the motor leads between the case and edge of the field push the case onto the field until it butts against the housing.

8. Secure the case to the housing with the two tie bolts.

9. Install end-play adjusting screw and locknut and adjust end-play as described in the adjustment section.

c. Disassembly of Relay Control and Latching Mechanism

1. Remove the four screws which secure the gear box cover or washer pump assembly to the gear box.

2. Disconnect coil spring, remove "E" ring and lift the latch and follower assembly off the pivot pin and relay armature. See Figure 1-29.

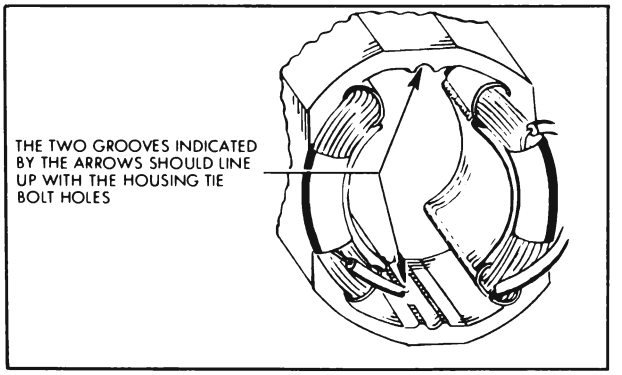

Figure 1-28—Aligning Field Coils

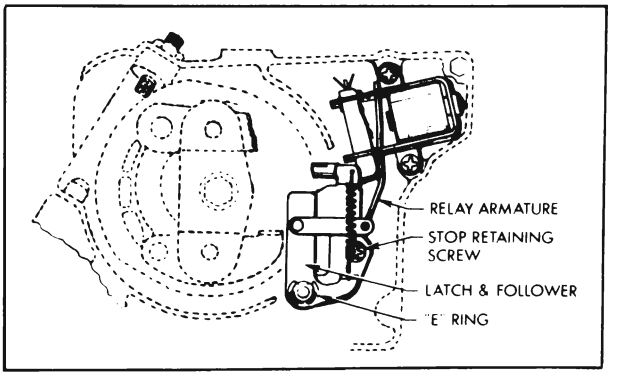

Figure 1-29—Disassembly of Relay and Latch

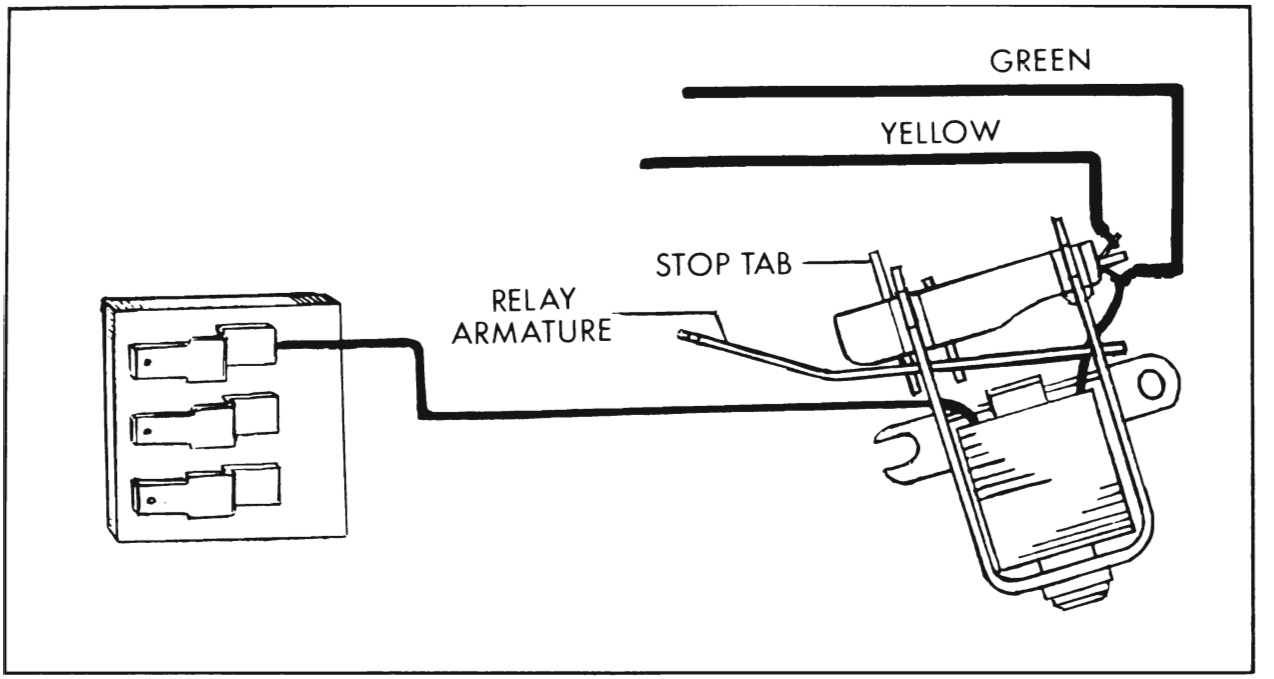

Figure 1-30—Relay Coil Wiring

3. Remove the stop assembly retaining screw. This will permit the stop assembly to be moved as necessary to allow clearance for removing the relay control assembly.

4. Remove the two screws that secure the relay control assembly.

5. Lift the relay control assembly out of the gear box and unsolder leads as required.

d. Assembly of Relay Control and Latching Mechanism

Solder existing green and yellow wiper leads to relay control switch and solder the relay coil lead to the wiper unit terminal board as shown in Figure 1-30.

e. Disassembly of Drive Gear Mechanism

1. Remove the crank arm retaining nut. See Figure 1-31.

2. Remove crank arm, snap ring and rubber seal.

3. Remove the retaining ring, end play washers, shield and spacer washer.

4. Follow Steps 1 through 3 under relay control and latch mechanism disassembly.

5. Remove gear mechanism from the gear box and slide spacer washer off the gear assembly eccentric shaft.

6. Slide the drive plate and shaft assembly out of the gear assembly, remove the lock and drive pawls and remove the coil spring.

