

WIPERS/WASHERS

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WIPERS/WASHERS

DESCRIPTION

An electrically operated intermittent wiper and washer system is standard factory-installed safety equipment on this model. The wiper and washer system includes the following major components, which are described in further detail elsewhere in this service information:

- **Central Timer Module** - The Central Timer Module (CTM) is located under the driver side end of the instrument panel, inboard of the instrument panel steering column opening. A base version of the CTM is used on base models of this vehicle. The base version of the CTM combines the functions of a chime module and an intermittent wipe module in a single unit. The high-line version of the CTM is used on high-line vehicles. The high-line CTM provides all of the functions of the base version of the CTM, but also is used to control and integrate many additional

electronic functions and features included on high-line models. The premium version of the CTM is the same as the high-line version, but is used only on models equipped with the heated seat option. The high-line and premium versions of the CTM contain integrated circuitry, a central processing unit and the programming to provide all of the proper wiper and washer system features based upon the monitored inputs. The high-line and premium CTM circuitry monitors hard wired switch inputs, as well as message inputs received from other vehicle electronic modules on the Chrysler Collision Detection (CCD) data bus network. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL/CENTRAL TIMER MODULE - DESCRIPTION).

- **Multi-Function Switch** - The multi-function switch is secured to the left side of the steering column, just below the steering wheel. Only the control stalk for the multi-function switch is visible, the remainder of the switch is concealed beneath the steering column shrouds. The multi-function switch

WIPERS/WASHERS (Continued)

contains all of the switches for both the wiper and washer systems.

- **Washer Fluid Level Switch** - The washer fluid level switch is located in a dedicated hole on the lower rear side of the washer reservoir, above the washer pump/motor unit near the left front corner of the engine compartment.

- **Washer Nozzles** - The dual fluidic washer nozzles are secured with integral snap features to dedicated openings in the cowl plenum cover/grille panel located near the base of the windshield. The washer plumbing fittings for the washer nozzles are concealed beneath the cowl plenum cover/grille panel.

- **Washer Pump/Motor** - The washer pump/motor unit is located in a dedicated hole on the lower rear side of the washer reservoir near the left front corner of the engine compartment.

- **Washer Reservoir** - The washer reservoir is secured to the left side of the radiator fan shroud in the left front corner of the engine compartment.

- **Wiper Arms** - The two wiper arms are secured to the two wiper pivots, which extend through the cowl plenum cover/grille panel located near the base of the windshield.

- **Wiper Blades** - The two wiper blades are secured to the two wiper arms, and are parked on the glass near the bottom of the windshield when the wiper system is not in operation.

- **Wiper Module** - The wiper pivots are the only visible components of the wiper module. The remainder of the module is concealed within the cowl plenum beneath the cowl plenum cover/grille panel. The wiper module includes the module bracket, the single wiper motor, the wiper linkage, and the two wiper pivots.

- **Wiper Relay** - The wiper relay is located in the Power Distribution Center (PDC) in the engine compartment near the battery.

Features of the wiper and washer system include the following:

- **Continuous Wipe Modes** - The two-speed wiper motor and the internal circuitry of the multi-function switch work in concert to provide two continuous wipe cycles, low speed or high speed.

- **Intermittent Wipe Mode** - The internal circuitry of the multi-function switch, the CTM, and the wiper relay work in concert to provide an intermittent wipe mode with multiple delay interval selections. On models with a high-line or premium CTM, the CTM also automatically adjusts each manually selected delay interval to compensate for vehicle speed.

- **Washer Mode** - When the washer system is activated with the multi-function switch while the wiper system is operating, washer fluid will be dispensed onto the windshield glass through the washer

nozzles for as long as the washer pump/motor is energized.

- **Wipe-After-Wash Mode** - The internal circuitry of the CTM provides a wipe-after-wash feature which, if the wipers are turned Off, will operate the washer pump/motor and the wipers for as long as the washer system is activated, then provide several additional wipe cycles after the washer system is deactivated before parking the wiper blades near the base of the windshield.

