

# WINDSHIELD WIPER AND WASHER SYSTEMS

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## FRONT WIPERS/WASHERS

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### GENERAL INFORMATION

An intermittent windshield wiper system and electric washers are standard equipment. The intermittent wiper system provides a pause between wipe cycles for use during conditions of very light precipitation.

The windshield wipers can be operated with the windshield wiper switch only when the ignition switch is in the ACCESSORY or RUN 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 20 seconds. This is performed by a variable resistor in the wiper switch and is controlled electrically by the intermittent wiper control unit.

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

If the washer knob is depressed while in the OFF position, the wiper control will operate for approximately 3 wipes and automatically turn OFF.

### WIPERS

The windshield wiper circuit contains three components; wiper/washer switch, motor, and front washer pump, module and delay resistance in the wiper switch. The circuit receives battery feed from, and is protected by a 10 amp circuit breaker.

The switch supplies battery feed to the intermittent wiper module, which then supplies the motor. In the delay position, the module is connected with the variable resistor in the wiper switch. The value of the resistance is used by the module to charge a capacitor, which triggers the amount of delay between wipes.

The wiper motor has an arrangement of brushes providing the two wiper speeds. When the wipers are turned off, the park switch maintains current to the motor until the wipers reach the park position on the windshield.

The park arm in the motor assembly is connected to the park switch and is driven by the motor. When the wiper/washer switch is turned to OFF, current flows through the contact and the module to the motor until the wipers reach the park position.

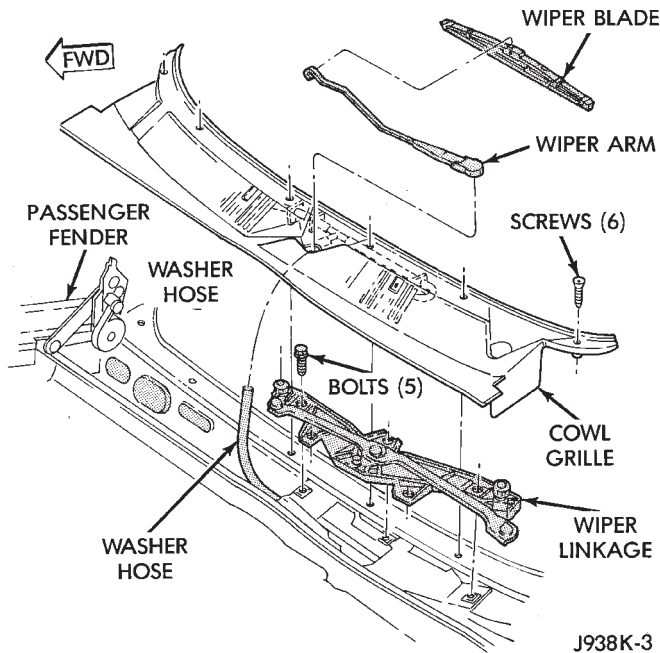
**CAUTION: The wiper arms and blades must not be moved manually from side to side or damage may result.**

### WASHERS

With the washer switch in ON, current flows through the washer pump to ground. The front washer pump runs as long as the driver holds the switch in ON. The wiper module runs the wiper motor on LO. Turning the switch to OFF stops the wipers.

If the washer knob is depressed while in the OFF position, the wiper control will operate for approximately 3 wipes and automatically turn OFF.

## WINDSHIELD WIPER AND WASHER SYSTEM



## DIAGNOSING WINDSHIELD WIPERS

- (1) Remove circuit breaker.
- (2) Measure voltage battery side of the circuit breaker. Meter should read battery voltage. If not, repair open to splice.
- (3) Measure resistance across circuit breaker terminals. Meter should read zero ohms. If not, replace circuit breaker.
- (4) Disconnect harness side Intermittent Wiper Module connector.
- (5) Measure the resistance from harness side connector terminal G to ground. Meter should read zero ohms. If not, repair open to ground.
- (6) Turn ignition switch to ACCY.
- (7) **Turn wiper switch to LO or HI.**

**CAUTION: DO NOT move the switch to intermittent. If the switch is moved to the intermittent position during the next step the rheostat will be damaged.**

(8) Remove intermittent wiper module and plug connectors together from the module. The Wipers should operate in LO and HI speed modes and Mist (washer) should work. If wipers and Mist now operate, replace intermittent wiper module. If not, go to step 10.

(9) Measure voltage at harness connector terminal E with wiper switch in LO and mist/intermittent. Meter should read battery voltage. If not, test switch.

(10) Measure voltage at harness connector terminal C with wiper switch in HI. Meter should read battery voltage. If not, test switch.

(11) Measure voltage at harness connector terminal F and move wiper switch to OFF. Meter should read battery voltage until wipers park and then zero volts. If not, replace switch.

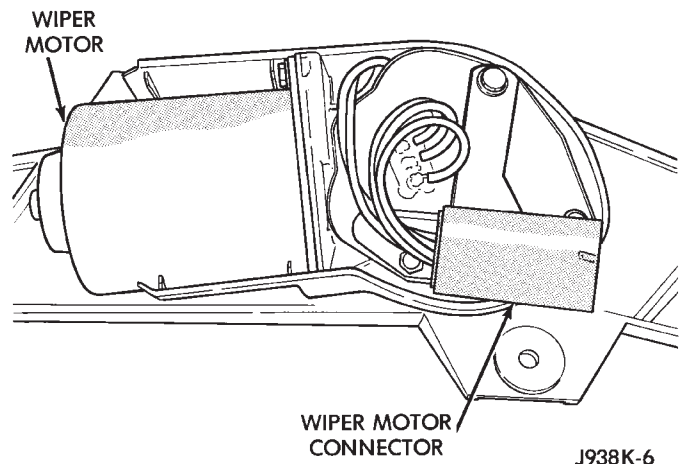
(12) Disconnect switch side of connector of intermittent wiper module.

(13) Measure resistance across terminals A and D while rotating switch from minimum delay to maximum delay. Meter should read 0-500K ohms. If not, test switch.

(14) Measure resistance across terminals A and G while rotating switch from minimum delay to maximum delay. Meter should read 0-500K ohms. If OK, replace wiper module. If not, test switch.

(15) Measure resistance at terminal 4. Meter should read zero ohms. If not, repair open to ground.

(16) To test the wiper motor turn the ignition switch to ACCY. Position the wiper and probe the motor connector as indicated Figure 1.



**Fig. 1 Wiper Motor Connector**

(17) Measure voltage at terminal 1, wiper switch in any position. Meter should read battery voltage. If OK, replace motor. If not, repair open from fuse panel.

(18) Measure voltage at terminal 5, wiper switch in LO. Meter should read battery voltage. If OK, replace motor. If not, repair open from wiper switch.