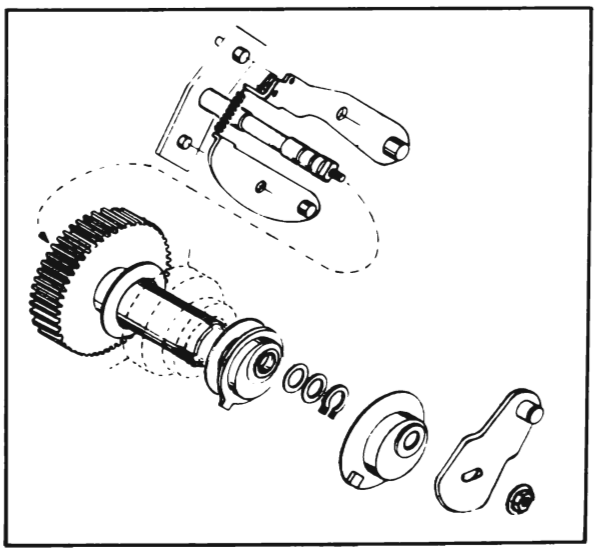

Figure 1-31—Drive Gear Mechanism

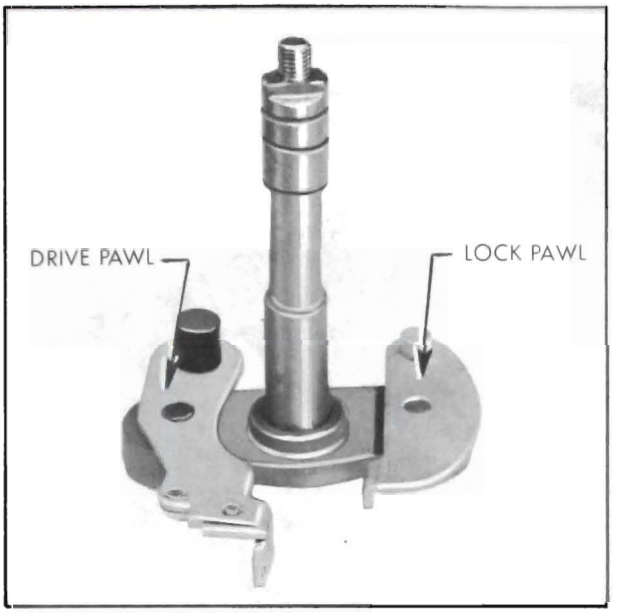

Figure 1-32—Lock and Drive Pawl Assembly

f. Assembly of Drive Gear Mechanism

1. Assemble lock and drive pawls to the shaft and drive plate assembly as shown in Figure 1-32.

2. Install the assembled parts from Step 1 in the gear and eccentric shaft as shown in Figure 1-33.

3. Connect the coil tension spring between the lock and drive pawls.

4. Reinstall spacer washer on the eccentric shaft of the gear.

5. Reinstall gear mechanism in the housing as shown in Figure 1-34.

6. Reassemble the parts removed in Steps 1 through 4 under drive gear assembly.

1-11 WINDSHIELD WIPER ADJUSTMENT

a. Armature End-Play

1. Loosen adjusting screw locknut and tighten the adjusting screw until finger tight.

2. Back off set screw 1/4 turn and tighten locknut.

b. Gear Assembly End-Play

1. Gear assembly end-play is controlled by end-play washers located between the seal cap and shield. See Figure 1-32. End-play should be .006.

