PART THREE—BODY

SECTION IV—INSTRUMENTS, GAUGES, HORNS, AND WINDSHIELD WIPERS

1. INSTRUMENTS AND GAUGES

GENERATOR INDICATOR LAMP

A generator indicator lamp is connected between the armature terminal of the voltage regulator and the ignition terminal of the starter and ignition switch. The indicator lamp indicates that generator output voltage is normal when the lamp goes out. This occurs just above normal engine idle speed. See electrical diagrams in back pages of manual.

ELECTRO-MAGNETIC FUEL GAUGE

The fuel gauge consists of a panel unit and tank unit connected by a single wire. The panel unit has two magnetic circuits, each with a coil to produce a magnetic field. The constant field coil is grounded internally and exerts a constant pull on the pointer toward the empty mark when the ignition is turned on. The variable field coil is grounded through the tank unit and exerts a pull on the pointer toward the full mark. The tank unit contains a resistor and a contact finger which moves as the float moves. A strong magnetic field is induced in the variable field coil when the tank fuel rises and gradually weakens as the level is reduced. See Figure 1.

The tank unit is locked in position by a retainer plate and rubber seal. The retainer can be removed by using a special Tool C-3582 when it is necessary to service the tank unit. See Figure 2 and 3.

TESTING ELECTRO-MAGNETIC GAUGE

TESTING WIRE FROM STARTER—IGNITION SWITCH TO PANEL UNIT—Turn switch to accessory position. Connect one wire of a test lamp to the sw terminal of the panel unit and the other wire to ground. If the lamp lights, circuit is good.

TESTING PANEL AND TANK UNIT FOR GROUND—Both units must have a good ground to operate properly. Turn ignition to accessory position. Use a jumper wire to temporarily ground each unit at the case. If the gauge unit changes when the temporary ground is made, see that the case of the unit under test is properly grounded. Clean and tighten the mounting screws on the panel unit. Clean the contacting surface of the tank unit and make sure the retainer is tight.

TESTING WIRE BETWEEN PANEL UNIT AND TANK UNIT—Disconnect the wire at both ends. Turn on ignition switch. Connect a test lamp to the accessory terminal of the starter—ignition switch and to one end of the wire. If the lamp lights, the wire is grounded and must be repaired or replaced. If the lamp does not light, ground the opposite end of the wire. The lamp should light. If it does not, the wire is broken and must be replaced.

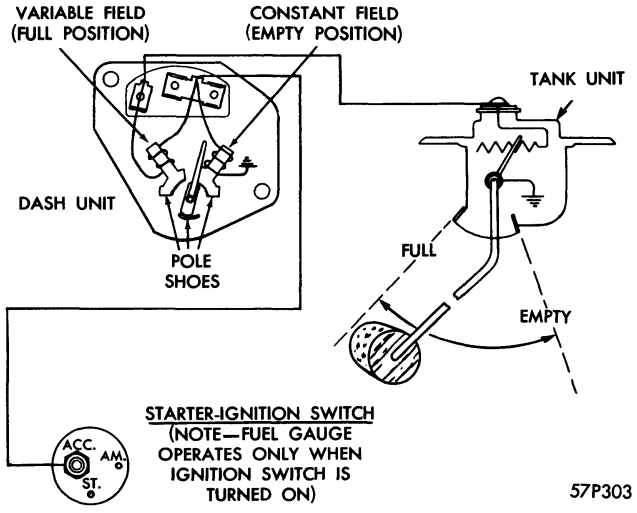

Figure 1—Electromagnetic Fuel Gauge Circuit

INSTRUMENTS AND GAUGES
DATA AND SPECIFICATIONS

MODEL		LP1, P-30, LP2, P31
Fuel Gauge	Type	Electro-magnetic
Horns	Type	Sea Shell
	Number	(1) Plaza, (2) Savoy and Belvedere
	Amperage Draw	8.5 amps. at 12.4 volts at each horn terminal
	Location	Behind Radiator Grille
Windshield Wiper Motor	Types	Electric—Constant Speed (Standard)
		Electric—Variable Speed (Special Equipment)
	Circuit Breaker Location	Constant Speed—Built into Switch
		Variable Speed—Attached to Switch

CIRCUIT BREAKER AND FUSE CHART

MODELS	LP1, P-30, LP2, P31
Headlamps	20 amp.—C. B. in switch
Radio	7½ amp.—Fuse
Clock	2 amp.—Fuse
W. S. Wiper Motor (constant speed)	C. B.—in switch
W. S. Wiper Motor (variable speed)	C. B.—8 amp.

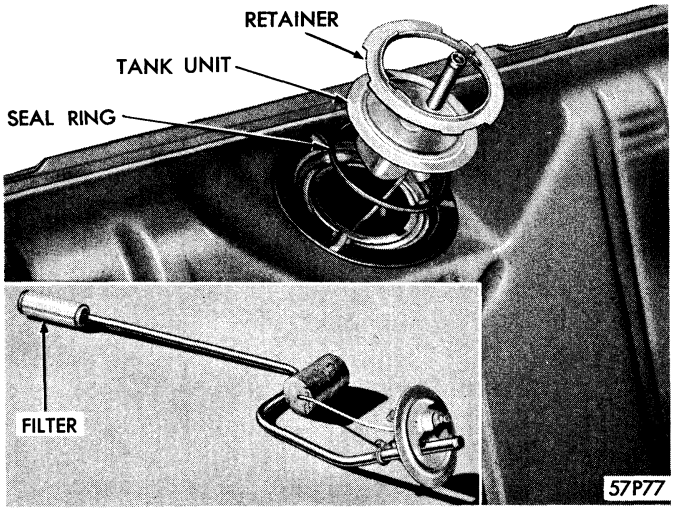

Figure 2—Fuel Gauge Tank Unit

Figure 3—Removing Retainer with Tool C-3582

TESTING PANEL AND TANK UNITS—If previous tests indicate that the panel unit is receiving current when the starter-ignition switch is turned on, that both the panel and tank units are properly grounded, and that the wire between the units is good—then test the panel and tank units as follows:

Use a spare tank unit known to be in good condition. Disconnect the tank unit to panel unit wire at the terminal of the panel unit. Connect the spare tank unit to the terminal on the panel unit and ground the tank unit with a jumper wire. Move the float arm of the tank unit up and down. If the panel unit registers correctly, the tank unit in the car is faulty and should be replaced. If the panel unit does not register when the arm of the spare tank unit is moved up and down—the panel unit is faulty and should be replaced.