(19) Measure voltage at terminal 6, wiper switch in HI. Meter should read battery voltage. If OK, replace motor. If not, repair open from wiper switch.

(20) Measure voltage at terminal 2 wiper switch to OFF with voltmeter connected. Meter should read battery voltage until wipers park and then zero volts. If OK, replace motor. If not, repair open from wiper switch.

## INTERMITTENT WIPER FUNCTION TESTING PROCEDURES

The multifunction switch contains circuitry for:

- turn signal
- hazard warning
- headlamp beam select
- headlamp optical horn

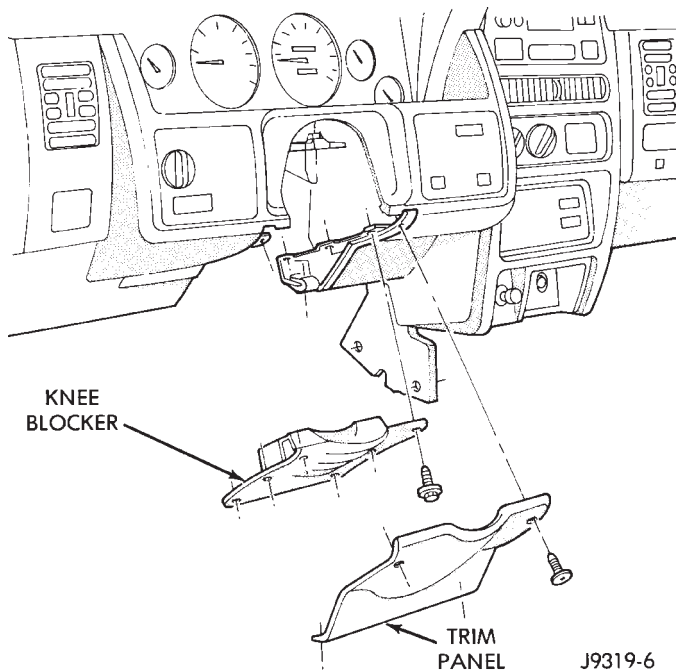
- windshield wiper
- pulse wipe
- and windshield washer switching.

This integrated switch assembly is mounted to the left-hand side of the steering column. Should any function of the switch fail, the entire switch assembly must be replaced.

Using an ohmmeter, test for continuity between the terminals of the switch as shown in Intermittent Wipe Switch Continuity Chart.

To test the switch:

- (1) Disconnect negative cable from the battery.
- (2) Remove tilt lever (tilt column only).
- (3) Remove both upper and lower steering column covers. Requires removal of 3 screws (Torx T-20).
- (4) Remove 4 screws holding steering column trim panel (Fig. 2).



**Fig. 2 Steering Column Trim And Knee Blocker**

- (5) Remove 6 screws holding knee blocker.
- (6) Remove steering column retaining nuts.
- (7) Lower steering column to gain access to rear of multifunction switch.

- (8) Remove switch connector (Figs. 3 and 4).

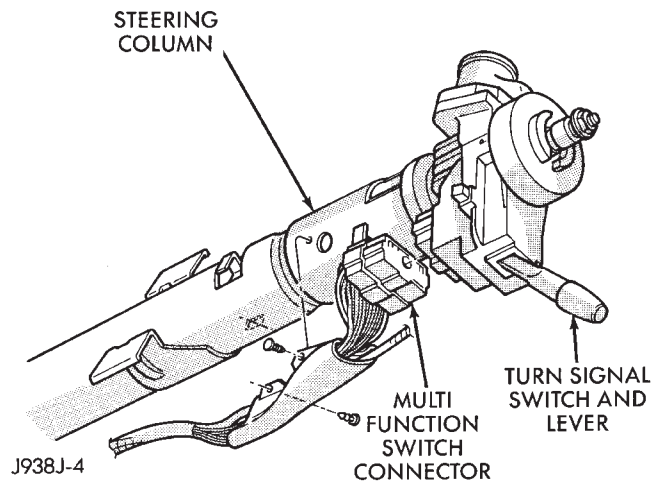
If the problem occurs only in the DELAY mode, the following tests are to be performed. These tests involve disconnecting the intermittent wipe control unit which can be found on a bracket located on the driver's side kick panel.

#### CONDITION

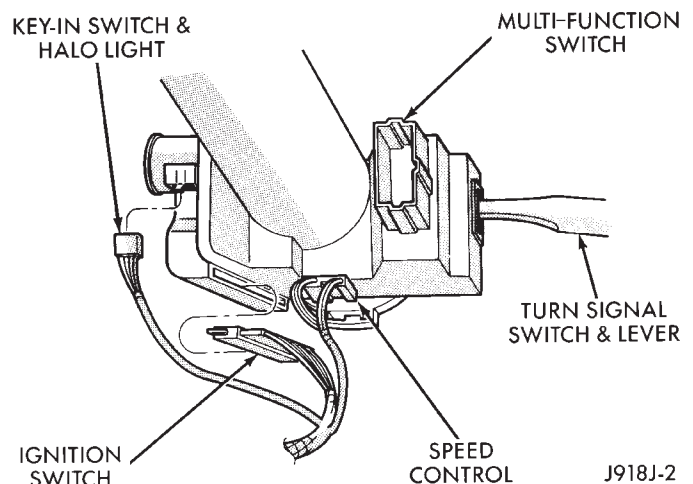
**Excessive delay (more than 30 seconds) or inadequate variation in delay.**

#### PROCEDURE

Variations in delay should be as follows:



**Fig. 3 Multifunction Switch Connector**



**Fig. 4 Steering Column Connectors**

- (1) Minimum delay (delay control to extreme counterclockwise position before first detent) 1/2 to 2 seconds.
- (2) Maximum delay (delay control to extreme clockwise position before off detent) 10 to 30 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.

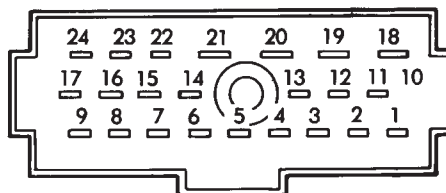
(2) Verify that the wiring ground connections are tight and have good contact.

(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.