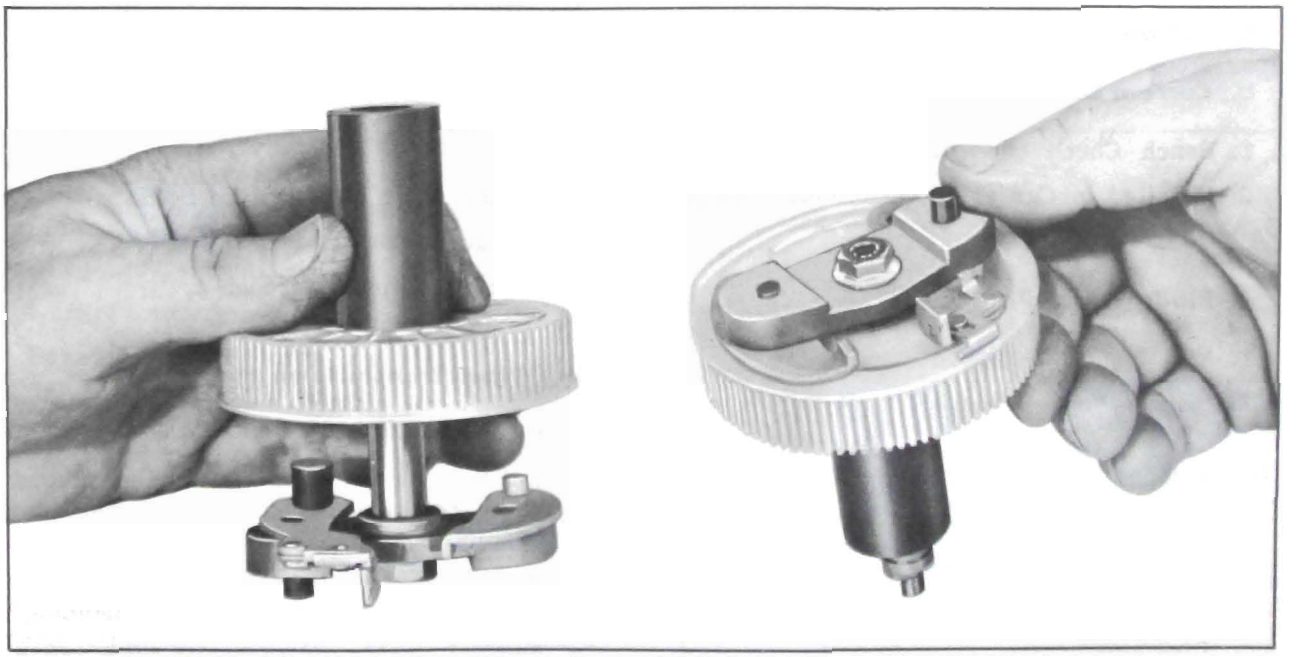

Figure 1-33—Installing Pawl and Shaft into Gear

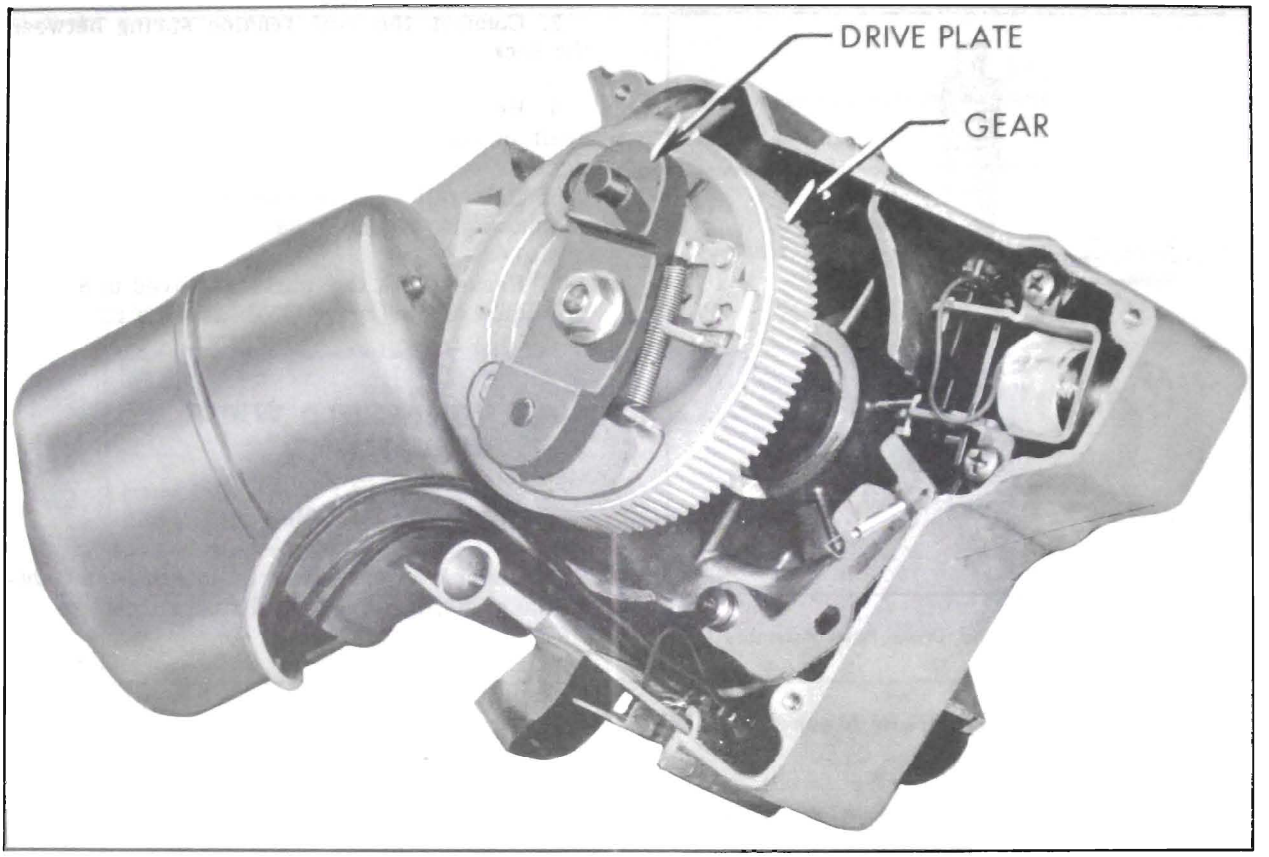

Figure 1-34—Installing Gear and Shaft Assembly

1-12 WIPER SPECIFICATIONS

a. Voltage Supply—12 Volts

b. Current Draw

1. Bench Check (no load)--3 to 4.5 Amps.

2. Installed in Car (wet windshield)--3.5 to 5 Amps.

c. Blade Wipes Per Minute

1. "Lo" Speed--35 to 45.