Hard wired circuitry connects the wiper and washer system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the wiper and washer system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

The wiper and washer system is intended to provide the vehicle operator with a convenient, safe, and reliable means of maintaining visibility through the windshield glass. The various components of this system are designed to convert electrical energy produced by the vehicle electrical system into the mechanical action of the wiper blades to wipe the outside surface of the glass, as well as into the hydraulic action of the washer system to apply washer fluid stored in an on-board reservoir to the area of the glass to be wiped. When combined, these components provide the means to effectively maintain clear visibility for the vehicle operator by removing excess accumulations of rain, snow, bugs, mud, or other minor debris from the outside windshield glass surface that might be encountered while driving the vehicle under numerous types of inclement operating conditions. The vehicle operator initiates all wiper and washer system functions with the multi-function switch control stalk that extends from the left side of the steering column, just below the steering wheel. Rotating the knob on the end of the multi-function switch control stalk selects the desired wiper system operating mode. The wiper system allows the vehicle operator to select from two continuous wiper speeds, Hi or Lo, or one of several intermittent wipe Delay mode intervals. Pushing the button on the end of the control stalk downwards towards the steering column

WIPERS/WASHERS (Continued)

activates the washer pump/motor, which dispenses washer fluid onto the windshield glass through the washer nozzles.

When the ignition switch is in the Accessory or On positions, battery current from a fuse in the Junction Block (JB) is provided through a fused ignition switch output (run-acc) circuit to the wiper motor park switch, the wiper relay, and the multi-function switch. The internal circuitry of the multi-function switch provides a direct hard wired battery current output to the low speed or high speed brushes of the wiper motor when the Lo or Hi switch setting is selected, which causes the wipers to cycle at the selected speed. The intermittent wipe, and wipe-after-wash features of the wiper and washer system are provided by the electronic intermittent wipe logic circuit within the Central Timer Module (CTM). In order to provide the intermittent wipe feature, the CTM monitors the wiper switch state and the wiper motor park switch state. In order to provide the wipe-after-wash feature, the CTM monitors both the washer switch state and the wiper motor park switch state. When a Delay position is selected with the multi-function switch control knob, the CTM logic circuit responds by calculating the correct delay interval. The CTM then energizes the wiper relay by pulling the relay control coil to ground. The energized wiper relay directs battery current through the normally open contact of the relay back through the internal circuitry of the multi-function switch to the low speed brush of the wiper motor. The CTM monitors the wiper motor operation through the wiper park switch sense circuit, which allows the CTM to determine the proper timing to begin the next wiper blade sweep. The normal delay intervals are driver adjustable from about one-half second to about eighteen seconds.

The high-line and premium CTM also provides a speed sensitive intermittent wipe feature. By monitoring vehicle speed messages received from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus network, the high-line or premium CTM is able to adjust the delay intervals to compensate for vehicle speed. Above about sixteen kilometers-per-hour (ten miles-per-hour) the delay is driver adjustable from about one-half second to about eighteen seconds. Below about sixteen kilometers-per-hour (ten miles-per-hour) the delay times are doubled by the CTM, from about one second to about thirty-six seconds.

When the Off position of the multi-function switch wiper control knob is selected, one of two events is possible. The event that will occur depends upon the position of the wiper blades on the windshield at the moment that the Off position is selected. If the wiper blades are in the down position on the windshield

when the Off position is selected, the park switch that is integral to the wiper motor is closed to ground and the wiper motor ceases to operate. If the wiper blades are not in the down position on the windshield at the moment the Off position is selected, the park switch is closed to battery current through a fused ignition switch output (run-acc) circuit. The park switch sense circuit directs this battery current to the low speed brush of the wiper motor through the normally closed contact of the wiper relay and the internal Off position circuitry of the multi-function switch. This causes the wiper motor to continue running until the wiper blades are in the down position on the windshield and the park switch is again closed to ground.

When the Wash position of the multi-function switch is selected, the Wash position circuitry within the switch directs battery current to the washer pump/motor. The CTM monitors the washer switch state through a washer switch sense input. When the washer switch is closed with the wiper system turned Off, the CTM operates the wiper motor through the wiper relay in the same manner as it does to provide the Delay mode operation. After the state of the washer switch changes to open, the CTM monitors the wiper motor through the wiper park switch sense circuit, which allows the CTM to monitor the number of wiper blade sweeps.

Proper testing of the CTM, the PCM, or the CCD data bus vehicle speed messages requires a DRBIII® scan tool. Refer to the appropriate diagnostic information. Refer to the owner's manual in the vehicle glove box for more information on the features and operation of the wiper and washer system.

DIAGNOSIS AND TESTING - WIPER & WASHER SYSTEM

WIPER SYSTEM

The diagnosis found here addresses an electrically inoperative wiper system. If the wiper motor operates, but the wipers do not move on the windshield, replace the faulty wiper module. If the wipers operate, but chatter, lift, or do not clear the glass, clean and inspect the wiper system components as required. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - INSPECTION) and (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - CLEANING). Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

The following tests will help to diagnose the hard wired components and circuits of the wiper system.