### MULTIFUNCTION (INTERMITTENT WIPER) SWITCH TESTING PROCEDURES

### INTERMITTENT WIPE SWITCH CONTINUITY CHART



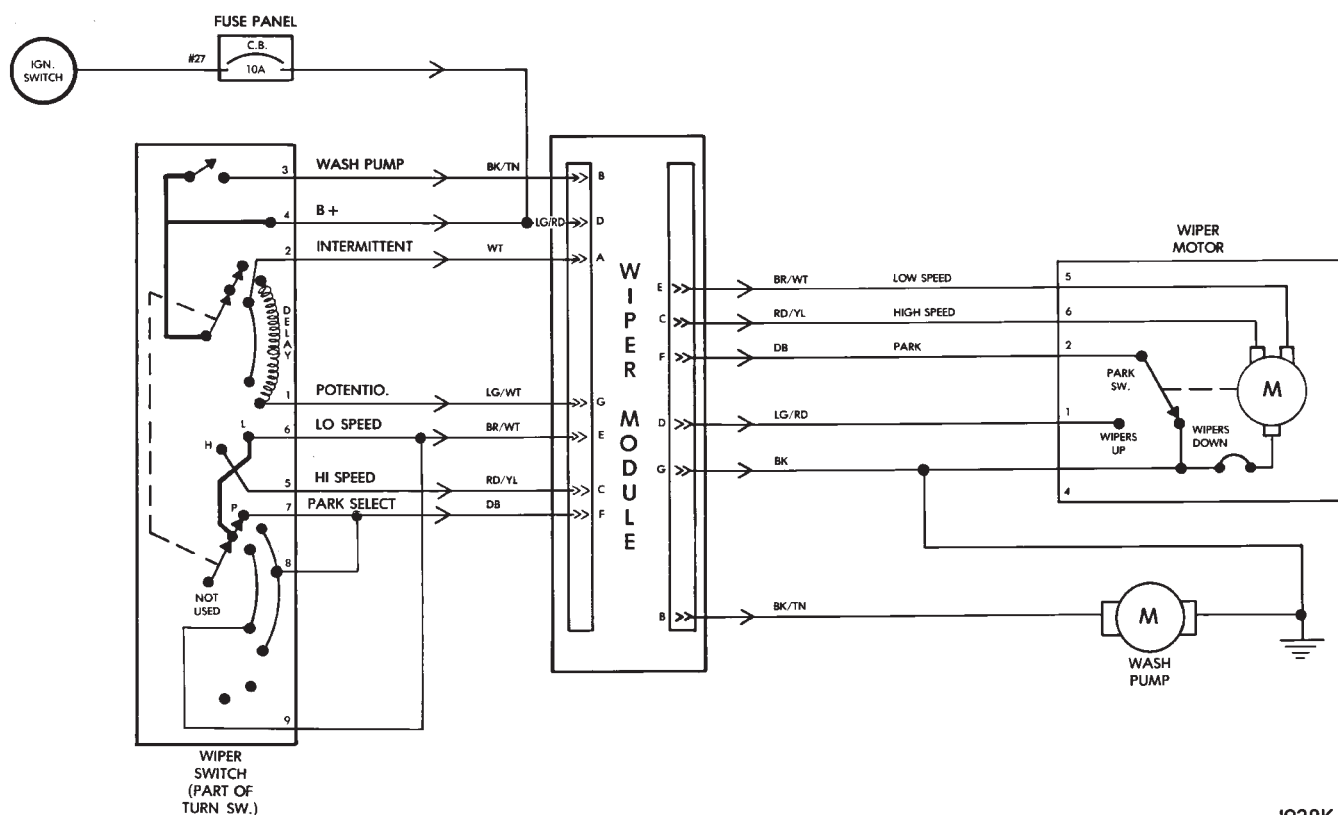
MULTIFUNCTION SWITCH PINS

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 270,000 OHMS AND 330,000 OHMS.  
\*RESISTANCE AT MINIMUM DELAY POSITION SHOULD BE ZERO WITH OHMMETER SET ON HIGH OHM SCALE.

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### INTERMITTENT WIPER SYSTEM SCHEMATIC



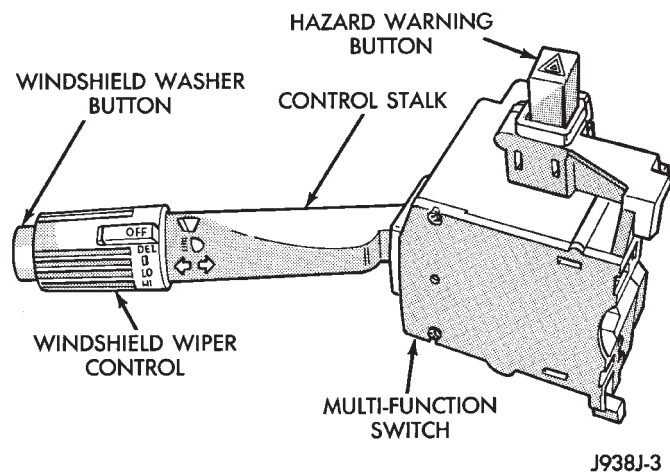
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## WIPER SWITCH REPLACEMENT

### REMOVAL

- (1) Disconnect negative cable from the battery.
- (2) Remove tilt lever (tilt column only).
- (3) Remove both upper and lower steering column covers. Requires removal of 3 screws (Torx T-20).
- (4) Remove 4 screws holding steering column trim panel (Fig. 2).
- (5) Remove 6 screws holding knee blocker.
- (6) Remove steering column retaining nuts.
- (7) Lower steering column to gain access to rear of multifunction switch.
- (8) Remove multifunction switch tamper proof mounting screws (tamper proof torx bit Snap-On TTXR20B2 or equivalent required).
- (9) Gently pull switch away from column. Loosen connector screw. The screw will remain in the connector.
- (10) Remove wiring connector from multifunction switch (Fig. 5).



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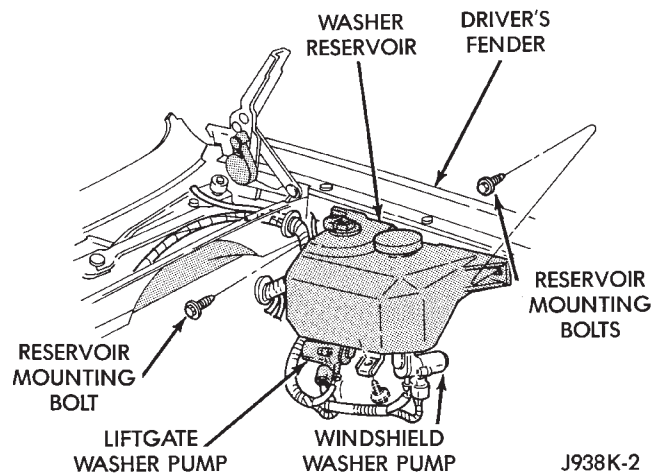
**Fig. 5 Multifunction Switch**

### INSTALLATION

- (1) Install wiring connector to switch and tighten connector retaining screw to 2 N•m (17 in. lbs.).
- (2) Mount multifunction switch to column and torque retaining screws to 2 N•m (17 in. lbs.).
- (3) Install steering column. Tighten nuts to (105 in. lbs.).
- (4) Install knee blocker and trim panel.
- (5) Install steering column covers. Torque screws to 2 N•m (17 in. lbs.).
- (6) Install tilt lever (tilt column only).
- (7) Install battery negative cable.
- (8) Check all functions of switch for proper operation.

