

Fig. 2-66-Wiper Motor and Crank Arm in Park Position

8. Operate wiper to park position and install crank arm in the position shown in Figure 2-66.
9. Install washer pump to wiper motor. Refer to Washer System - Round Motor, Assembly of Washer Pump to Wiper Motor.

WIPER MOTOR ADJUSTMENTS

Armature End Play

1. Loosen adjusting screw locknut (Fig. 2-66) and tighten or loosen the adjusting screw as required

The modified pulse wiper system provides a controlled wiping action. This optional system is standard on K styles and available on all A, B, C, D and F styles. It uses a round motor and wiper blades that park below the hoodline. The system can be identified by a dark gray pump cover and the two electrical leads coming out of the motor grommet (Fig. 2-68).

Each division uses a different dash switch. The Oldsmobile, Pontiac and Chevrolet switches provide two continuous speeds - LO and HI plus the delay modes. Buick and Cadillac switches provide three continuous speeds - LO, MED and HI as well as the delay modes.

SPECIFICATION CHART			
OPERATING VOLTAGE	12 VOLTS D.C.		
BENCH CHECK (No Load)	CURRENT DRAW (Amps)	CRANKARM SPEED	
"F"	"A-B-C-D-E-K"		
"LO" SPEED	5.0 Max.	6.0 Max.	35 - 50
"HI" SPEED	4.0 Max.	4.5 Max.	70 - 90
STALL (Cold Motor)			
"LO" SPEED	18.0 Max.	29.0 Max.	0
Torque	INCH-POUNDS		NEWTON-METRES
Washer Pump Mounting Screws	18		2.0
Armature Adjusting Screw Jam Nut	50		5.7
Motor Tie Bolts	30		3.4
Gear Box Relay Attaching Screw	30		3.4
Motor Crankarm Attaching Nut	300 - 350		34 - 40
Motor Crankarm to Transmission Drive Link	25 - 35		3 - 4
Motor to Body Attaching Bolts	30 - 45		4 - 5
Transmission to Body Attaching Bolts	57 - 72		7 - 8
Lubrication			
Gear Teeth			
Gear Shaft			
Gear Camtrack			
Seal Cap (Inside)	Multifak EP-1 or Equivalent		
Armature Shaft			
Armature Worm			

Fig. 2-67-Specification Chart-Round Motor

until end of screw barely touches end of armature.

2. Back off adjusting screw one quarter turn and tighten locknut.

Gear Assembly End Play

Add or remove shim washers as required to obtain 0.10 mm (.004") plus or minus 0.05 mm (.002") end play (Fig. 2-61).

MODIFIED PULSE WIPER SYSTEM

Regardless of the dash switch type, the dash switch lever in the DELAY mode can be moved from a MIN (minimum) to a MAX (maximum) position. The movement of the lever from the MIN to MAX position varies the amount of time the wiper will delay between each wipe. The delay ranges between 0 and 12 seconds depending on the position of the lever. MIN delay or 0 seconds between wipes provides the equivalent of LO speed continuous operation.

LO speed position on Buick, Chevrolet, Oldsmobile and Pontiac switches is actually the MIN delay mode. The Cadillac switch, however, bypasses the delay circuit for its continuous LO speed. This will be covered under Wiper Motor Operation.

2-46 WINDSHIELD WIPER SYSTEM

by the pulse relay switch contacts when the coil circuit is completed to ground by either the dash switch or the timing circuit, depending upon the position of the dash switch. Actually, the dash switch and the timing circuits are parallel paths to ground for the pulse relay coil. Different switches are used by the various car divisions and the variations for each are explained as they occur.

Cadillac - Referring to Figure 2-70, note that the pulse relay coil circuit is completed to ground at the dash switch in the OFF, LO, MEDIUM and HI positions. Thus, whenever the dash switch is moved to LO, MEDIUM or HI, the gearbox and pulse relay circuits are completed at the same time, which in turn completes the motor circuit. The wiper motor then operates continuously in the speed selected by the dash switch position.

When the dash switch is moved to the DELAY mode, the pulse relay coil circuit is opened at the dash switch and the coil circuit will then be completed by the timing circuit as explained under Pulse Relay Coil Circuit via the Timing Device.

Buick, Chevrolet, Oldsmobile and Pontiac - The pulse relay coil circuit is connected to ground at the dash switch in OFF, MEDIUM (Buick) and HI positions (Fig. 2-70). In LO dash switch position, the switch is actually in the MIN delay position and the coil circuit is completed to ground via the timing device.

MIN delay provides continuous LO speed operation. When the dash switch is moved from the MIN delay position toward the MAX delay, pulse wiper motor operation is attained.

Pulse Relay Coil Circuit via the Timing Device

B plus is completed to the pulse relay coil when the gearbox relay is energized.

Regardless of application, the timing circuit for the pulse relay functions the same.

The timing circuit consists of two diodes, capacitor, variable resistor, transistor and holding switch. The diodes, capacitor, transistor and holding switch are

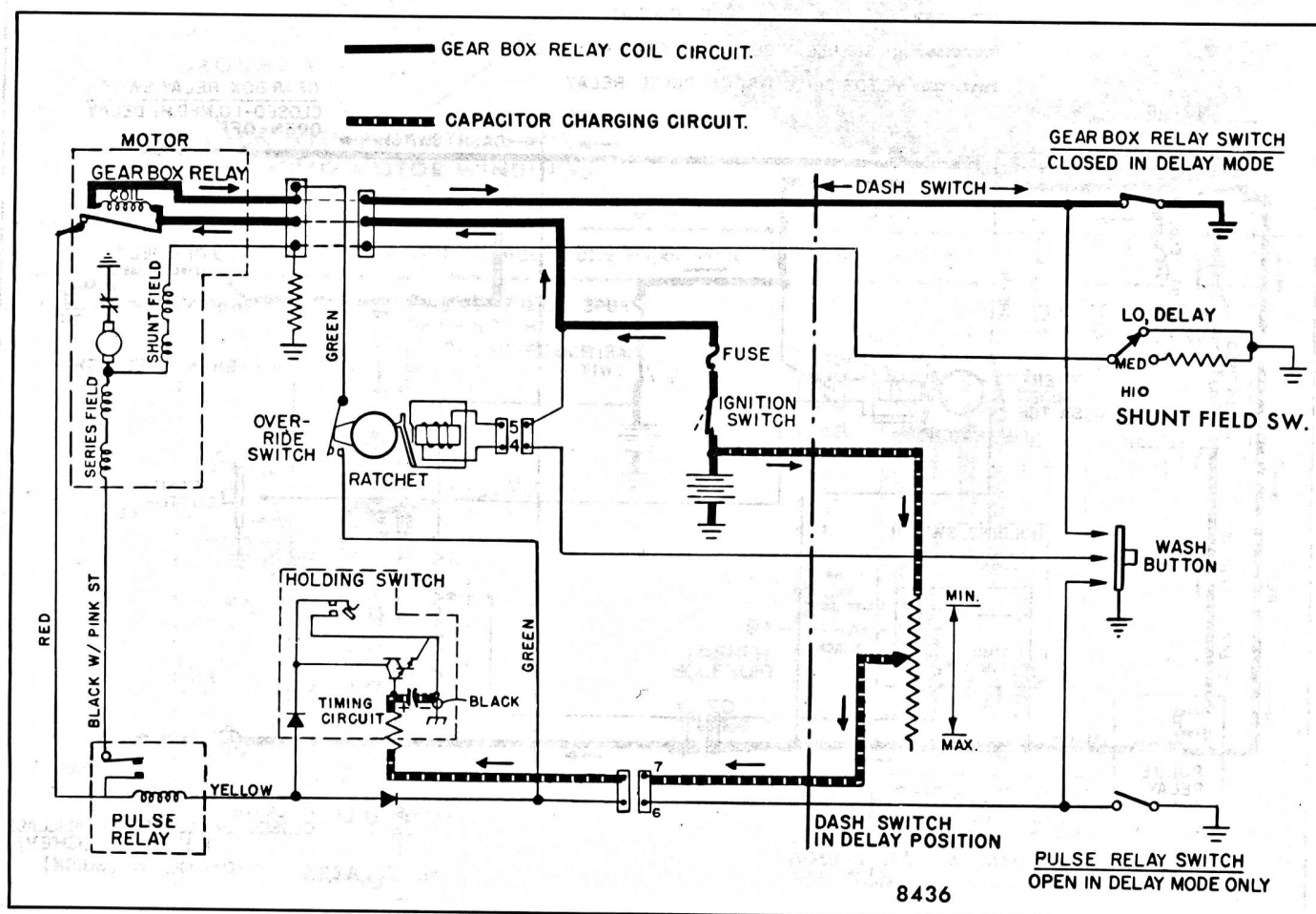


Fig. 2-71-Timing Capacitor Charging Circuit

located on the washer pump. The variable resistor is part of the dash switch.

The timing circuit functions as follows: Voltage applied to the capacitor via the variable resistor in the dash switch causes it to charge up (Fig. 2-71). When the capacitor reaches a predetermined charge it causes the transistor to turn on like a switch, completing the circuit to ground for the pulse relay coil (Fig. 2-72). This completes the pulse relay coil circuit and the pulse relay switch contacts close completing the B plus feed circuit to the motor.

The holding switch contacts are held open by a fin on the washer pump drive cam (Fig. 2-73). When the wiper starts to run, the fin is moved away from the holding switch permitting the contacts to close.

Closing the contacts accomplishes a dual function:

1. The capacitor is partially discharged in preparation for the next delay period. This also turns off the transistor.

2. A holding circuit to ground for the pulse relay coil is provided until the wiping stroke is completed.

The wiping stroke is completed and the wiper shuts off when the fin on the washer pump drive cam reopens the holding switch contacts.

When the holding switch contacts open, the capacitor again starts charging to repeat the cycle.

When the wiper is operating in the delay mode, the blades stop at the end of the normal wipe pattern (i.e., blades do not move down in their normal park position).

The amount of delay between wiping strokes is controlled by the variable resistor in the dash switch. Increasing the resistance increases the amount of time between wipe strokes.

LO-MEDIUM-HI Speed Motor Operation

Wiper motor speed variations are accomplished by changing the strength of the shunt field as follows:

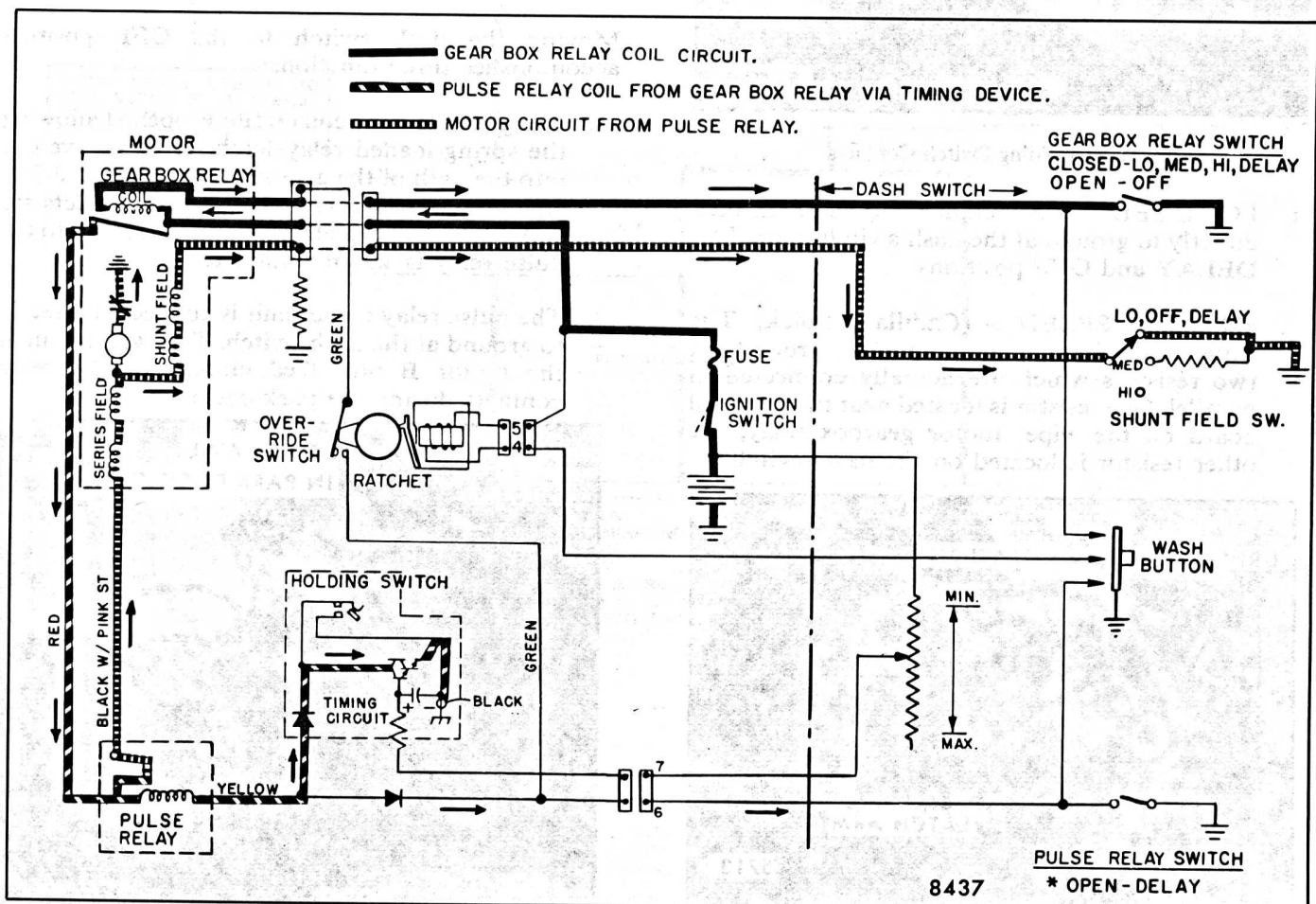


Fig. 2-72-Pulse Relay Coil Circuit via Timing Device

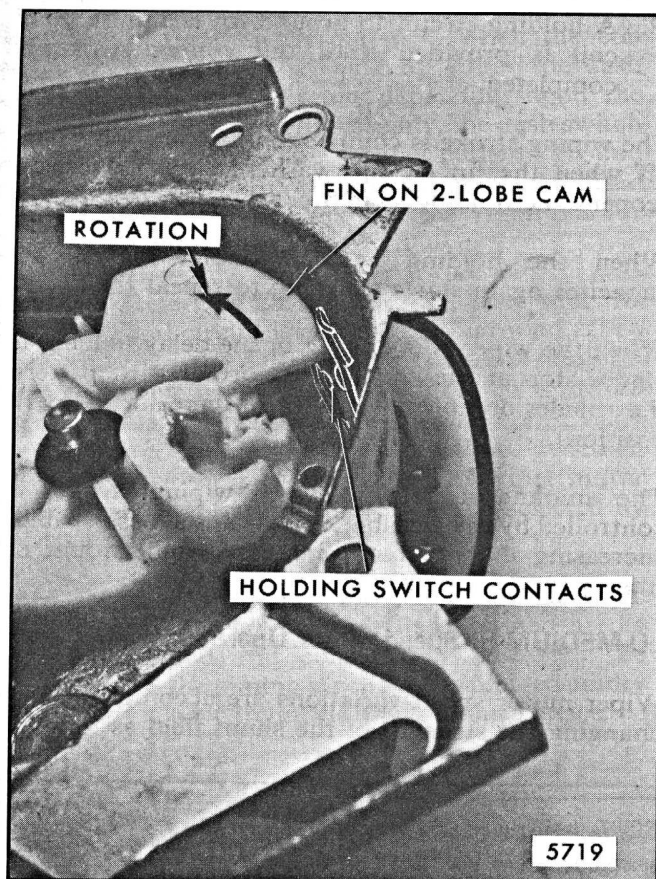


Fig. 2-73-Holding Switch Contacts

1. **LO SPEED** - The shunt field is connected directly to ground at the dash switch in the LO, DELAY and OFF positions.
2. **MEDIUM SPEED** - (Cadillac, Buick) The shunt field circuit is completed to ground via two resistors which are actually connected in parallel. One resistor is located near the terminal board on the wiper motor gearbox relay, the other resistor is located on the dash switch.

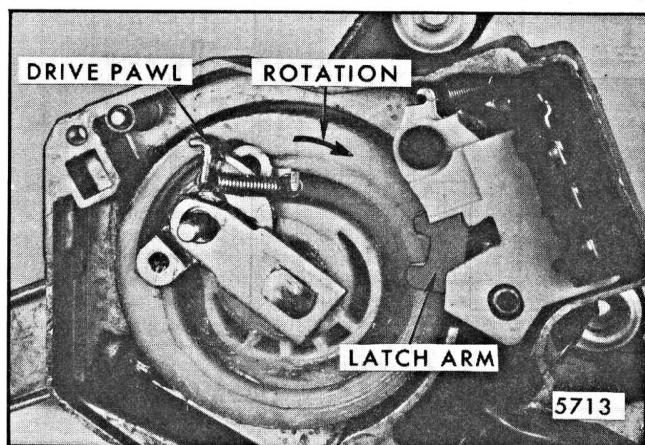


Fig. 2-74-Gear in Normal Run Position

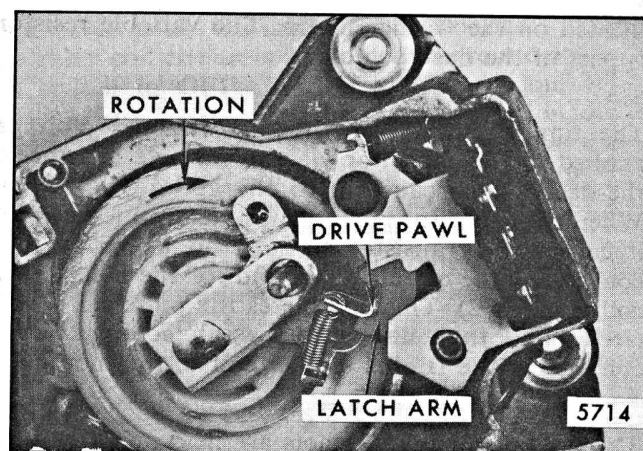


Fig. 2-75-Wiper Shutting Off

3. **HI SPEED** - The shunt field circuit is opened to ground at the dash switch. However, it is completed to ground through the resistor located on the motor terminal board relay assembly.

Shutting the Wiper Off

Moving the dash switch to the OFF position accomplishes three functions:

1. The gearbox relay coil circuit is opened allowing the spring-loaded relay latch arm to move out into the path of the gear mechanism (Fig. 2-74). However, the gearbox relay switch contacts are still closed and therefore the B plus circuit to the pulse relay is still maintained.
2. The pulse relay coil circuit is connected directly to ground at the dash switch. This will maintain the motor B plus feed circuit via the relay contacts during the park cycle.

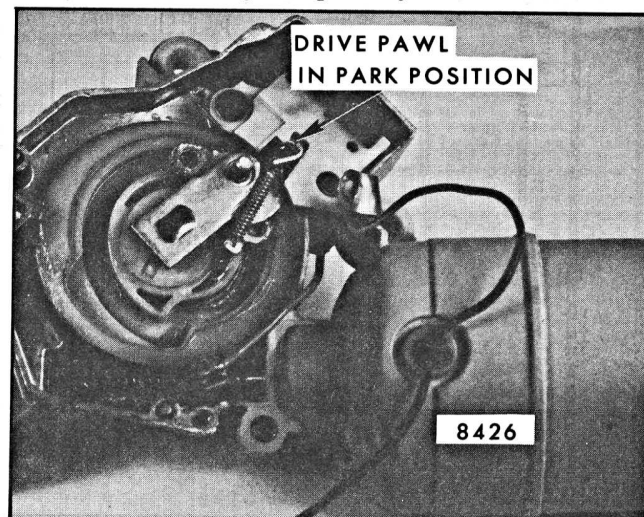


Fig. 2-76-Drive Pawl in Park

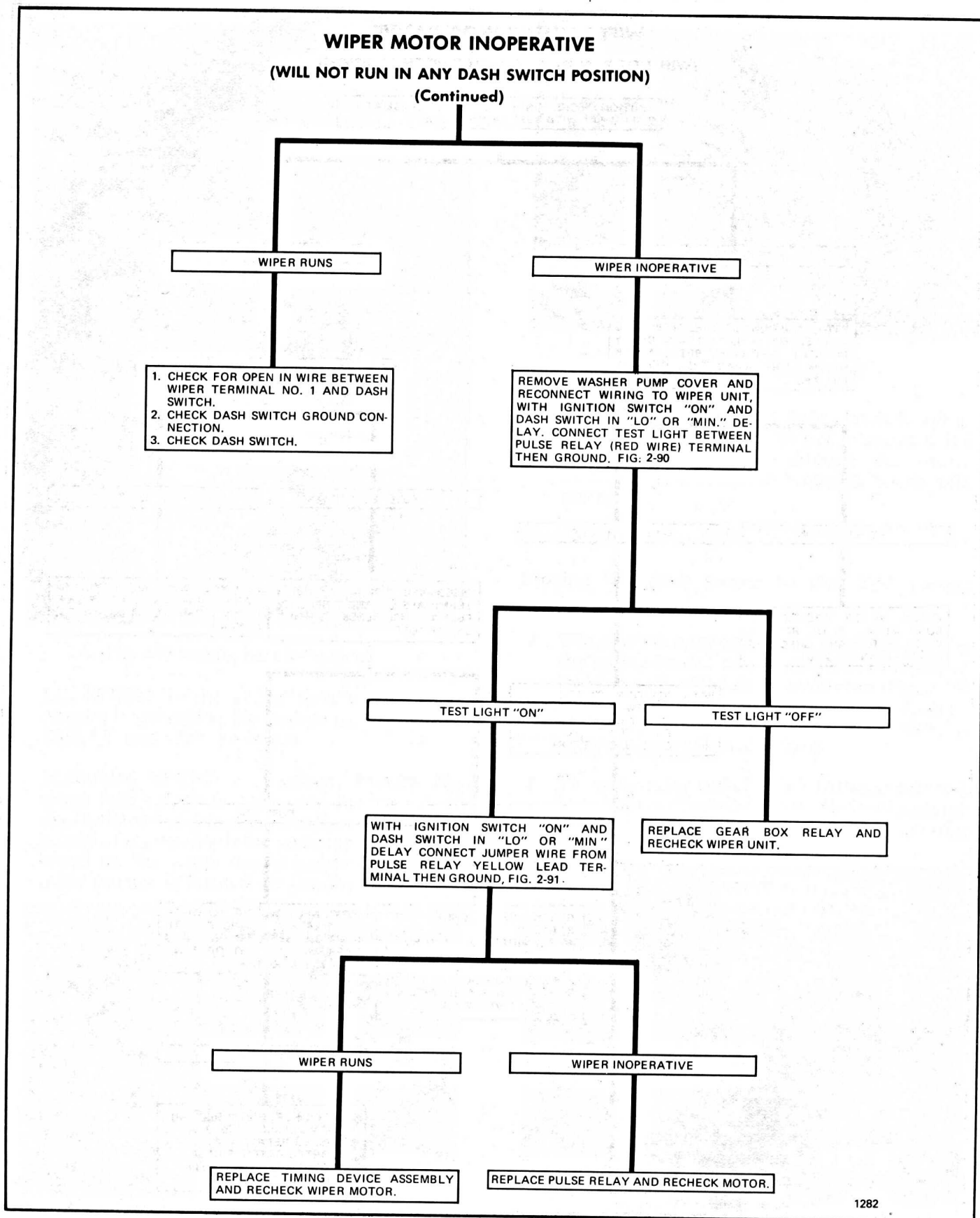


Fig. 2-78-Modified Pulse Wiper Diagnosis Chart - Condition 1

**WIPER INOPERATIVE IN DELAY MODE
OPERATES CORRECTLY IN LO, MED, HI — CADILLAC
MED, HI — BUICK
HI — CHEVROLET, OLDS, PONTIAC**

WITH IGNITION SWITCH "ON" AND DASH SWITCH IN "MID." DELAY. REMOVE CONNECTOR FROM TERMINALS 6 AND 7 AND CONNECT VOLTMETER. FIG. 2-92

VOLTMETER READS APPROX. 12 VOLTS

REPLACE TIMING DEVICE ASSEMBLY AND RECHECK WIPER OPERATION.