WIPERS/WASHERS (Continued)

However, these tests may not prove conclusive in the diagnosis of this system on models equipped with a high-line or premium Central Timer Module (CTM). In order to obtain conclusive testing of the wiper system on models with a high-line or premium CTM, the Chrysler Collision Detection (CCD) data bus network and all of the electronic modules that provide inputs to or receive outputs from the wiper system components must be checked. The most reliable, efficient, and accurate means to diagnose the wiper system on models with a high-line or premium CTM requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information. The DRBIII® scan tool can provide confirmation that the CCD data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the CCD data bus, and that the wiper relay is being sent the proper hard wired outputs by the CTM for it to perform its wiper system functions.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Check the fused ignition switch output (run-acc) fuse (Fuse 6 - 25 ampere) in the Junction Block (JB). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run-acc) fuse (Fuse 6 - 25 ampere) in the JB. If OK, go to Step 3. If not OK, repair the open fused ignition switch output (run-acc) circuit between the JB and the ignition switch as required.

(3) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the multi-function switch from the switch connector receptacle. Reconnect the battery negative cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run-acc) circuit cavity of the instrument panel wire harness connector for the multi-function switch. If OK, go to Step 4. If not OK, repair the

open fused ignition switch output circuit between the multi-function switch and the JB as required.

(4) If the problem being diagnosed involves only the intermittent wipe feature, go to Step 5. If the problem being diagnosed involves all wiper modes, or only the Low and/or High speed modes, go to Step 7.

(5) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector (Connector C1) for the Central Timer Module (CTM) from the CTM connector receptacle. Check for continuity between the wiper switch mode sense circuit cavities of the instrument panel wire harness connector for the multi-function switch and the instrument panel wire harness connector (Connector C1) for the CTM. There should be continuity. If OK, go to Step 6. If not OK, repair the open wiper switch mode sense circuit between the multi-function switch and the CTM as required.

(6) Check for continuity between the wiper switch mode signal circuit cavities of the instrument panel wire harness connector for the multi-function switch and the instrument panel wire harness connector (Connector C1) for the CTM. There should be continuity. If OK, proceed to the diagnosis for the wiper relay. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER RELAY - DIAGNOSIS AND TESTING). If not OK, repair the open wiper switch mode signal circuit between the multi-function switch and the CTM as required.

(7) Check for continuity between the two wiper switch low speed output circuit cavities of the instrument panel wire harness connector for the multi-function switch. There should be continuity. If OK, go to Step 8. If not OK, repair the open wiper switch low speed output circuit between the two cavities of the instrument panel wire harness connector for the multi-function switch as required.

(8) Test the multi-function switch continuity. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DIAGNOSIS AND TESTING). If the multi-function switch tests OK, reconnect the instrument panel wire harness connector for the multi-function switch to the switch connector receptacle and go to Step 9. If not OK, replace the faulty multi-function switch and test the wiper system operation again. If still not OK, go to Step 9.

(9) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Measure the resistance between the headlamp and dash wire harness ground wire for the wiper motor and a good ground. The meter should read zero ohms. If OK, go to Step 10. If not OK, repair the open ground circuit to ground (G100) as required.

WIPERS/WASHERS (Continued)

(10) Disconnect the headlamp and dash wire harness connector for the wiper module from the wiper motor pigtail wire connector. Reconnect the battery negative cable. Turn the ignition switch to the On position. Place the multi-function switch in the positions indicated in the tests below, and check for battery voltage at the appropriate cavity of the headlamp and dash wire harness connector for the wiper motor.

(a) Check for battery voltage at the fused ignition switch output (run-acc) circuit cavity of the headlamp and dash wire harness connector for the wiper module with the multi-function switch in any position. If OK, go to Step b. If not OK, repair the open fused ignition switch output (run-acc) circuit between the wiper module and the JB as required.

(b) Check for battery voltage at the wiper switch low speed output circuit cavity of the headlamp and dash wire harness connector for the wiper module with the multi-function switch in the Lo position. If OK, go to Step c. If not OK, repair the open wiper switch low speed output circuit between the wiper module and the multi-function switch as required.

(c) Check for battery voltage at the wiper switch high speed output circuit cavity of the headlamp and dash wire harness connector for the wiper module with the multi-function switch in the Hi position. If OK, go to Step d. If not OK, repair the open wiper switch high speed output circuit between the wiper module and the multi-function switch as required.

(d) Check for battery voltage at the wiper park switch sense circuit cavity of the headlamp and dash wire harness connector for the wiper module with the multi-function switch in the Lo or Hi position, then move the switch to the Off position. The meter should switch between battery voltage and zero volts while the wipers are cycling. The meter should read battery voltage when the switch is first moved to the Off position until the wipers park, and then read a steady zero volts. If not OK, replace the faulty wiper module.