2. "Hi" Speed--70 to 85.

1-13 REMOVAL AND REPLACEMENT OF ASSEMBLIES

a. Wiper Motor Assembly

1. Remove

a. Disconnect wire connectors from motor and pump.

b. Pull washer hoses loose from pump.

c. Remove left side air intake grille.

d. Remove spring retainer clip from wiper motor shaft.

e. Lift transmission drive links off motor shaft.

f. Remove four wiper motor bolts.

2. Replacement

a. Reverse Steps f. through a.

b. Wiper Transmission

1. Removal

a. Remove wiper blade and arm, shaft and escutcheon retaining nuts and escutcheon from transmission shaft.

b. Remove air intake grille retaining screws. Slide grille out from under reveal molding.

c. Remove spring retainer clip from wiper motor shaft. Lift drive links off motor shaft.

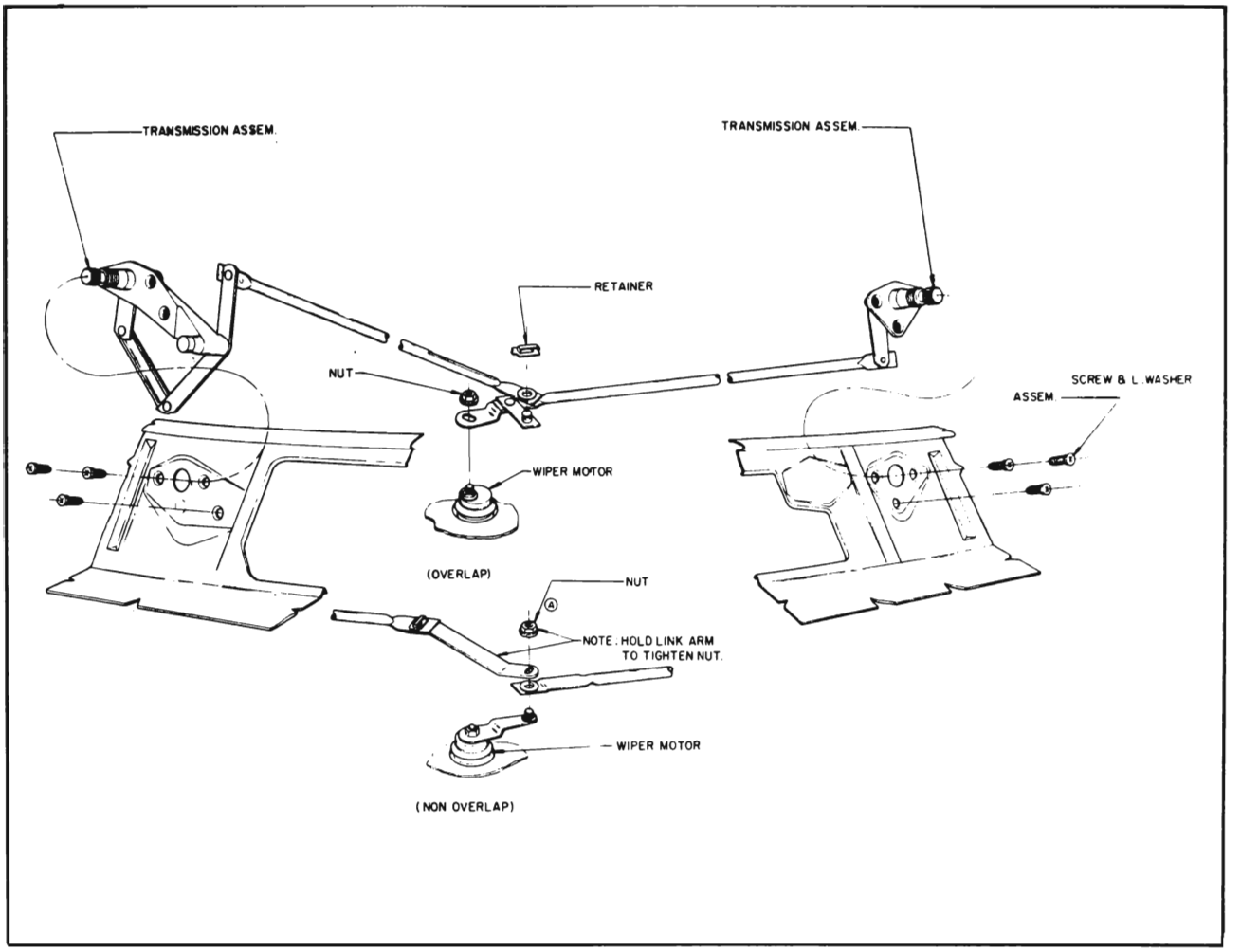

Figure 1-35—Wiper Assembly

d. Remove the three transmission retaining screws.

e. Slide transmission and drive link toward opposite side of car. Lift transmission up at opening and remove.

2. Replacement

Reverse Steps e. through a.

1-14 WINDSHIELD WASHER DESCRIPTION AND OPERATION

a. Description

Any time that the motor is turning, a guide pin on the motor drive plate assembly turns a four lobe shaped nylon cam follower in the pump assembly. The cam follower contacts a roller on the ratchet pawl lever. See Figure 1-36. A torsion spring on the ratchet pawl