VOLTMETER READS 0 VOLTS

CHECK 1. B PLUS CIRCUIT TO DASH SWITCH.
2. DASH SWITCH
3. OPEN WIRE BETWEEN DASH SWITCH AND WIPER.

1283

Fig. 2-79-Modified Pulse Wiper Diagnosis Chart - Condition 2

**WIPER WILL NOT DELAY BETWEEN WIPES —
RUNS STEADY WITH DASH SWITCH IN DELAY MODE**

(WIPER OPERATES CORRECTLY IN OTHER
MODES AND SHUTS "OFF" O.K.)

WITH IGNITION SWITCH "ON" AND DASH SWITCH AT "MID." DELAY. REMOVE CONNECTOR FROM WIPER TERMINALS 6 AND 7. THEN, RE-INSTALL CONNECTOR SO THAT IT MISSES TERMINAL NO. 6. FIG. 2-93

WIPER OPERATES CORRECTLY

CHECK FOR:
1. GROUNDED WIRE BETWEEN #6 TERMINAL AND DASH SWITCH.
2. IF NO GROUNDED CONDITION IS FOUND REPLACE DASH SWITCH.

WIPER STILL RUNS CONTINUOUSLY

REMOVE WASHER PUMP COVER AND RE-INSTALL WIRING TO TERMINALS. WITH IGNITION SWITCH "ON" AND DASH SWITCH AT "MID." DELAY. DISCONNECT YELLOW LEAD FROM PULSE RELAY, FIG. 2-94

WIPER RUNS CONTINUOUSLY
WILL NOT DELAY

REPLACE PULSE RELAY AND RE-CHECK WIPER MOTOR.

WIPER INOPERATIVE

CHECK FOR LOOSE HOLDING SWITCH MOUNTING SCREW, BENT OR BURNT CONTACTS. CLEAN OR ADJUST SO CONTACTS ARE OPEN IN PARK. CHECK OPERATION. IF STILL INOPERATIVE, REPLACE TIMING CIRCUIT.

1284

Fig. 2-80-Modified Pulse Wiper Diagnosis Chart - Condition 3

WIPER WON'T SHUT "OFF"
(BLADES OPERATE THROUGH NORMAL WIPE PATTERN)
IF WASHER PUMP IS ALSO PUMPING
CONTINUOUSLY, REFER TO CONDITION NO. 5

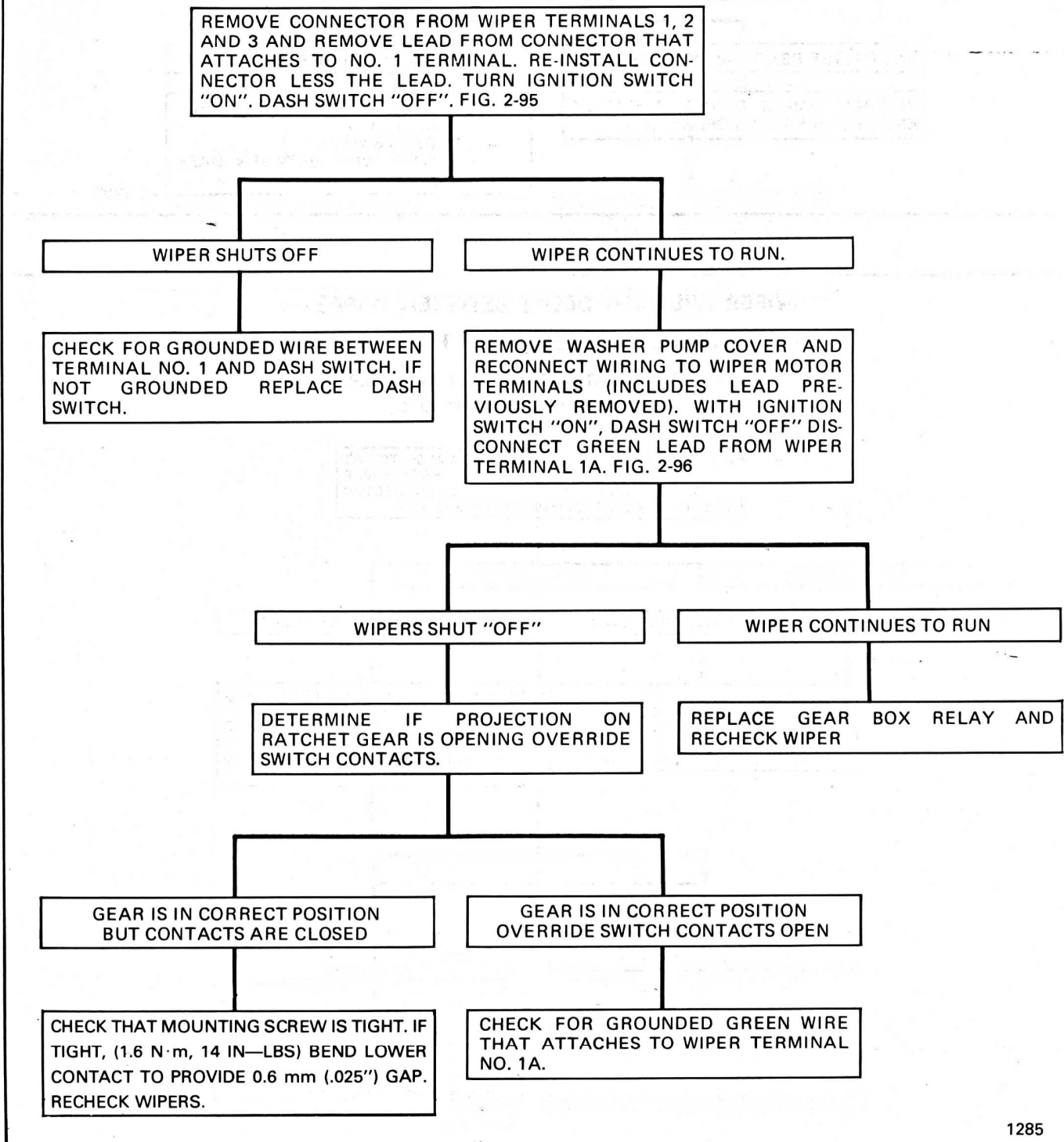


Fig. 2-81-Modified Pulse Wiper Diagnosis Chart - Condition 4

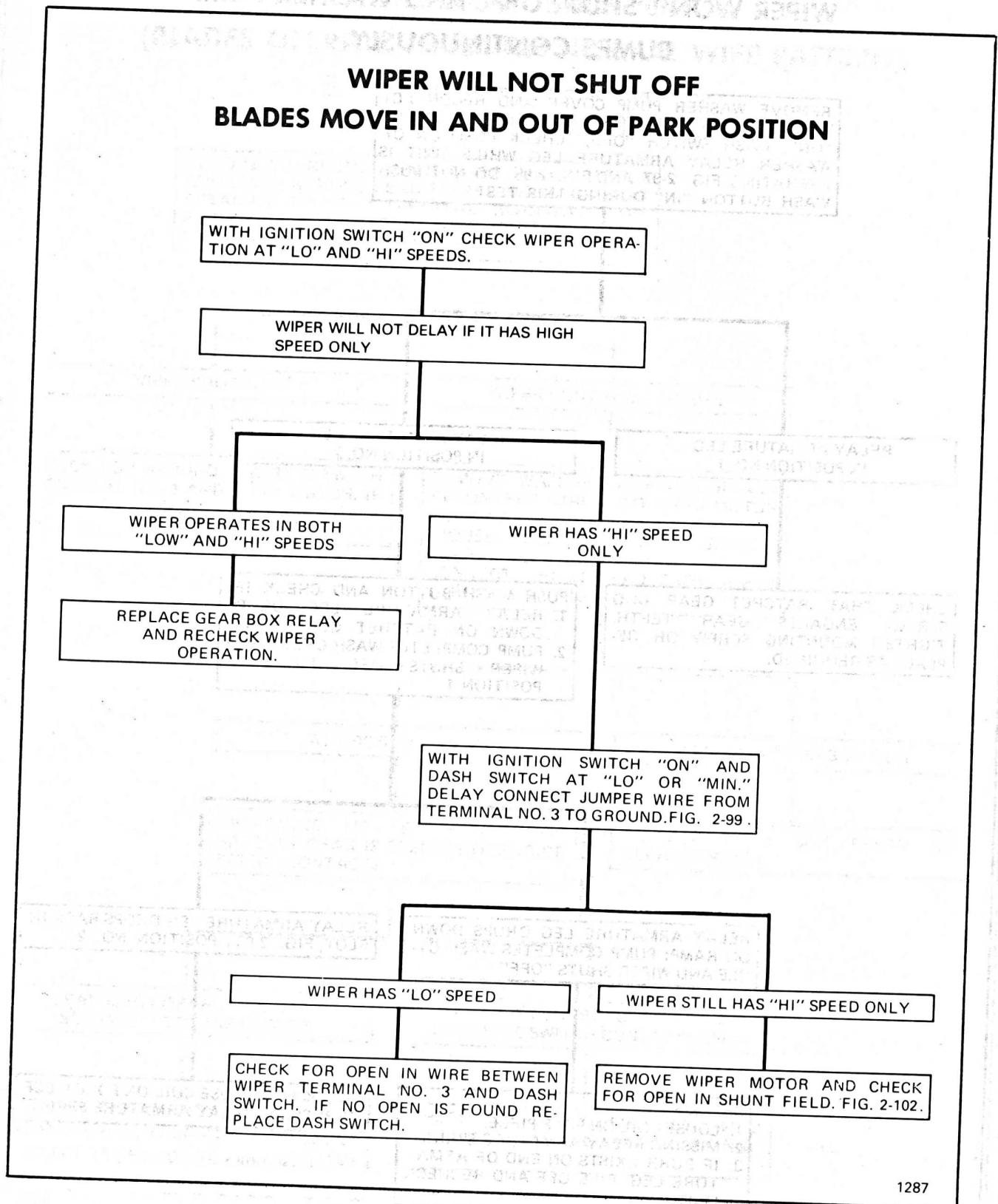


Fig. 2-83-Modified Pulse Wiper Diagnosis Chart - Condition 6

WIPER HAS "HIGH" SPEED ONLY

WITH IGNITION SWITCH "ON" AND DASH SWITCH AT "LO" OR "MIN." DELAY CONNECT JUMPER WIRE FROM TERMINAL NO. 3 TO GROUND. FIG. 2-99.

WIPER HAS "LO" SPEED

CHECK FOR OPEN IN WIRE BETWEEN WIPER TERMINAL NO. 3 AND DASH SWITCH. IF NO OPEN IS FOUND REPLACE DASH SWITCH.

WIPER STILL HAS "HI" SPEED ONLY

REMOVE WIPER MOTOR AND CHECK FOR OPEN IN SHUNT FIELD. FIG. 2-102.