WASHER SYSTEM

The diagnosis found here addresses an electrically inoperative washer system. If the washer pump/motor operates, but no washer fluid is emitted from the washer nozzles, be certain to check the fluid level in the reservoir. Also inspect the washer system components as required. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - INSPECTION). Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness

routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

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(1) Turn the ignition switch to the On position. Turn the multi-function switch wiper control knob to the Lo or Hi speed position. Check whether the wipers operate. If OK, go to Step 2. If not OK, repair the wiper system as required before proceeding with the following tests. Refer to WIPER SYSTEM .

(2) Turn the multi-function switch wiper control knob to the Off position. Depress the washer button. The washer pump should operate and the wipers should operate for as long as the washer button is depressed. The wipers should continue to operate for about three sweep cycles after the button is released before they park. If the wipers are OK, but the washers are not, go to Step 3. If the washers are OK, but the wipers are not, go to Step 5.

(3) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the headlamp and dash wire harness connector for the washer pump/motor from the motor connector receptacle. Measure the resistance between the ground circuit cavity of the headlamp and dash wire harness connector for the washer pump/motor and a good ground. The meter should read zero ohms. If OK, go to Step 4. If not OK, repair the open ground circuit to ground (G100) as required.

(4) Reconnect the battery negative cable. Turn the ignition switch to the On position. With the washer button depressed, check for battery voltage at the washer switch output circuit cavity of the headlamp and dash wire harness connector for the washer pump/motor. If OK, replace the faulty washer pump/motor. If not OK, repair the open washer switch output circuit between the washer pump/motor and the multi-function switch as required.

(5) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector (Connector C1) for the Central Timer Module

WIPERS/WASHERS (Continued)

(CTM) from the CTM connector receptacle. Reconnect the battery negative cable. Turn the ignition switch to the On position. With the washer button depressed, check for battery voltage at the washer switch sense circuit cavity of the instrument panel wire harness connector (Connector C1) for the CTM. If OK, proceed to the diagnosis for the wiper relay. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER RELAY - DIAGNOSIS AND TESTING). If not OK, repair the open washer switch sense circuit between the CTM and the multi-function switch as required.

CLEANING - WIPER & WASHER SYSTEM**WIPER SYSTEM**

The squeegees of wiper blades exposed to the elements for a long time tend to lose their wiping effectiveness. Periodic cleaning of the squeegees is suggested to remove any deposits of salt or road film. The wiper blades, arms, and windshield glass should only be cleaned using a sponge or soft cloth and windshield washer fluid, a mild detergent, or a non-abrasive cleaner. If the wiper blades continue to leave streaks, smears, hazing, or beading on the glass after thorough cleaning of the squeegees and the glass, the entire wiper blade assembly must be replaced.

CAUTION: Protect the rubber squeegees of the wiper blades from any petroleum-based cleaners, solvents, or contaminants. These products can rapidly deteriorate the rubber squeegees.

WASHER SYSTEM

If the washer system is contaminated with foreign material, drain the washer reservoir by removing the front washer pump/motor from the reservoir. Clean foreign material from the inside of the washer reservoir using clean washer fluid, a mild detergent, or a non-abrasive cleaner. Flush foreign material from the washer system plumbing by first disconnecting the washer hoses from the washer nozzles, then running the washer pump/motor to run clean washer fluid or water through the system. Plugged or restricted washer nozzles should be carefully back-flushed using compressed air. If the washer nozzle obstruction cannot be cleared, replace the washer nozzle.

CAUTION: Never introduce petroleum-based cleaners, solvents, or contaminants into the washer system. These products can rapidly deteriorate the rubber seals and hoses of the washer system, as well as the rubber squeegees of the wiper blades.

CAUTION: Never use compressed air to flush the washer system plumbing. Compressed air pressures are too great for the washer system plumbing components and will result in further system damage. Never use sharp instruments to clear a plugged washer nozzle or damage to the nozzle orifice and improper nozzle spray patterns will result.

INSPECTION - WIPER & WASHER SYSTEM**WIPER SYSTEM**

The wiper blades and wiper arms should be inspected periodically, not just when wiper performance problems are experienced. This inspection should include the following points:

(1) Inspect the wiper arms for any indications of damage, or contamination. If the wiper arms are contaminated with any foreign material, clean them as required. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - CLEANING). If a wiper arm is damaged or corrosion is evident, replace the wiper arm with a new unit. Do not attempt to repair a wiper arm that is damaged or corroded.

