

# WINDSHIELD WIPER AND WASHER SYSTEMS

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## GENERAL WIPER INFORMATION

**WARNING: ON VEHICLES EQUIPPED WITH AIR-BAG, SEE GROUP 8M, RESTRAINT SYSTEMS FOR STEERING WHEEL OR COLUMN REMOVAL PROCEDURES.**

The windshield wipers can be operated with the windshield wiper switch only when the ignition switch is in the ACCESSORY or IGNITION position. A fuse, located in the fuse block, protects the circuitry of the wiper system and the vehicle.

The wiper motor has permanent magnet fields. The

speeds are determined by current flow to the appropriate set of brushes.

The intermittent wipe system, in addition to low and high speed, has a delay mode. The delay mode has a range of 2 to 15 seconds. This is accomplished by a variable resistor in the wiper switch and is controlled electrically by a relay.

The wiper system completes the wipe cycle when the switch is turned OFF. The blades park in the lowest portion of the wipe pattern.

## WINDSHIELD WIPER BLADE AND ARM SERVICE PROCEDURES

### WIPER BLADES

Wiper blades, exposed to the weather for a long period of time, tend to lose their wiping effectiveness. Periodic cleaning of the wiper blade is suggested to remove the accumulation of salt and road film. The wiper blades, arms, and windshield should be cleaned with a sponge or cloth and a mild detergent or non-abrasive cleaner. If the blades continue to streak or smear, they should be replaced.

### WIPER BLADE ELEMENT CHANGE

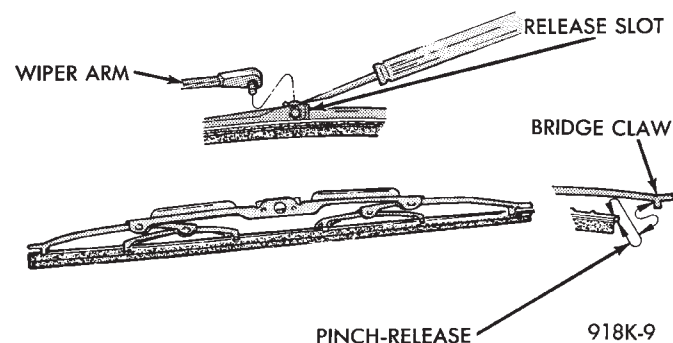
(1) Turn wiper switch ON, position blades to a convenient place by turning the ignition switch ON and OFF.

(2) Lift wiper arm to raise blade off glass.

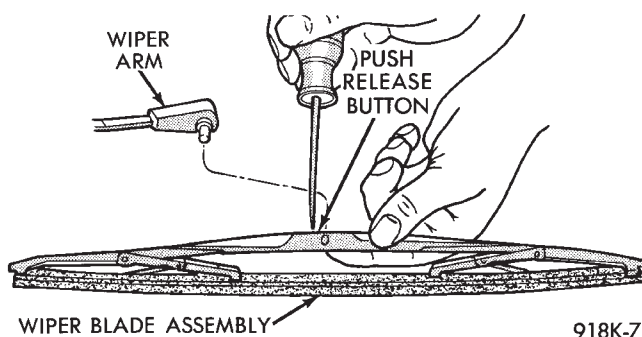
(3) Remove blade assembly from arm by inserting a small screwdriver blade into release slot of wiper blade and push downward (Fig. 1 and 2), or push release button (2).

(4) To remove wiping element from blade assembly:

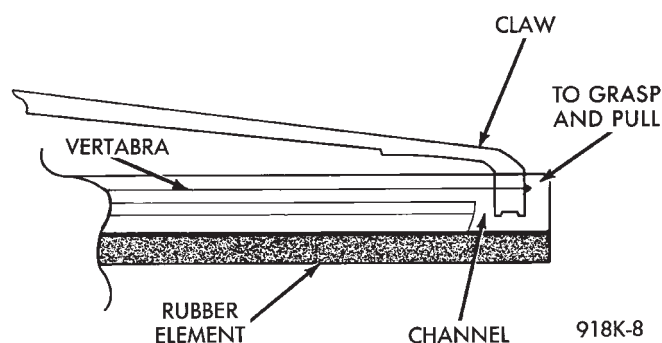
- Place blade assembly on a working surface
- Apply pressure backwards to open up the blade assembly (Fig. 3)
- By pushing downward and pulling away remove the wiping element, or lift tab on one end links and squeeze link to remove from center bridge.



**Fig. 1 Wiper Blade and Element**

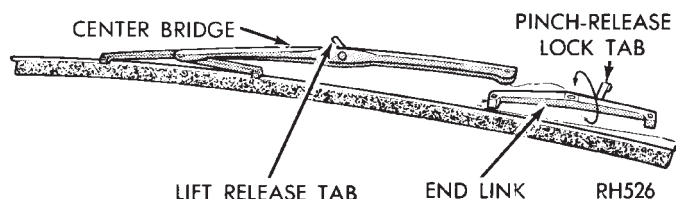


**Fig. 2 Blade Assembly from Arm**



**Fig. 3 Wiper Element**

- Slide end link off element from claws of other link (Fig. 4), or by grasping the rubber element where the channel is and pull the element out for replacement.
- (5) To install reverse above procedures.



**Fig. 4 Wiping Element from Blade Assembly**

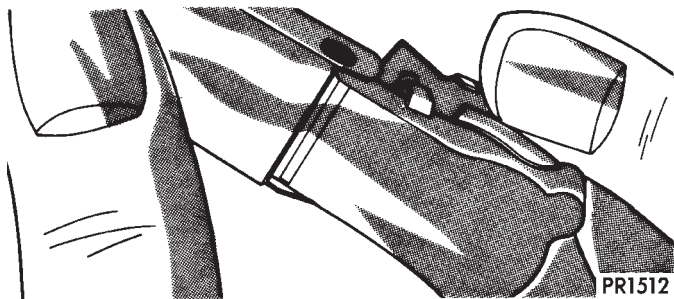
- (6) Check each bridge claw for positive locking when installing blade element, and blade assembly for positive locking.

## WIPER ARM REPLACEMENT

### AG AND AJ BODIES

#### REMOVAL

Lift the arm to permit the latch (Fig. 5) to be pulled out to the holding position then release the arm. Arm front will remain off windshield in this position. Remove the arm from the pivot using a rocking motion.



**Fig. 5 Removing Wiper Arm—AG and AJ Bodies**

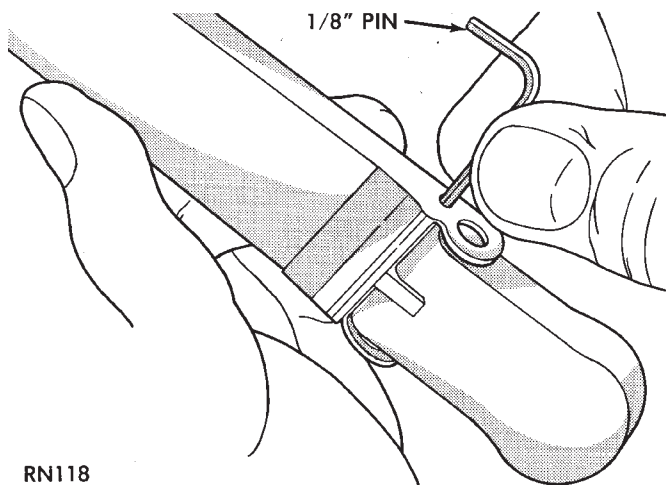
#### INSTALLATION

For proper installation of wiper arm, refer to Wiper Arm Adjustment.

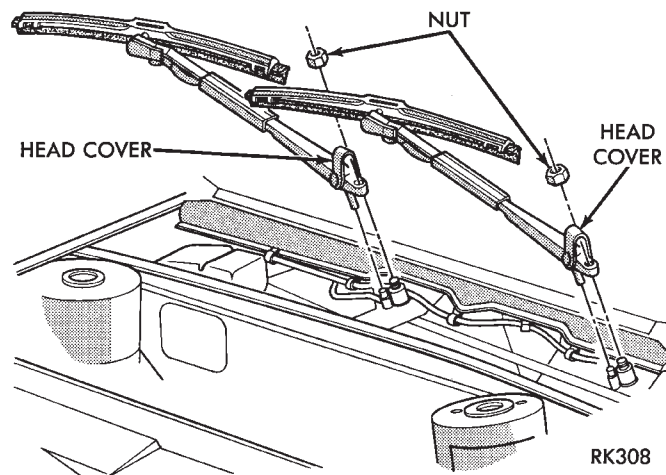
### AA, AC, AP AND AY BODIES

#### REMOVAL

- (1) Lift the wiper arm and place a 3.17mm (1/8 inch) pin into the arm pin hole (Fig. 6).



**Fig. 6 Removing Wiper Arm—AA, AC, AP and AY Bodies 16**



**Fig. 7 Wiper Arm Head Cover and Nut—AA, AC, AP and AY Bodies**

- (2) Lift the head cover (Fig. 7) and remove the wiper arm attaching nut.
- (3) Remove the wiper arm from the pivot using a rocking motion.

#### INSTALLATION

- (1) Clean the wiper pivot shaft of any metal filings using a wire brush.
- (2) Position wiper arm so that the blade tip is 19.05 mm (3/4 inch) from the top of the cowl screen.
- (3) Secure arm to pivot with attaching nut and tighten 17 to 22 N·m (155 to 195 in. lbs.) torque.
- (4) Close head cover and remove pin from arm pin hole.

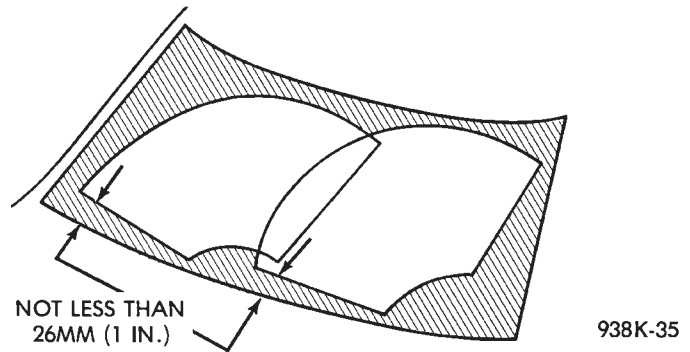
## WIPER ARM ADJUSTMENT

### FRONT ARM ADJUSTMENT

- (1) Cycle the wiper motor into the PARK position.
- (2) Check the tips of the blades in blackout area. From the bottom edge of the windshield to the blade should be no closer than 25 mm (1 inch) (Fig. 8).
- (3) Operate the wipers if the requirements are not met, check linkage and pivot assembly for worn parts.

### REAR ARM ADJUSTMENT

With the motor in the park position, mount the arm on the motor shaft. Choose a serration engagement that positions the blade, parallel with the bottom edge of the liftgate glass.



**Fig. 8 Windshield Wiper Arm Adjustment**

## WINDSHIELD WIPER MOTOR AND LINKAGE ASSEMBLY SERVICE PROCEDURES

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## WIPER MOTOR SYSTEM TEST PROCEDURES

**WARNING: ON VEHICLES EQUIPPED WITH AIR-BAG, SEE GROUP 8M, RESTRAINT SYSTEMS FOR STEERING WHEEL OR COLUMN REMOVAL PROCEDURES.**

Whenever a wiper motor malfunction occurs, first verify that the wiper motor wire harness is properly connected to all connectors before starting normal diagnosis and repair procedures. Refer to Wiper Motor Diagnosis Chart (Fig. 9).

The following is a list of general wiper motor system problems, the tests that are to be performed to locate the faulty part, and the corrective action to be taken. These tests will cover both two speed and intermittent wipe functions.

### TWO SPEED MOTOR FUNCTION TESTS

**CONDITION: MOTOR WILL NOT RUN IN ANY SWITCH POSITION**

#### PROCEDURE

- (1) Check for a blown fuse in the fuse block.
  - (a) If fuse is good, proceed to step 2.
  - (b) If fuse is defective, replace and check motor operation in all switch positions.
  - (c) If motor is still inoperative and the fuse does not blow, proceed to step 2.
  - (d) If replacement fuse blows, proceed to step 5.

- (2) Place switch in LOW speed position.