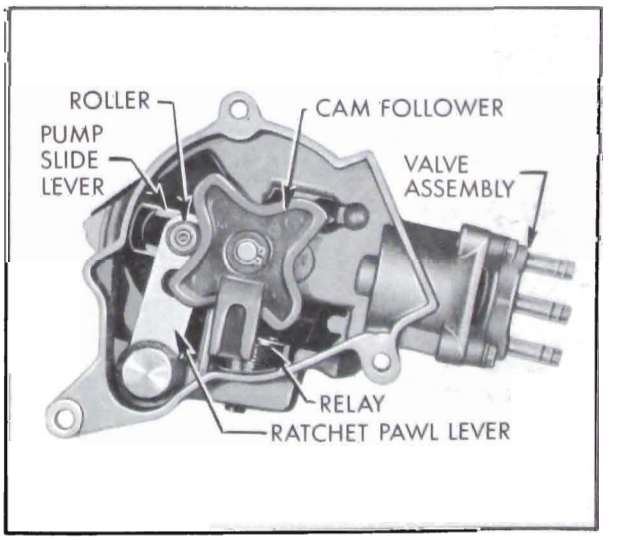

Figure 1-36—Washer Pump-Motor Side

lever pivot shaft makes the lever and roller follow the nylon cam follower and also puts the ratchet pawl under spring tension.

Two other shafts are located on the ratchet pawl lever, on the side opposite the roller. One of the shafts supports the ratchet pawl, while the shorter shaft actuates the pump slide lever. The pump slide lever is slotted at one end to receive the short shaft. The other end of the pump slide lever is fitted with a rubber cup type pump diaphragm and a coil spring.

The ratchet pawl is slotted on the end opposite the pivot shaft. The slotted end contacts a nylon ratchet wheel which has 21 teeth. During pump operation, the slot in the ratchet pawl slips over one tooth on the ratchet wheel and rotates the wheel one tooth at a time until the ratchet wheel has been rotated through all 21 teeth or one complete revolution.

The nylon ratchet wheel has a ramp on the side down toward the pump slide lever and also a notch on the top side. The ramp has two functions. First, as the ratchet wheel rotates, the ramp makes contact with a relay armature hair spring to move the spring from under the armature and allow it to drop toward the ratchet pawl. Secondly, it contacts a tang on the pump slide lever which allows the tang to climb up on the ramp and stop the pumping action.