(2) Carefully lift the wiper blade off of the glass. Note the action of the wiper arm hinge. The wiper arm should pivot freely at the hinge, but with no lateral looseness evident. If there is any binding evident in the wiper arm hinge, or there is evident lateral play in the wiper arm hinge, replace the wiper arm.

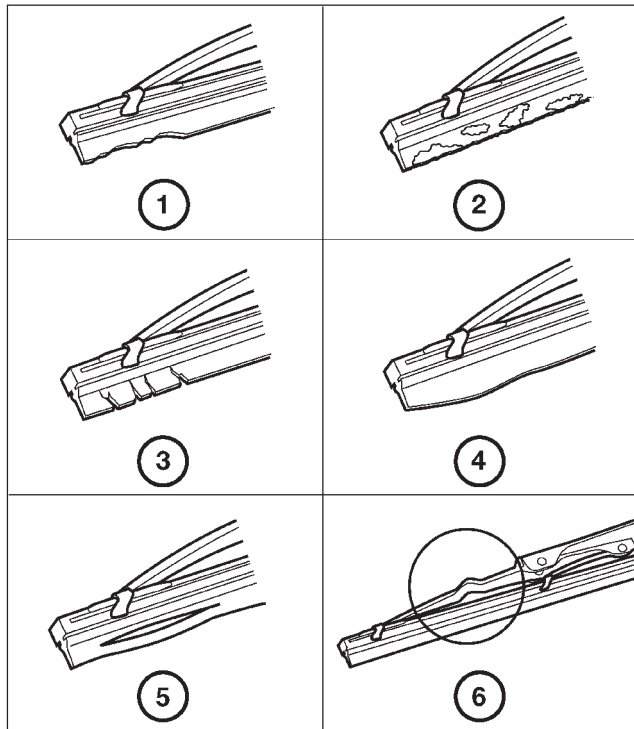
CAUTION: Do not allow the wiper arm to spring back against the glass without the wiper blade in place or the glass may be damaged.

(3) Once proper hinge action of the wiper arm is confirmed, check the hinge for proper spring tension. Remove the wiper blade from the wiper arm. Either place a small postal scale between the blade end of the wiper arm and the glass, or carefully lift the blade end of the arm away from the glass using a small fish scale. Compare the scale readings between the right and left wiper arms. Replace a wiper arm if it has comparatively lower spring tension, as evidenced by a lower scale reading.

(4) Inspect the wiper blades and squeegees for any indications of damage, contamination, or rubber deterioration (Fig. 1). If the wiper blades or squeegees are contaminated with any foreign material, clean them and the glass as required. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - CLEANING). After cleaning the wiper blade and the glass, if the wiper blade still fails to clear the glass without smearing, streaking, chattering, hazing, or beading, replace the wiper blade. Also, if a wiper blade is damaged or the squeegee rubber is damaged or deteriorated, replace

WIPERS/WASHERS (Continued)

the wiper blade with a new unit. Do not attempt to repair a wiper blade that is damaged.



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Fig. 1 Wiper Blade Inspection

- 1 - WORN OR UNEVEN EDGES
- 2 - ROAD FILM OR FOREIGN MATERIAL DEPOSITS
- 3 - HARD, BRITTLE, OR CRACKED
- 4 - DEFORMED OR FATIGUED
- 5 - SPLIT
- 6 - DAMAGED SUPPORT COMPONENTS

WASHER SYSTEM

The washer system components should be inspected periodically, not just when washer performance problems are experienced. This inspection should include the following points:

(1) Check for ice or other foreign material in the washer reservoir. If contaminated, clean and flush the washer system. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - CLEANING).

(2) Inspect the washer plumbing for pinched, leaking, deteriorated, or incorrectly routed hoses and damaged or disconnected hose fittings. Replace damaged or deteriorated hoses and hose fittings. Leaking washer hoses can sometimes be repaired by cutting the hose at the leak and splicing it back together using an in-line connector fitting. Similarly, sections of deteriorated hose can be cut out and replaced by splicing in new sections of hose using in-line connector fittings. Whenever routing a washer hose or a wire harness containing a washer hose, it must be routed away from hot, sharp, or moving parts. Also,

sharp bends that might pinch the washer hose must be avoided.

WASHER FLUID LEVEL SWITCH

DESCRIPTION

The washer fluid level switch is a single pole, single throw reed-type switch mounted on the rear of the washer reservoir above the washer pump/motor, in the left front corner of the engine compartment. Only the molded plastic switch mounting flange and connector receptacle are visible when the switch is installed in the reservoir. A short nipple formation extends from the inner surface of the switch mounting flange, and a barb on the nipple near the switch mounting flange is press-fit into a rubber grommet seal installed in the mounting hole of the reservoir. A small plastic float pivots on the end of a bracket that extends from the switch nipple formation. Within the float is a small magnet, which actuates the reed switch. The washer fluid level switch cannot be adjusted or repaired. If faulty or damaged, the switch must be replaced.

