WINDSHIELD WIPERS AND WASHERS

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WINDSHIELD WIPERS

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GENERAL INFORMATION

INTRODUCTION

WARNING: VEHICLES ARE EQUIPPED WITH AN AIRBAG, REFER TO GROUP 8M, RESTRAINT SYSTEMS FOR STEERING WHEEL OR COLUMN SERVICE PROCEDURES.

The windshield wipers will only operate with the ignition switch in the ACCESSORY or IGNITION RUN position. The wiper circuit is protect against over loads by a fuse in the fuse block and a circuit breaker within the wiper motor. This protects the circuitry of the wiper system and the vehicle.

The wiper motor has permanent magnet fields.

The intermittent wiper system, in addition to low and high speed, has a delay mode and a pulse wipe mode. The delay mode has a range of 1 to 15 seconds. Pulse wipe is accomplished by momentarily moving the stalk lever into the WASH position while the wiper switch is in either OFF or DELAY position. The wiper blades then sweep once or twice and return to the previous wiper switch mode, OFF or DELAY.

The intermittent wiper function is integral to the wiper switch. All electronics and relay are inside the switch assembly.

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

NOTE: This group covers both Left-Hand Drive (LHD) and Right-Hand Drive (RHD) versions of this model. Whenever required and feasible, the RHD versions of affected vehicle components have been constructed as mirror-image of the LHD versions. While most of the illustrations used in this group represent only the LHD version, the diagnostic and service procedures outlined can generally be applied to either version. Exceptions to this rule have been clearly identified as LHD, RHD, or Export if a special illustration or procedure is required.

DESCRIPTION AND OPERATION

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

DESCRIPTION AND OPERATION (Continued)

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 nonabrasive cleaner. If the blades continue to streak or smear, they should be replaced. The right and left wipers are different blade lengths. The driver side length is 525 mm and the passenger side length is 450 mm. The blades should not be interchanged.

DIAGNOSIS AND TESTING

WINDSHIELD WIPER CONDITION

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

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.

Whatever the problem, disconnect motor wire harness and clean the terminals, then connect motor wire harness and test.

MOTOR WILL NOT OPERATE IN SOME OR ALL SWITCH POSITIONS

(1) Check fuse 15, in the fuse block (Fig. 1).

(a) If fuse is OK, go 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, go to Step 2.

(d) If replacement fuse blows, go to Step 6.

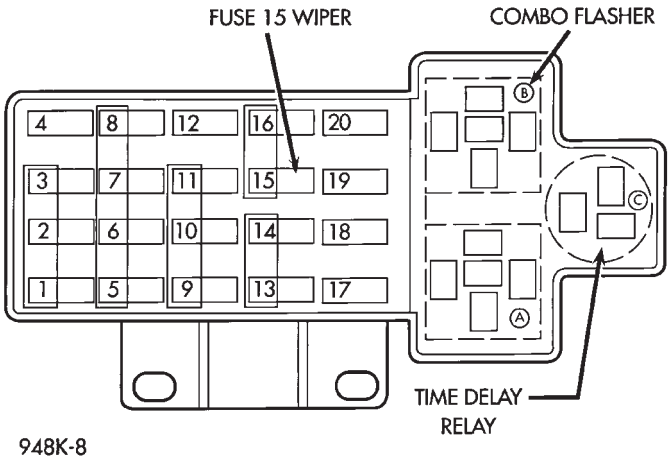


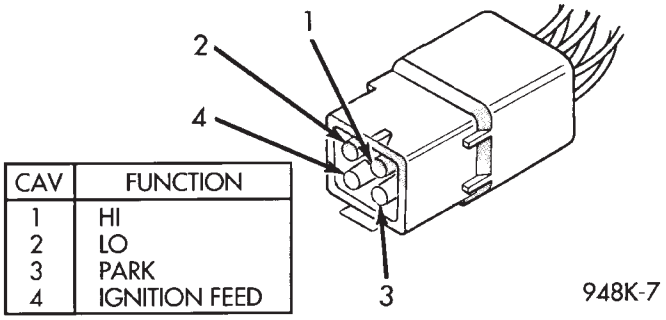
Fig. 1 Fuse Block

(2) Disconnect motor wire connector.

(3) Check motor low speed. Using two jumper wires, connect one jumper wire between the battery positive terminal and terminal 2 of the motor connector. Connect the other jumper wire to the battery negative terminal and the motor ground strap (Fig. 2). Check motor high speed, connect the positive jumper wire to terminal 1 of the motor connector. Connect the negative jumper wire to the motor ground strap.