(3) Listen to motor. If you cannot hear it running, proceed to Step 4. If you hear it running, check motor output shaft. If output shaft is not turning, replace motor assembly. If it is turning, drive link to output shaft or linkage is not properly connected. Replace worn parts and/or properly connect drive link to the motor output shaft.

(4) Connect a voltmeter between motor terminal 3 and ground strap (Fig. 10). If there is no voltage or very little voltage (less than one volt) present, move negative test lead from the ground strap to negative battery terminal.

(a) If an increase in voltage is noticed, the problem is a bad ground circuit. Make sure the motor mounting is free of paint and that nuts or bolts are tight.

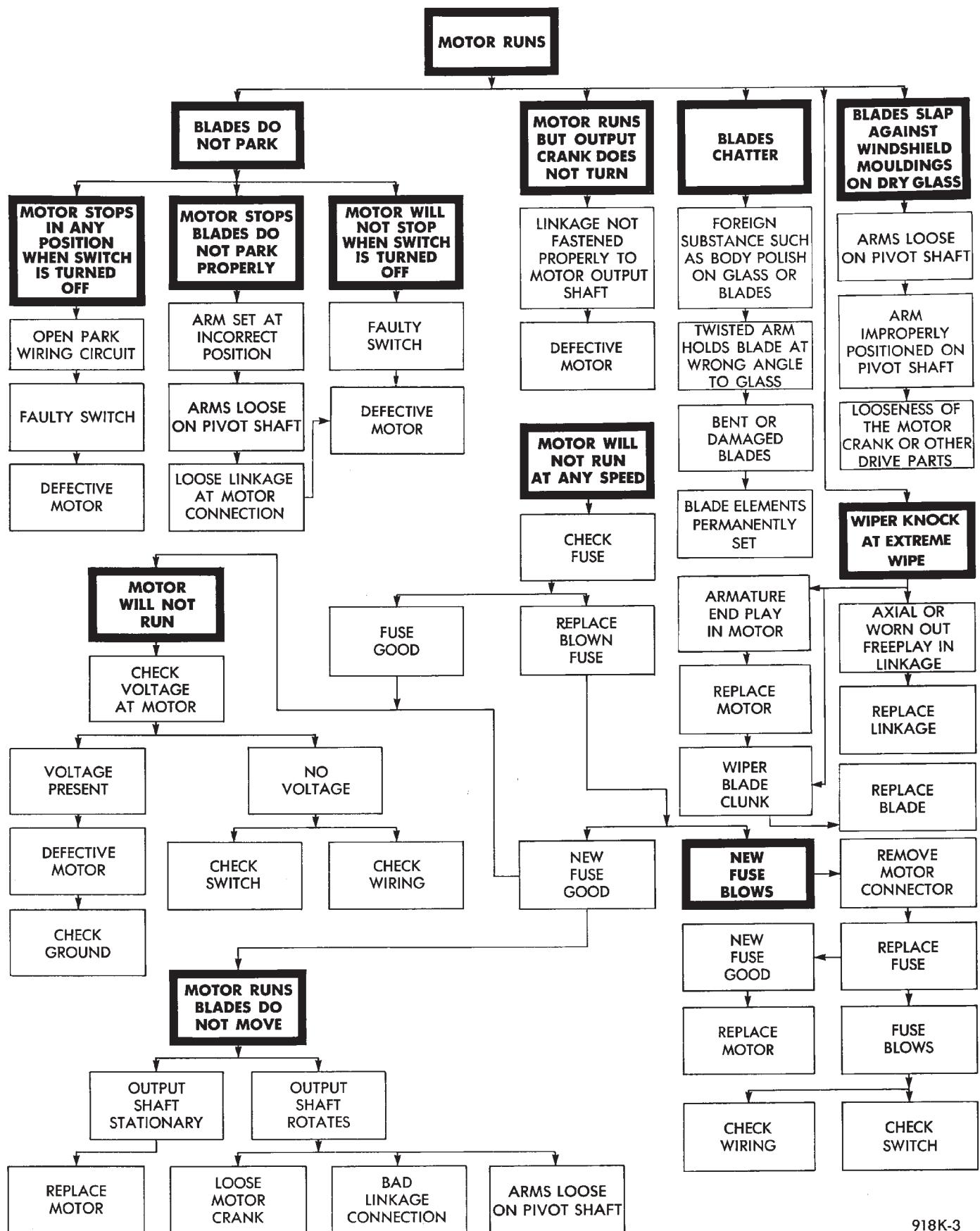
(b) If there is still no indication of voltage, the problem is an open circuit in the wiring harness or wiper switch.

(c) If no more than 3 volts increase in voltage is observed, the problem is a faulty motor assembly.

(5) Disconnect motor wiring connector and replace fuse.

(a) If fuse does not blow, motor is defective.

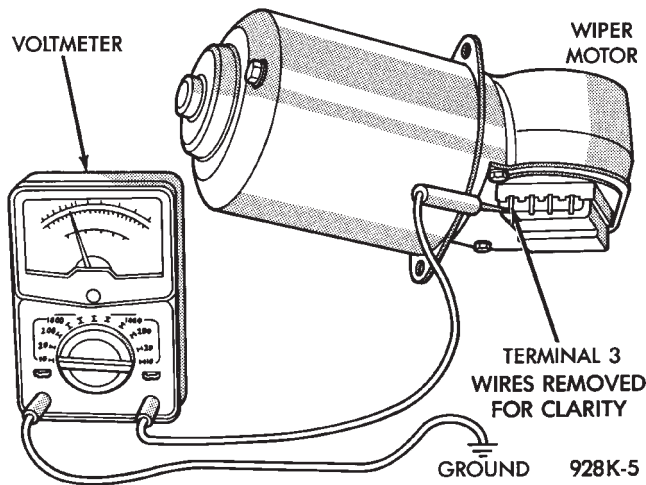
(b) If fuse blows, switch or wiring is at fault.



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Fig. 9 Windshield Wiper Motor Diagnosis



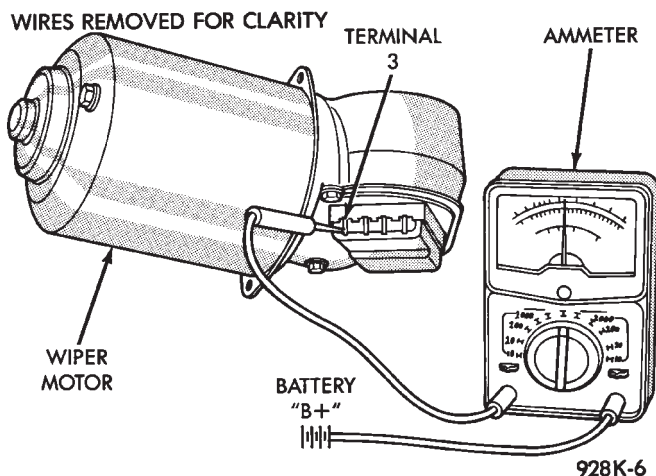


**Fig. 10 Voltmeter Between Terminal 3 and Ground**

**CONDITION: MOTOR RUNS SLOWLY AT ALL SPEEDS**

#### PROCEDURE

(1) Disconnect wiring harness connector at motor. Remove wiper arms and blades. Connect an ammeter between battery (B+) and terminal 3 on motor (Fig. 11).



**Fig. 11 Ammeter Between Terminal 3 and Battery**

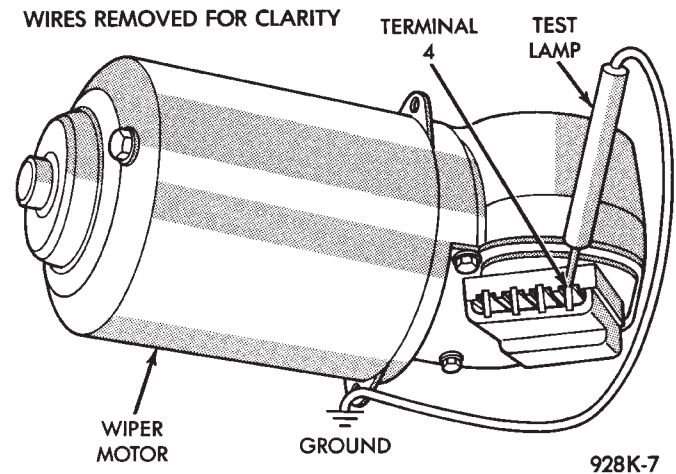
- (a) If motor runs and average ammeter reading is more than 6 amps, proceed to step 2.
- (b) If motor runs and average ammeter reading is less than 6 amps, proceed to step 3.
- (2) Check to see if wiper linkage or pivots are binding or caught. Disconnect drive link from motor.
  - (a) If motor now runs and draws less than 3 amps, repair linkage system.
  - (b) If motor continues to draw more than 3 amps, replace motor assembly.
- (3) Check motor wiring harness for shorting between high and low speed wires as follows:

- (a) Connect a voltmeter or test lamp to motor ground strap.
- (b) Set wiper switch to LOW position.
- (c) Connect other lead of voltmeter to terminal 4 of the wiring harness.
- (d) If voltage is present, there is a short in the wiring or wiper switch. If no voltage is present proceed to step e.
- (e) Set wiper switch to HIGH position.
- (f) Move voltmeter lead from terminal 4 to terminal 3 of the wiring harness.
- (g) If voltage is present, there is a short in the wiring or wiper switch.

**CONDITION: MOTOR WILL RUN AT HIGH SPEED, BUT NOT AT LOW SPEED. MOTOR WILL RUN AT LOW SPEED, BUT NOT AT HIGH SPEED**

#### PROCEDURE

(1) If motor will not run on high speed, put switch in HIGH position and connect a test lamp between motor Terminal 4 and ground (Fig. 12).



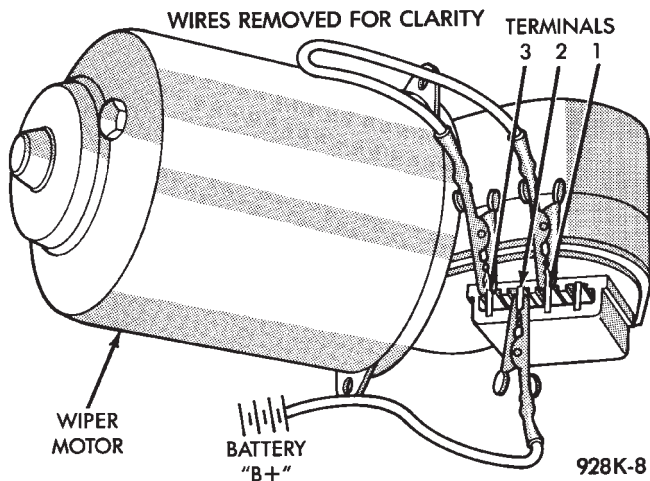
**Fig. 12 Test Lamp Between Terminal 4 and Ground**

- (2) If motor will not run on low speed, put switch in LOW position and connect a test lamp between motor Terminal 3 and ground.
- (3) If test lamp does not light at motor terminal, there is an open in wiring or switch. If test lamp lights at motor terminal, replace motor assembly.

**CONDITION: MOTOR WILL KEEP RUNNING WITH SWITCH IN OFF POSITION**

#### PROCEDURE

Remove wiring harness. Connect jumper from Terminal 1 to Terminal 3 of wiper motor (Fig. 13). Connect second jumper from Terminal 2 to battery (B+). If motor runs to PARK position and stops, wiper switch is faulty. If motor keeps running and does not park, replace motor assembly.



**Fig. 13 One Jumper Wire Between Terminal 1 and 3. One Jumper Wire Between Terminal 2 and Battery positive**

CONDITION: MOTOR WILL STOP WHEREVER IT IS, WHEN COLUMN SWITCH IS PUT IN OFF POSITION. THE WIPERS DO NOT CONTINUE RUNNING TO PARK POSITION

#### PROCEDURE

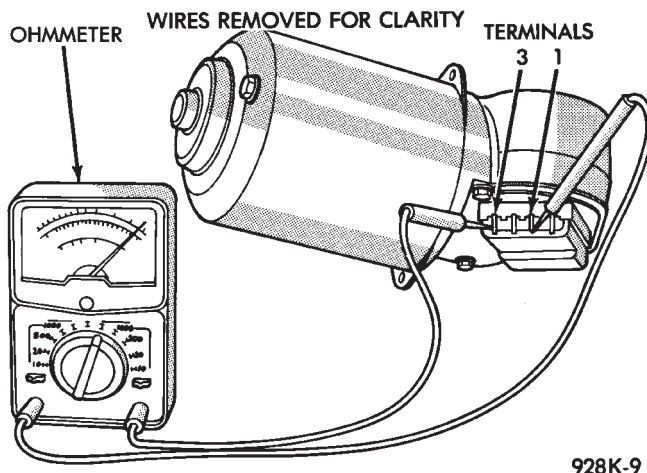
(1) Remove motor wiring connector and clean terminals. Reconnect connector and test motor. If problem persists, proceed to Step 2.