TESTING TANK UNIT REMOVED—Connect a test lamp from the battery and connect the ground side of the bulb to a jumper leading to the tank unit terminal. Connect a jumper from the tank unit case to the other side of the battery. With the float in the full position, the bulb should burn almost at full brilliance. When the float arm is lowered, the light should decrease steadily in brightness, until it will barely be visible.

The test will only show if the tank unit is functioning. It will not indicate exact calibration. It is important to use care when installing a tank unit so as not to bend the arm which will cause an error in the panel unit reading. Always compare the tank units with a new one to make sure that the rod angle is correct.

TEMPERATURE GAUGE

The electro-magnetic temperature gauge consists of an engine sending unit and a panel unit connected by a single wire. The panel unit consists of two coils which produce two magnetic fields. A constant field exerts a constant pull on the indicator toward the cold mark when the ignition switch is turned on. The variable field exerts a pull toward the hot mark. The magnetic pull from the variable field changes as the resistance in the engine sending unit changes.

The engine sending unit contains a carbon resistor. Its resistance increases as coolant temperatures decrease. As coolant temperatures increase, the resistance decreases.

TESTING TEMPERATURE GAUGE—Before performing tests on the gauge, inspect the wires of the temperature gauge circuit for worn, frayed, or broken wires. Clean terminals at the panel unit and engine sending unit. Check the battery voltage.

Remove the sending unit from the cylinder head and ground the unit to the car with a jumper wire. Place the unit in a container of hot water with a thermometer. Do not immerse unit. Make sure that top of sending unit or the terminal does not get wet. The gauge should indicate approximately the same temperature as the thermometer. Use the temperature chart to determine the degrees Fahrenheit. In most cases, if the first four readings correspond to the temperature chart, it can be assumed that the gauge is accurate for the entire range. If the entire range is to be checked, it will be necessary to use a liquid with a higher boiling point than water.

If gauge readings do not correspond, use a new engine sending unit known to be accurate, and again check the temperature gauge readings.

Another method, although not as accurate, can be used to test the gauge. Run the engine indoors at a fast idle with a cover over the radiator until the thermostat is open, and place a thermometer in the top tank of the radiator. The gauge should register approximately the same temperature as the thermometer.

Degrees Fahrenheit	Gauge Indication
100°F. ± 1/16	At cold mark
150°F. ± 3/64	Start of normal bar
225°F. ± 3/64	End of normal bar
250°F. ± 1/16	At hot mark

SPEEDOMETER

The speedometer consists of an indicating head and the speedometer drive cable. In addition to speed, the speedometer records mileage on its odometer. If speedometer fails to indicate speed and mileage, inspect for a broken drive cable.

SPEEDOMETER CABLE—Most cables are broken due to lack of lubrication. In some instances a cable may break due to binding mechanism in the indicating head. A "jumpy" pointer may be due to a kink in the cable. The kinked cable rubs on the housing and winds up slightly, slowing down the mechanism. It then unwinds and causes the pointer to jump. To check for kinks remove the cable from the housing and lay it on a flat surface. Twist one end with the fingers. If the cable turns over smoothly, the cable is not kinked. If it "flops" over as it is twisted, the cable is kinked and should be replaced.

Inspect the housing for evidence of kinks. If a cable sticks or binds as it is inserted in the housing, the housing is damaged inside and should be replaced.

The speedometer drive pinion should also be checked. If the pinion is dry or teeth are stripped, the speedometer may not register properly.

The transmission main shaft nut must be tight or the speedometer gear may slip on the main shaft and cause slow speed readings. Proper torque on main shaft nut is 95 to 105 foot-pounds.

LUBRICATING SPEEDOMETER CABLE—The speedometer cable should be lubricated with Speedometer Cable Lubricant every 10,000 miles. Fill the ferrule at the upper end of the housing. Insert the cable in the housing, starting at the upper end. Turn the cable as it is fed into the housing. Repeat filling the ferrule except for the last six inches of the cable. Too much lubricant at this point may cause the lubricant to work into the indicating head.

LUBRICATING SPEEDOMETER HEAD—The speedometer head should be lubricated every 10,000 miles with Speedometer Lubricating Oil. Remove the oil tube from the housing and put a few drops of oil on the wick in the tube. Reinstall tube.

INSTALLING SPEEDOMETER CABLE AND HOUSING—If a new cable and housing is to be installed, always check both for kinks. Use wide, sweeping, gradual curves where cable comes out of transmission and connects to speedometer head to prevent damage to the cable. Care should be exercised when installing the assembly to prevent kinking the cable due to rough handling.

Make certain that cable housing is straight as it enters the speedometer head. An angle at the speedometer head can cause the cable to wear prematurely and result in failure.

SPEEDOMETER DRIVE PINION OIL SEAL—The seal on the speedometer pinion may wear causing transmission lubricant to be pumped into speedometer cable housing. When the lubricant is extremely cold, the cable channels through it and rubs against the housing, causing noise. After cable runs a while, lubricant thins out and the noise should disappear. To correct this, wipe all transmission lubricant off cable, apply Speedometer drive pinion seal before reinserting the cable.

OIL PRESSURE INDICATOR LAMP

The oil pressure indicator lamp is connected between the oil pressure switch and the ignition terminal of the starter and ignition switch. When oil pressure exceeds 8 to 12 p.s.i. the switch contacts open and the indicator lamp goes out. The light may be on during idle speeds and will go out at speeds above idle. The switch operating pressure can be checked by connecting a pressure gauge in the line with the switch. The switch is located at the rear of the block, at the top on V-8 engines and at the left side of the cylinder block at the rear on 6 cylinder engines.