(a) If motor does not run, high or low speed go to Step 4.

(b) If motor runs, go to Step 5.



CAV	FUNCTION
1	HI
2	LO
3	PARK
4	IGNITION FEED

Fig. 2 Motor Connector

(4) Using an ohmmeter, check for good ground at the motor ground strap. If OK, replace motor. If not repair the ground circuit as necessary.

(5) Check terminal E of wiper switch connector for continuity to ground. If OK, go to Step 6. If not OK, repair the ground circuit as necessary.

(6) Using a voltmeter, with wiper switch connected, connect negative lead to motor ground strap. Connect the positive lead to terminal P1 of the wiper switch connector (Fig. 3) and (Fig. 5).

(a) If no voltage, repair wiring as necessary. If OK, go to Step 2.

(b) Check wiper switch low speed, connect voltmeter positive lead to terminal L of the wiper switch connector. Move wiper stalk to LOW position. If no voltage, replace switch.

(c) Check wiper switch high speed, connect voltmeter positive lead to terminal H of the wiper switch connector. Move wiper stalk to HIGH position. If no voltage, replace switch.

(7) Disconnect motor connector and replace fuse 15 in fuse block.

(a) If fuse does not blow, replace motor.

(b) If fuse blows, disconnect wiper switch and replace fuse.

(c) If fuse does not blow, replace switch.

(d) If fuse blows, repair wiring as necessary.

MOTOR OPERATES SLOWLY AT ALL SPEEDS

(1) Remove wiper arms and cowl screen. Disconnect motor linkage from motor. Connect an ammeter between battery positive terminal and terminal 4 of

DIAGNOSIS AND TESTING (Continued)

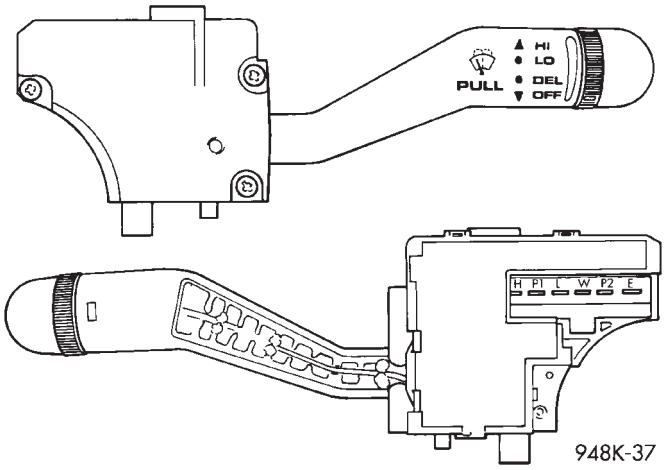


Fig. 3 Wiper Switch and Terminals

the motor connector (Fig. 4). Turn wiper motor on and check ampere reading.

If motor runs and ammeter reading is more than 6 amps, go to Step 2. If less than 6 amps, go to Step 3. When replacing drive link nut tighten to 11 to 12 N·m (98 to 106 in. lbs.) torque.

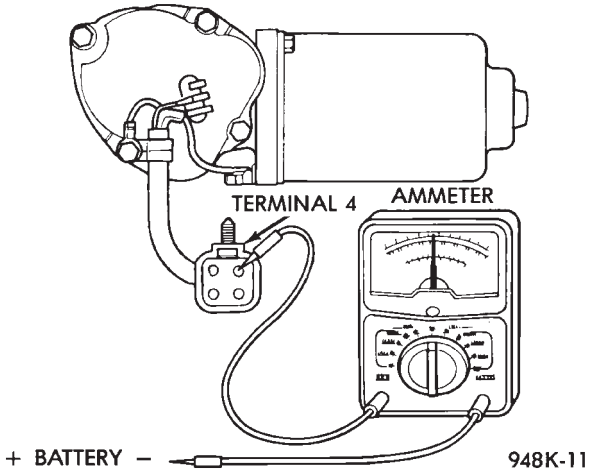


Fig. 4 Ammeter Test

(2) Using an ohmmeter, check the high and low circuits for a short to ground. Refer to Group 8W, Wiring Diagrams.

(3) Check to see if wiper linkage or pivots are binding or caught.