1289

Fig. 2-84-Modified Pulse Wiper Diagnosis Chart - Condition 7

3. The shunt field is connected directly to ground at the dash switch to maintain LO speed operation during park cycle.

The continuing rotation of the motor gear causes the gear drive pawl to engage the relay latch arm (Fig. 2-75). This action unlocks the output shaft and wiper

WIPER HAS "LO" SPEED ONLY

(OPERATES CORRECTLY IN DELAY MODE AND SHUTS OFF CORRECTLY)

REMOVE CONNECTOR FROM TERMINALS 1, 2 AND 3. THEN PULL OUT TERMINAL FROM CONNECTOR THAT NORMALLY GOES TO NO. 3 TERMINAL. TURN IGNITION SWITCH "ON" AND DASH SWITCH TO "HI" FIG. 2-100.

WIPER HAS "HI" SPEED

CHECK FOR GROUNDED WIRE BETWEEN TERMINAL NO. 3 AND DASH SWITCH. IF NO GROUND IS FOUND REPLACE DASH SWITCH.

WIPER STILL HAS "LO" SPEED

REMOVE WIPER MOTOR AND CHECK FOR GROUNDED CONDITION IN SHUNT FIELD. REFER TO CURRENT DRAW CHART FIG. 2-102.

1290

Fig. 2-85-Modified Pulse Wiper Diagnosis Chart - Condition 8

INTERMITTENT WIPER OPERATION BLADES STOP AT RANDOM POSITIONS ON WINDSHIELD

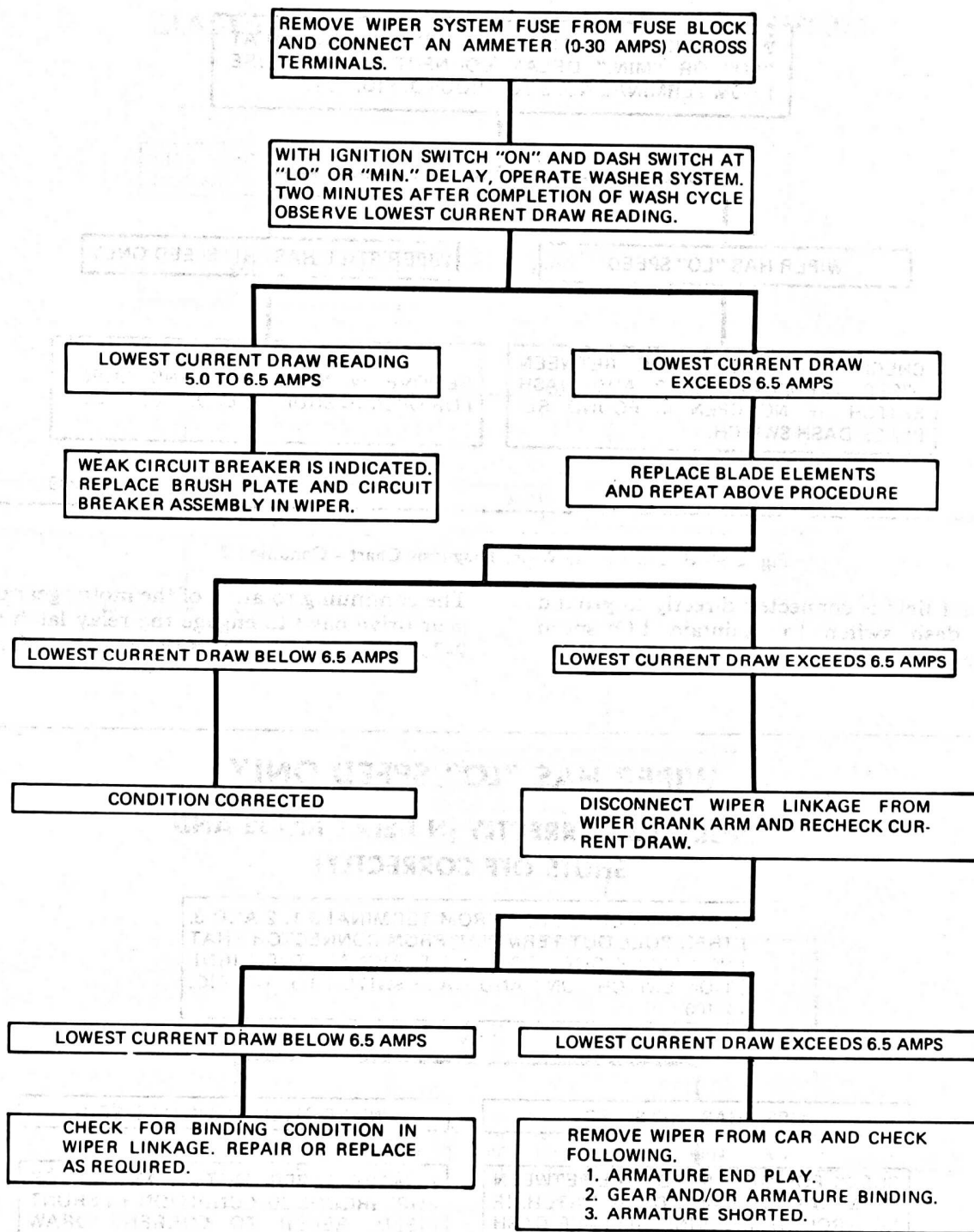


Fig. 2-86-Modified Pulse Wiper Diagnosis Chart - Condition 9

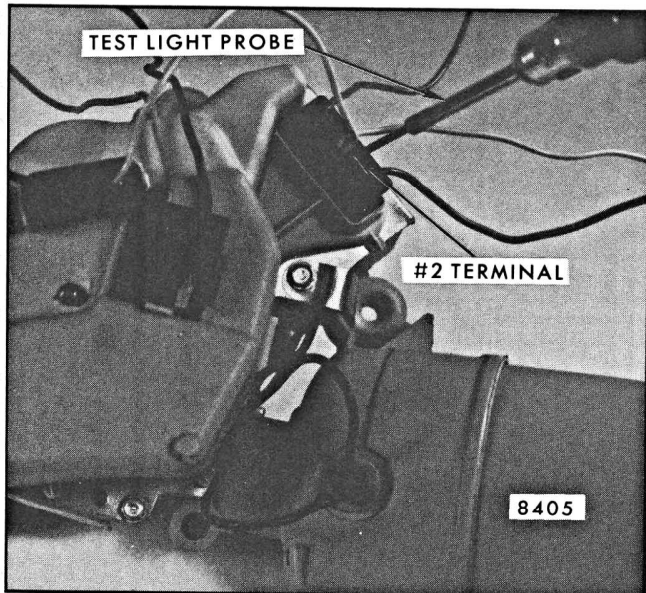


Fig. 2-87 - Condition 1

crank arm from the gear. The output shaft extends through the gear tube off center and as the gear continues to rotate a cam action results.

When the cam action described above is completed it accomplishes two functions:

1. It causes the gear assembly drive pawl to push the relay latch arm into the relay housing (Fig. 2-76), which opens the relay switch contacts. This opens the B plus circuit to the pulse relay coil. The pulse relay contacts then open which shuts off the B plus feed to the motor.
2. Since the wiper crank arm is attached to the wiper output shaft, the resulting cam action,

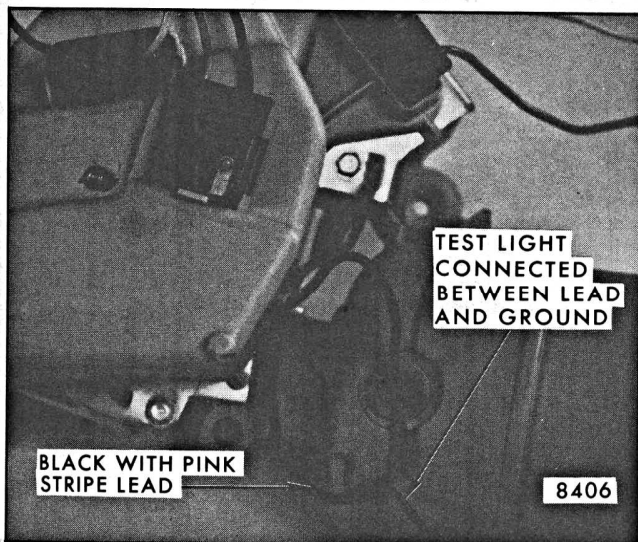


Fig. 2-88-Condition 1

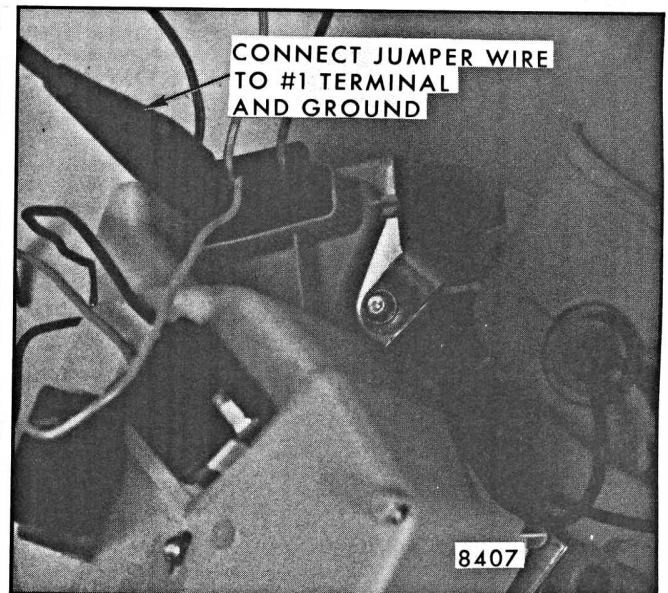


Fig. 2-89-Condition 1

previously described, causes a somewhat lateral movement of the crank arm. This lateral movement causes the wiper transmission to produce the additional angular rotation to move the blades into the full park position below hood level.

DIAGNOSTIC PROCEDURES

The diagnostic procedures covered in this manual are based on certain tests and operational checks that

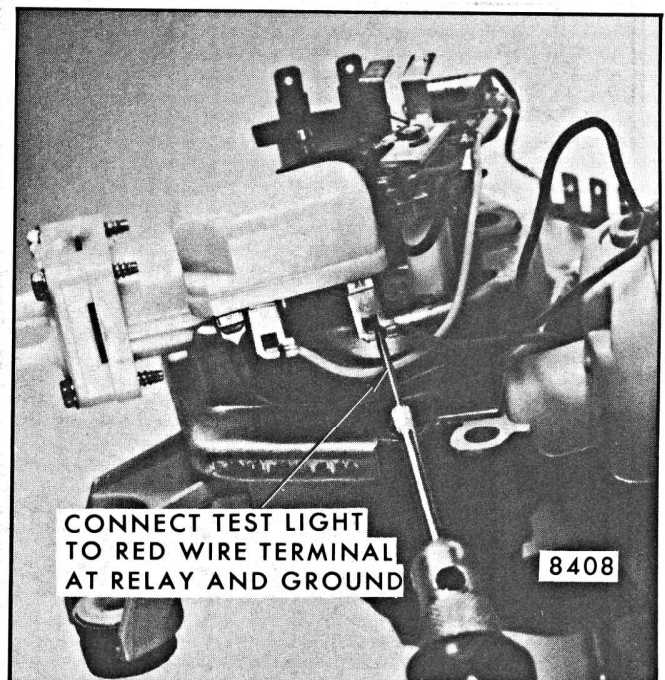


Fig. 2-90-Condition 1

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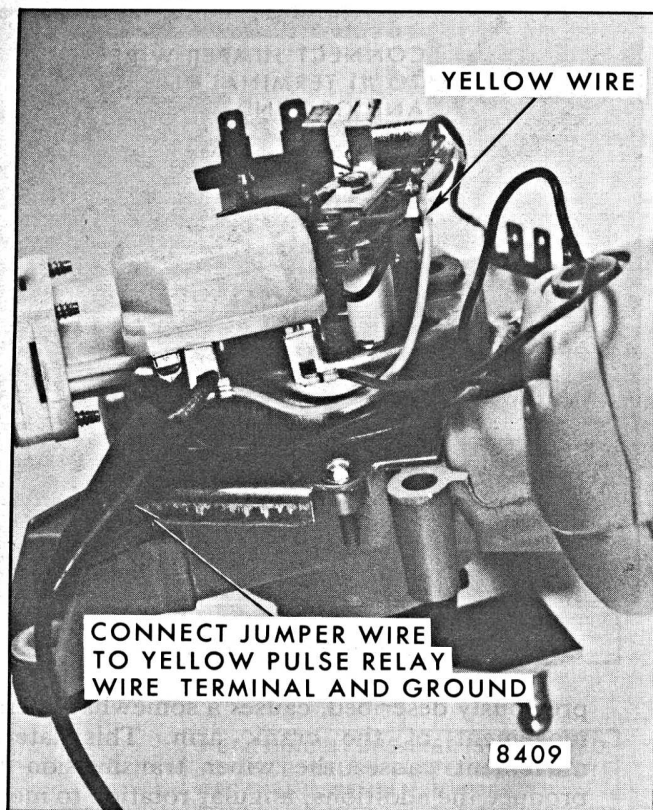


Fig. 2-91-Condition 1

will help locate the problem. Illustrations referred to within the diagnostic procedures are shown following the complete procedures.