2. HORNS

The horns are connected through the battery terminal of the generator regulator and are operated when the circuit is grounded at the horn ring. They are located behind the radiator grille. The high note horn is located at the left and the low note on the right.

If horns do not operate or do not have a clear tone, the cover should be removed and inspected for faulty wiring, broken insulation, or corroded contact points. Contact points should be carefully dressed down with a clean fine file.

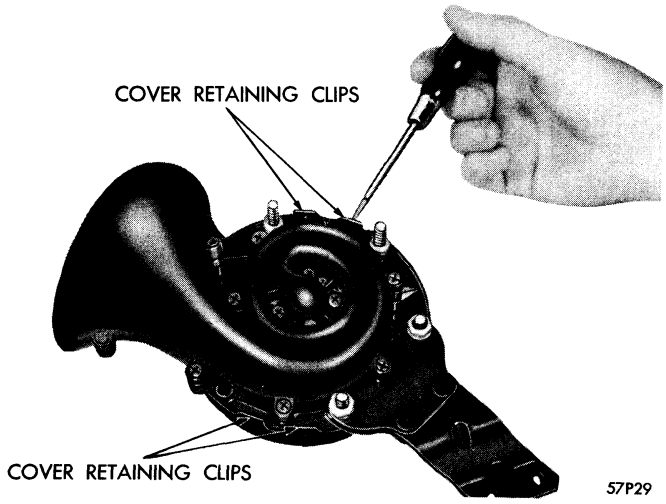

Figure 4—Removing Horn Cover

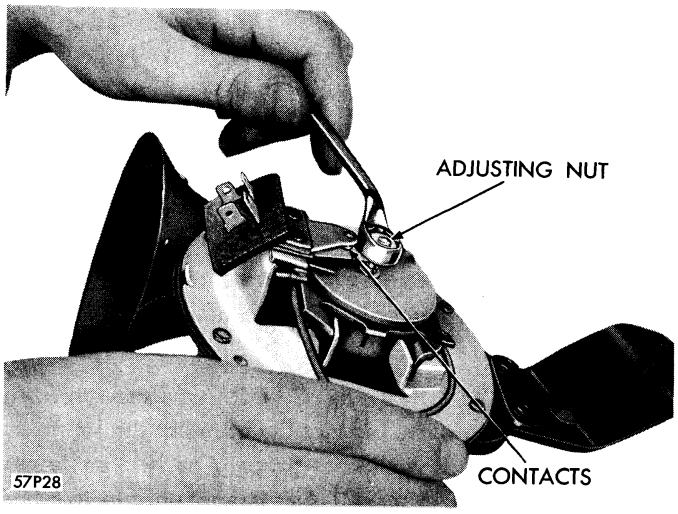

Figure 5—Adjusting Horn

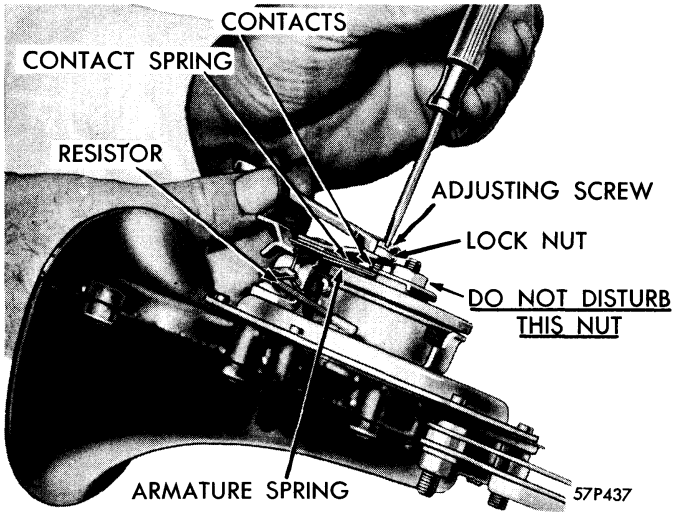

Figure 6—Adjusting Horn

ADJUSTMENTS

To remove the cover, pry the retaining clips away as shown in Figure 4. Loosen the locknut and turn the adjustment screw or nut until there is no vibration. See Figure 5 or 6. Then turn screw counterclockwise ¼ turn or until a clear tone is obtained. Horns must be adjusted individually. After adjustments are made, try both horns for combined tone.

HORN CONTROL

The horns are operated by a horn blowing bar or ring depending upon the model of the car. To remove the horn blowing bar on Plaza and Savoy models, remove the two recessed cross-head screws accessible underneath the steering wheel, see Figure 7. To remove the horn blowing bar on Belvedere models rotate the center ornament counter-clockwise until it disengages from the bar.

3. ELECTRIC WINDSHIELD WIPER

The windshield wiper motor is connected through the fuel gauge to the starter-ignition switch so that the motor will not operate unless the ignition switch key is turned to the right or left position. See Figures 8 and 9. The constant speed motor is protected by a circuit breaker built into the windshield wiper switch. The variable speed motor is protected by a circuit breaker which is attached to the "B" terminal of the switch. Both motors use the same wiper blades, arm assembly and pivots. Convertible and Sport Coupe blades, arms, and pivots differ from other models.