(2) Set wiper switch to OFF position. Disconnect motor wiring connector. Connect a voltmeter or test lamp to the motor ground strap. Connect the other lead to terminal 2 of wiring connector.

(a) If voltage is not present, check for an open circuit in the wiring harness or wiper control switch.

(b) If voltage is present, proceed to step 3.

(3) Connect an ohmmeter or continuity tester between terminals 3 and 1 (Fig. 14).



**Fig. 14 Ohmmeter Between Terminals 3 and 1**

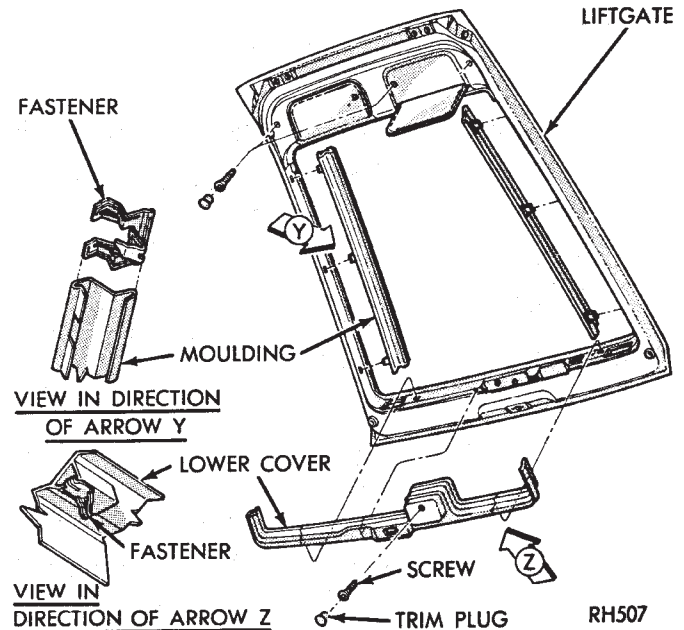
(a) If there is continuity between these terminals, the problem is a defective motor.

(b) If there is no continuity, the problem is an open circuit in the wiper control switch or wiring harness.

#### REAR WIPER MOTOR—AG BODY TEST

The following test is used in order to locate and then repair liftgate wiper motor defects. Refer to Group 8W, Wiring Diagrams for liftgate wiper motor wiring schematic.

(1) Remove lower cover on liftgate (Fig. 15).



**Fig. 15 Liftgate Lower Cover**

(2) Disconnect feed connector from wiper motor.

(3) With ignition switch in ON position, check for battery voltage at blue wire.

(4) With ignition switch in ON position and wiper switch ON, check for battery voltage at blue and brown wire. If battery voltage is not present in steps 3 and 4, check fuse, liftgate wiper switch and wiring.

(5) With ignition switch in ON position, and wiper switch in OFF position, check for battery voltage between blue and brown wires. If battery voltage is not present, check ground wire to liftgate switch.

(6) If battery voltage is present in steps 3 and 4, replace motor.

#### FRONT WIPER MOTOR ASSEMBLY—AG and AJ BODIES

##### REMOVAL

(1) Park system.

(2) Open the hood assembly.

(3) Remove wiper arms and blades, disconnect hoses from tee connector (Fig. 16).

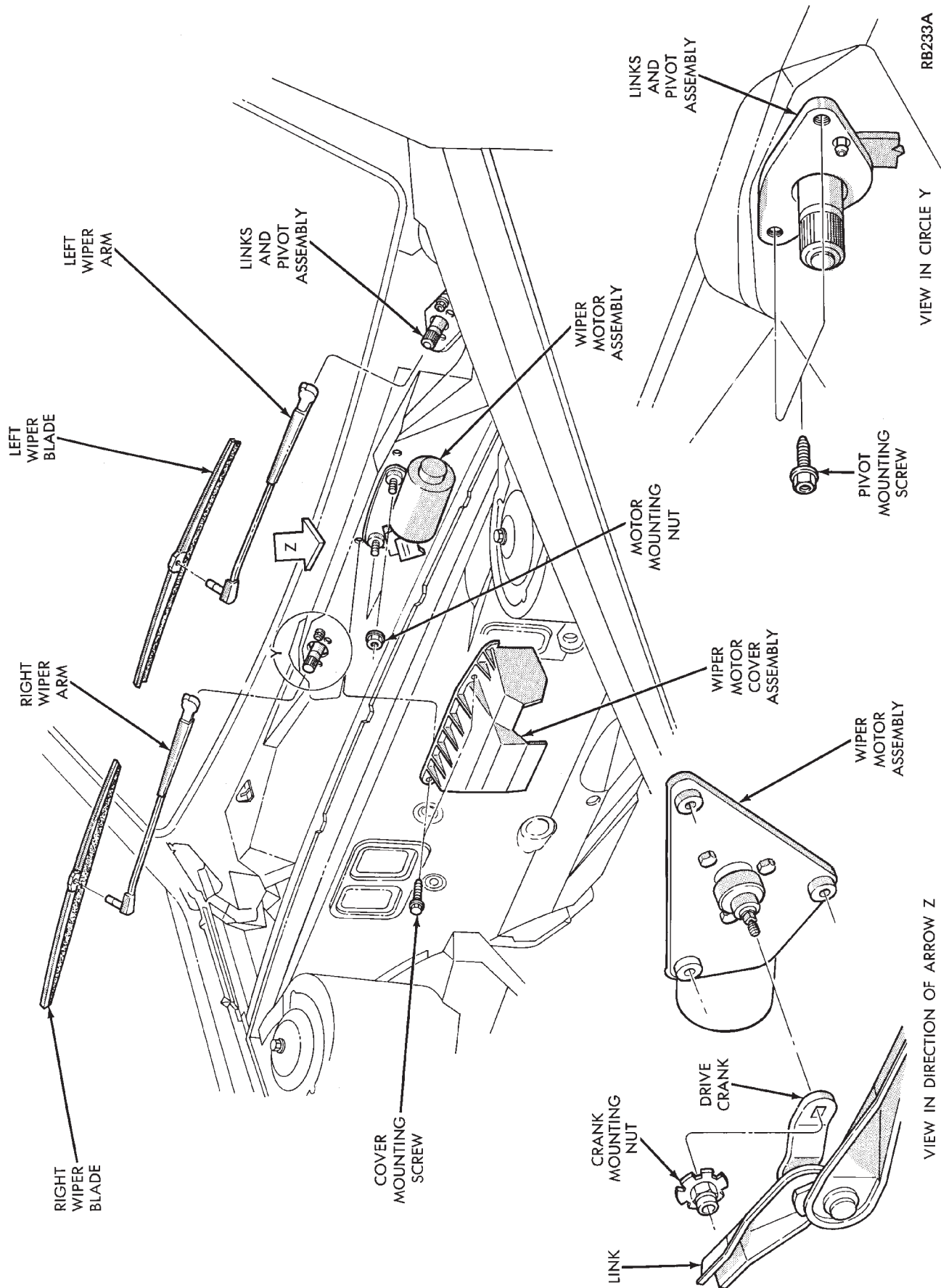


Fig. 16 Windshield Wiper Motor and Linkage—AG and AJ Bodies

- (4) Remove the cowl top plastic screen.
- (5) Remove pivot screws.
- (6) Remove wiper motor cover and disconnect wiring harness.
- (7) Remove three motor mounting nuts.
- (8) Push pivots down into plenum chamber and pull motor out until it clears the mounting studs. Then move it as far to the drivers side or outboard as it will go. Pull right pivot and link out through opening. Shift motor to opposite side or inboard of opening and remove motor, left link and pivot.
- (9) Clamp motor crank in a vise and remove nut from end of motor shaft. **Do not rotate motor output shaft from PARK position.**

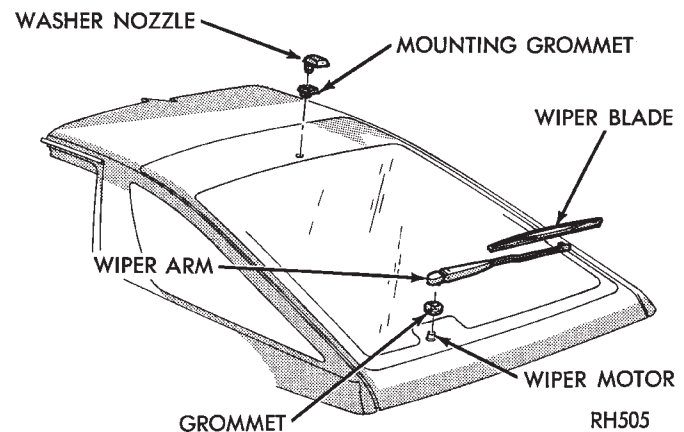
#### INSTALLATION

- (1) Assemble linkage to motor. Make sure crank fits over D slot on motor shaft. Torque mounting nut 10 to 11 N·m (90 to 100 in. lbs.). Be sure motor is still in park position before assembling to linkage, if not temporarily connect motor to wiring and operate switch to position motor in park before assembling linkage.
- (2) Place left pivot and link into plenum chamber.
  - (a) Slide it all the way to the left or outboard side until motor clears studs and crank is behind sheet metal.
  - (b) Push right pivot and link through opening.
  - (c) Move assembly right and position motor on studs.
- (3) Install three motor mounting nuts and tighten 7 to 8 N·m (60 to 70 in. lbs.) torque.
- (4) Position pivots and install pivot screws and tighten 7 to 8 N·m (60 to 70 in. lbs.) torque.
- (5) Connect wiring to motor.
- (6) Install motor cover. Tighten screws to 4 N·m (35 in. lbs.) torque.
- (7) Attach reservoir hose to T-connector through hole provided in cowl screen.
- (8) Use plastic fasteners to install cowl screen.
- (9) Install arm and blade assemblies. Refer to Wiper Arm Adjustment. Connect arm washer hoses to T-connector.

#### REAR WIPER MOTOR ASSEMBLY—AG BODY

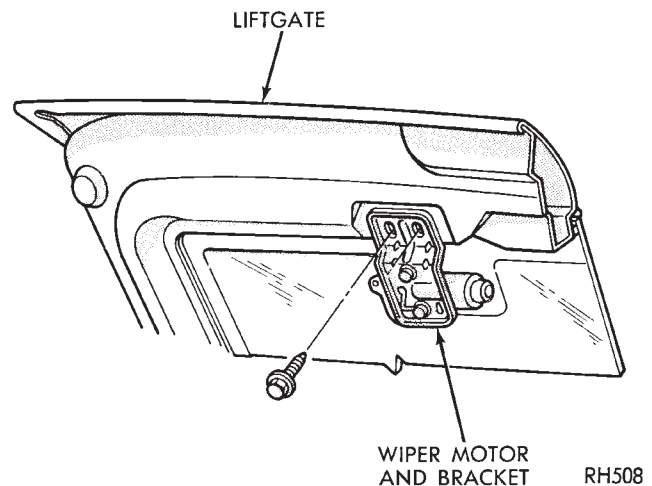
##### REMOVAL

- (1) Remove arm and blade assembly, refer to Arm and Blade Removal.
- (2) Unlock and open liftgate.
- (3) Remove trim panel refer to Group 23, Body.
- (4) Disconnect feed wire connector from motor.
- (5) Remove grommet from liftgate glass (Fig. 17).



**Fig. 17 Liftgate Wiper Grommet**

- (6) Remove two screws fastening bracket to liftgate (Fig. 18).



**Fig. 18 Liftgate Wiper Motor—AG Body**

- (7) Remove motor from liftgate.