## WASHER PUMP REPLACEMENT

- (1) Remove 3 screws holding reservoir to driver's fender (Fig. 6).
- (2) Disconnect hose from pump(s) (Fig. 6).



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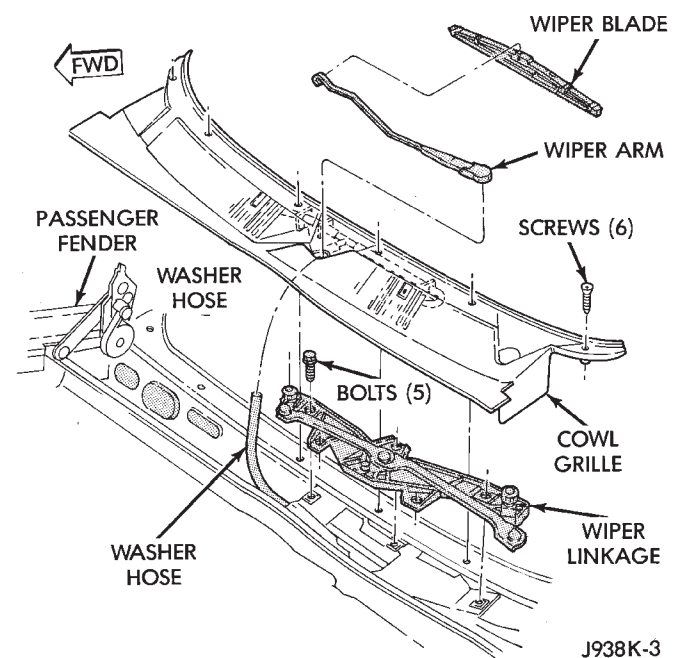
**Fig. 6 Washer Reservoir Mounting**

- (3) Drain washer reservoir.
- (4) Using a deep socket, remove filter nut(s) from bottom inside reservoir and remove pump.
- (5) Reverse the removal procedure to install a new pump(s).

## WIPER MOTOR REPLACEMENT

### REMOVAL

- (1) Remove wiper arms by lifting up wiper arm and slide tap out.
- (2) Remove 6 screws holding the cowl grille (Fig. 7).



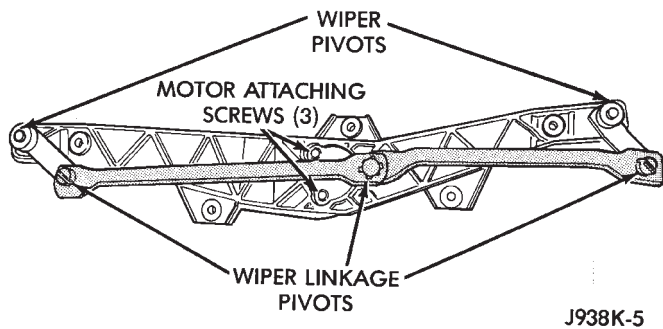
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**Fig. 7 Wiper Linkage Removal**

- (3) Disconnect washer hose and set cowl grille aside.
- (4) Remove 5 bolts holding wiper linkage assembly.

(5) Turn linkage over and remove the nut holding the crank arm to the motor.

(6) Remove 3 screws holding motor to linkage (Fig. 8) and remove motor.



**Fig. 8 Wiper Motor Removal**

#### INSTALLATION

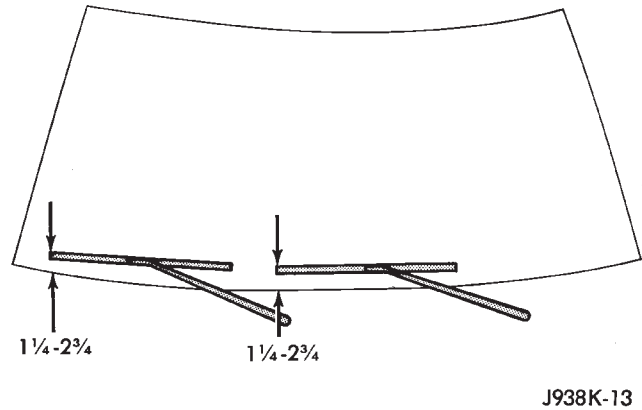
(1) Install motor and tighten screws to 5-7 N•m (44-62 in. lbs.).

(2) Install crank arm to motor and tighten nut to 10-12 N•m (88-106 in. lbs.)

(3) Install linkage assembly and tighten screws to 8 N•m (72 in. lbs.).

(4) Connect washer hose to cowl grille and install grille.

(5) Install wiper arms on pivot as shown in Figure 9 and release tabs.



**Fig. 9 Front Wiper Arm Positioning**

## REAR WINDOW WIPER/WASHER

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## GENERAL INFORMATION

The rear wiper system provides four operating modes:

- Intermittent wipe with a 5 to 8 second delay between sweeps.
- Continuous wipe.
- Park mode which operates when the rear wiper switch is turned off.
- Rear washer with 2-3 sweeps in any of the other operating modes.

The rear wiper motor contains electronic controls to provide four operating modes. It receives signal currents from the rear wiper switch for these four modes.

The rear wiper switch is located in the right hand switch pod and is supplied current when the ignition switch is in the ON position. When the switch is placed in the ON position current is supplied to the electronic motor controls. When the switch is placed in the DELAY position it provides current to the rear wiper motor electronic controls and timer to control the pulse. When the switch is PUSHED to the wash position it provides current to both the motor electronics and the rear washer pump. The switch is spring loaded in the wash position.

The rear washer reservoir and pump are located on the left inner fender in the engine compartment. The pump is fed current from the rear wiper switch. Washer fluid is routed from the pump through a rubber hose which is run in the electrical harness to the right of the quarter panel.

## DIAGNOSING REAR WIPER

- (1) Remove and inspect 20 amp fuse #9 in the fuse panel. Replace as required.
- (2) Remove liftgate cover, refer to Rear Wiper Motor Replacement.
- (3) Measure resistance between Rear Wiper motor connector terminal 3 and ground. Meter should read zero ohms. If not, repair open to splice in body harness.
- (4) Turn ignition switch to RUN and place wiper switch in WASH. Measure voltage at Rear Wiper motor connector terminal 5. Meter should read battery voltage. If not, go to step 6.

(5) Place wiper switch in ON. Measure voltage at Rear Wiper motor connector terminal 2. Meter should read battery voltage. If not, go to step 6.

(6) Remove switch and reconnect below Instrument panel; back probe switch connector, with ignition key in RUN position.