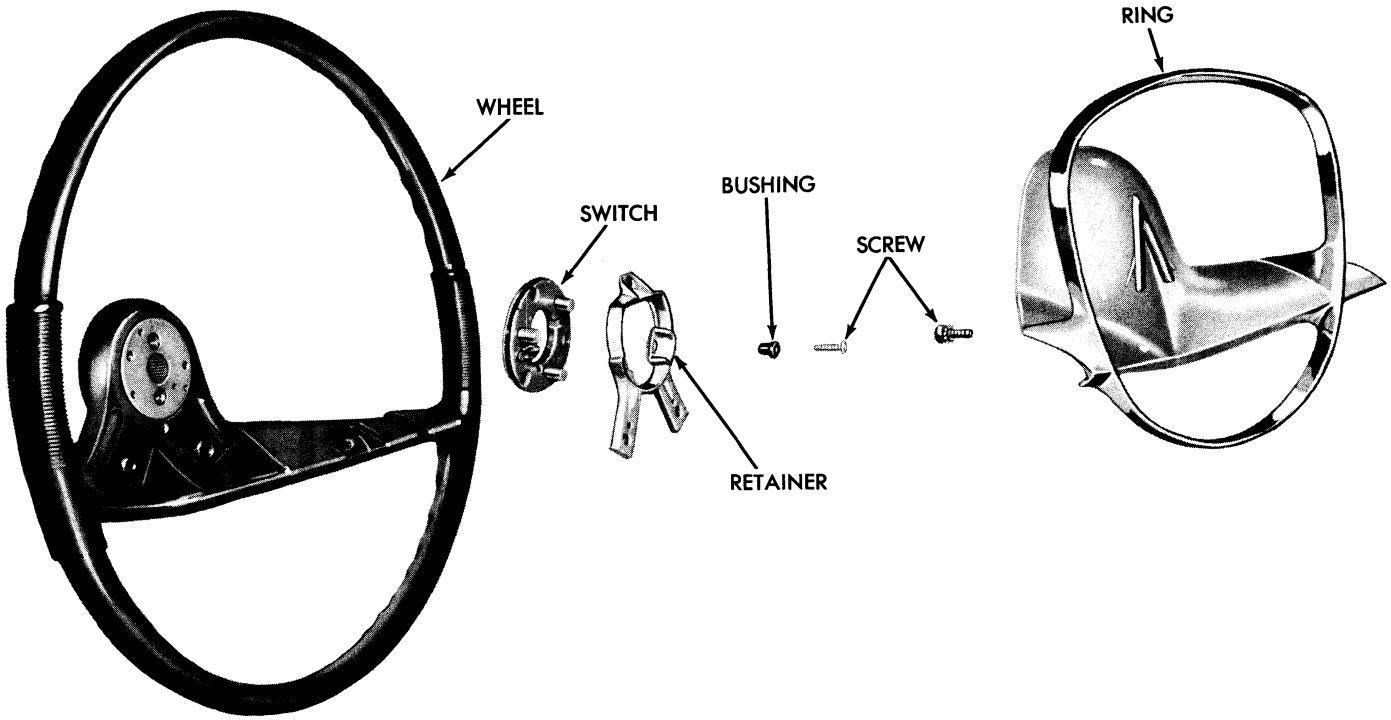

Figure 7—Horn Control—Disassembled

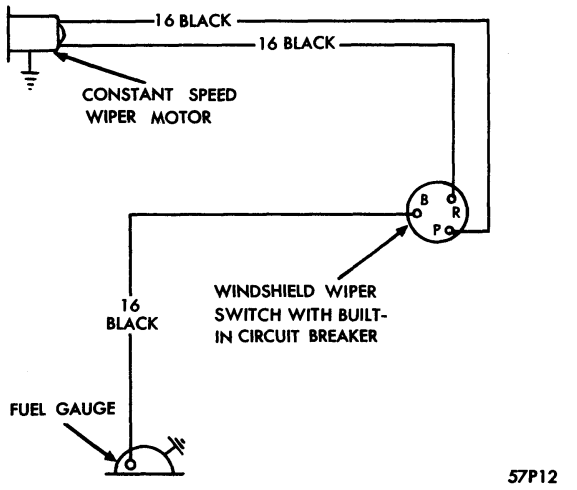

Figure 8—Windshield Wiper Circuit Diagram (Constant speed motor)

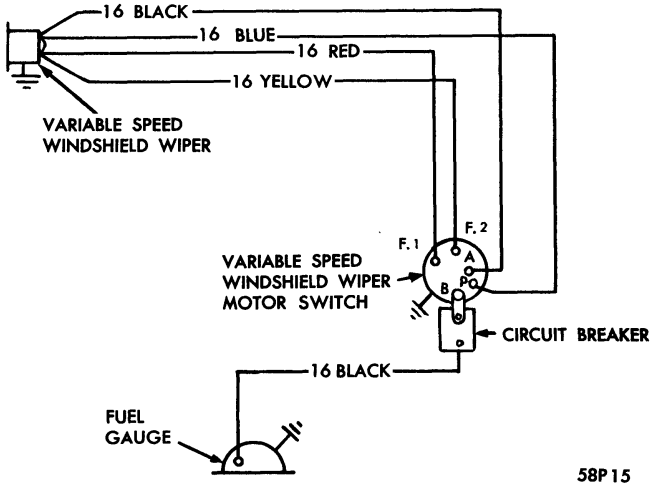

Figure 9—Windshield Wiper Circuit Diagram (Variable Speed Motor)

The variable speed motor has an "off glass parking" feature which is accomplished by reversing the motor and the use of parking cams at the pivot pins of the intermediate crank arm. When the switch is turned to the "off" position, the motor reverses direction and at the same time the parking cams rotate 180 degrees, lengthening the linkage slightly to park the blades against the moulding. The linkage shortens when the motor runs in the wiping direction.

WIPER BLADE ADJUSTMENT

To properly position wiper blades, adjust the parking cam at the motor switch plate so that blades park as low as possible. Then loosen the blade arms at the pivots. Position the blades against the windshield moulding on variable speed motors and tighten pivot attaching nuts. Position blades of constant speed motors one inch from the windshield moulding.

REMOVAL AND INSTALLATION

The wiper is mounted to the cowl panel by means of studs in the panel and a mounting bracket on the motor. Disconnect the wiper links at the pivots. Remove the motor bracket nuts. Lower the motor and remove it from the right side. Use care so as not to bend the links.

CAUTION

Keep hands and fingers away from the windshield wiper operating linkage when the wiper motor is running. The power of the wiper motor is sufficient to cause serious personal injury.

When installing the motor on the studs, do not tighten nuts until the pivot ends of the links are secured. Make sure the nylon pivot insert does not bind on the pivot pin. Lubricate the insert with dripless, heavy type lubricant. The nylon insert is not replaceable.