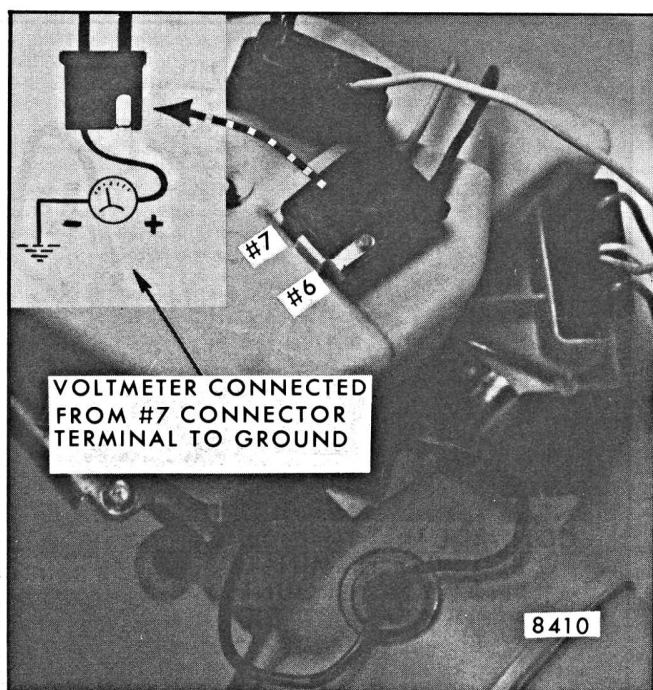


Fig. 2-92-Condition 2

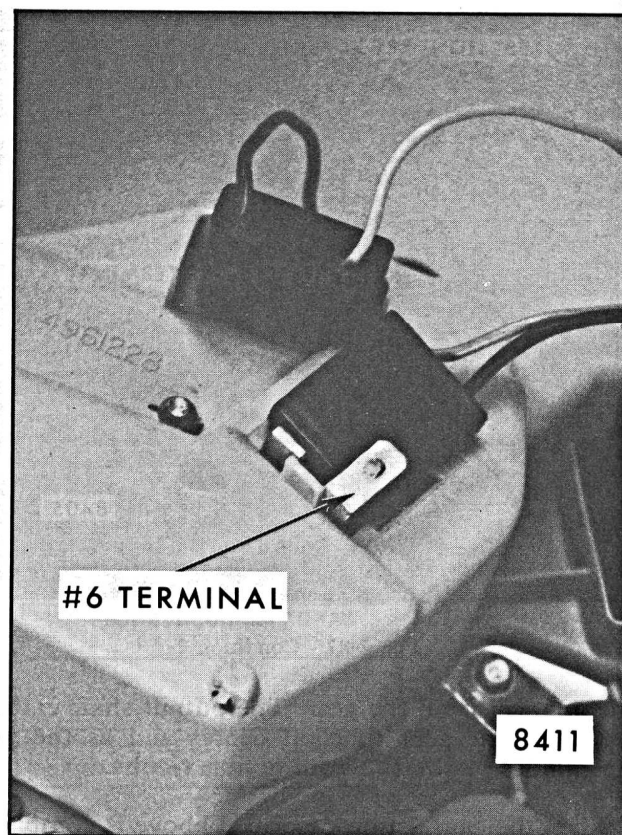


Fig. 2-93-Condition 3

Prior to starting the diagnosis procedure, it is very important to confirm the reported condition with a complete operational check, including the washer



Fig. 2-94-Condition 3

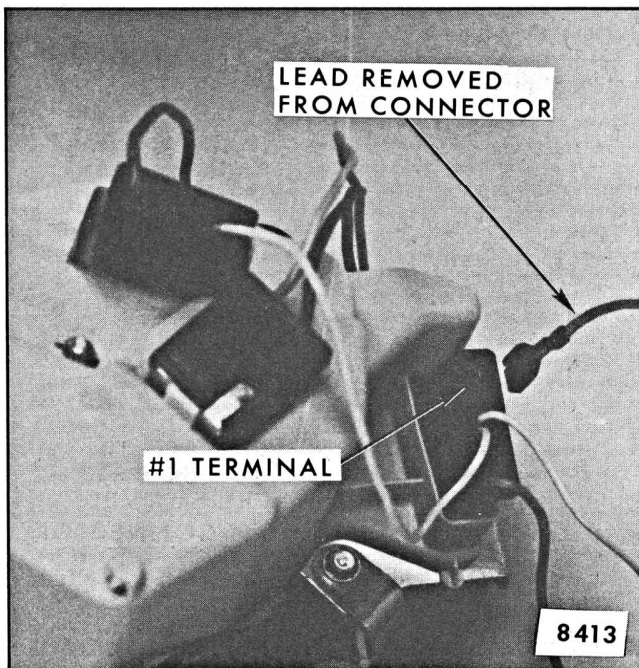


Fig. 2-95-Condition 4

system. Then match up the condition with one in the Diagnosis Chart.

When the diagnosis procedure requires removal of

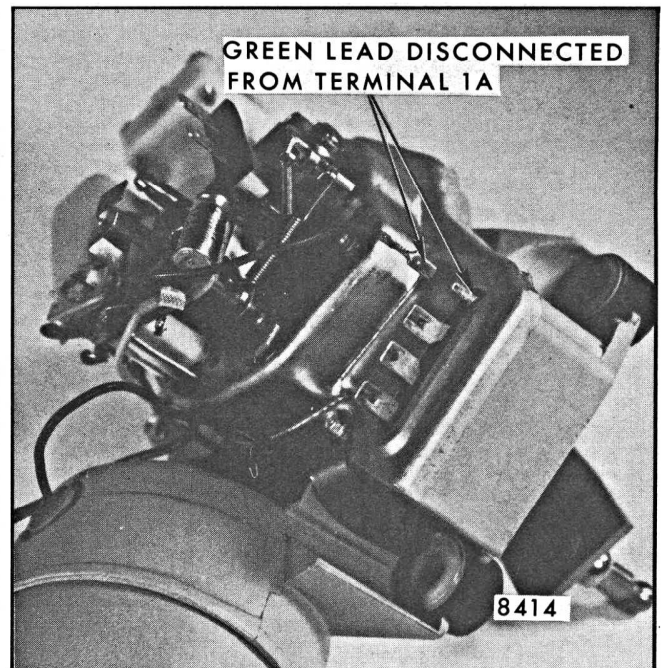


Fig. 2-96-Condition 4

the washer pump, BE SURE to refer to Washer Pump Cover Removal. If wiper unit (wiper-washer assembly) is to be diagnosed on a detached basis, refer to Bench Operational Test. Find trouble that exists, then refer to the diagnostic procedures.

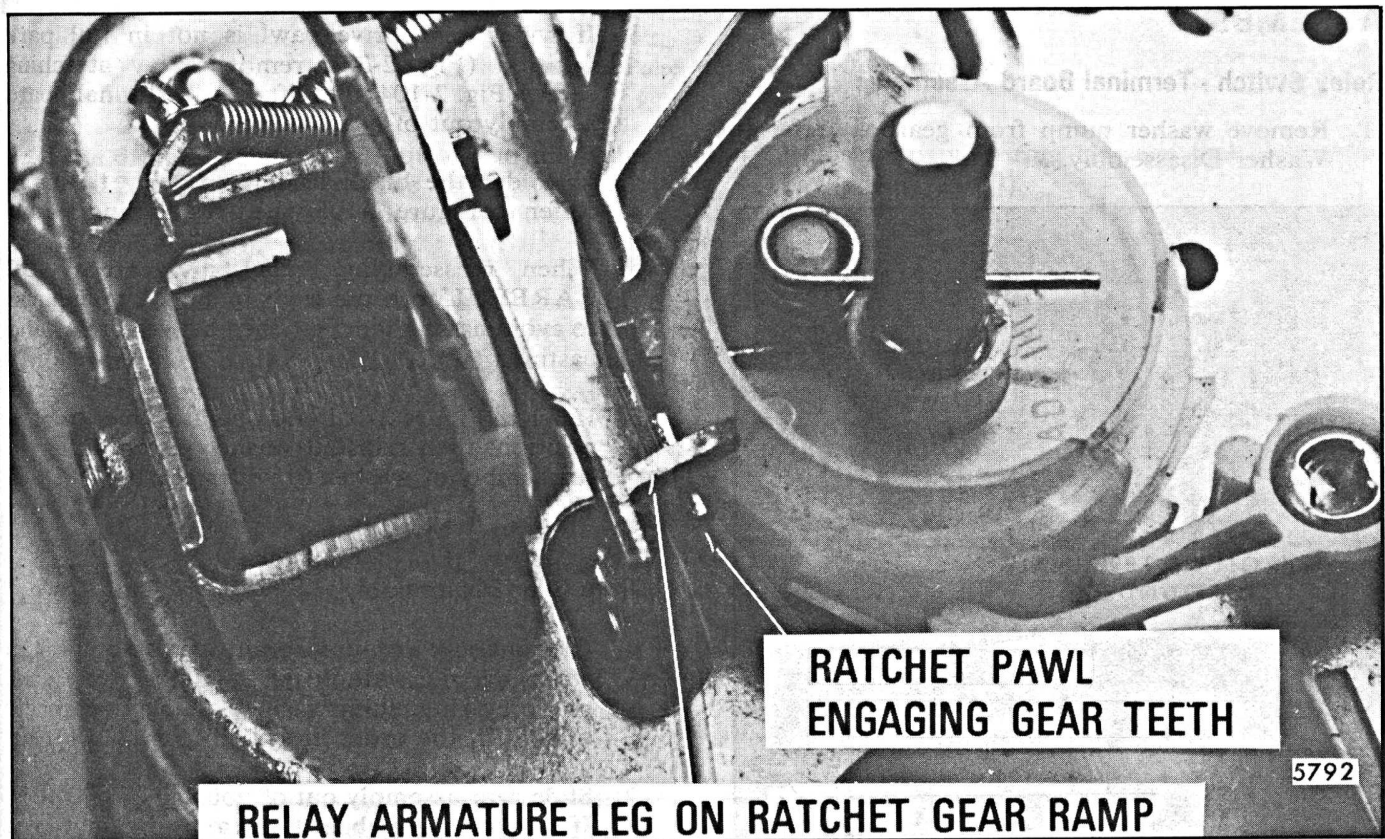


Fig. 2-97-Condition 5 - Position 1

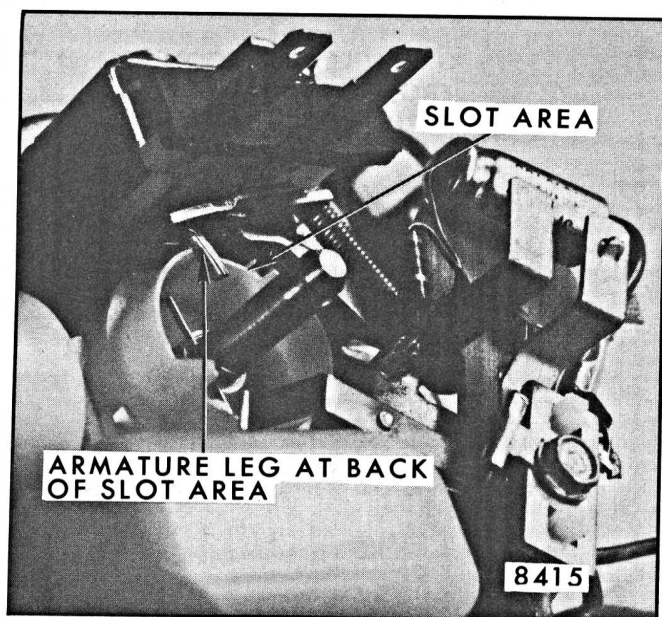


Fig. 2-98-Condition 5 - Position 2

It is possible that a wiper may have more than one problem. When this exists, and one problem has been located and repaired, refer to the chart and follow the procedures for the second condition.