A tang on the pump relay armature falls into the notch on the nylon ratchet wheel when the wheel has made one revolution. This allows the ratchet pawl to slide into a wide slot in the armature, lifting the ratchet pawl away from the teeth of the nylon ratchet wheel.

A relay within the pump housing is energized anytime the washer button is depressed. See Figure 1-37. When energized, the armature is pulled up against the relay to release the ratchet pawl from the armature, allowing the ratchet pawl to engage the ratchet wheel teeth. At the same time, the relay armature hair spring trips to a position under the armature, holding it away from the ratchet wheel and ratchet pawl.

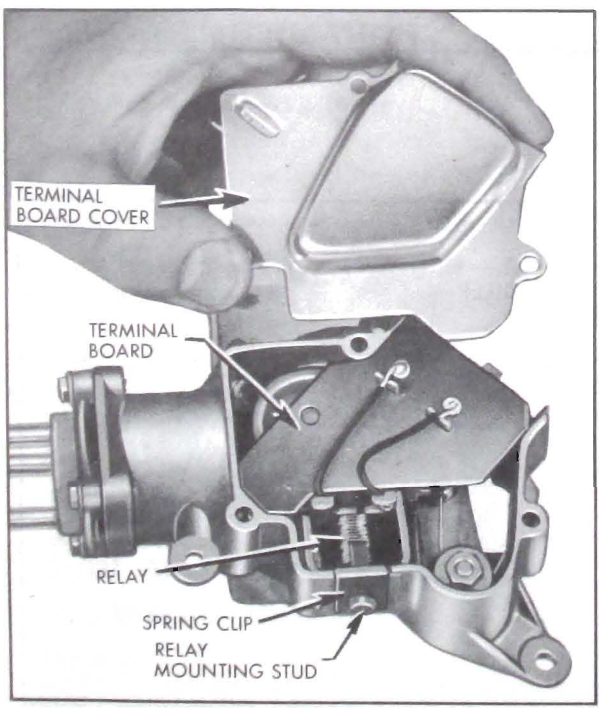

Figure 1-37—Washer Pump—Cover Side

b. Operation

Pump action remains the same regardless of whether wiper motor is on when washer button is depressed or if button is depressed to start washer and motor at the same time.

1. Idling.

With wiper motor turning, the elliptical cam follower is rotated by the guide pin on the ratchet pawl lever. The tang on the pump slide lever is on the high portion of the ratchet wheel ramp, leaving the pump in a cocked position.

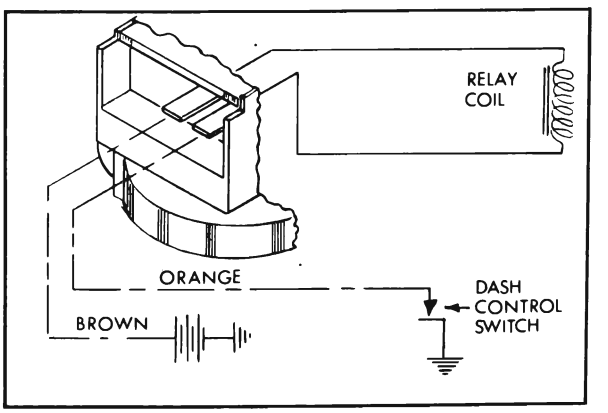

Figure 1-38—Washer Pump—Wiring Circuit

The pump slide lever is spring loaded by a coil spring next to the rubber cup diaphragm.

With the wiper motor turning, the elliptical cam follower is rotated by the guide pin of the motor drive plate. The pump slide lever is held from pumping by the tang resting on the high portion of the nylon ratchet wheel ramp. The ratchet pawl does not engage the teeth of the ratchet wheel because it is held away from the wheel by the armature. The armature tang is engaged in the slot of the ratchet wheel. The rotating cam follower contacts the roller and moves the ratchet pawl lever back and forth. The ratchet pawl also moves, being connected to the ratchet pawl lever, but no ratchet wheel rotation takes place. The pump is idling.