RECONDITIONING WIPER MOTOR

CONSTANT SPEED MOTOR—To disassemble the motor, remove the switch plate first. Then remove motor crank nut, washers and motor crank arm. Lift out nylon gear. Remove end head through bolts and carefully pull off end head. Armature can then be removed.

VARIABLE SPEED MOTOR — Remove end head through bolts and pull out end head using care so as not to break the lead wire to the brush holder. Remove switch plate and cover screws. *Rotate armature in reverse so that tang in switch plate will disengage gear follower to permit removal of plate assembly.* Remove crank arm nut, washers, crank arm, gear and armature in that order.

NOTE

When only the switch plate on variable speed motors is removed, position the crank arm 180° from the park position. This is done to disengage the spring follower from the tang on the switch plate.

INSPECTION

Thoroughly inspect the motor parts for wear, corrosion or damage. Clean the armature commutator with 00 or 000 sandpaper or if necessary turn down the com-

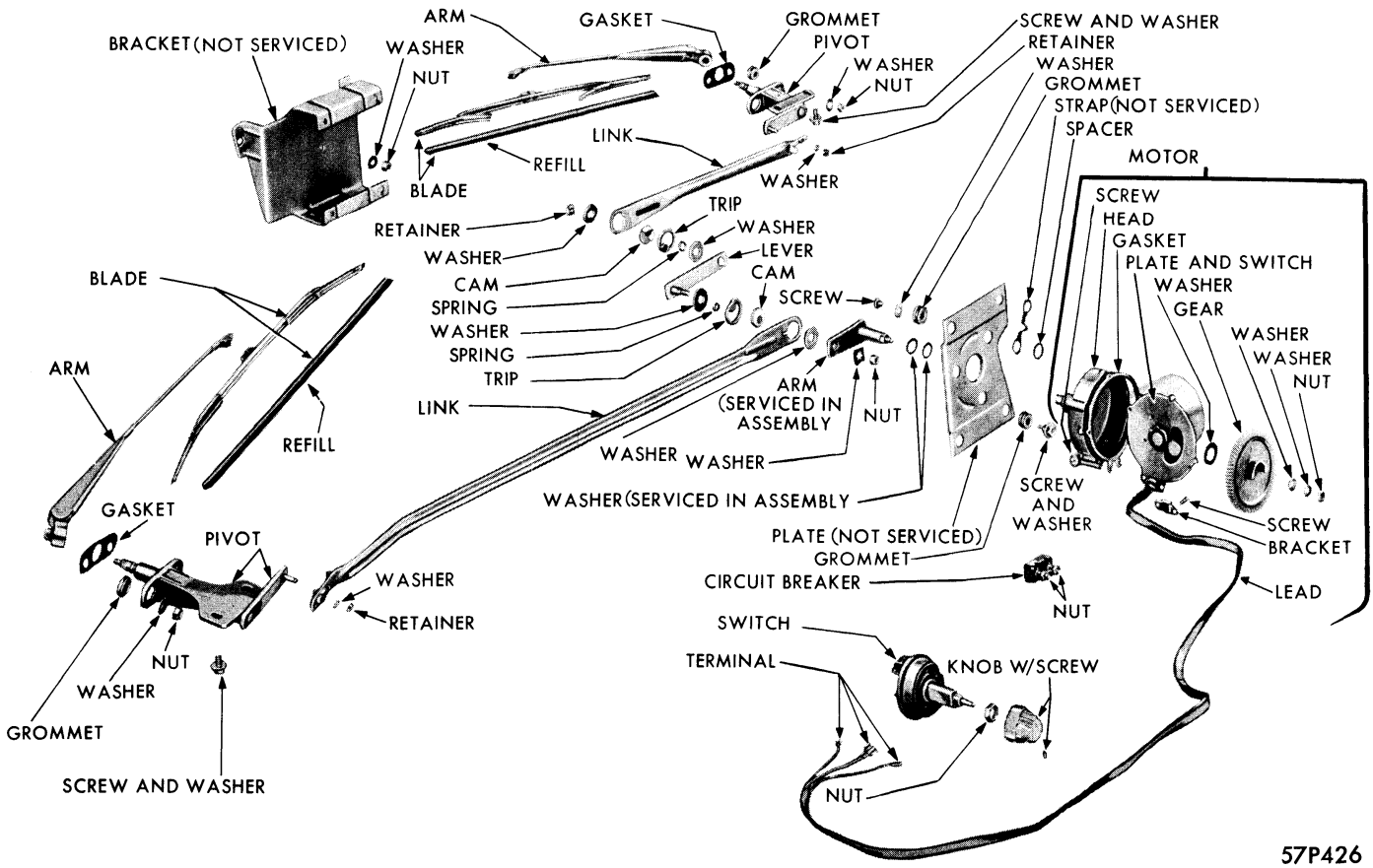

Figure 10—Windshield Wiper Motor—Disassembled (Variable Speed)

mutator. Replace worn or oil soaked brushes. Check the armature and crankshaft in their respective bushings and replace worn parts if any looseness is detected. End play in the armature shaft is controlled by a thin thrust washer in the end plate. Inspect gears for worn or broken teeth and replace those showing damage or excessive wear. Be sure that the parking switch contact is clean and dry.