##### INSTALLATION

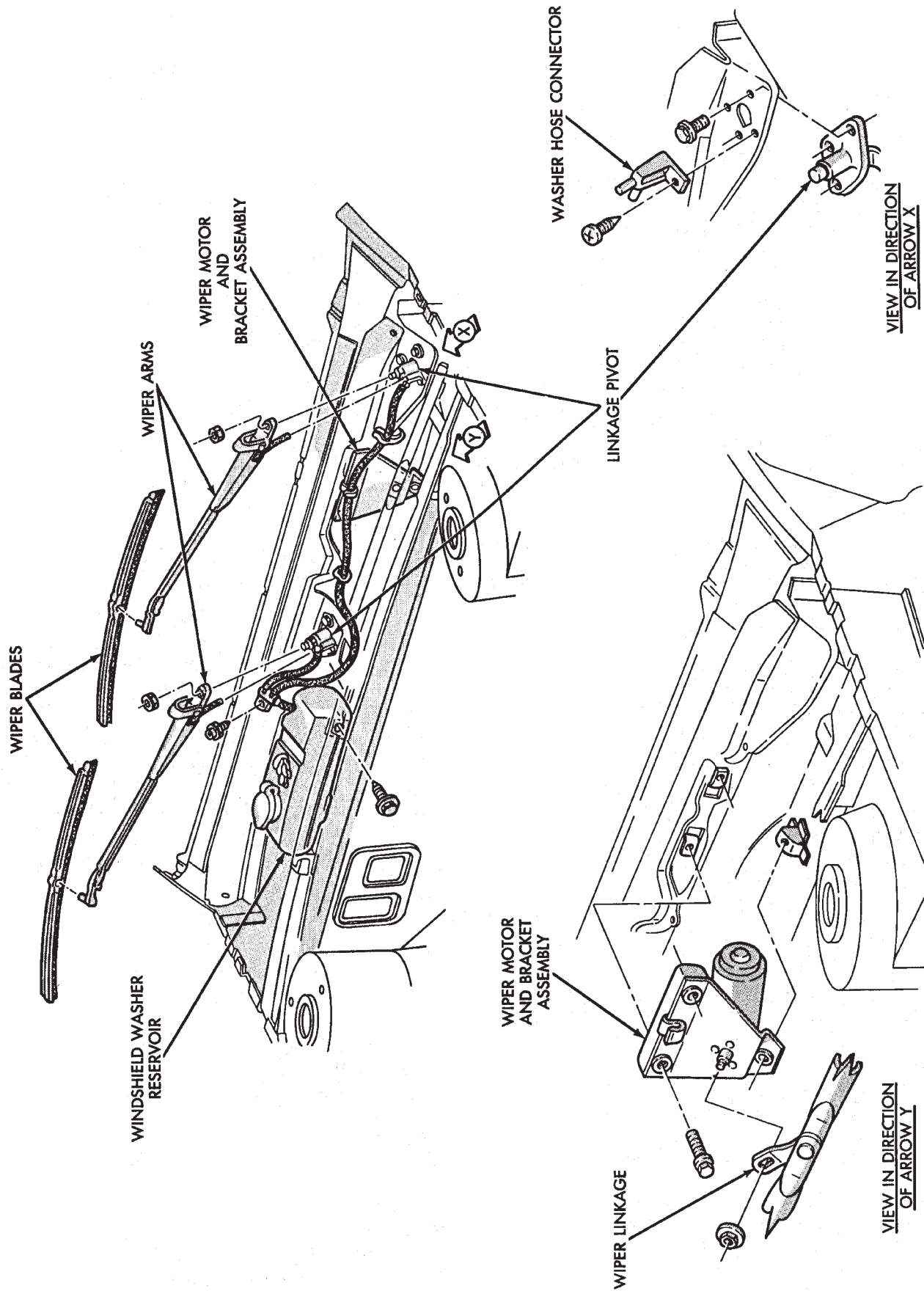
- (1) Install new grommet in liftgate glass.
- (2) Position motor to liftgate and secure with two screws. Tighten screws 7 to 8 N·m (60 to 70 in. lbs.) torque.
- (3) Connect feed wires to motor.
- (4) Install trim panel.
- (5) Install and adjust arm and blade assembly refer to Arm Assembly. Tighten nut 17 to 19 N·m (150 to 170 in. lbs.) torque.

#### WIPER MOTOR AND LINKAGE ASSEMBLY—AA, AC, AY BODIES

##### REMOVAL

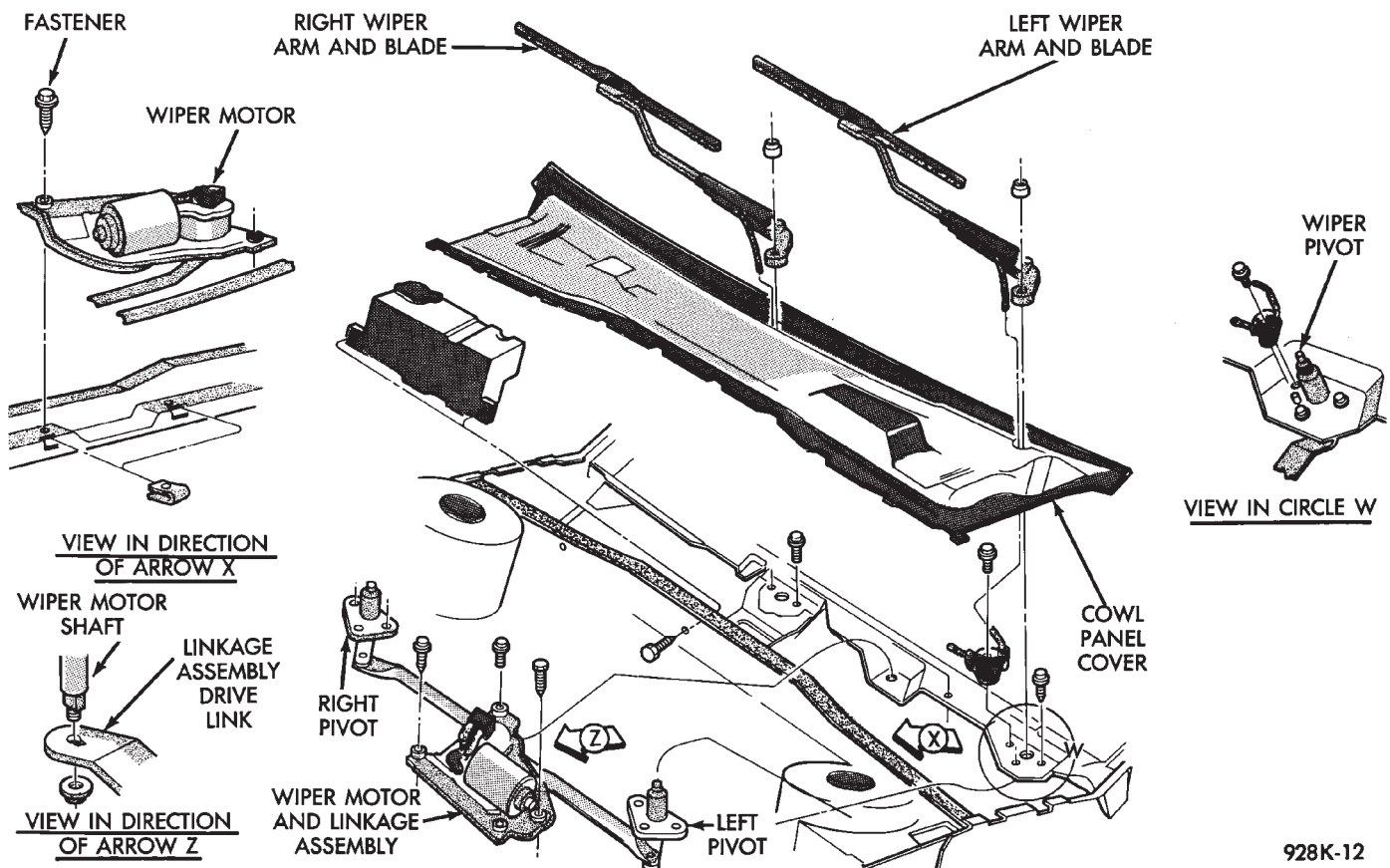
- (1) Open hood assembly.
- (2) Remove wiper arms (Fig. 19 and 20).





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Fig. 19 Windshield Wiper Motor and Linkage—AC and AY Bodies



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**Fig. 20 Windshield Wiper Motor and Linkage—AA Body**

- (3) Remove cowl top plastic cover.
- (4) Remove three attaching screws from each pivot.
- (5) Disconnect the wiper motor wiring harness.
- (6) Remove three bolts that attach motor mounting bracket to body.
- (7) Remove wiper motor, bracket, and linkage assembly from cowl plenum.
- (8) Clamp motor crank in a vise and remove nut from end of motor shaft. **Do not rotate motor output shaft from PARK position.**

#### INSTALLATION

- (1) Assemble linkage to motor. Make sure crank fits over D slot on motor shaft. Tighten mounting nut 10 to 11 N·m (90 to 100 in. lbs.) torque. Be sure motor is still in park position before assembling to linkage, if not temporarily connect motor to wiring and operate switch to position motor in park before assembling linkage.
- (2) Install wiper motor, bracket, crank and linkage assembly into cowl plenum.
- (3) Loosely install pivots and hose connector with three attaching screws.
- (4) Secure motor mounting bracket screws to body and tighten to 7 to 8 N·m (60 to 70 in. lbs.) torque.
- (5) Tighten pivot attaching screws to 7 to 8 N·m (60 to 70 in. lbs.) torque.
- (6) Attach wiper motor wiring harness.

- (7) Cycle wiper motor and turn OFF. To ensure wiper motor is in the park position.
- (8) Install cowl top plastic cover.
- (9) Install and adjust wiper arm assembly tighten to 17 to 19 N·m (150 to 170 in. lbs.) torque.

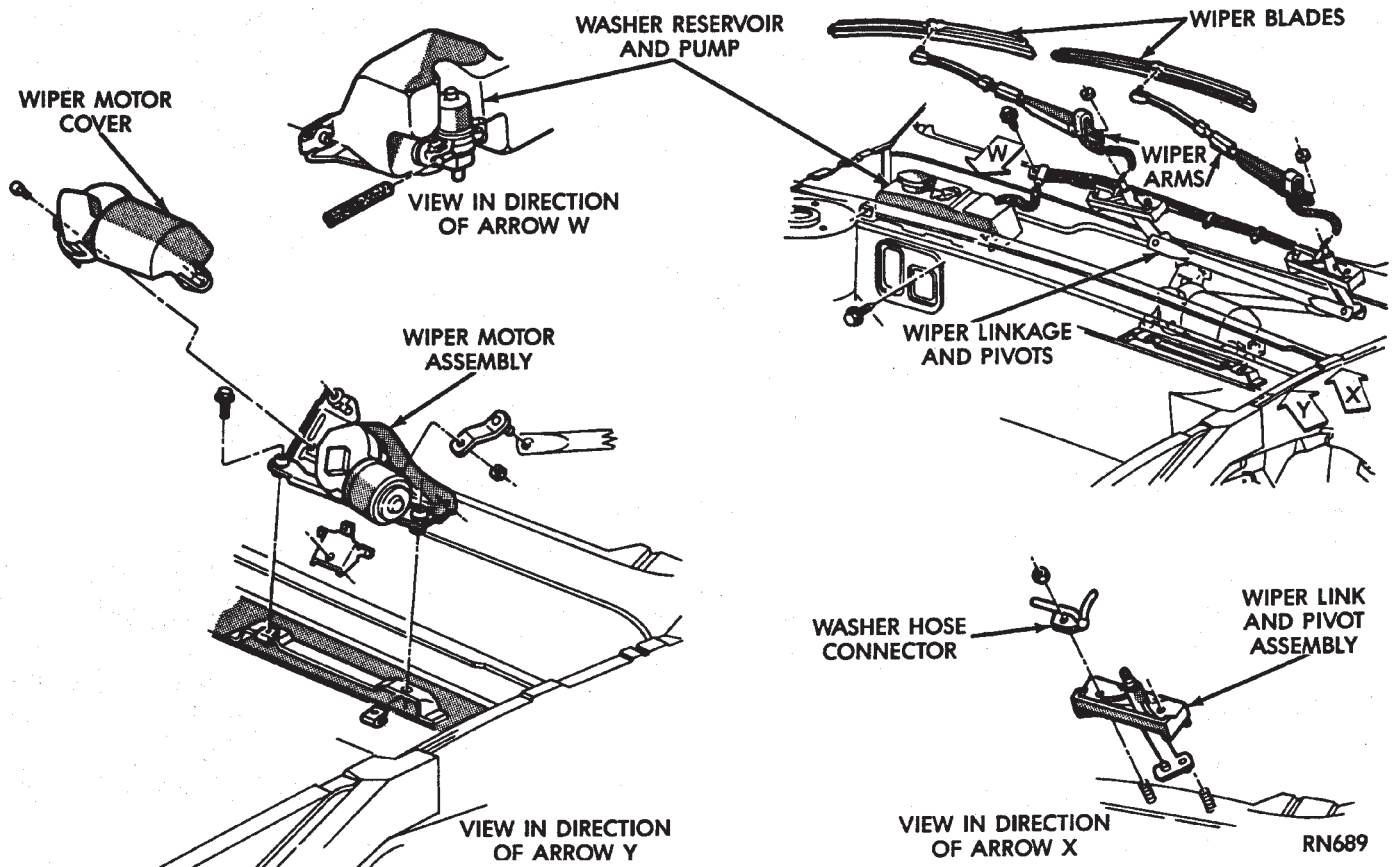
#### WIPER MOTOR AND LINKAGE ASSEMBLY—AP BODY