2. Pumping.

When the washer button is depressed, the relay energizes. The armature tang moves out of the ratchet wheel slot and the armature hair spring trips under the armature. As the armature moves toward the relay, the ratchet pawl falls free of the armature and engages a ratchet wheel tooth, rotating the wheel one tooth. The distance moved is sufficient for the pump slide lever tang to fall off the ratchet wheel ramp and allow the spring loaded pump to pump the first stroke. The pump completes one pumping stroke for each ratchet wheel tooth movement. After the wheel has rotated approximately 1/2 turn the ramp engages the armature hair spring and moves it out from under the armature. The armature crops and the tang contacts the ratchet wheel but does not affect the ratchet pawl action. After another 1/8 to 1/4 turn of the ratchet wheel, the pump slide lever tang contacts the ramp with a resulting shorter pump stroke. Each succeeding stroke becomes shorter until the nylon ratchet wheel has made one complete revolution and returned to the starting position. At that point, the armature tang drops into the ratchet wheel slot, with the ratchet pawl entering the large slot in the armature and lifting away from the ratchet wheel teeth. The pump is then returned to idling and has completed one pumping cycle.

1-15 DISASSEMBLY AND ASSEMBLY

a. Removal and Replacement of Relay and Terminal Board

1. Remove relay terminal board cover.

2. Slide spring clip off relay mounting stud. See Figure 1-37.

3. Rotate nylon rotor cam to free ratchet arm from relay armature and lift out relay and terminal board as an assembly.

CAUTION: Whenever it is necessary to solder connections on either the wiper or the pump rosen core solder should be used. Do not use acid core solder.

NOTE: Terminal insulator must be saved for reinstallation.

4. To reinstall hold relay armature in against the coil pole and position the relay mounting stud in the slot provided in the pump body casting.

5. Install spring clip on relay mounting stud.

6. Assemble terminal insulator over terminals and position terminal board.

7. Manually rotate washer pump through a complete cycle to check if pump is operating properly.

b. Removal and Replacement of Valve Assembly

1. Remove four screws attaching valve to pump body.

2. Carefully remove valve assembly.

3. To install, reverse removal procedure.

NOTE: Be certain that bellows is positioned properly when valve assembly is installed.

c. Removal and Replacement of Bellows

1. Remove valve assembly.

2. If pump is in idling position release it as follows: push relay armature toward relay coil so that wire stop spring engages relay armature, then manually rotate nylon rotor cam until pumping action is felt.

3. When plunger is all the way in on the pump stroke place a block of wood between the pump slide lever and pump body to prevent slide lever from being pushed back in next step. See Figure 1-39.

4. Push in against bottom of bellows and turn bellows approximately 90 o This should release bellows unit from pump plunger.

5. To install, reverse removal procedure.

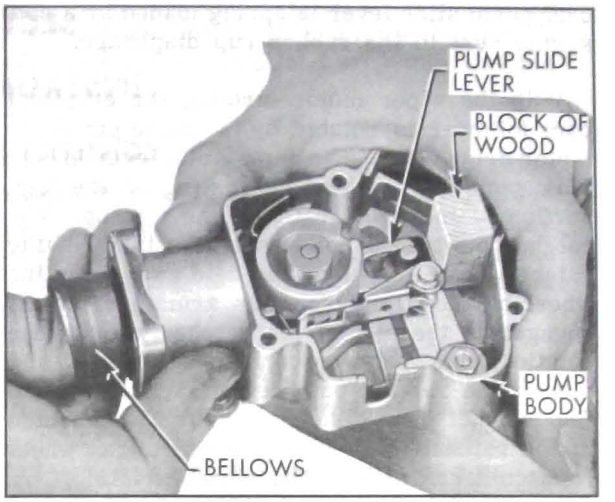

Figure 1-39—Bellows Removal