REFACING COMMUTATOR

If the armature commutator is rough, out of round, burned, or the bakelite material is even with or extends

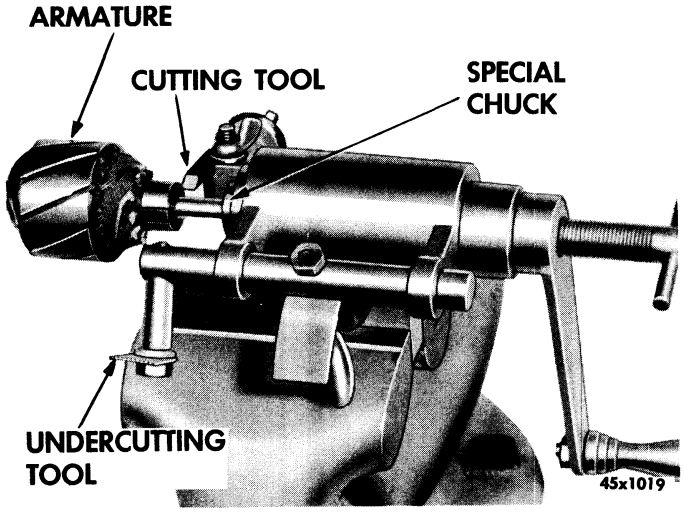

Figure 11—Refacing Commutator

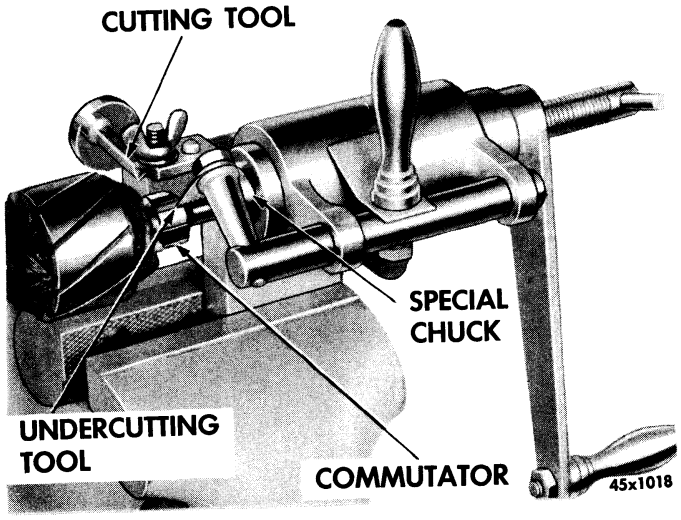

Figure 12—Undercutting Commutator Segments

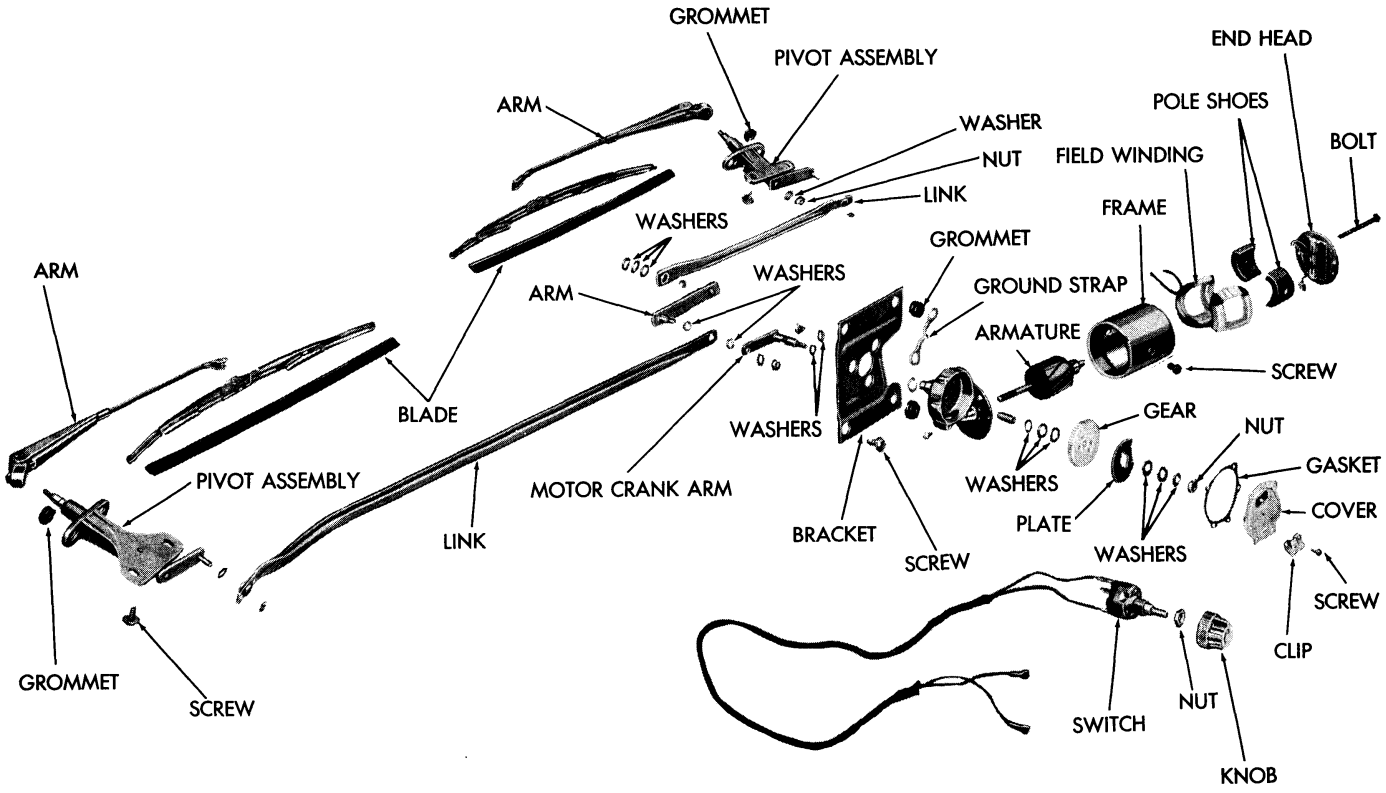

Figure 13—Windshield Wiper Motor—Disassembled (Constant Speed)

above the surface of the commutator bars, the commutator should be turned down. Remove only enough metal to provide a clean smooth surface. Operation can be performed on a suitable lathe or by using Tool C-770 shown in Figure 11.

UNDERCUTTING BAKELITE

Undercut the bakelite segments to a depth of $\frac{1}{16}$ inch, using Tool C-770 with special blade SP-839, as shown in Figure 12, or a fine tooth hacksaw blade. Be sure to undercut the bakelite squarely. After undercutting, polish the commutator with 00 or 000 sandpaper to remove burred edges.