WIPERS RUN AT HIGH SPEED WITH SWITCH IN LOW SPEED POSITION OR WIPERS RUN AT LOW SPEED WITH SWITCH IN HIGH SPEED POSITION.

(1) Check for crossed wires in the motor pigtail wire connector. Refer to Group 8W, Wiring Diagrams.

(2) Check for crossed wires in harness connector from wiper switch to motor.

(3) If OK, replace wiper switch.

WIPERS WILL OPERATE CONTINUOUSLY WITH SWITCH IN THE INTERMITTENT POSITION—WHEN WIPER SWITCH IS TURNED OFF, WIPERS STOP WHEREVER THEY ARE, WITHOUT RETURNING TO PARK POSITION.

(1) Check at motor ground strap for a good ground.

(2) Turn ignition switch OFF. Using an ohmmeter, with the motor in the park position, check for continuity between terminal 3 and ground strap. If continuity, replace wiper switch. If no continuity, repair wiring as necessary.

WIPERS DO NOT OPERATE WHEN WASHER MOTOR IS ENGAGED (PULSE WIPE) OR WIPERS DO OPERATE IN INTERMITTENT POSITION.

Check for a good ground at motor ground strap and at wiper switch terminal E. If OK, replace wiper switch. If not OK, repair wiring as necessary.

WIPER MOTOR

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

Whenever a wiper motor malfunction occurs, verify that the wire harness is properly connected start normal diagnosis and repair procedures. Refer to Wiper Motor Test.

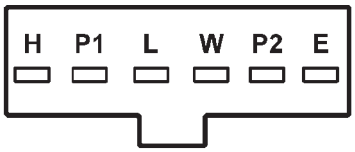
DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
Wiper blades do not park properly.	(1) Wiper arms improperly parked. (2) Wiper arms are loose on pivot shaft. (3) Motor crank loose at output shaft.	(1) Remove wiper arms and repark. Refer to Wiper Arm Removal and Installation. (2) Remove wiper arm and repark. Refer to Wiper Arm Removal and Installation. (3) Remove wiper arm, run wiper motor to park position and remove the module. Without rotating the motor output shaft, remove the crank and clean any foreign matter from the motor shaft. Install the motor crank in its original position.
Motor stops in any position when the switch is turned off.	(1) Open park circuit.	(1) Check park switch by disconnecting the wire connector and apply battery voltage to Pin 4. Place a jumper wire from Pin 2 to Pin 3 and then to an external ground. Replace motor if it does not park.
Motor will not stop when the switch is turned off.	(1) Faulty switch. (2) Lock of dynamic brake on wet glass.	(1) check switch in low, high and intermittent position. (2) Ensure park switch has clean ground.
Wiper blades slap against cowl screen or window moldings.	(1) Wiper arms are parked incorrectly.	(1) Park wiper arms. Refer to Wiper Arm Adjustment.
Blades chatter.	(1) Foreign substance such as polish on glass or blades. (2) Arms twisted, blade at wrong angle on glass. (3) Blade structure bent. (4) Blade element has permanent set.	(1) Clean glass and blade element with non-abrasive cleaner. (2) Replace arm. (3) Replace blade. (4) Replace blade element.
Wiper knock at reversal.	(1) Linkage bushings worn. (2) Armature endplay in motor.	(1) Replace worn link. Refer to Wiper Linkage Removal and Installation. (2) Replace wiper motor. Refer to Wiper Motor Removal and Installation.
Wiper motor will not run.	(1) Blown fuse. (2) New fuse blows. (3) New fuse blows. (4) No Voltage at motor. (5) Poor ground.	(1) Replace fuse, and run system. (2) Check for short in wiring or switch. (3) Replace fuse, remove motor connector, turn switch ON, fuse does not blow, replace motor. (4) Check switch and wiring harness. Refer to Group 8W, Wiring Diagrams. (5) Repair ground wire connection as necessary.

DIAGNOSIS AND TESTING (Continued)

WIPER SWITCH

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 (Fig. 5).



INTERMITTENT WIPER SWITCH PINS

SWITCH POSITION	CONTINUITY BETWEEN
OFF	PIN P2 and PIN L
LOW	PIN P1 and PIN L
HIGH	PIN P1 and PIN H
WASH	PIN P1 and PIN W
INTERMITTENT	CANNOT BE CHECKED

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Fig. 5 Wiper Switch Test

REMOVAL AND INSTALLATION

WIPER ARM

REMOVAL

(1) Place the wiper arm/blades in the PARK position and turn ignition OFF.