(7) Measure voltage at switch connector terminal 1. Meter should read battery voltage. If not, repair open to fuse #9.

(8) Push switch to WASH. Measure voltage at switch connector terminal 4. Meter should read battery voltage. If OK, repair open to Rear Wiper Motor terminal 5. If not, replace switch.

(9) Move switch to ON. Measure voltage at switch connector terminal 3. Meter should read battery voltage. If OK, repair open to Rear Wiper motor terminal 2. If not, replace switch.

(10) Move switch to DELAY. Measure voltage at switch connector terminal 2. Meter should read battery voltage. If OK, repair open to Rear Wiper motor terminal 4. If not, replace switch.

## DIAGNOSING REAR WASHER

Refer to Rear Wiper/Washer Circuitry

(1) Turn ignition switch to RUN and place rear wiper/washer switch to ON. If motor does not operate check fuse #9 in the fuse panel.

(2) Unplug Rear Washer Pump connector.

(3) Measure resistance at pump connector terminal B (ignition switch off). Meter should read zero ohms. If not, repair open to ground.

(4) Turn ignition switch to RUN.

(5) Measure voltage at pump connector terminal A, switch in WASH. Meter should read battery voltage. If OK, replace pump. If not, go to step 6.

(6) Remove switch and reconnect below instrument panel. Backprobe switch connector with ignition switch in RUN.

(7) Measure voltage at switch connector terminal 1. Meter should read battery voltage. If not, repair open to fuse #9.

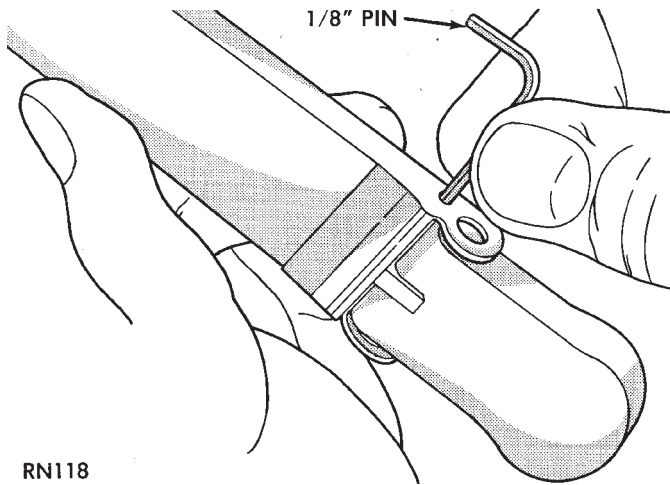
(8) Measure voltage at switch connector terminal 4, switch in WASH. Meter should read battery voltage. If not, replace switch.

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## WIPER BLADE REPLACEMENT

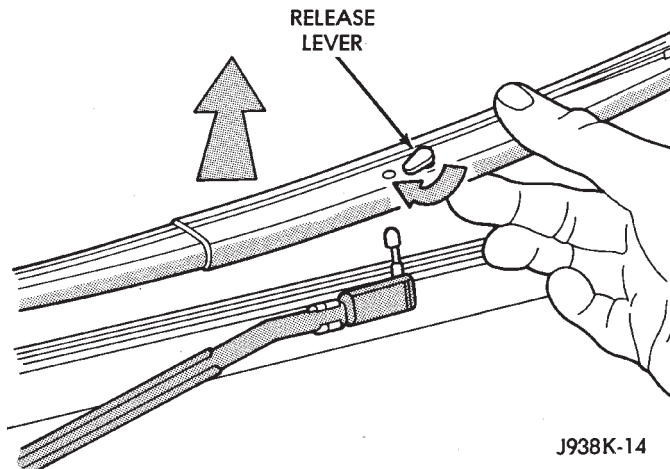
(1) Lift the wiper arm and place a 1/8 inch pin into the arm pin hole (Fig. 1).



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**Fig. 1 Removing Wiper Arm**

(2) Turn the release lever (Fig. 2), then pull blade from wiper arm pin.



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**Fig. 2 Wiper Blade Removal**

(3) When installing the blade, make sure the release lever is not between the blade and arm.

## REAR WIPER MOTOR REPLACEMENT

### REMOVAL

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

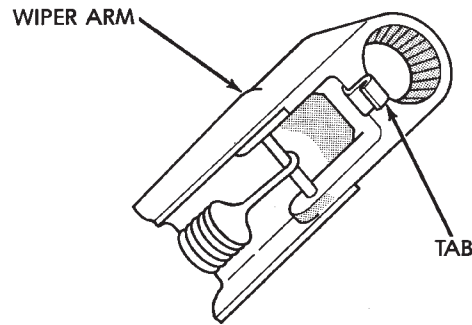
(2) Remove the wiper arm assembly from the pivot pin by depressing the tab (Fig. 3) and pulling straight out on wiper arm.

(3) Remove motor retaining nut (Fig. 4).

(4) Remove external bezel.

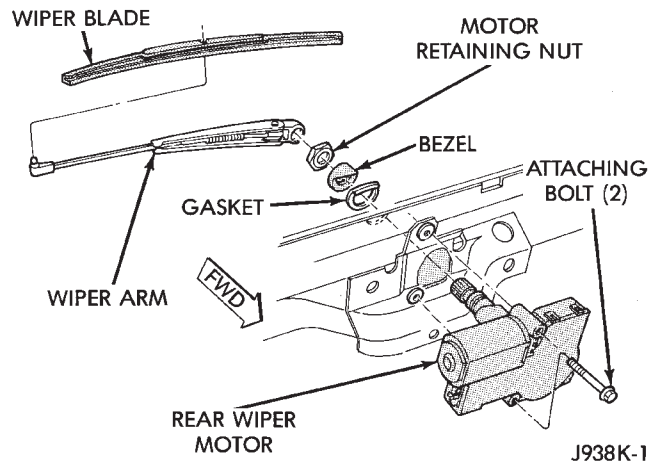
(5) Remove 5 screws holding liftgate interior trim panel.

(6) Remove the trim panel with a wide flat blade tool (Fig. 5).



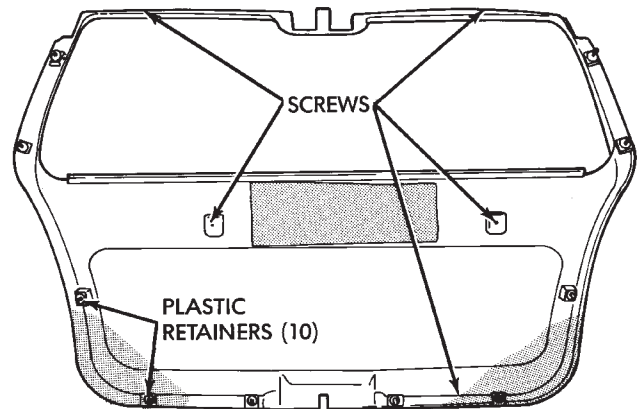
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**Fig. 3 Rear Wiper Arm Removal**



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**Fig. 4 Rear Wiper Motor Removal/Installation**



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**Fig. 5 Liftgate Trim Panel Removal**

**To aid in removal of the trim panel, start at the bottom of the panel.**

(7) Unplug the harness connector from the motor.