GEARBOX DISASSEMBLY AND ASSEMBLY

Relay Switch - Terminal Board Assembly

1. Remove washer pump from gearbox, refer to Washer Disassembly.

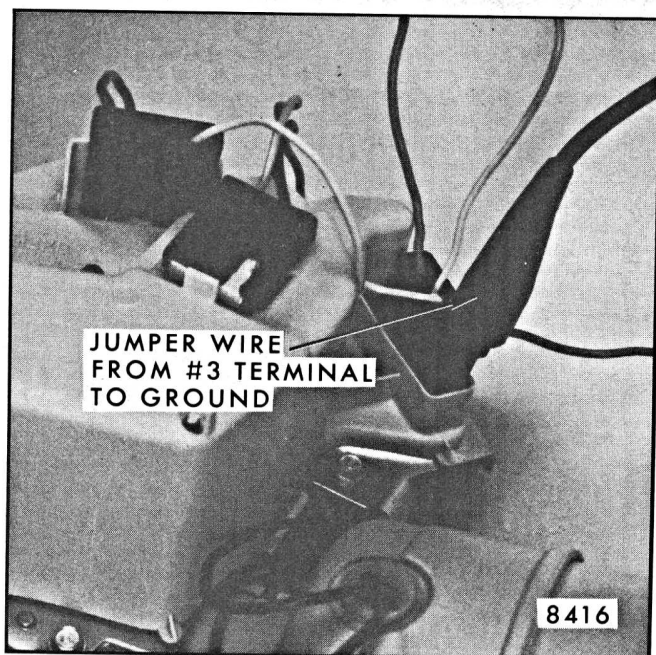


Fig. 2-99-Condition 6

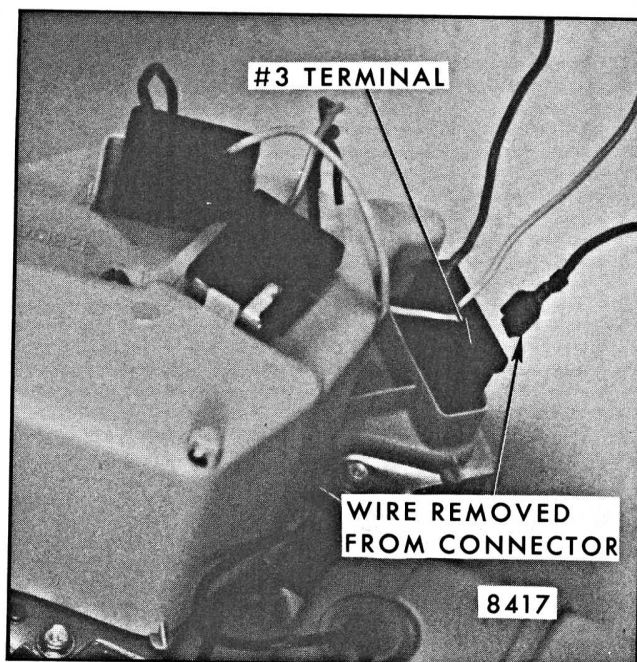


Fig. 2-100-Condition 8

2. If wiper gear drive pawl is in full park position (Fig. 2-104), operate the motor as required to move pawl out of relay slot (Fig. 2-101). If wiper will not run, remove the gear mechanism.
3. If wiper gear drive pawl is not in full park position (Fig. 2-74), remove relay attaching screw (Fig. 2-104) and lift relay- terminal board assembly out of gearbox.
4. Unsolder the black lead from relay terminal. Refer to Figure 2-105 when resoldering leads.
5. When reassembling relay in gearbox, BE CAREFUL to route leads in such a manner as to avoid having them pinched between relay and casting.
6. Refer to Figure 2-101 and operate wiper to park position, then reinstall washer pump. Refer to reassembly of washer to wiper gearbox (Fig. 2-104).

Drive Gear Disassembly

1. Clamp crank arm in vise and remove crank arm retaining nut, crank arm, rubber seal cap, retaining ring, shim washers, shield and spacer washer in the order indicated (Fig. 2-106).
2. Slide gear assembly out of housing (Fig. 2-107). If relay-terminal board assembly has not been removed, move the relay latch arm out of the way.

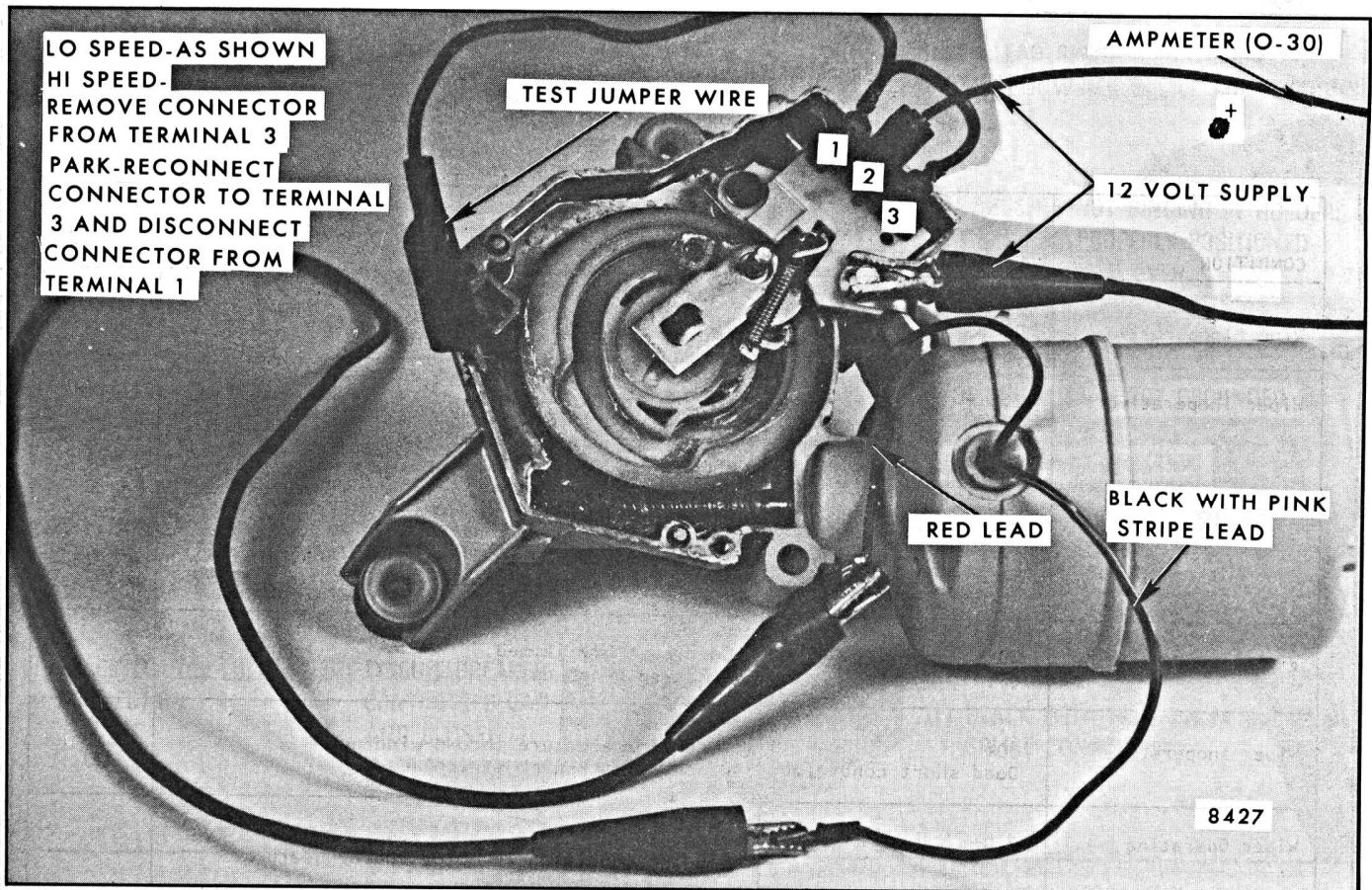


Fig. 2-101-Modified Pulse Motor Bench Operation Test

3. Slide drive plate and shaft out of gear and tube (Fig. 2-108), and remove the drive pawl, lock pawl and coil spring as required. Save the inside spacer washer for reassembly.

The replacement drive plate and shaft assembly is equipped with two retaining ring grooves. The instructions in the package call out which groove to use.

Drive Gear Reassembly

1. Position drive and lock pawls on drive plate as shown in Figure 2-108.
2. Slide gear and tube over the drive plate shaft. Move drive and lock pawls as required to allow their respective pins to fit in the gear guide channel (Fig. 2-108).
3. Holding the gear, manually rotate the drive plate in the direction of the arrow until the drive and lock pawl guide pins fit into the gear pockets (Fig. 2-109).

4. Reinstall pawl spring between lock and drive pawls (Fig. 2-109).

NOTICE: Be careful to maintain the gear mechanism in its assembled position during step 5.

5. Assemble inner spacer washer over the gear tube and reassemble gear mechanism in gearbox (Fig. 2-107).
6. Reassemble parts removed in step 1 under disassembly.

Use shim washers as required to obtain a maximum of 0.13 mm (.005) end play.

7. Refer to Figure 2-101 and operate wiper to park position; then position crank arm on output shaft flat so that it points in the direction shown in Figure 2-110. Next, install crank arm retaining nut fingertight.
8. Clamp crank arm in vise and torque retaining nut to about 34 N·m (300 in-lb).

2-62 WINDSHIELD WIPER SYSTEM

INTERPRETATION OF CURRENT DRAW READINGS

LO SPEED OPERATION - NORMAL CURRENT @ 12V - 5-6 AMPS

CONDITION	CURRENT DRAW (AMPS)	INTERPRETATION	REFER TO FIGURE 2-103
Wiper Inoperative	0	Open condition in gearbox relay coil.	
Wiper Inoperative	2.5 - 3.5 Open Armature Circuit	Open armature condition (commutator hooks - broken coil leads). Hung brush. Open splice connections. Circuit breaker contacts open.	(I) (H) (C) (A) (J) (G)
Wiper Inoperative	20 - 25 (Stall Current)	Gear assembly jammed. Armature bound up.	
Wiper Inoperative	30+ Dead short condition	Check for armature thrown winding. Pinched black-pink stripe lead.	(F)
Wiper Operating	7.0+	Armature shorted. Binding condition in motor and/or gearbox.	
Wiper Operating - Won't shut off	5 - 6.0	Gearbox Relay	1296

Fig. 2-102-Interpretation of Current Draw Readings

9. Reinstall washer pump to gearbox. Refer to washer pump to wiper gearbox assembly instructions.

MOTOR DISASSEMBLY AND ASSEMBLY

Remove washer pump from wiper gearbox. It is not necessary to disassemble the gearbox.