##### REMOVAL

- (1) Open hood assembly.
- (2) Remove wiper arms (Fig. 21).
- (3) Remove cowl top plastic cover.
- (4) Disconnect the wiper motor wiring harness.
- (5) Remove retaining nuts from the pivot mounting studs.
- (6) Remove the three bolts that attach motor mounting bracket to body.
- (7) Remove wiper motor, bracket, and linkage assembly from cowl plenum.
- (8) Clamp motor crank in a vise and remove nut from end of motor shaft. **Do not rotate motor output shaft from PARK position.**

##### INSTALLATION

- (1) Assemble linkage to motor. Make sure crank fits over D slot on motor shaft. Tighten mounting nut



**Fig. 21 Windshield Wiper Motor and Linkage—AP BODY**

10 to 11 N·m (90 to 100 in. lbs.) torque. Be sure motor is still in park position before assembling to linkage, if not temporarily connect motor to wiring and operate switch to position motor in park before assembling linkage.

(2) Install wiper motor, bracket crank and linkage assembly into cowl plenum.

(3) Loosely install pivots and hose connector with retaining nuts to mounting studs.

(4) Secure motor mounting bracket screws to body and tighten to 7 to 8 N·m (60 to 70 in. lbs.) torque.

(5) Attach wiper motor wiring harness.

(6) Tighten pivot attaching screws to 7 to 8 N·m (60 to 70 in. lbs.) torque.

(7) Cycle wiper motor and turn OFF. To ensure wiper motor is in the park position.

(8) Install cowl top plastic cover.

(9) Install and adjust wiper arm assembly. Tighten to 17 to 19 N·m (150 to 170 in. lbs.) torque.

# INTERMITTENT WINDSHIELD WIPER MOTOR AND SWITCH SERVICE PROCEDURES

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## INTERMITTENT WIPER MOTOR SYSTEM TEST

Intermittent Wiper Motor Service Procedures for diagnosis of problems which do not involve the delay function, refer to the Two-Speed Motor Function Tests. The two-speed functions of all wiper motors are identical.

If a problem occurs, only in the DELAY mode, the following tests are to be performed.

## INTERMITTENT WINDSHIELD WIPER SWITCH TESTS

**WARNING: ON VEHICLES EQUIPPED WITH AIR-BAG, SEE GROUP 8M, RESTRAINT SYSTEMS FOR STEERING WHEEL OR COLUMN REMOVAL PROCEDURES.**

The intermittent wipe function on AC, AG, AJ and AY vehicles is controlled by the body controller, located in the passenger compartment behind the right side kick panel (Fig. 22). If the body controller is determined to be the problem, refer to Group 8E, Instrument Panels and Gauges, for replacement procedures.

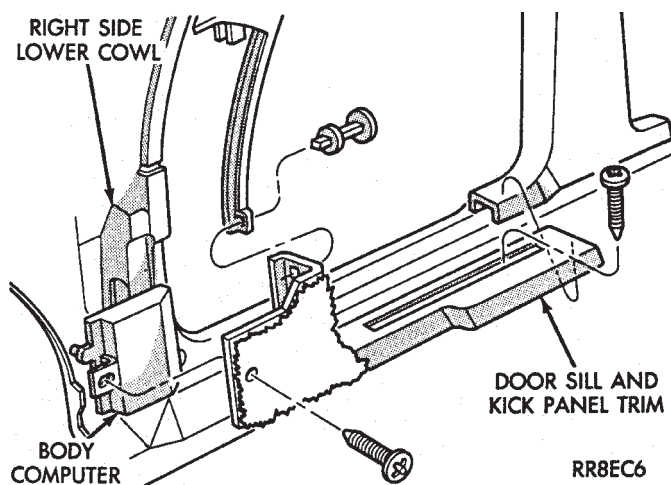


Fig. 22 Body Controller Location

*CONDITION: WIPERS DO NOT COME ON WHEN THE SWITCH IS IN DELAY POSITION*

## PROCEDURE

(1) Disconnect 25-way connector (blue) from the body controller.

(2) Place wiper control switch in maximum DELAY position.

(3) Connect positive lead of voltmeter to pin 9 of connector (blue) and negative lead to the good ground.

(a) If voltmeter reads 0, check control switch and wiring for an open circuit.

(b) If voltmeter reads 10 to 15 volts, proceed to step 4.

(4) Connect positive lead of voltmeter to pin 22 of blue connector and negative lead to a good ground.

(a) If voltmeter reads 0, check fuses and wiring for an open circuit.

(b) If voltmeter reads 10 to 15 volts, reconnect body controller and proceed to step 5.

(5) Connect positive lead of voltmeter to pin 24 of blue connector and negative lead to the metal case of the body controller. Disconnect wiring harness from wiper motor. Set control switch to the minimum delay mode.

(a) If voltmeter reads 0, check wiring from the intermittent wipe switch to body controller for an open circuit.

(b) If voltmeter reads 10 to 15 volts, proceed to step 6.

(6) Connect voltmeter to pin L of the Intermittent wiper switch. Place intermittent wiper switch in the Max. Delay position.

(a) If voltmeter reads zero volts, change the intermittent wiper switch.

(b) If voltmeter reads 10-15 volts, check the wiring harness from the intermittent wiper switch to the wiper motor for an open circuit.

(7) If all tests above have been performed and the problem was not found, replace the body controller.



*CONDITION: WIPERS START TO WIPE, BUT STOP BEFORE ONE COMPLETE CYCLE AND DO NOT RETURN TO PARK POSITION*

#### PROCEDURE

- (1) Verify that motor will park when the column switch is put in the OFF position.
- (2) Set wiper control switch to maximum DELAY and allow motor to run until it stops during the wipe cycle. When motor stops, disconnect 25-way blue connector from the body controller.
- (3) Connect positive lead of voltmeter to pin 20 of blue connector and negative lead to the metal case of the body controller.
  - (a) If voltmeter reads 0, check wiring for an open circuit.
  - (b) If voltmeter reads 10 to 15 volts, proceed to step 4.
- (4) Using an ohmmeter or continuity tester;
  - (a) Check for continuity between pins 20 and 24 of blue connector of the body controller.
  - (b) Reverse ohmmeter leads on pins 20 and 24, again checking for continuity.
  - (c) If continuity between pins 20 and 24 is not observed in both steps a and b, replace the body controller.

*CONDITION: EXCESSIVE DELAY OF MORE THAN 30 SECONDS OR INADEQUATE VARIATION IN DELAY*

#### PROCEDURE

- (1) Variations in delay should be as follows:
  - (a) Minimum delay control to extreme counter-clockwise position before first detent of 1/2 to 2 seconds.
  - (b) Maximum delay control to extreme clockwise position before OFF detent of 15 to 25 seconds.
- (2) If there is excessive delay or no variations in delay, remove the wiper motor wiring harness while the motor is parked in the OFF position.
- (3) Remove 25-way blue connector from the body controller.
- (4) Set wiper control switch to maximum DELAY position.
- (5) With ignition switch in ON position, measure voltage between pin 9 of black connector and a good ground.
  - (a) If voltmeter reads 0, proceed to step 6.
  - (b) If voltmeter reads 10 to 15 volts, proceed to step 7.
- (6) Set wiper control switch to minimum DELAY position and measure voltage between pin 9 of blue connector and a good ground.
  - (a) If voltmeter reads 0, check for an open circuit in the intermittent wipe wiring harness.
- (7) Remove wiper motor circuit fuse.

(8) Using an ohmmeter, measure the resistance between pins 9 and 22 of the body controller 25-way black connector. Set the wiper control switch first to minimum DELAY and then maximum DELAY.

- (a) If resistance reading at minimum DELAY setting is between 0 and 15 ohms, and at maximum DELAY setting the resistance is between 240,000 and 400,000 ohms, replace the body controller.
- (b) If the resistance values above are not obtained, replace the wiper control switch.

*CONDITION: WIPERS DO NOT RUN CONTINUALLY WHEN WASH CONTROL IS OPERATED DURING DELAY MODE*

#### PROCEDURE

- (1) Disconnect 25-way blue connector from the body controller
- (2) Using a voltmeter, connect the positive lead to pin 10 of the (Black) connector. Connect negative lead to the body computer metal case.
- (3) Set wiper control switch to DELAY position.
- (4) Depress wash switch.
- (5) If voltage reads 0, check switch relay and wiring.
- (6) If voltage is between 10 and 15 volts, the problem is in the body controller.

*CONDITION: IN DELAY MODE, WIPERS RUN CONTINUALLY WHEN WASH IS OPERATED BUT DO NOT PROVIDE FOUR EXTRA WIPES WHEN WASH CONTROL IS RELEASED*

#### PROCEDURE

- Replace body controller.

*CONDITION: WIPERS START ERRATICALLY DURING DELAY MODE*

#### PROCEDURE

- (1) Verify that the ground connection at the instrument panel is making a good connection, free from paint and is tight.
- (2) Verify that the motor ground strap is making good contact and that the motor mounting bolts are tight.
- (3) Verify that the wiring connections to the body controller, wiper motor, and wiper motor switch are tight and free of corrosion.
- (4) If condition is not corrected, problem is with the body controller

## INTERMITTENT WIPER FUNCTION TESTS

**CONDITION:** EXCESSIVE DELAY OF MORE THAN 30 SECONDS OR INADEQUATE VARIATION IN DELAY

### PROCEDURE

Variations in delay should be as follows:

(1) Minimum delay control to extreme counterclockwise position before first detent of one half to two seconds.

(2) Maximum delay control to extreme clockwise position before off detent of ten to thirty seconds.

(3) If there is excessive delay or no variations in delay proceed to intermittent wipe switch test.

**CONDITION:** IN DELAY MODE WIPERS RUN CONTINUALLY WHEN WASH IS OPERATED BUT DO NOT PROVIDE AN EXTRA WIPE WHEN THE WASH CONTROL IS RELEASED

### PROCEDURE

Replace the control unit.

**CONDITION:** WIPERS START ERRATICALLY DURING DELAY MODE

### PROCEDURE

(1) Verify that the ground connection at the instrument panel is making good connection, free from paint and is tight.

(2) Verify that the motor ground strap is making good contact and that the motor mounting bolts are tight.

(3) Verify that the wiring ground connections for the intermittent wipe control unit and the wiper switch are tight.

(4) If condition is not corrected, replace control unit.

## STANDARD WIPER SWITCH TEST

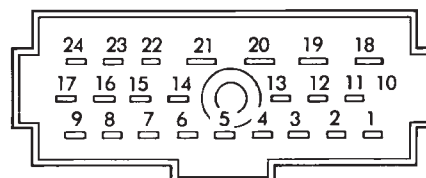
### AP BODY

To test the switch, first disconnect the switch wires from the body wiring in the steering column. Using an ohmmeter, test for continuity between the terminals of the switch, as indicated in the following continuity chart. The identity of each terminal is shown in Fig. 23.