(8) Remove 2 wiper motor mounting bolts.

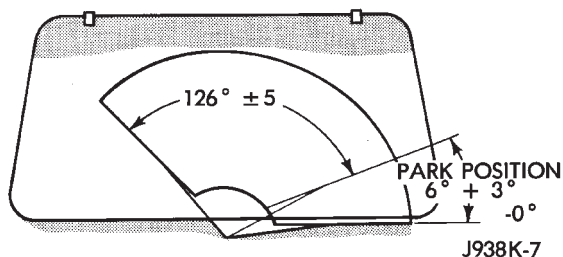
(9) Remove the wiper motor.

### INSTALLATION

(1) Position the motor (Fig. 4) in the liftgate cavity with the knurled driver protruding through the hole in the liftgate and the gasket.

- (2) Install the mounting bolts. Tighten bolts to 1-1.7 N•m (10-15 in. lbs.).
- (3) Connect the wiring harness.
- (4) Install the bezel and motor retaining nut (Fig. 3). Torque nut to 4-5.6 N•m (35-50 in. lbs.).
- (5) Install the liftgate trim panel.
- (6) Install the wiper arm assembly.

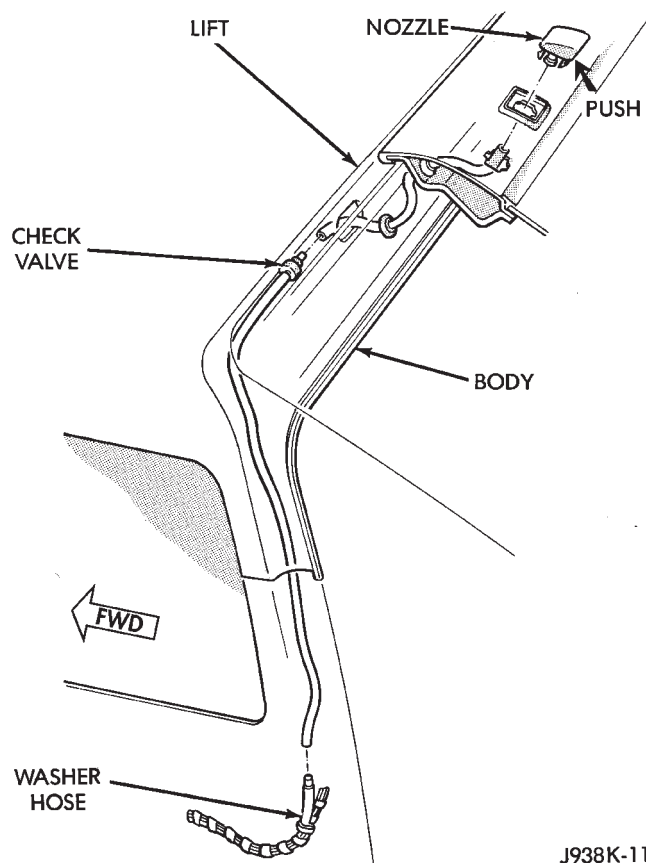
The blade should be positioned as shown in Figure 6.



**Fig. 6 Rear Wiper Arm Positioning**

#### REAR WASHER NOZZLE

To remove the rear washer nozzle push up on the nozzle (Fig. 7). There is a small tang that will release.

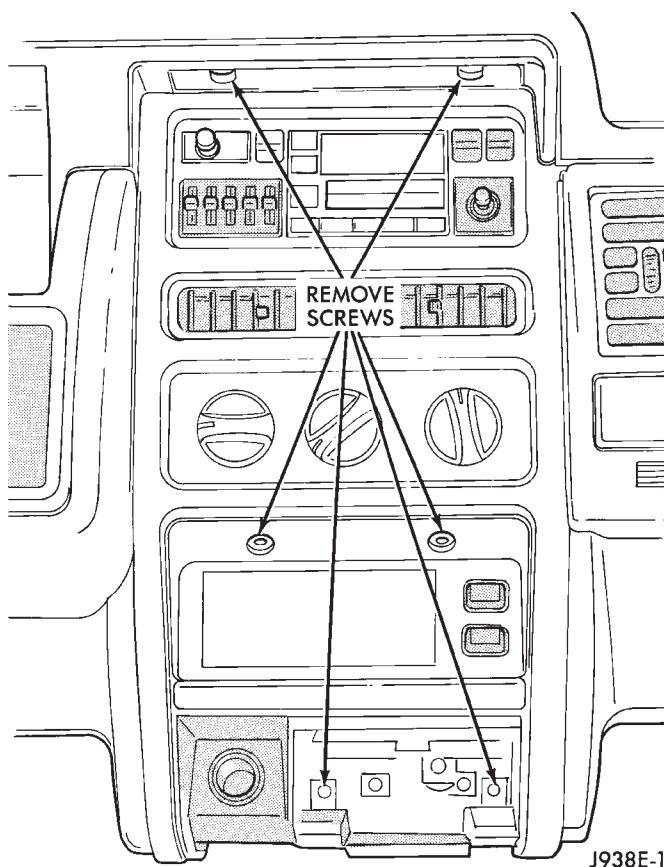


**Fig. 7 Rear Washer Nozzle And Hose**

#### REAR WIPER SWITCH REPLACEMENT

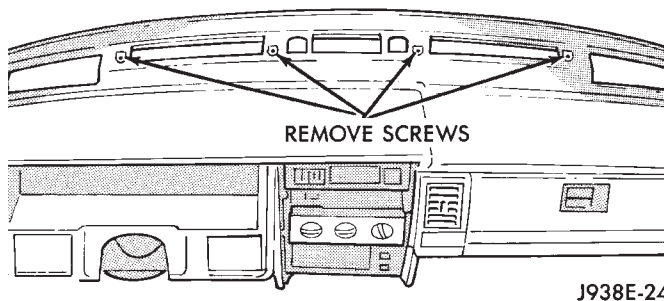
- (1) Disconnect negative cable from the battery.
- (2) Remove ash tray.

- (3) Remove 6 screws holding center cluster bezel (Fig. 8).