Brush Plate and Circuit Breaker Removal

1. Scribe a reference line along the side of the casing and end cap to insure proper reassembly (Fig. 2-111).
2. Remove the two motor tie bolts.
3. Feed exposed excess length of motor leads through the casting grommet and carefully back the case and field assembly plus the armature

away from the casting (Fig. 2-111) until the armature shaft clears the casting bearing.

If necessary, remove the armature end play adjusting screw and insert a rod through the opening in order to apply pressure against the end of the armature.

4. Carefully note the routing, then unsolder the black lead from circuit breaker (Fig. 2-112).

NOTICE: Be careful not to break any of the retainer tabs.

5. Straighten out the four tabs that secure the brush plate to the field coil bracket (Fig. 2-112).
6. Install U-shaped brush retainer clip over brush holder that has brush lead attached to circuit breaker (Fig. 2-112).
7. Holding the opposite brush from that retained

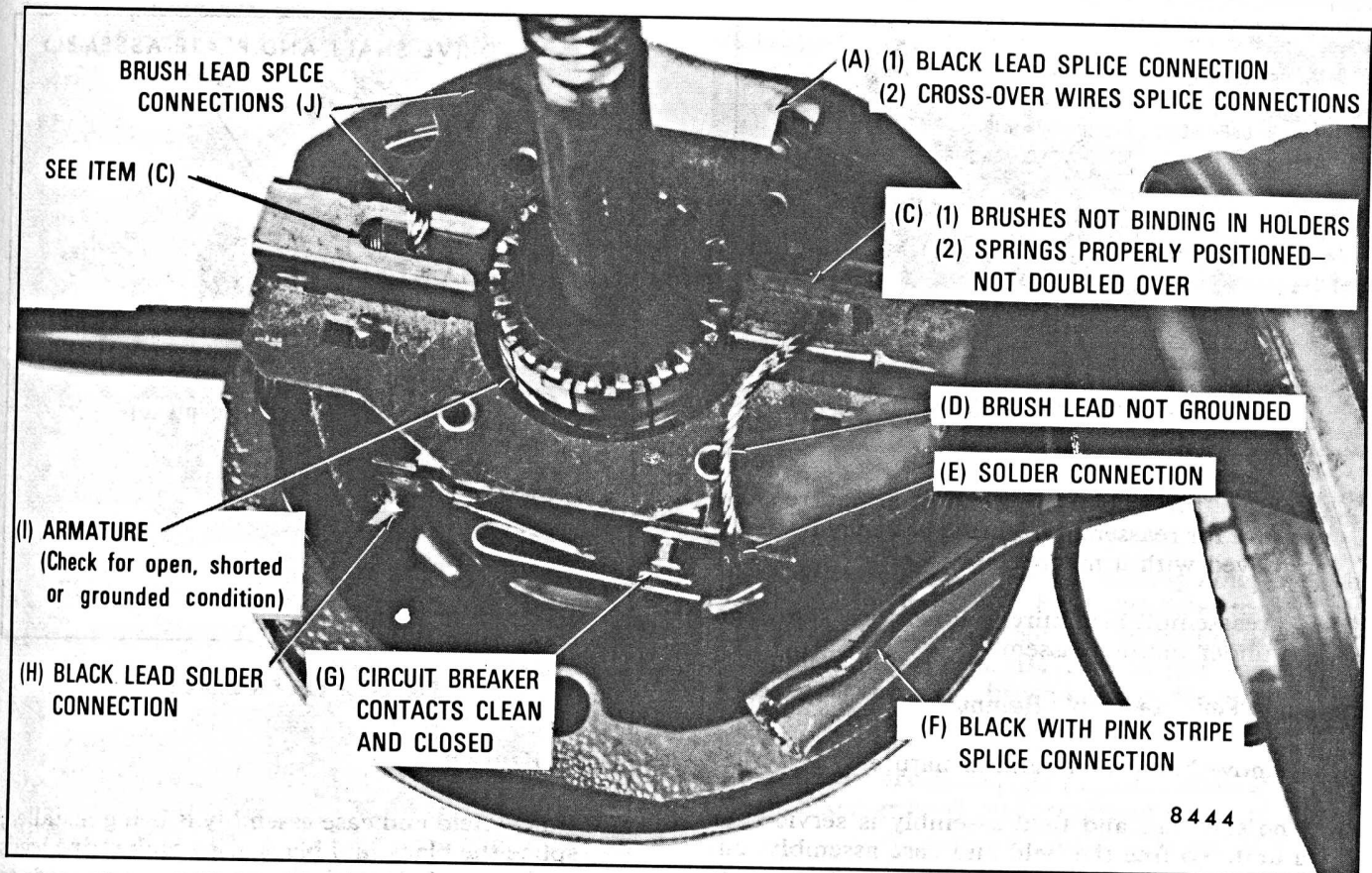


Fig. 2-103-Visual Inspection Modified Pulse Motor

in step 6, carefully lift the brush holder off the mounting tabs far enough to clear the armature commutator.

8. Allow the brush held in step 7 to move out of its holder. Remove the brush spring and lift the brush holder off the armature shaft. Refer to Motor Reassembly for reinstalling brush plate and circuit breaker assembly (steps 5, 6, 7 and 9 through 12).

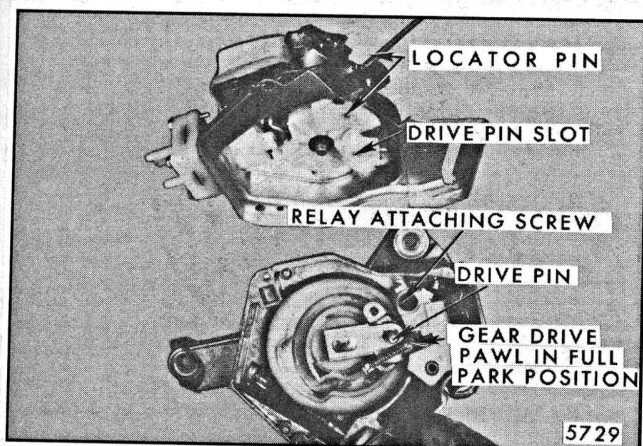


Fig. 2-104-Installing Pump to Motor

Armature Removal

1. Follow steps 1 through 8 under brush plate removal.
2. Lift armature out of case and field assembly.

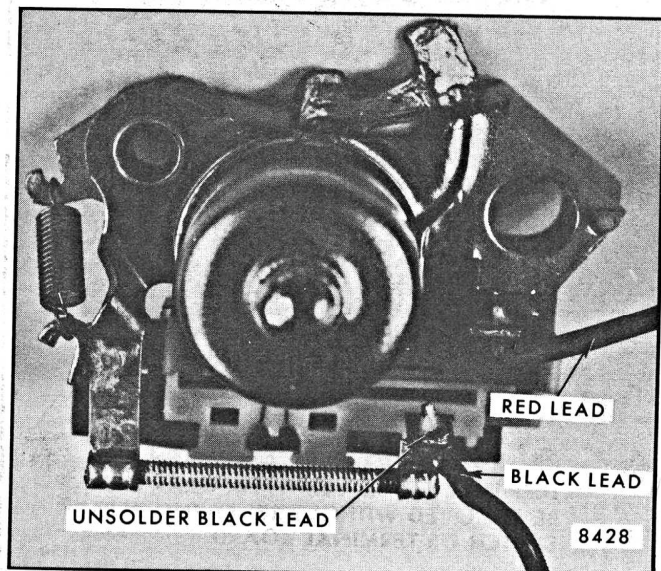


Fig. 2-105-Pulse Relay Terminal

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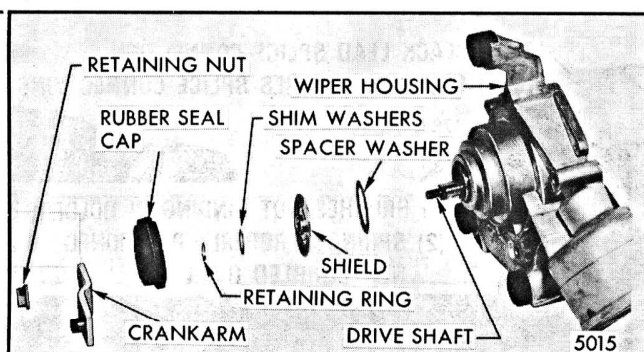


Fig. 2-106-Crank Arm Components

3. Remove thrust ball from end of armature shaft to save for reassembly. Thrust ball may be easily removed with a magnet.
4. To reassemble armature, follow steps 3 through 10 under motor reassembly.

Case and Field Assembly Removal

1. Remove brush plate and armature.
2. The end case and field assembly is serviced as a unit. To free the field and case assembly, cut the solid black and black with pink stripe leads in a location convenient for splicing.
3. Remove felt lubricating washer, steel thrust plate and rubber disc from case bearing.

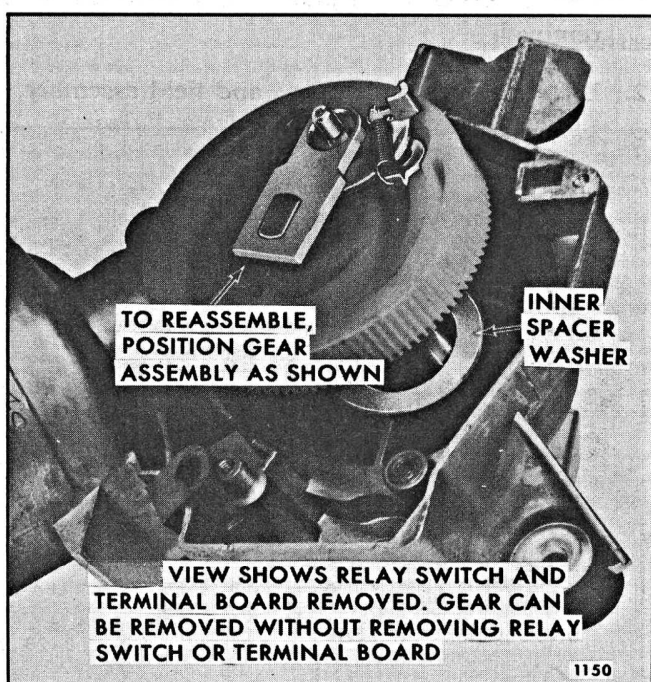


Fig. 2-107-Removing Gear

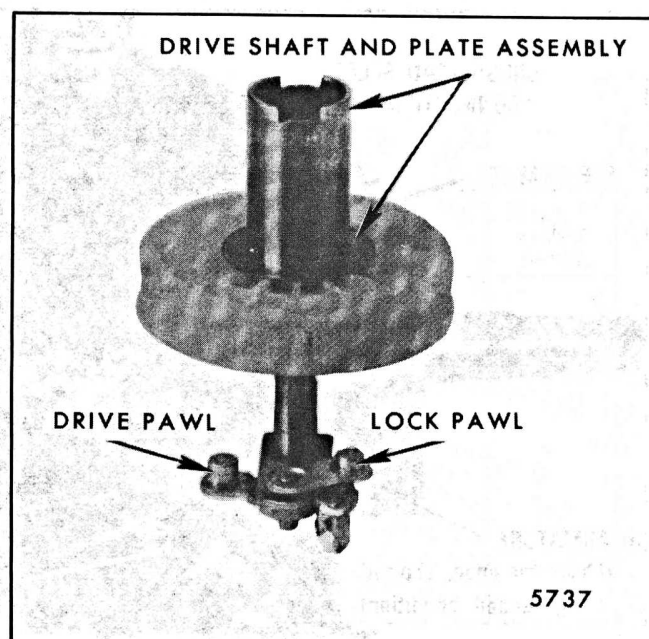


Fig. 2-108-Gear Removed

Motor Reassembly

1. If new field and case assembly is being installed, splice the black and black with pink stripe leads of the new field with the corresponding leads to the wiper.
2. Install the rubber thrust disc, steel thrust disc and felt lubricating washer in the case assembly bearing in the order indicated.
3. Lubricate end of armature shaft that fits in case bearing with recommended type grease (Fig. 2-113). Next, install thrust ball in end of shaft.