(2) Remove arm cap and wiper arm nut.

(3) Remove the arm from the pivot using a rocking motion.

(4) Clean metal splinters OFF the pivot shafts.

INSTALLATION

For installation reverse above procedures. Before installation activate wiper system to ensure the wiper module is in the PARK position. Position wiper arms so that the heel of the blade(s) is on the park line on the windshield.

WIPER BLADE

REMOVAL

(1) Lift wiper arm to over center position.

(2) Remove blade assembly from arm by pushing release tab under arm tip and slide blade away from arm tip (Fig. 6) and (Fig. 7).

(3) Gently place wiper arm tip on glass surface.

INSTALLATION

For installation reverse above procedures.

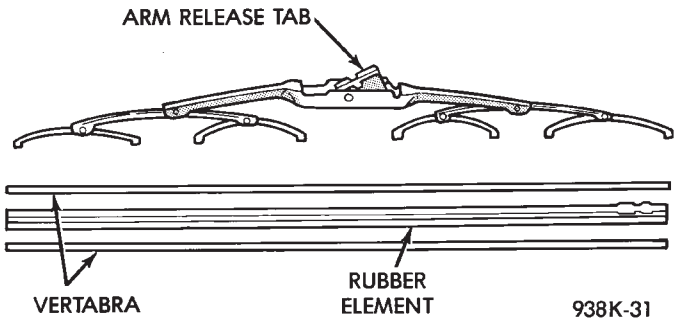

Fig. 6 Wiper Blade and Element

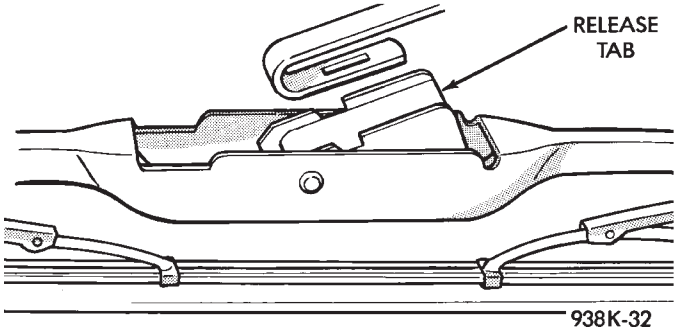

Fig. 7 Remove Blade from Arm

WIPER BLADE ELEMENT

REMOVAL

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

(2) Remove blade assembly from arm by pushing release tab under arm tip and slide blade away from arm tip (Fig. 6) and (Fig. 7). Gently place wiper arm tip on glass surface.

(3) Remove wiping element from blade assembly. Pull stopper, of the rubber element, out of the end claw together with vertibra (metal rails) (Fig. 8).

INSTALLATION

For installation reverse the above procedures. Check that the element and vertibra are through all claws and the final claw is locked in the stopper.

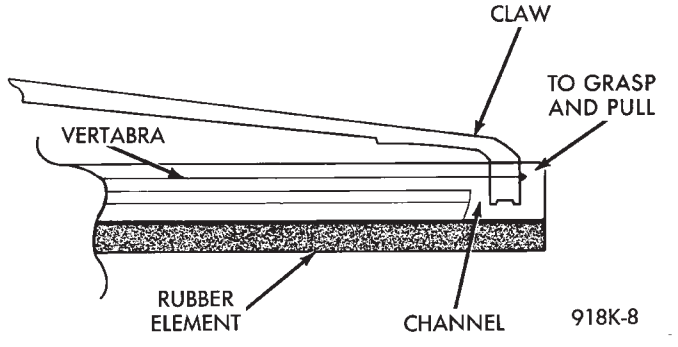

Fig. 8 Wiper Blade and Element

REMOVAL AND INSTALLATION (Continued)

WIPER LINKAGE

REMOVAL

(1) Remove wiper module refer above (Fig. 9).

(2) Disconnect wiper arm linkage, by insert screwdriver between ball cap and linkage, then twist the screwdriver and lift straight up on linkage.

INSTALLATION

For installation reverse the above procedures. Using pliers or hand press the ball cap straight on to the ball stud.

WIPER MODULE

REMOVAL

(1) Remove wiper arms and blades (Fig. 9).

(2) Remove the rear hood seal with the cowl top plastic screen.