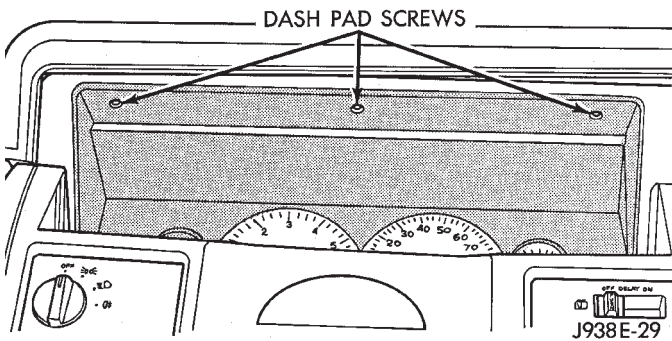
**Fig. 8 Remove Center Bezel Upper Screws**

- (4) Remove center bezel.
- (5) Remove 2 screws holding dash pad located behind top of center bezel.
- (6) Gently pry defroster grille out of dash pad.
- (7) Unplug sensors (if equipped) and set defroster grille aside.
- (8) Remove 4 screws in defroster duct opening holding dash pad (Fig. 9).



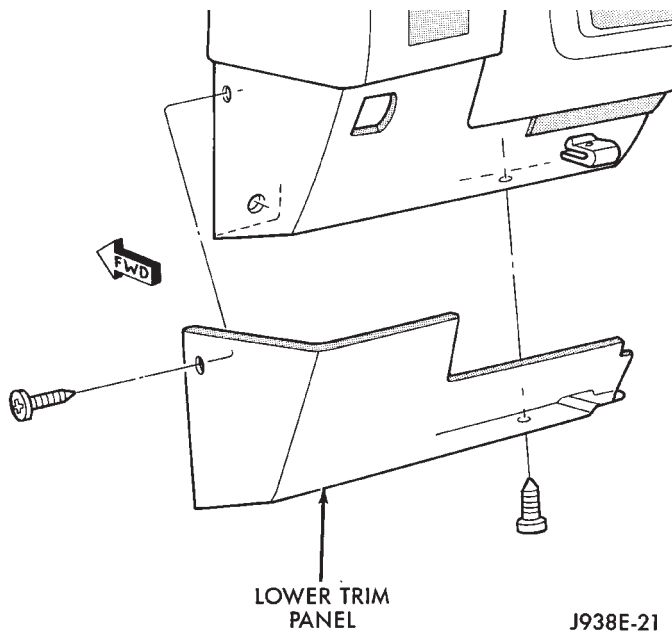
**Fig. 9 Upper Dash Pad Attaching Screws**

- (9) Remove 3 screws above Instrument Panel cluster holding dash pad (Fig. 10).
- (10) Open glove box and remove 2 screws holding dash pad.



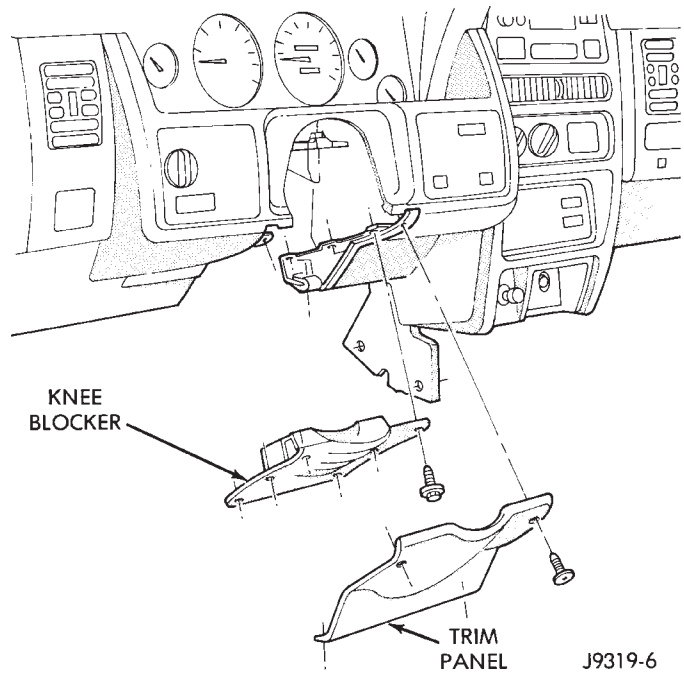
**Fig. 10 Remove Screws Holding Dash Pad**

- (11) Remove dash pad pulling up to unsnap end clips.
- (12) With driver's door open remove 1 screw from the side of the lower trim panel (Fig. 11).

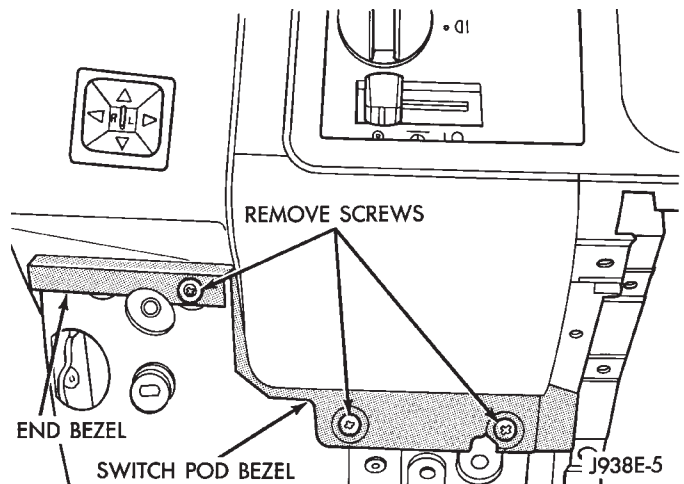


**Fig. 11 Lower Trim Panel**

- (13) Remove 4 screws holding the steering column cover (Fig. 12).
- (14) Remove 1 screw from bottom of lower trim panel and pull panel off. There is also a clip holding the panel to the instrument panel.
- (15) Remove 6 screws holding knee blocker.
- (16) Remove steering column retaining nuts.
- (17) Remove 3 screws holding bottom of bezels (Fig. 13).
- (18) Remove 2 screws holding top of end and switch pod bezels (Fig. 14). The end bezel can now be removed.
- (19) Remove 2 screws holding left side of switch pod bezel (Fig. 15).
- (20) Remove 3 screws holding right hand side of switch pod bezel (Fig. 16).