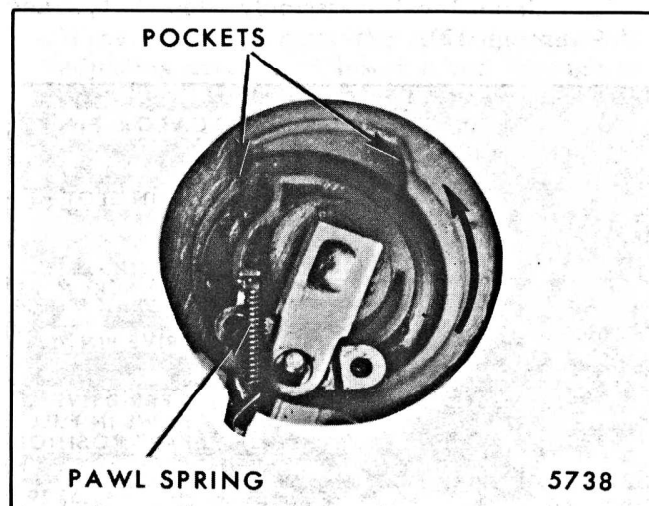


Fig. 2-109-Drive and Lock Pawl Guide Pin Pockets

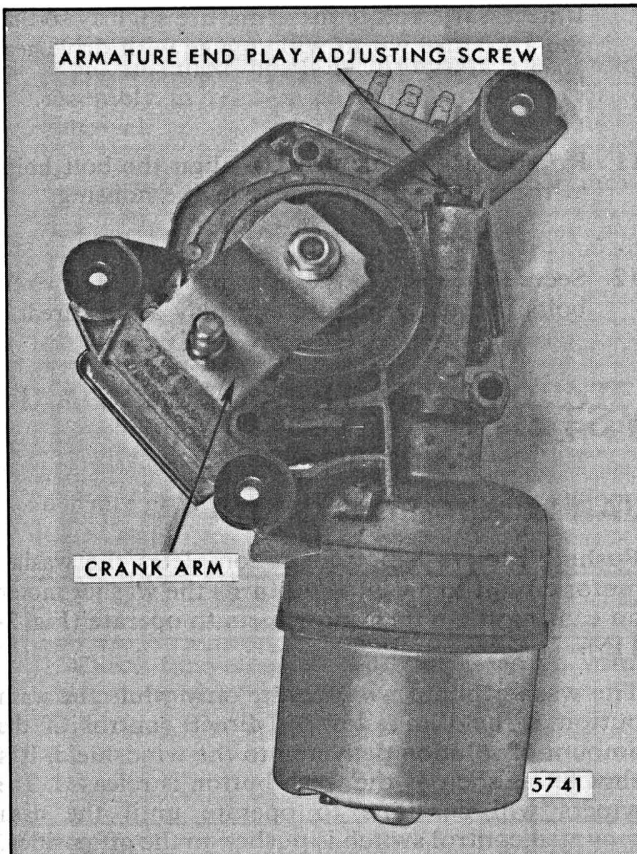


Fig. 2-110-Crank Arm in Park Position

4. Assemble armature in the case and field assembly.
5. Position the partially assembled brush plate over the armature shaft far enough to allow reassembly of the remaining brush in its brush holder; then position the brush plate assembly on the mounting tabs in the position shown in Figure 2-112.

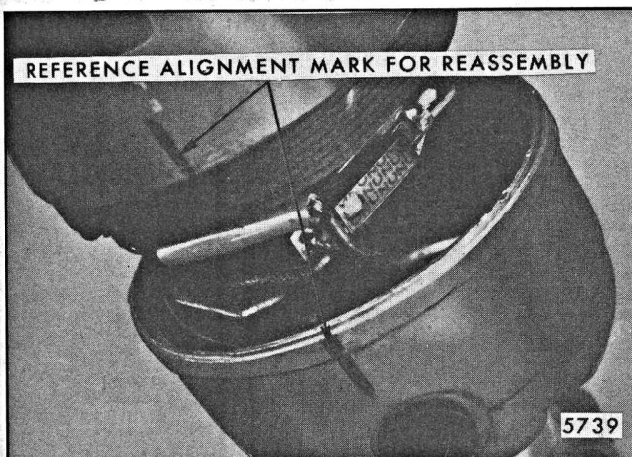


Fig. 2-111-Motor Case Alignment Marks

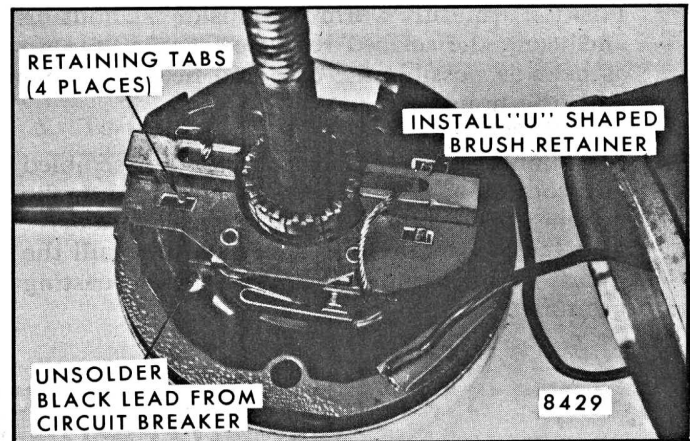


Fig. 2-112-Brushes and Brush Plate

6. Center the brush plate mounting holes over the mounting tabs and bend the tabs toward the brush holders as required to secure the brush plate in position. Be careful not to bend or distort the metal brush holders. Be sure tabs are centered in brush plate mounting holes.
7. Remove brush retainer clips and resolder circuit breaker ground lead to circuit breaker.
8. If new case and field assembly is used, scribe a line on it in the same location as the one scribed on the old case. This will insure proper alignment of the new case with the scribed line made on the housing.

SPECIFICATION CHART				
OPERATING VOLTAGE		12 VOLTS D.C.		
BENCH CHECK (No Load)	CURRENT DRAW (Amps)		CRANKARM SPEED	
	"P"	"A-B-C-D-E-K"		
"LO" SPEED	5.0 Max.	6.0 Max.	35 - 50	
"HI" SPEED	4.0 Max.	4.5 Max.	70 - 90	
STALL (Cold Motor)				
"LO" SPEED	18.0 Max.	29.0 Max.	0	
Torque		INCH-POUNDS	NEWTON-METRES	
Washer Pump Mounting Screws		18	2.0	
Armature Adjusting Screw Jamb Nut		50	5.7	
Motor Tie Bolts		30	3.4	
Gear Box Relay Attaching Screw		30	3.4	
Motor Crankarm Attaching Nut		300 - 350	34 - 40	
Motor Crankarm to Transmission Drive Link		25 - 35	3 - 4	
Motor to Body Attaching Bolts		30 - 45	4 - 5	
Transmission to Body Attaching Bolts		57 - 72	7 - 8	
Lubrication				
Gear Teeth		Multifak EP-1 or Equivalent		
Gear Shaft				
Gear Camtrack				
Seal Cap (Inside)				
Armature Shaft				
Armature Worm				

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Fig. 2-113-Specification Chart - Pulse Wiper Motor

2-66 WINDSHIELD WIPER SYSTEM

9. Position armature worm shaft inside the housing and using the scribed reference marks, line up as near as possible the case and field assembly with the housing.
10. Maintaining the armature in its assembled position, start the armature shaft through the housing bearing until it starts to mesh with drive gear teeth. At the same time carefully pull the excess lead lengths through the casting grommet.

If necessary, rotate the armature slightly so that the armature worm will engage with drive gear teeth.

11. Rotate case as required to align the bolt holes in the end case with those in the housing.
12. Secure the case to the housing with the two bolts. Adjust armature end play as required.

WASHER SYSTEMS

The washer pump used on all round motor systems is a positive displacement type pump employing a small piston, spring and valve arrangement. The plastic valve assembly is identical; however, the programming (starting and completion of wash cycle) which is accomplished electrically and mechanically by a relay assembly and ratchet wheel arrangement differs and will be explained separately.

The washer system on H and X styles consists of a permanent magnet motor and pump assembly that is mounted to the bottom of the washer solution jar with a retaining nut and screen assembly. The motor and pump assembly is common to the three different shaped jars used on F, H and X styles. It is serviced as a complete assembly including the gasket and retaining nut and screen (Fig. 2-114). The washer solution jar is serviced separately.

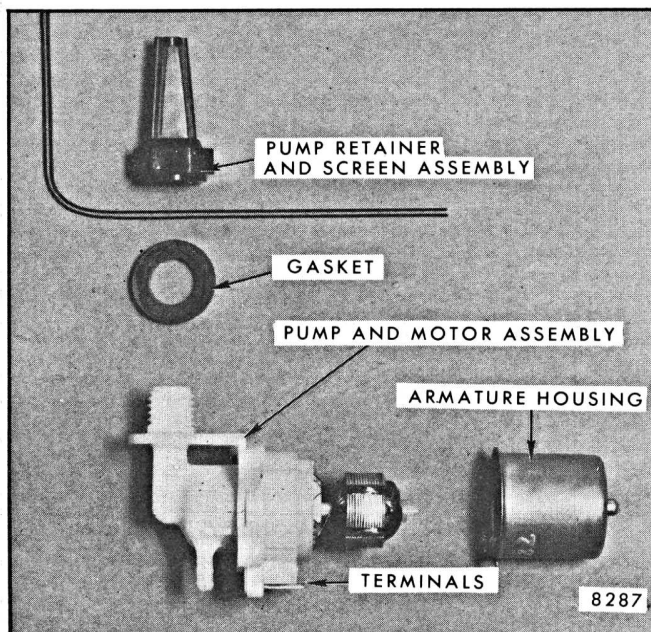


Fig. 2-114-Jar Mounted Motor and Pump Assembly

JAR MOUNTED SYSTEM

Pushing the wash button in completes the washer motor circuit to ground and turns the washer motor on causing the pump and wipers to operate (Fig. 2-115).

The washer pump will operate only while the wash button is held in allowing direct control of the amount of solution delivered to the windshield. It is shut off as soon as the wash button is released. The wipers will continue to operate until the dash mounted control switch is pushed to the off position.

Removal and Installation

1. Remove two solution jar to body attaching screws.

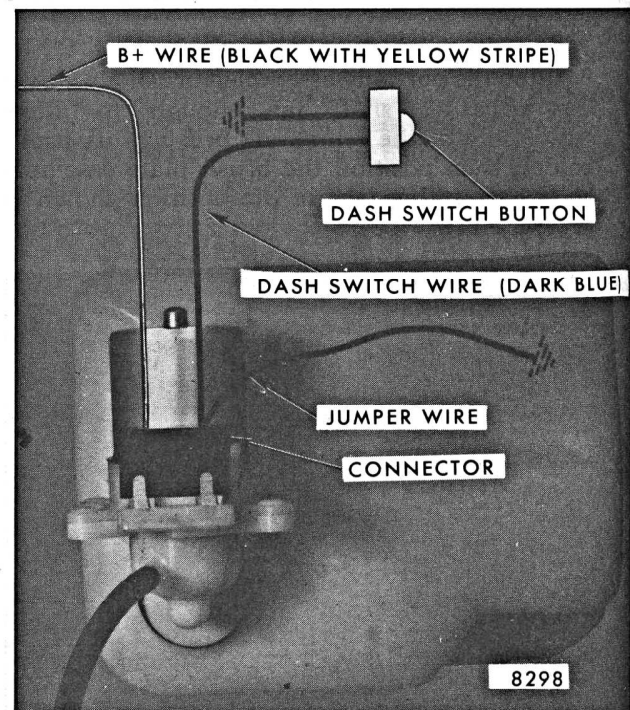


Fig. 2-115-Jumper Wire from Dash Switch Motor Terminal to Ground