OPERATION

The washer fluid level switch uses a pivoting, oblong float to monitor the level of the washer fluid in the washer reservoir. The float contains a small magnet. When the float pivots, the changing proximity of its magnetic field will cause the contacts of the small, stationary reed switch to open or close. When the fluid level in the washer reservoir is at or above the float level, the float moves to a vertical position and the switch contacts open. When the fluid level in the washer reservoir falls below the pivoting float, the float moves to a horizontal position and the switch contacts close. The switch contacts are connected in series between ground and the washer fluid switch sense input of the instrument cluster. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness. The switch receives ground through another take out of the headlamp and dash wire harness with a single eyelet terminal connector that is secured under a nut to a ground stud located on the front extension of the left front wheel housing in the engine compartment. The washer fluid level switch can be diagnosed using conventional diagnostic tools and methods. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/WASHER FLUID INDICATOR - DIAGNOSIS AND TESTING).

WASHER FLUID LEVEL SWITCH (Continued)

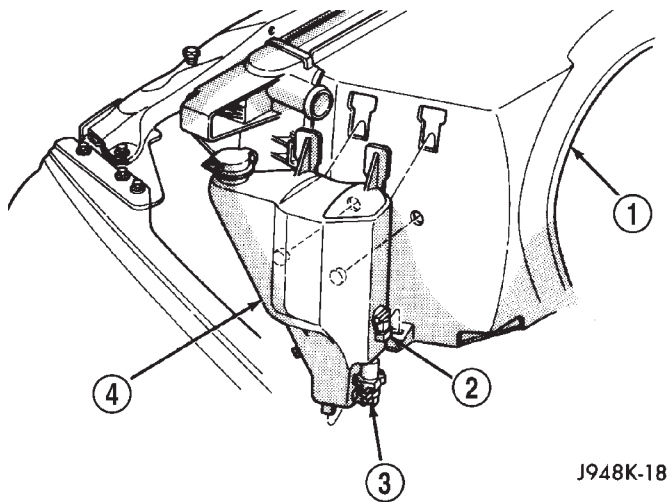
REMOVAL

The washer fluid level switch can be removed from the washer reservoir without removing the reservoir from the vehicle.

(1) Disconnect and isolate the battery negative cable.

(2) Disconnect the washer hose from the barbed outlet nipple of the washer pump/motor unit and allow the washer fluid to drain into a clean container for reuse.

(3) Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the switch connector receptacle (Fig. 2).



J948K-18

Fig. 2 Washer Reservoir

- 1 - FAN SHROUD
- 2 - LOW WASHER FLUID SENSOR
- 3 - WASHER PUMP
- 4 - WASHER RESERVOIR

NOTE: The pivoting float of the washer fluid level switch must be in a horizontal position within the reservoir in order to be removed. With the reservoir empty and in an upright position, the pivoting float will orient itself to the horizontal position when the switch connector receptacle is pointed straight downwards.

(4) Using a trim stick or another suitable wide flat-bladed tool, gently pry the barbed nipple of the washer fluid level switch out of the rubber grommet seal on the rear of the reservoir. Care must be taken not to damage the reservoir.

(5) Remove the washer fluid level switch and float from the washer reservoir.

(6) Remove the rubber grommet seal from the washer fluid level switch mounting hole in the washer reservoir and discard.

INSTALLATION

(1) Install a new rubber grommet seal into the washer fluid level switch mounting hole in the front of the washer reservoir. Always use a new rubber grommet seal on the reservoir.

(2) Position the float of the washer fluid level switch through the rubber grommet seal in the washer reservoir (Fig. 2). The connector receptacle of the washer fluid level switch should be pointed downward.

(3) Press firmly and evenly on the washer fluid level switch using hand pressure until the barbed nipple is fully seated in the rubber grommet seal in the washer reservoir mounting hole.

(4) Reconnect the headlamp and dash wire harness connector for the washer fluid level switch to the switch connector receptacle.

(5) Reconnect the washer hose to the barbed outlet nipple of the washer pump/motor unit.

(6) Refill the washer reservoir with the washer fluid drained from the reservoir during the removal procedure.

(7) Reconnect the battery negative cable.