## INTERMITTENT WIPE SWITCH TEST

### AC AND AY BODIES

To test the switch, first disconnect the switch wires from the body wiring in the steering column. Using an ohmmeter, test for continuity between the terminals of the switch, as indicated in the following continuity chart. The identity of each terminal is shown in Fig. 24.

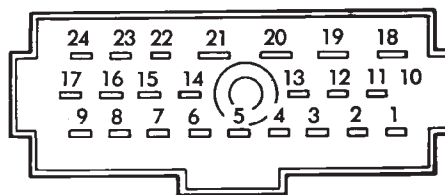


MULTIFUNCTION SWITCH PINS

SWITCH POSITION	CONTINUITY BETWEEN
OFF	PIN 1 AND PIN 2
LOW	PIN 1 AND PIN 4
HIGH	PIN 4 AND PIN 5
WASH	PIN 3 AND PIN 4
* RESISTANCE AT MAXIMUM DELAY POSITION SHOULD BE BETWEEN 210,000 OHMS AND 390,000 OHMS.	
* RESISTANCE AT MINIMUM DELAY POSITION SHOULD BE ZERO WITH OHMMETER SET ON HIGH OHM SCALE.	

928J-4

**Fig. 23 Standard 2-Speed Wiper Switch Test**



MULTIFUNCTION SWITCH PINS

SWITCH POSITION	CONTINUITY BETWEEN
OFF	PIN 6 AND PIN 7
DELAY	PIN 8 AND PIN 9
	PIN 2 AND PIN 4
	PIN 1 AND PIN 2
	PIN 1 AND PIN 4
LOW	PIN 4 AND PIN 6
HIGH	PIN 4 AND PIN 5
WASH	PIN 3 AND PIN 4
* RESISTANCE AT MAXIMUM DELAY POSITION SHOULD BE BETWEEN 210,000 OHMS AND 390,000 OHMS.	
* RESISTANCE AT MINIMUM DELAY POSITION SHOULD BE ZERO WITH OHMMETER SET ON HIGH OHM SCALE.	

928J-3

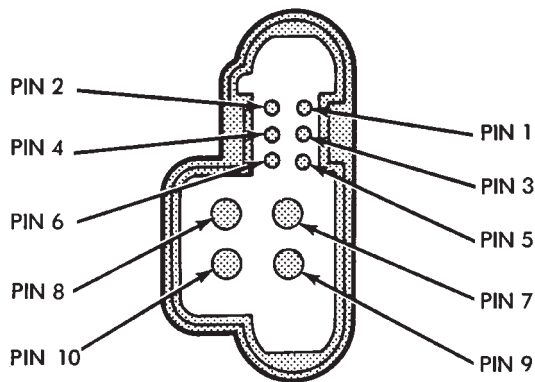
**Fig. 24 Multi-Function Switch Connector and Intermittent Wipe Continuity**

For test purposes, the first position is the OFF position, next is the slide for the DELAY wipe. LOW is the next detent position and HIGH is the full counterclockwise detent position.

In any wiper mode, if the knob is pushed all the way in, the washer circuit will be completed.

### AG AND AJ BODIES

To test the switch, remove switch pod from instrument panel. Using an ohmmeter, test for continuity between the terminals of the switch, as indicated in the following continuity chart (Fig. 25).



WIPER SWITCH PINS

SWITCH POSITION	CONTINUITY BETWEEN
OFF	PIN 8 AND PIN 10
DELAY	PIN 1 AND PIN 9
LOW	PIN 9 AND PIN 10
HIGH	PIN 9 AND PIN 7

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**Fig. 25 Front Wiper Continuity—AG and AJ Bodies**  
WIPER SWITCH SERVICE PROCEDURE

**WARNING: ON VEHICLES EQUIPPED WITH AIR-BAG, SEE GROUP 8M, RESTRAINT SYSTEMS FOR STEERING WHEEL OR COLUMN REMOVAL PROCEDURES.**

#### AC AND AY BODIES

The wiper switch is part of the multi-function switch assembly. If the wiper switch fails, the multi-function switch must be replaced. Refer to Group 8J, Turn Signals and Hazard Warning Flasher for multi-function switch service procedure.

#### AG AND AJ BODIES

##### REMOVAL

- (1) Remove switch pod assembly from instrument panel.
- (2) Remove five inner switch pod panel.
- (3) Unhook switch linkage from buttons.
- (4) Remove switch mounting screws.
- (5) Remove switch.

##### INSTALLATION

- (1) Latch switch linkage in the up position.
- (2) Insert switch into switch pod and install mounting screws.
- (3) Unlatch linkage and install onto push buttons.

- (4) Operate all switch modes for correct operation.
- (5) Reinstall five inner switch pod panel screws.
- (6) Reinstall switch pod assembly.

#### PULSE INTERMITTENT WINDSHIELD WIPER CONTROLLER (PIWWC)

The controller is a part of the washing and wiper system which includes:

- Pulse intermittent windshield wiper controller
- Wiper blades and arms
- Wiper motor
- Windshield washer reservoir
- Wiring harness
- Windshield washer pump
- Windshield washer hoses

Any part not working properly could cause, the whole system not to work properly or at all. If the system is not working proper, check all parts before taking any action of part replacements.

The controller controls the pulse/wipe and the intermittent modes only. The time delay in the intermittent wipe mode is a minimum of 45 to a maximum of 25 seconds depending on the switch setting.

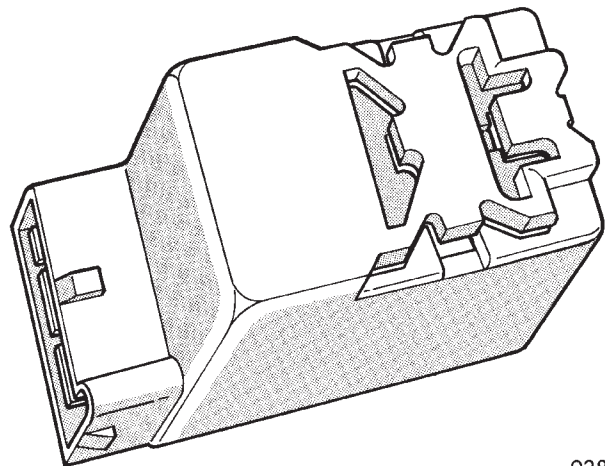
The wash function can be turned ON with the wiper control switch in the OFF position. Pressing the wash button on the end of the level will operate the washer pump until released. The wipers will operate while the pump is operating and continue for about three additional wipes ( $\pm 1$ ) after before parking.

#### AA BODY

The PIWWC (Fig. 26) is attached to a bracket located to the right of the steering column behind the steering column cover (Fig. 27).

#### AP BODY

The PIWWC is attached to a bracket located to the right of the steering column behind the steering column cover (Fig. 28).



928K-2

**Fig. 26 Pulse Intermittent Windshield Wiper Controller (PIWWC)**

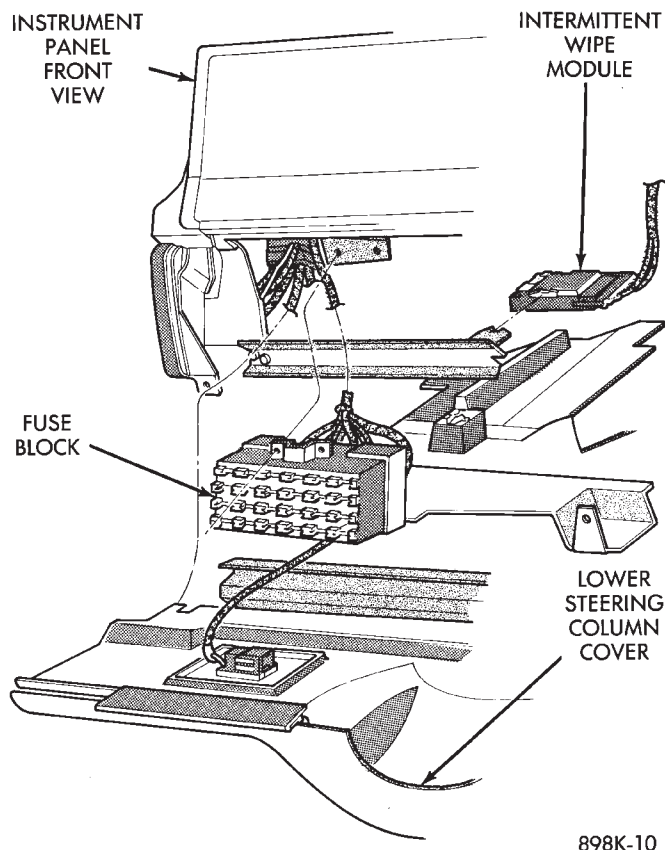


Fig. 27 PIWWC Location AA-Body

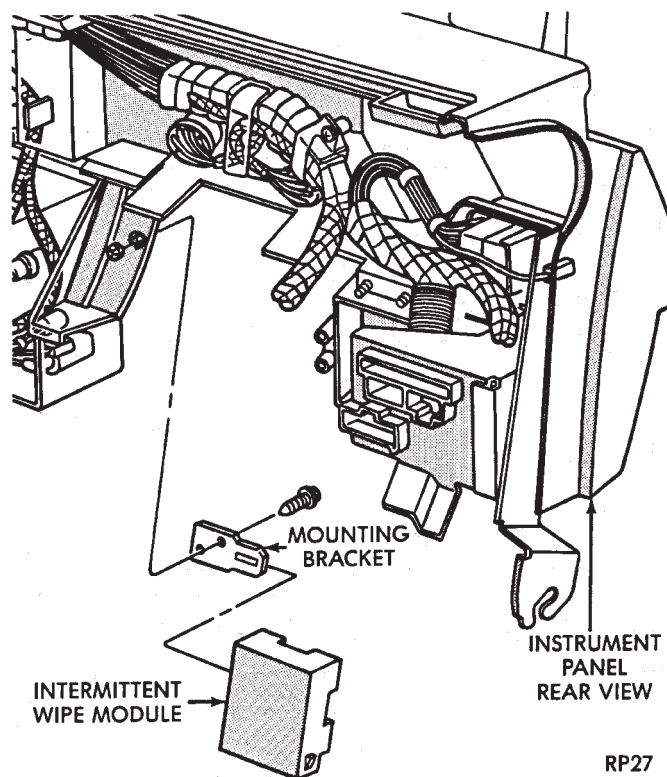


Fig. 28 PIWWC Location AP-Body

## WINDSHIELD WASHERS

## INDEX

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## GENERAL INFORMATION

All models are equipped with electric operated windshield washer pumps.

The wash function can be accessed in the OFF position of the wiper control switch. Holding the wash button depressed when the switch is in the OFF position will operate the wipers and washer motor pump continuously until the washer button is released. Releasing the button will stop the washer pump but the wipers will complete the current wipe cycle. Then followed by an average of two more wipe cycles ( $\pm 1$ ) before the wipers park and the module turns off.

Whenever a windshield washer malfunction occurs, first verify that the windshield washer wire harness is properly connected to all connectors before starting normal diagnosis and repair procedures. Refer to Windshield Washer Diagnosis Chart (Fig. 29).

The electric pump assembly is mounted directly to the reservoir. A permanently lubricated sealed motor is coupled to a rotor type pump. Fluid, gravity fed from the reservoir, is forced by the pump through rubber hoses to the nozzles which direct the streams to the windshield.

The pump and reservoir are serviced as separate assemblies on all vehicles.

## WASHER RESERVOIRS

## FRONT WASHER RESERVOIR

## REMOVAL

- (1) Remove cowl top screen on applicable models (Fig. 30 through 33)
- (2) Remove sheet metal screws attaching the reservoir in plenum.