CAUTION

Be sure the commutator is clean and free from oil or grease. A dirty, greasy commutator will cause a high resistance and greatly impair the efficiency of the wiper.

Assemble the frame, armature and head being careful to raise the brushes to allow entrance of the commutator. Rap the motor frame several sharp blows with rubber hammer to align the brushes.

WINDSHIELD WIPER SWITCH

CONSTANT SPEED MOTOR—The switch contains a built in circuit breaker to protect the motor and is serviced only as an assembly. To test the switch, disconnect the lead wires and remove the switch from the instrument panel. Connect a test lamp between "B" terminal of the switch and the negative battery post.Connect the positive battery terminal to the "P" terminal of the post. The lamp should light when the switch is in the "off" position and go out when the switch is turned to the "on" position.

Connect the positive battery to the "R" terminal of the switch. The lamp should light when the switch is turned "on" and go out when turned "off."

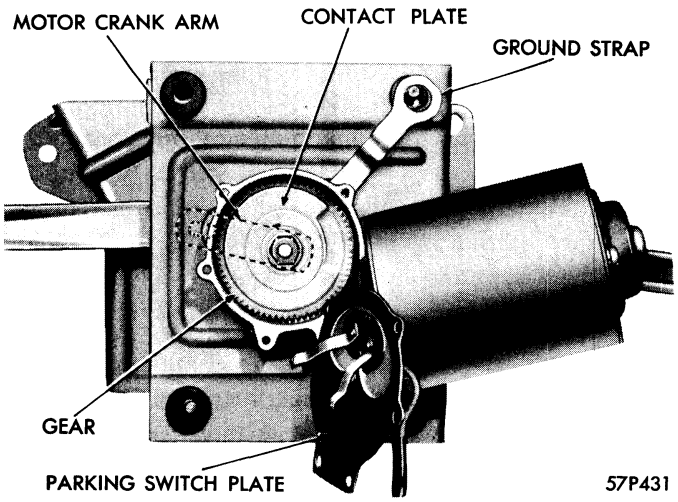

Figure 14—Constant Speed Motor

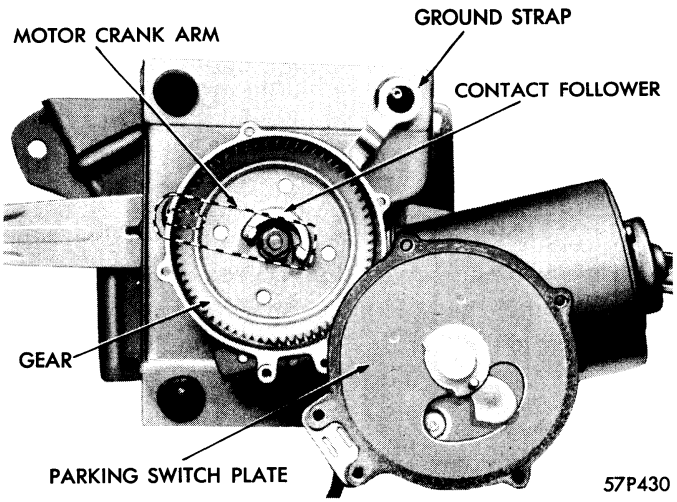

Figure 15—Variable Speed Motor

VARIABLE SPEED MOTOR—The switch contains a bar resistance plate which provides a means of controlling the amount of current flow to the motor field as the switch control shaft is rotated. In addition, the switch is designed to provide a circuit to the motor to reverse the direction of the current to the field winding thus providing a means of reversing the armature. A replaceable circuit breaker is attached to the "B" terminal of the switch to protect the motor.

To test the switch, disconnect the lead wires and remove the switch. Connect a wire from the battery positive terminal to the case of the switch and another wire from the battery positive terminal to the "F1" terminal of the switch. Connect a test lamp between the battery negative terminal and the "B" terminal of the switch. Lamp should light when switch is turned on and gradually dim as switch is rotated clockwise. Lamp should go out when switch is turned "off." The switch is serviced only as an assembly.

END PLAY ADJUSTMENT

To adjust the armature shaft end play turn adjustment screw in until it bottoms and back ¼ turn. See Figure 16.

BENCH TESTING MOTOR

Before bench testing a motor, the lead wires should be inspected for opens or shorts, and for poor connections at the switch plate. Inspect and clean if required the breaker points on the variable speed motor. Use fine grade sandpaper across the contact points.

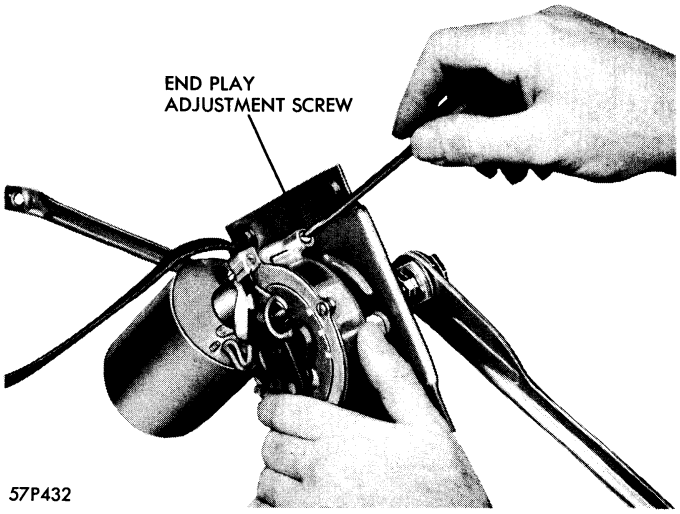

Figure 16—End Play Adjustment

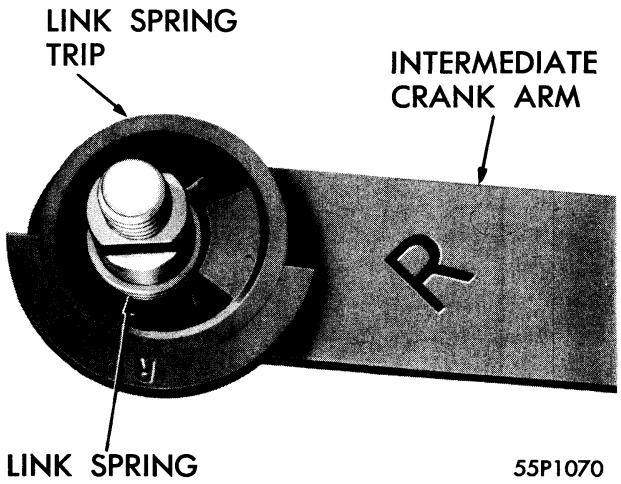

Figure 17—Link Spring Trip Installed (Variable Speed Motor)