(3) Disconnect motor wire connector at front plenum wall.

(4) Remove wiper module mounting screws and remove module.

INSTALLATION

For installation reverse the above procedures. Tighten the mounting screws to 7 to 9 N·m (60 to 80 in. lbs.) torque.

WIPER MOTOR

REMOVAL

(1) Remove wiper module refer above.

(2) Remove linkage from motor crank. Insert screwdriver between crank and linkage then twist the screwdriver and lift straight up on linkage.

(3) Remove motor mounting screws and remove motor.

INSTALLATION

For installation add unilube grease to socket and reverse the above procedures. Tighten the motor mounting screws to 5 to 6 N·m (45 to 55 in. lbs.) torque. Tighten drive link nut to 11 to 12 N·m (98 to 106 in. lbs.) torque.

WIPER SWITCH

REMOVAL

(1) Remove three screws holding steering column shroud and remove upper half of shroud (Fig. 10).

(2) Remove mounting screw on switch and remove switch.

(3) Disconnect wire harness connector from switch.

INSTALLATION

For installation, reverse the above procedures.

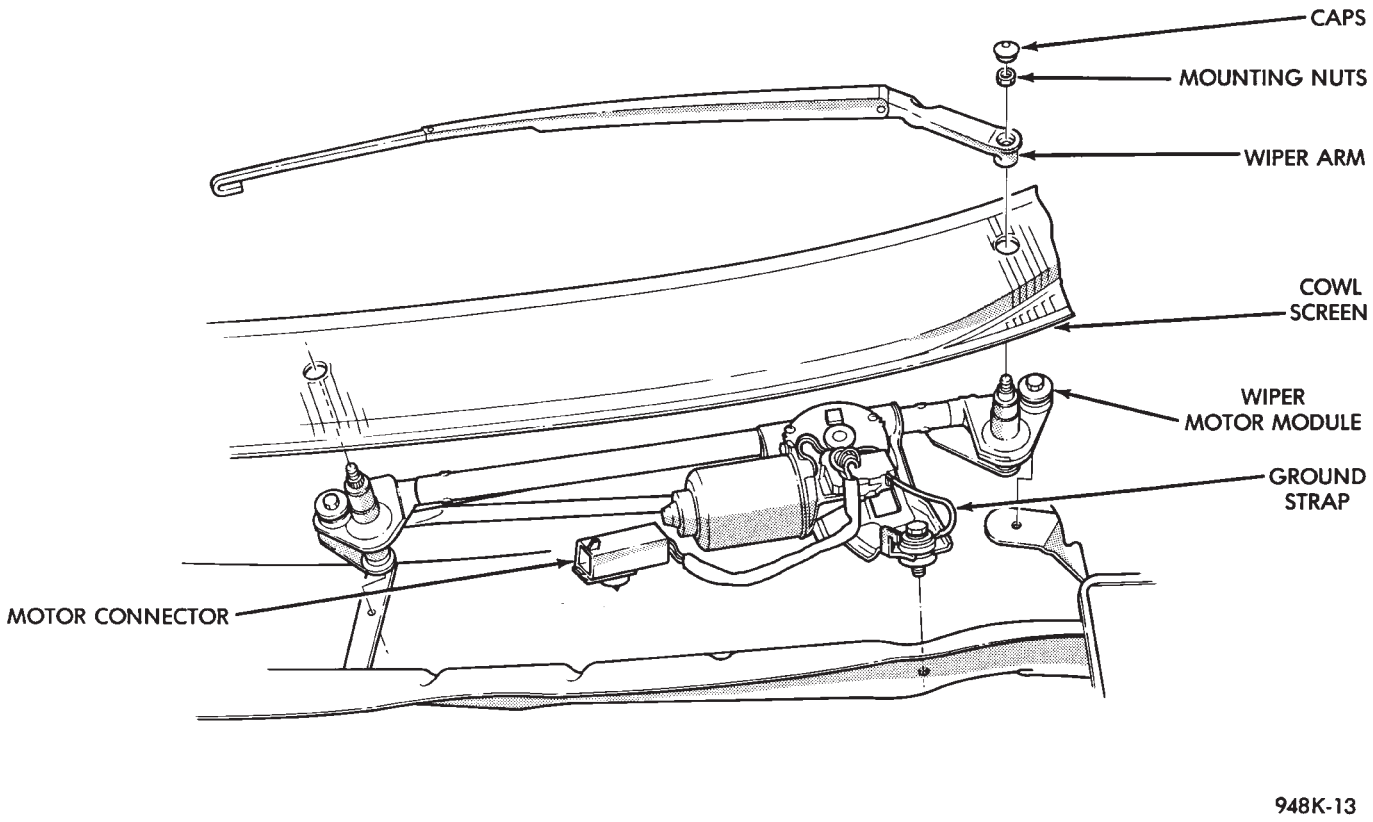

Fig. 9 Wiper Motor and Linkage Module

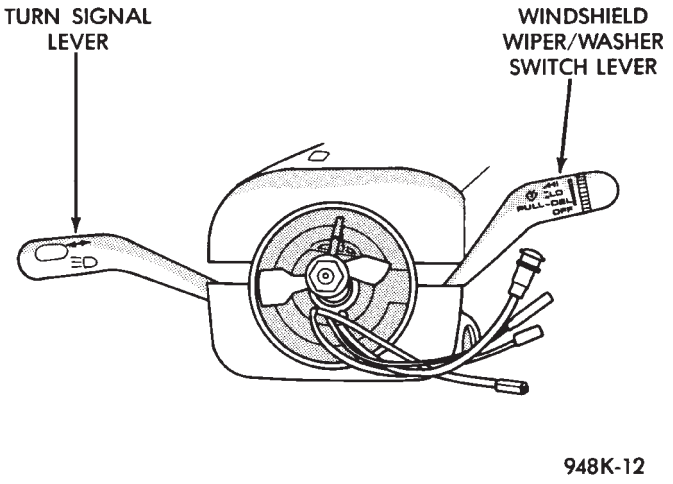

Fig. 10 Upper Shroud Removal

CLEANING AND INSPECTION

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 recommended to remove the accumulation of salt and road grime. The wiper blades, arms and windshield should be cleaned with a sponge or cloth and a mild detergent or nonabrasive cleaner. If the wiper blades continue to streak or smear, they should be replaced. The wiper blade