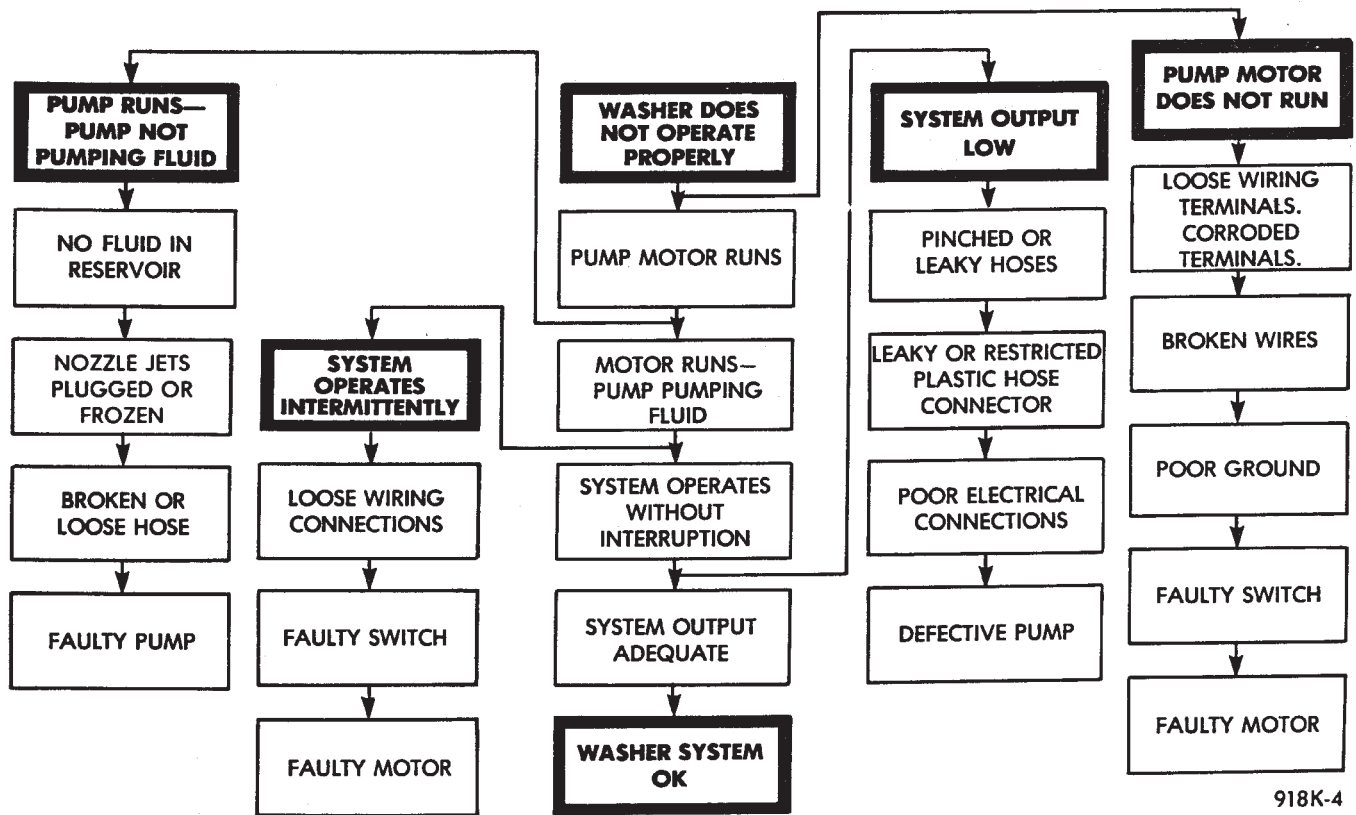


Fig. 29 Windshield Washer Diagnosis

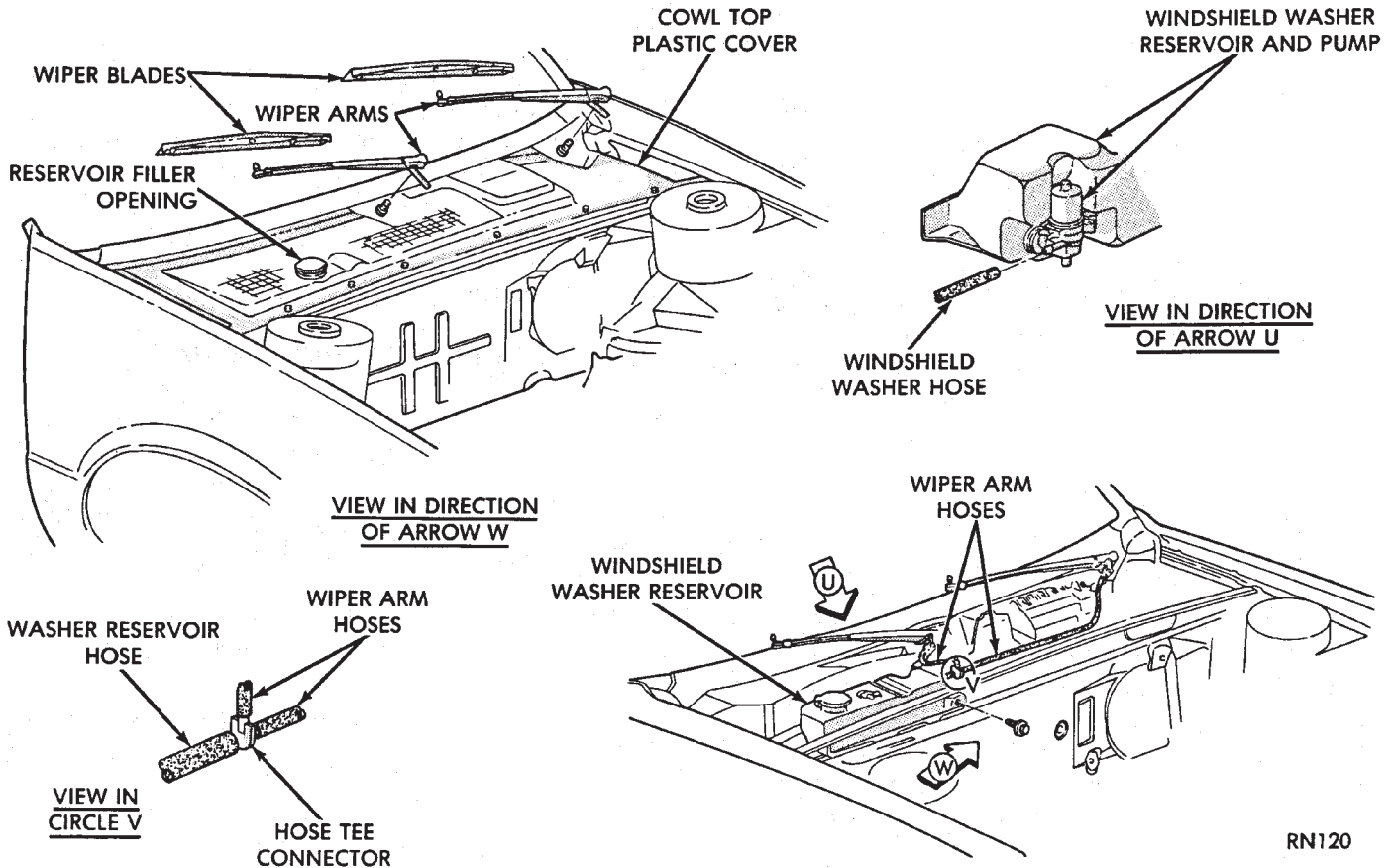
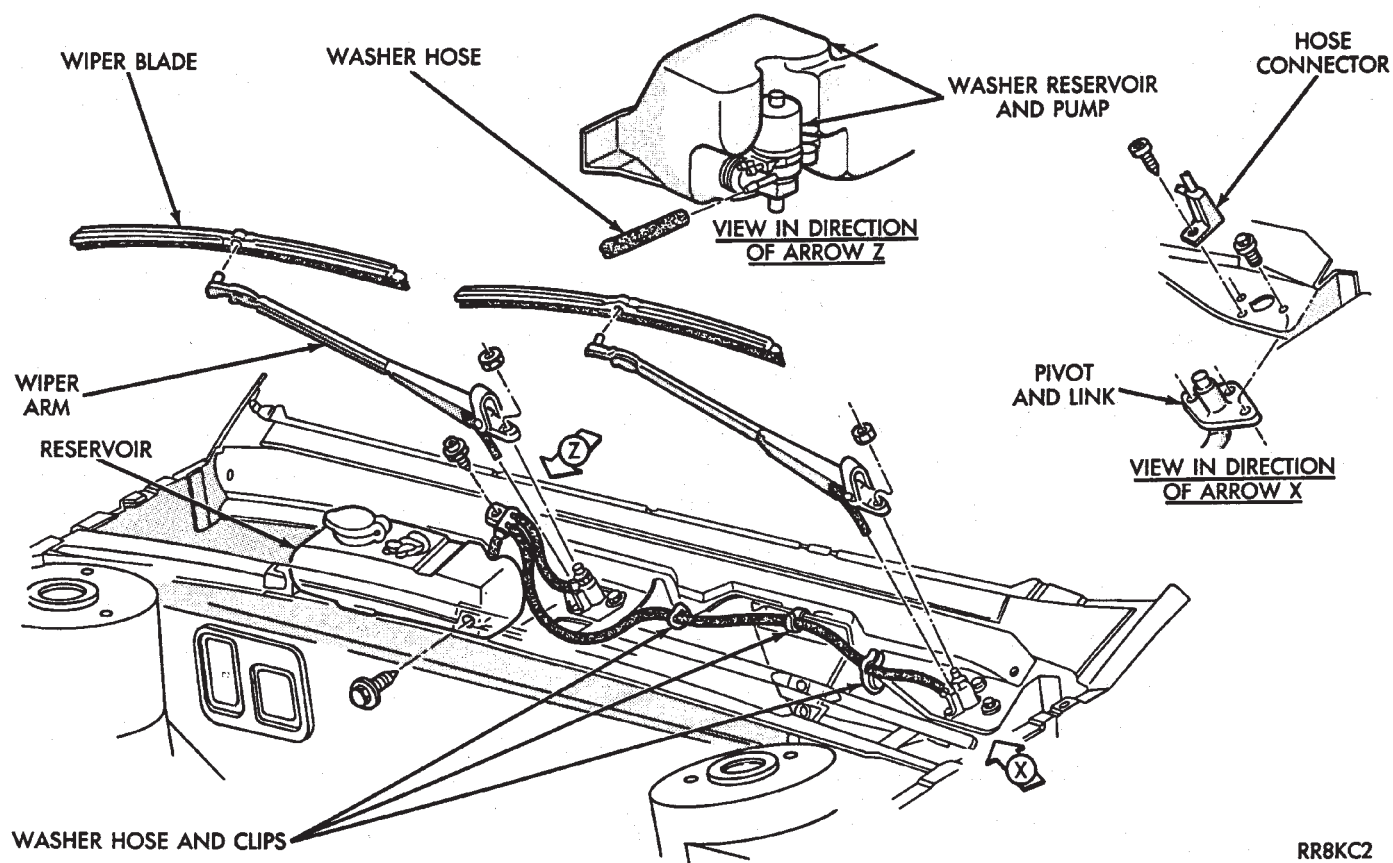


Fig. 30 Windshield Washer System—AG and AJ Bodies



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**Fig. 31 Windshield Washer System—AC and AY Bodies**

(3) Disconnect the wiring harness from the reservoir pump.

(4) Disconnect the washer hose and block the liquid outlet to prevent the liquid from running out while removing the reservoir from engine compartment.

#### INSTALLATION

(1) Connect washer hose, wiring harness and install the reservoir in the plenum chamber.

(2) Install sheet metal attaching screws. Tighten to 3 N·m (24 in. lbs.) torque.

#### REAR WASHER RESERVOIR

##### REMOVAL

- (1) Unlock and open liftgate.
- (2) Remove right rear quarter panel inside trim as necessary to gain access to reservoir (Fig. 34).
- (3) Remove two reservoir mounting screws.
- (4) Disconnect wiring harness and filler tube from reservoir and pump assembly.
- (5) Disconnect the washer hose and block the pump outlet to prevent liquid from running out.
- (6) Remove reservoir and pump assembly from rear quarter panel.

#### INSTALLATION

- (1) Position reservoir and pump assembly into the right rear quarter panel.
- (2) Connect washer hose, wire harness and filler tube to the reservoir and pump assembly.
- (3) Install two reservoir mounting screws.
- (4) Install right rear quarter panel inside trim.