**Fig. 12 Steering Column Cover and Knee Blocker**



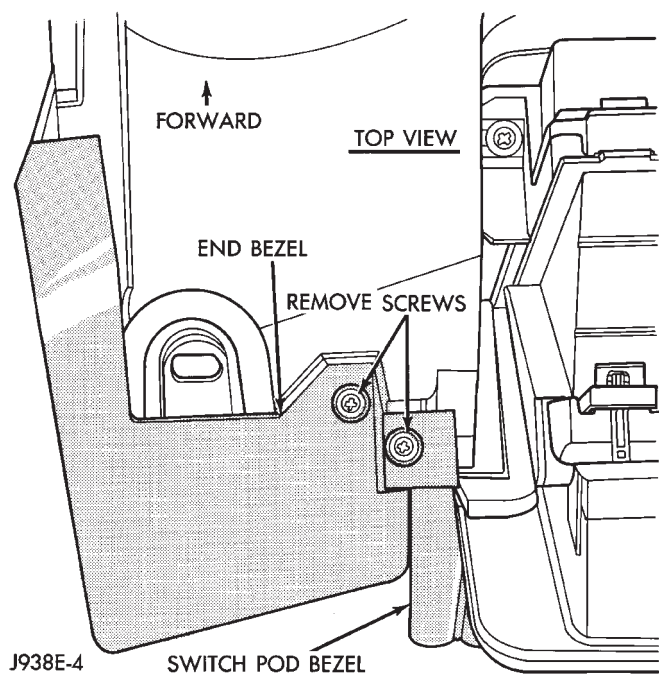
**Fig. 13 Remove Screws Holding Bottom Of Bezels**

- (21) Pull switch pod bezel out far enough to remove switch connectors. Disconnect connectors from each switch pod and remove bezel (Fig. 17).
- (22) Remove required switch attaching screws and switch.
- (23) Reverse the removal procedures to install a new switch. Tighten steering column retaining nuts to 105 in. lbs.

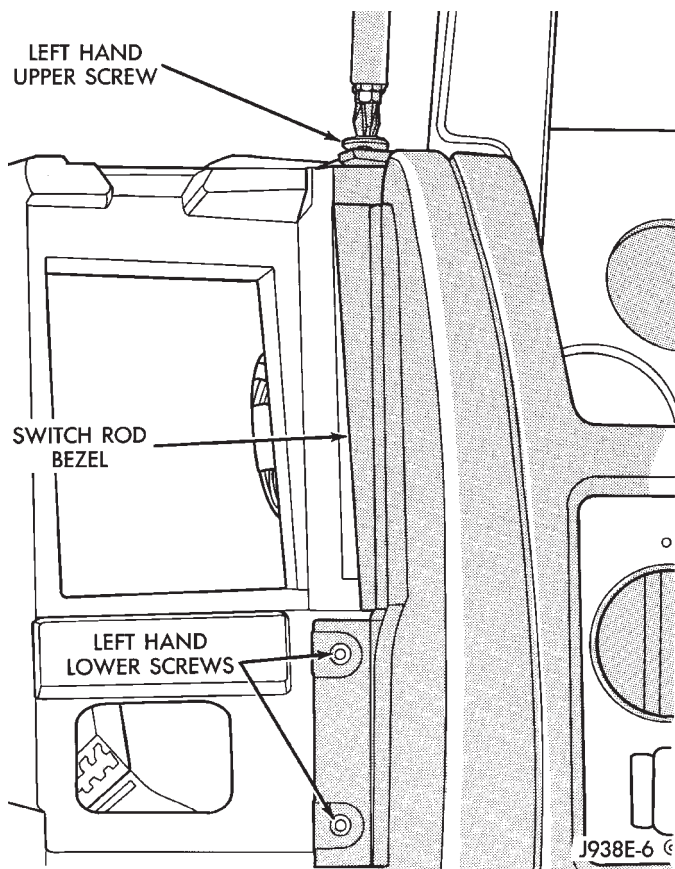
## REAR WASHER PUMP REPLACEMENT

The washer pump for the rear window is located next to the front washer pump on the washer reservoir in the engine compartment. For replacement refer to the front washer pump replacement procedure.

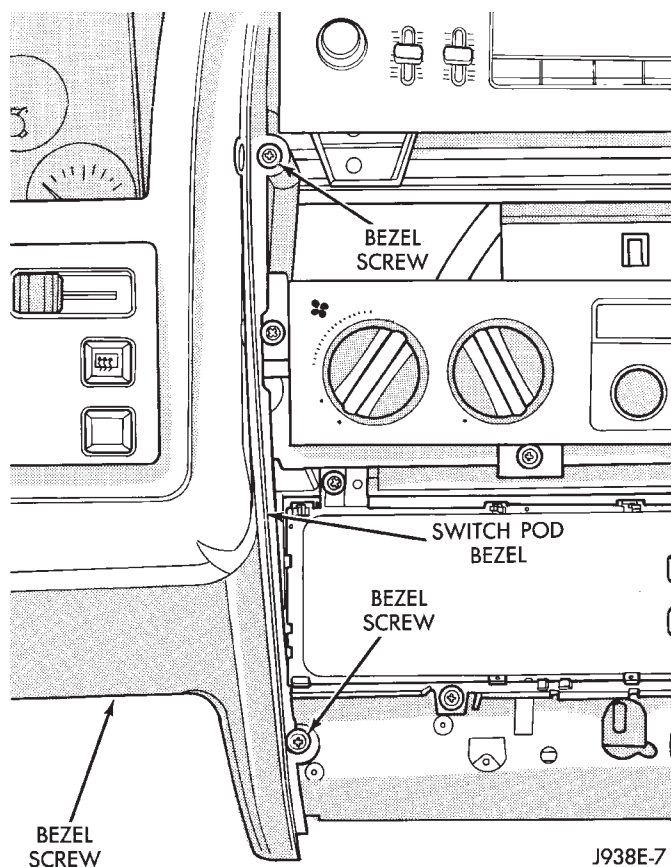




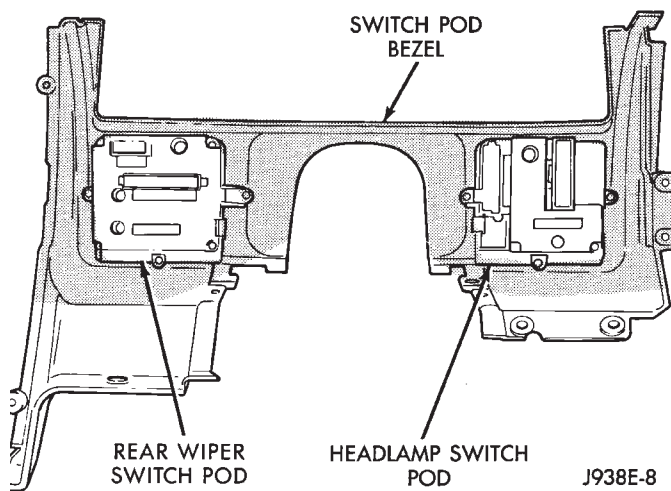
**Fig. 14 Remove Screws Holding Top Of Bezels**



**Fig. 15 Left Hand Switch Pod Bezel Screws**



**Fig. 16 Right Hand Switch Pod Bezel Screws**



**Fig. 17 Rear View of Switch Pod Bezel**