should run smoothly across the windshield in both directions. The wiper blade should slightly roll over center when the blade reverses direction. A wiper blade insert that has lost flexibility or a wiper arm that has lost spring tension, will cause the blade to skip or chatter across the windshield. If the wiper blades are new and the wiper arm spring tension is OK and a chattering sound is emitted from the wiper(s), the wiper blade is not rolling over center. If this condition exists, refer to the Wiper Arm Alignment paragraph of this group.

ADJUSTMENTS

WIPER ARM ADJUSTMENT

(1) Cycle the wiper motor into the PARK position.

(2) Lift the wiper blade off the windshield and release it.

(3) The wiper blade heel should be parked within 5 mm of the park line. The park line is mark on the windshield (Fig. 11).

(4) In the event that the wiper blade tip excessively strikes the cowl screen due to long term normal wear, reposition the wiper blade heel slightly above the park line. Make sure that the wipers are in the PARK position.

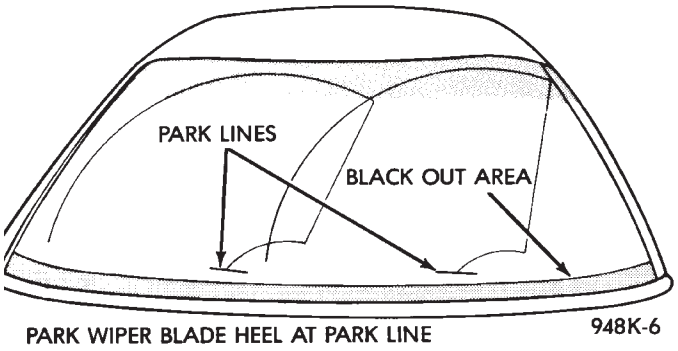

Fig. 11 Arm Adjustment

WINDSHIELD WASHER SYSTEM

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DESCRIPTION AND OPERATION

WASHER NOZZLE

This model is equipped with two hood mounted washer nozzles. Each nozzle emits two streams into the wiper pattern (Fig. 1). If the nozzle performance is unsatisfactory they can be adjusted. To adjust insert a pin into the nozzle ball and move to proper pattern (Fig. 2). The right and left nozzles are identical.