WASHER HOSES/TUBES

DESCRIPTION

The washer plumbing consists of a small diameter rubber hose that is routed from the barbed outlet nipple of the washer pump/motor on the washer reservoir through the engine compartment along the left inner fender shield to a molded plastic in-line fitting with barbed nipples near the dash panel. A second section of washer hose passes from the engine compartment into the cowl plenum area through a dedicated hole with a rubber grommet near the left end of the cowl plenum panel. Beneath the cowl plenum cover/grille panel, a molded plastic wye fitting with barbed nipples joins the engine compartment hose to the two washer nozzle hoses. The two washer hoses are routed through locating clips on the underside of the cowl plenum cover/grille panel to the two washer nozzles.

Washer hose is available for service only as roll stock, which must then be cut to length. The molded plastic washer hose fittings cannot be repaired. If these fittings are faulty or damaged, they must be replaced.

OPERATION

Washer fluid in the washer reservoir is pressurized and fed by the washer pump/motor through the washer system plumbing and fittings to the two washer nozzles. Whenever routing the washer hose or a wire harness containing a washer hose, it must

WASHER HOSES/TUBES (Continued)

be routed away from hot, sharp, or moving parts; and, sharp bends that might pinch the hose must be avoided.

WASHER NOZZLE

DESCRIPTION

The two washer nozzles have integral snap features that secure them in dedicated holes in the cowl plenum cover/grille panel located near the base of the windshield. The domed upper surface of the washer nozzle is visible on the top of the plenum cover/grille panel, and the nozzle orifice is oriented towards the windshield glass. The washer plumbing fittings for the washer nozzles are concealed beneath the cowl plenum cover/grille panel. These fluidic washer nozzles are constructed of molded plastic. The cowl plenum cover/grille panel must be removed from the vehicle to access the nozzles for service. The washer nozzles cannot be adjusted or repaired and, if faulty or damaged, they must be replaced.

OPERATION

The two washer nozzles are designed to dispense washer fluid into the wiper pattern area on the outside of the windshield glass. Pressurized washer fluid is fed to each nozzle from the washer reservoir by the washer pump/motor through rubber hoses, which are attached to a barbed nipple on each washer nozzle below the cowl plenum cover/grille panel. The washer nozzles incorporate a fluidic design, which causes the nozzle to emit the pressurized washer fluid as an oscillating stream to more effectively cover a larger area of the glass area to be cleaned.

REMOVAL

(1) Remove the cowl plenum cover/grille panel from the cowl top. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).

(2) From the underside of the cowl plenum cover/grille panel, disconnect the washer hose from the nozzle fitting.

(3) From the underside of the cowl plenum cover/grille panel, compress the snap features of the washer nozzle and push the nozzle out through the top of the panel.

INSTALLATION

(1) From the top of the cowl plenum cover/grille panel, insert the barbed nipple of the washer nozzle through the nozzle mounting hole.

(2) With the orifice of the washer nozzle oriented toward the windshield, use hand pressure to push the nozzle into the mounting hole until the snap fea-

tures of the nozzle are fully engaged with the underside of the cowl plenum cover/grille panel.

(3) From the underside of the cowl plenum cover/grille panel, reconnect the washer hose to the washer nozzle fitting.

(4) Reinstall the cowl plenum cover/grille panel onto the cowl top. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).

WASHER PUMP/MOTOR

DESCRIPTION

The washer pump/motor unit is located on the rear of the washer reservoir, near the bottom in the left front corner of the engine compartment. A small permanently lubricated and sealed electric motor is coupled to the rotor-type washer pump. A seal flange with a large barbed inlet nipple on the pump housing passes through a rubber grommet seal installed in the dedicated mounting hole near the bottom of the washer reservoir. A smaller barbed outlet nipple on the pump housing connects the unit to the washer hose. The washer pump/motor unit is retained on the reservoir by the interference fit between the barbed pump inlet nipple and the grommet seal, which is a light press fit. An integral electrical connector receptacle is located on the motor housing. The washer pump/motor unit cannot be repaired. If faulty or damaged, the entire washer pump/motor unit must be replaced.

OPERATION

The washer pump/motor unit is connected to the vehicle electrical system through a single take out and two-cavity connector of the headlamp and dash wire harness. The washer pump/motor is grounded at all times through a take out of the headlamp and dash wire harness with a single eyelet terminal connector that is secured by a nut to a ground stud located on the forward extension of the left front fender wheel housing in the engine compartment. The washer pump/motor receives battery current on a fused ignition switch output (run-acc) circuit through the closed contacts of the momentary washer switch within the multi-function switch only when the washer button on the end of the switch control stalk is depressed towards the steering column. Washer fluid is gravity-fed from the washer reservoir to the inlet side of the washer pump. When the pump motor is energized, the rotor-type pump pressurizes the washer fluid and forces it through the pump outlet nipple, the washer plumbing, and the washer nozzles onto the windshield glass.