#### WASHER RESERVOIR PUMP

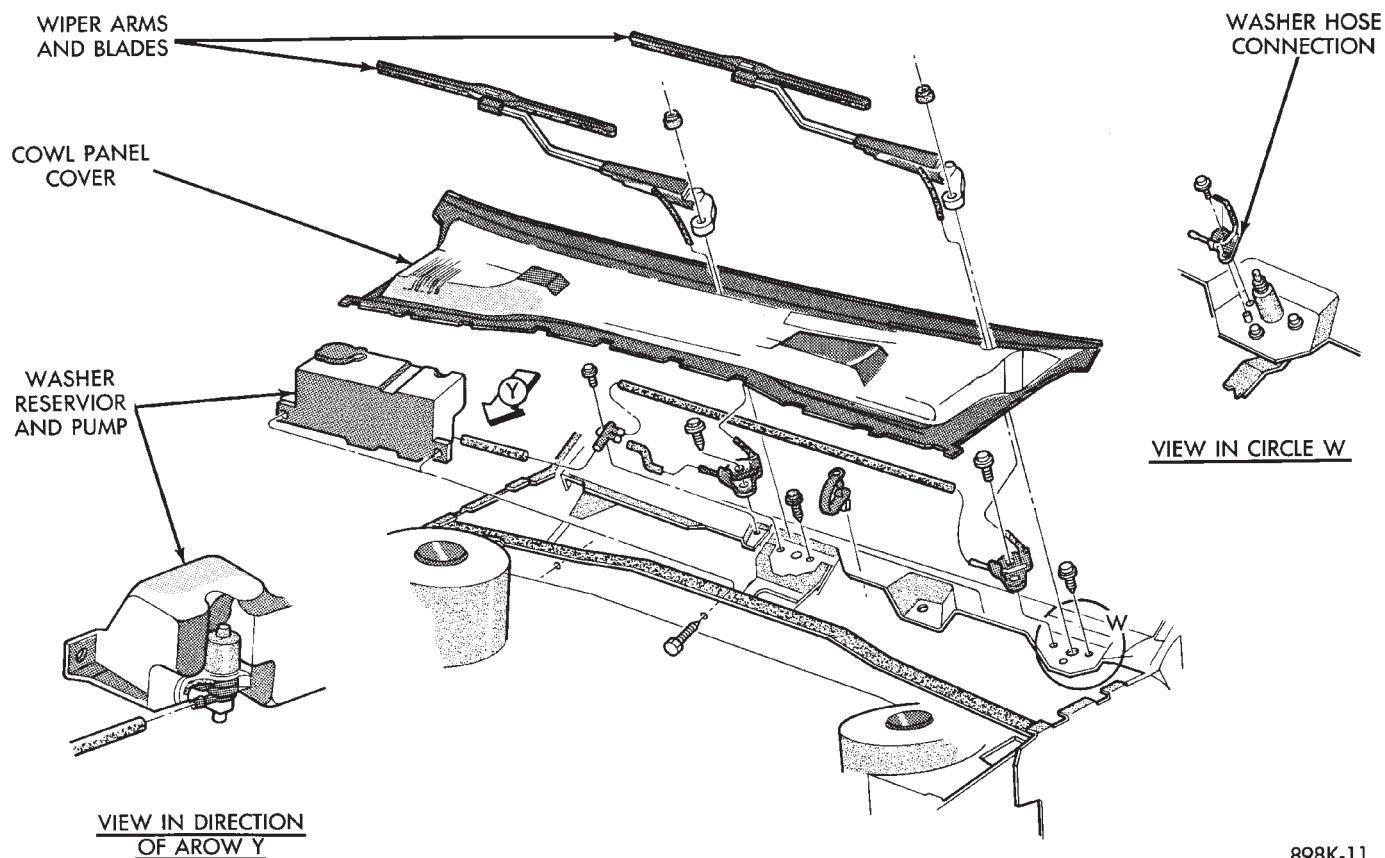
##### FRONT WASHER RESERVOIR PUMP

##### REMOVAL

- (1) Remove liquid from reservoir.
- (2) Remove reservoir mounting screws and remove reservoir and pump assembly (Fig. 30 through 33).
- (3) Disconnect electrical lead and rubber hose from bottom of pump.
- (4) Gently pry pump away from reservoir and out of grommet. Care must be taken not to puncture reservoir.
- (5) Remove rubber grommet from reservoir and throw away.

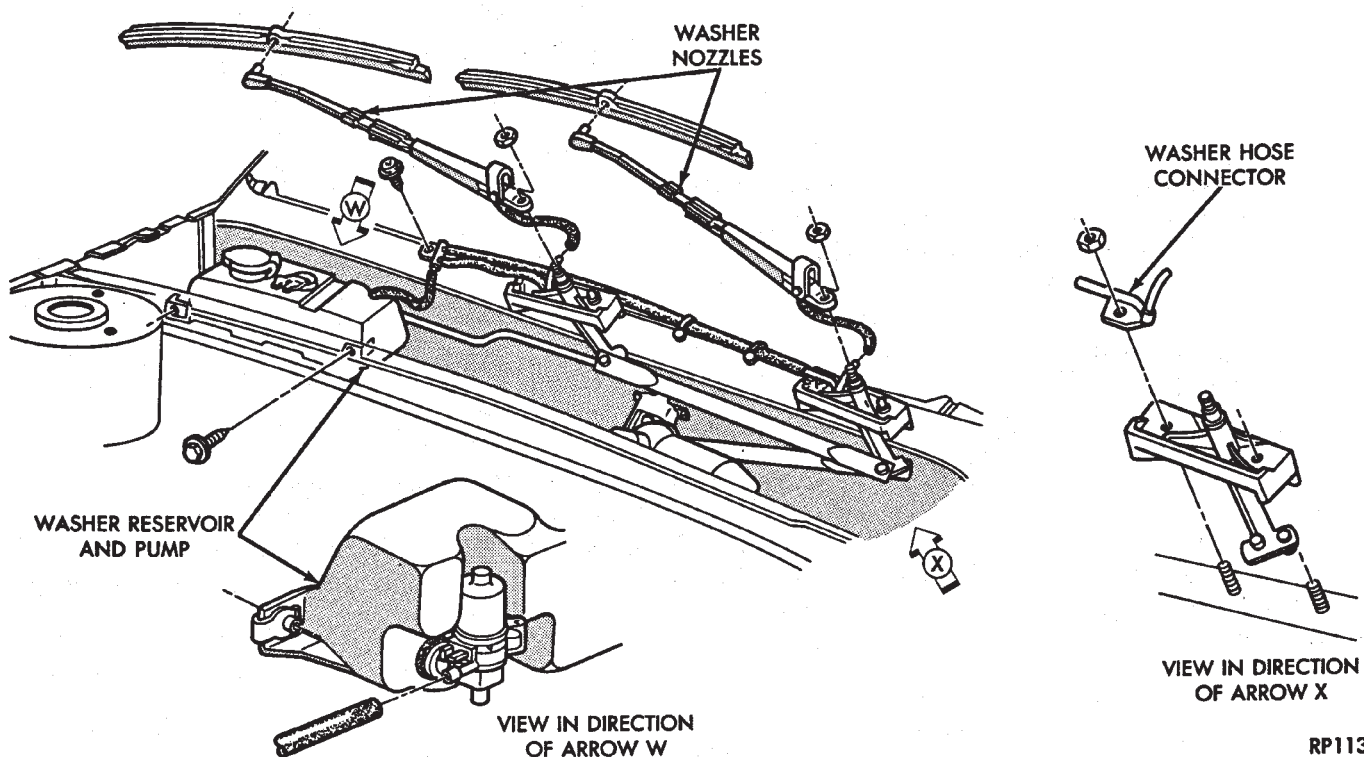
##### INSTALLATION

- (1) Install new rubber grommet on reservoir.
- (2) Position pump into place, and push in firmly until it locks into grommet.



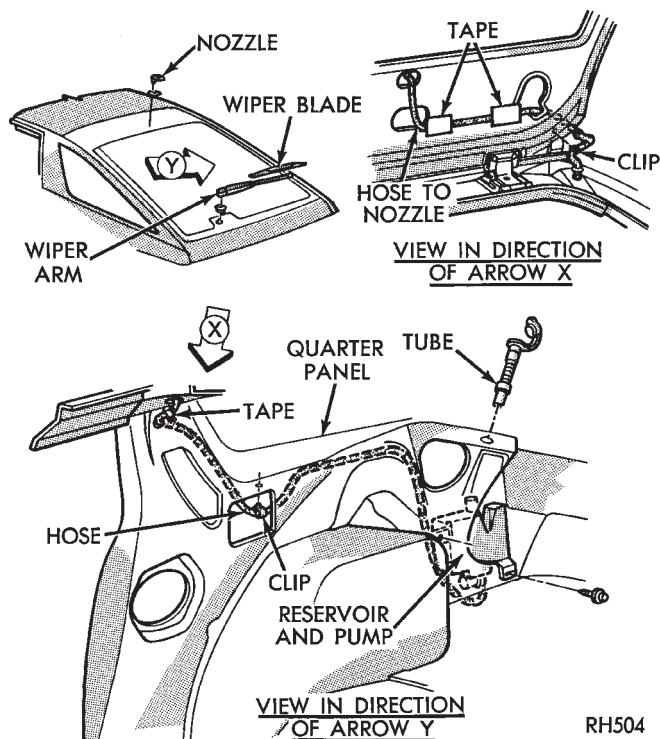
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Fig. 32 Windshield Washer System—AA Body



RP113

Fig. 33 Windshield Washer System—AP Body



**Fig. 34 Liftgate Washer System**

- (3) Connect electrical lead and rubber hose to pump.
- (4) Position reservoir into place and install mounting screws.
- (5) Fill reservoir.

#### REAR WASHER RESERVOIR PUMP

##### REMOVAL

- (1) Remove washer reservoir and pump assembly, refer to Washer Reservoir Removal.
- (2) With mechanical fingers, loosen pump filter and nut through liquid filler opening.
- (3) Disconnect the outside portion of the pump.
- (4) Remove inner and outer portions of the pump, and remove pump.

##### INSTALLATION

- (1) Install rubber grommet into place in bottom of reservoir.
- (2) Position pump into place, install nut through filler opening and tighten with mechanical fingers.
- (3) Install reservoir and pump assembly, refer to Reservoir Installation.

#### WASHER NOZZLE

##### FRONT WASHER NOZZLE

These models are equipped with the washer nozzles attached to the wiper arms. Each arm emit five streams across the wiper pattern. These washer systems requires no adjustment. If nozzle performance is unsatisfactory, they should be replaced. The right and left nozzles are identical.

##### REMOVAL

To remove unsnap nozzle from wiper arm and disconnect hose.

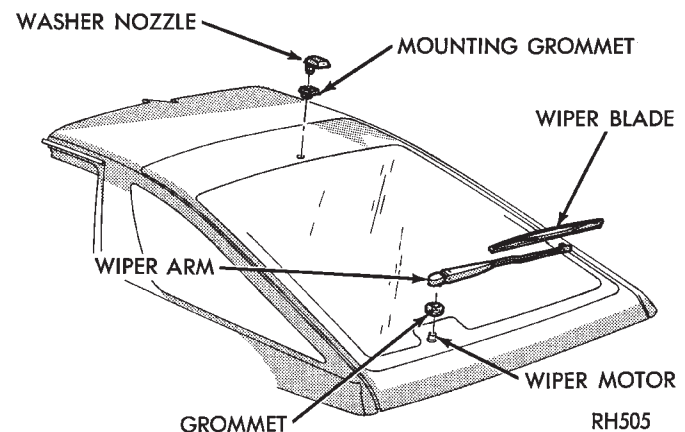
##### INSTALLATION

To install make sure that both the nozzle and the hose guard are securely snapped into position.

##### REAR WASHER NOZZLE

##### REMOVAL

- (1) Pull washer nozzle out of mounting grommet (Fig. 35).



**Fig. 35 Washer Nozzle**

- (2) Disconnect hose from nozzle.

##### INSTALLATION

- (1) Connect the hose to the nozzle.
- (2) Moisten the nozzle and hose.
- (3) Insert nozzle into mounting grommet.
- (4) Align nozzle.
- (5) Open liftgate.
- (6) Verify engagement of hose grommets to vehicle body and liftgate.