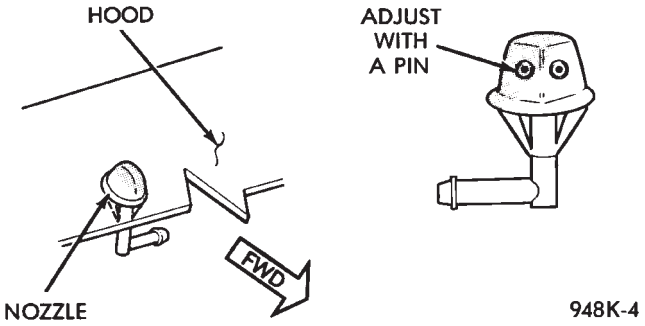

Fig. 1 Windshield Washer Nozzle

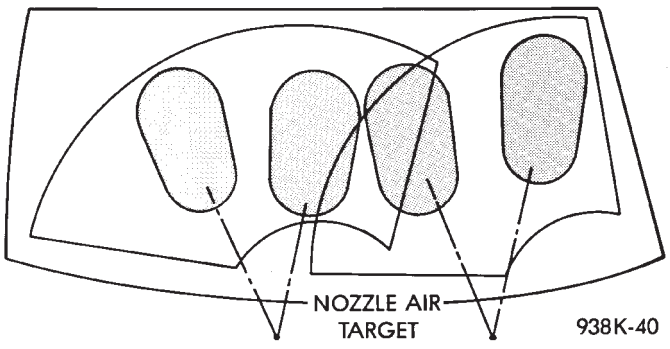

Fig. 2 Windshield Washer Pattern

DIAGNOSIS AND TESTING

WINDSHIELD WASHERS

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. Followed by an average of two more wipe cycles (±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 Test (Fig. 3).

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

The pump and reservoir are serviced as separate assemblies (Fig. 4).

Condition	Possible Cause	Correction
Pump runs no fluid flowing.	(1) No fluid in the reservoir.	(1) Fill reservoir.
	(2) Nozzle plugged or frozen.	(2) Thaw and check flow if blocked replace as necessary.
	(3) Broken, loose or pinched hose.	(3) Check flow through hose connections.
	(4) Faulty pump.	(4) Apply battery voltage to motor terminals, replace if pump does not run.
System operates intermittently.	(1) Loose wire connection.	(1) Check wire connections.
	(2) Faulty switch.	(2) Disconnect wire harness use voltmeter to check switch.
System output is low.	(1) Pinched hose.	(1) Check flow through hose connection.
	(2) Hose blocked.	(2) Disconnect hose at nozzle and Y connector check for flow. Replace as necessary.

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Fig. 3 Windshield Washer Test

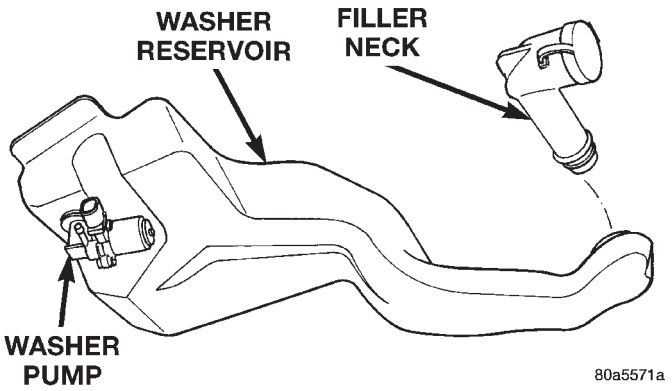

Fig. 4 Washer Fluid Reservoir

REMOVAL AND INSTALLATION

WASHER NOZZLE

REMOVAL

(1) Disconnect washer fluid hose at the nozzle.

(2) Using a needle nose pliers, squeeze together the locking tabs on the nozzle (Fig. 1).

(3) Remove nozzle.

INSTALLATION

(1) Place the nozzle in position and push downward till locking tabs are securely snapped into position.

(2) Connect the washer hose and ensure that the hose is not kinked.

WASHER RESERVOIR

REMOVAL

(1) Remove filler neck (Fig. 5).

(2) Raise vehicle on hoist.

(3) Disconnect the wire connector from the reservoir pump (Fig. 6).

(4) Disconnect the washer hose at the pump and drain the reservoir.

(5) Remove fastener from reservoir.

(6) Remove the reservoir through fender opening.

INSTALLATION

For installation, reverse the above procedures. Tighten the reservoir screw to 2.2 to 3.3 N·m (20 to 29 in. lbs.) torque.