CONSTANT SPEED MOTOR—Connect the battery positive terminal to the wiper motor ground strap. Connect the black and blue wires of the motor to the negative battery terminal. Motor should continue to run. Remove black wire with blue connected. Motor should park.

VARIABLE SPEED MOTOR—Connect the yellow wire to the motor ground strap. Connect the battery positive terminal to the motor ground strap. Connect the red and black wires to the battery negative terminal. The motor should run in the wipe direction.

To park the motor, connect the blue and yellow wire to the battery negative terminal. Connect the battery positive terminal to the motor ground strap. Connect the red wire to the motor ground strap. Momentarily touch the black wire to the yellow and blue wire. Motor should park.

Correct indexing of the contact plate (constant speed motor) or the contact follower (variable speed motor) on the nylon gear is important. After the armature, nylon gear, and crank arm are installed, index the contact plate (constant speed motor) on the nylon gear with the slot pointing in the same direction as the motor crank arm. See Figure 14. Install the contact follower (variable speed motor) with open end pointing in same direction as motor crank arm. See Figure 15.

VARIABLE SPEED MOTOR LINKAGE

It is important that the linkage and eccentrics be installed correctly on the pivot pins. Install the spring washer, concave side down over the intermediate crank arm pin. Slide the link spring over the pin against the washer by slightly spreading the ends. The spring prevents slippage in the running direction and allows 180° slippage on the pin when the motor reverse to park the blades.

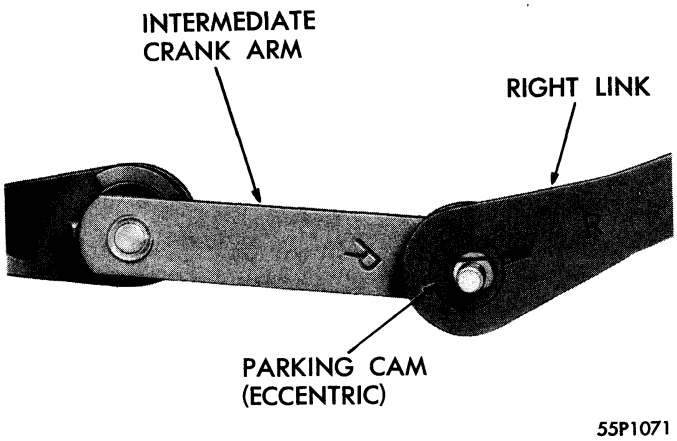

Figure 18—Link Arm Installed (Variable Speed Motor)

When assembling right linkage install link spring trip to engage spring ends with the "R" on the trip up to match the "R" on the intermediate crank arm. This is important to parking of the blades. See Figure 17. When assembling left hand linkage "L" mark on link should be up to match "L" on intermediate crank arm.

Then install the eccentric (parking cam) so that it indexes in the link spring trip. Install right and left links (marked "L" and "R") to their respective pins. Refer to Figure 18. Place the link washer over pin. Install right link assembly in motor crank arm and secure with washer and nut. Left assembly is secured to left pin with a spring clip.

4. DIAGNOSIS PROCEDURES

HORNS WILL NOT BLOW

1. HORN ADJUSTMENT—Adjust horns as outlined under Horns—Adjustment. See Figure 5 or 6.

2. HORN—Connect jumper wire from the horn terminal to ground. If horn does not blow, horn is at fault.

If horn blows inspect wire from horn terminal to horn switch and the switch itself.

> **CAUTION**
>
> ***Do not loosen the lock nut in the center of either horn or the diaphragm may become damaged.***

HORNS BLOW CONTINUOUSLY

(Horn Control Not Sticking)

1. WIRING—Inspect wiring for ground between horn switch and horn. Remove cable from ground terminal. If horn stops blowing, ground is either in column cable or horn control.

WIPER FAILS TO OPERATE

1. SWITCH—Inspect for loose connections and correct wiring at switch. Replace switch with a new one to determine if switch is at fault.

2. LINKAGE—Inspect linkage for misalignment or binding and repair and lubricate as required.

3. WIRING—Inspect wiring for opens or grounds between switch and motor.

WIPER OPERATES SLOWLY

1. *RESISTANCE*—Inspect the motor brushes and commutator for dirt or carbon deposits in slots.

2. *GROUND STRAP*—Check for high resistance at ground strap. Clean area with fine sandpaper.

3. *LINKAGE*—Inspect linkage for binding, misalignment and lack of lubrication.

4. *WIRE TERMINALS*—Inspect terminals for poor contact, dirt and looseness.

WIPER FAILS TO PARK

1. *ADJUSTMENT*—Readjust parking lever at motor switch plate. Further adjustment may be necessary at the pivots to even up blade position.

2. *SWITCH*—Make certain that lead wires are tight in switch and are installed in proper socket.

3. *CONTACT POINTS*—Clean contact points at switch plate (variable speed motor) with fine sandpaper. Inspect contact spring leaf on switch plate for excessive tension which would prevent points from separating.

4. *LINK SPRING TRIP*—If blades slap moulding and park high on glass on the variable speed motor, the link spring trip is installed incorrectly. See page 486 for correct assembly of linkage.