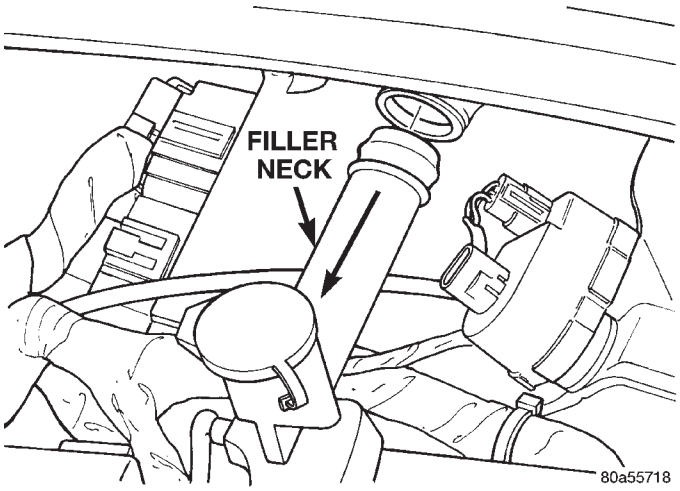

Fig. 5 Filler Neck Removal

REMOVAL AND INSTALLATION (Continued)

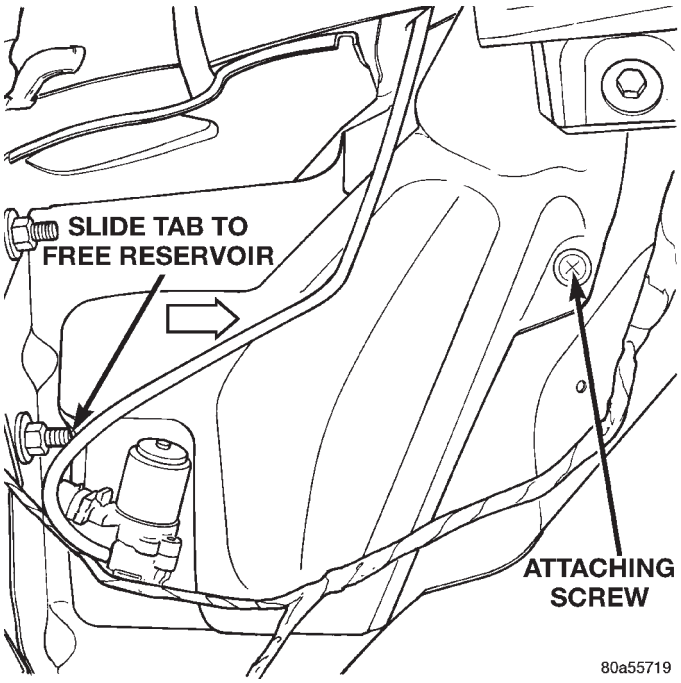

Fig. 6 Reservoir Removal

WASHER RESERVOIR PUMP

REMOVAL

(1) Raise vehicle on hoist.

(2) Disconnect the wire connector from the reservoir pump.

(3) Disconnect the washer hose at the pump and drain the reservoir.

(4) Gently pry pump away from reservoir and out of grommet. Care must be taken not to puncture reservoir (Fig. 7).

(5) Remover rubber grommet from reservoir and throw away.

INSTALLATION

For installation, reverse the above procedures.

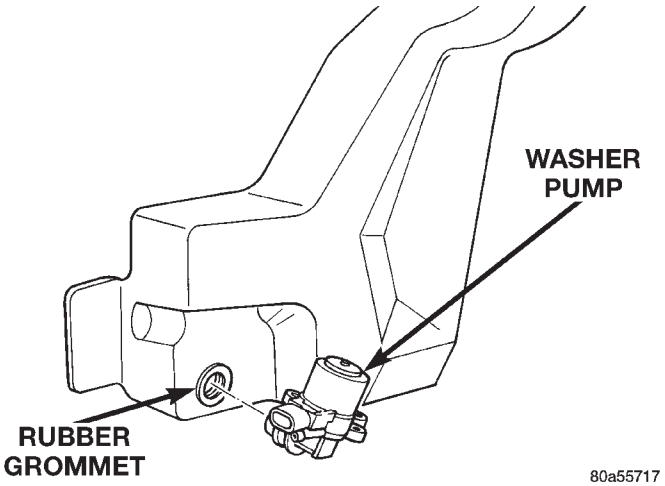

Fig. 7 Washer Pump