WASHER PUMP/MOTOR (Continued)

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Disconnect the headlamp and dash wire harness connector for the washer pump/motor from the motor connector receptacle (Fig. 3).

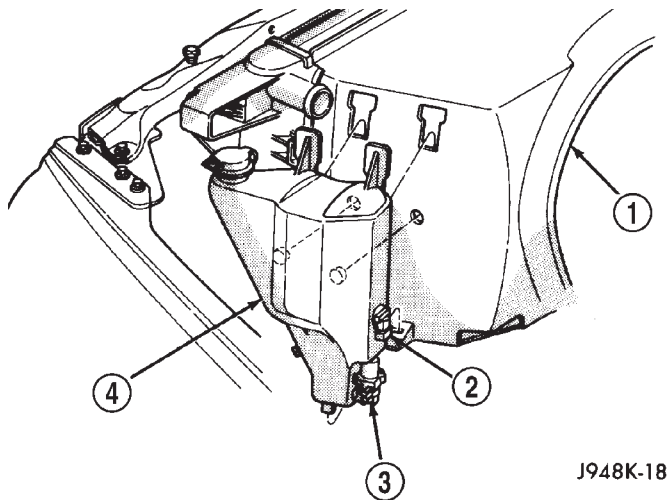


Fig. 3 Washer Reservoir

- 1 - FAN SHROUD
- 2 - LOW WASHER FLUID SENSOR
- 3 - WASHER PUMP
- 4 - WASHER RESERVOIR

(3) Disconnect the washer hose from the barbed outlet nipple of the washer pump/motor and allow the washer fluid to drain into a clean container for reuse.

(4) Using a trim stick or another suitable wide flat-bladed tool, gently pry the barbed inlet nipple of the washer pump out of the rubber grommet seal in the reservoir. Care must be taken not to damage the reservoir.

(5) Remove the rubber grommet seal from the washer pump mounting hole in the washer reservoir and discard.

INSTALLATION

(1) Install a new rubber grommet seal into the washer pump mounting hole in the washer reservoir. Always use a new rubber grommet seal on the reservoir.

(2) Position the barbed inlet nipple of the washer pump to the rubber grommet seal in the reservoir.

(3) Press firmly and evenly on the washer pump until the barbed inlet nipple is fully seated in the rubber grommet seal in the washer reservoir mounting hole.

(4) Reconnect the washer hose to the barbed outlet nipple of the washer pump.

(5) Reconnect the headlamp and dash wire harness connector for the washer pump/motor unit to the motor connector receptacle (Fig. 3).

(6) Refill the washer reservoir with the washer fluid drained from the reservoir during the removal procedure.

(7) Reconnect the battery negative cable.

WASHER RESERVOIR**DESCRIPTION**

The molded plastic washer fluid reservoir is secured with integral mounting tabs to keyed slots on the left side of the radiator fan shroud in the left front corner of the engine compartment. A bright yellow plastic filler cap with a rubber seal and an International Control and Display Symbol icon for "Windshield Washer" and the text "Washer Fluid Only" molded into it snaps over the open end of the filler neck. A bail strap that is integral to the cap secures the cap to the reservoir filler neck when it is removed for inspecting or adjusting the fluid level in the reservoir. There are separate, dedicated holes on the rear side of the reservoir provided for the mounting of the washer/pump motor unit and the washer fluid level switch.

The washer reservoir cannot be repaired and, if faulty or damaged, it must be replaced. The washer reservoir, the grommet seals for the washer pump/motor unit and the washer fluid level switch, and the filler cap are each available for service replacement.

OPERATION

The washer fluid reservoir provides a secure, on-vehicle storage location for a large reserve of washer fluid for operation of the washer system. The washer reservoir filler neck provides a clearly marked and readily accessible point from which to add washer fluid to the reservoir. The washer/pump motor unit is located in a sump area near the bottom of the reservoir to be certain that washer fluid will be available to the pump as the fluid level in the reservoir becomes depleted. The washer fluid level switch is mounted just above the sump area of the reservoir so that there will be adequate warning to the vehicle operator that the washer fluid level is low, before the washer system will no longer operate.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Drain the engine cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE - DRAIN/ALL EXCEPT DIESEL ENGINE) or (Refer to 7 -

WASHER RESERVOIR (Continued)

COOLING - STANDARD PROCEDURE - DRAIN/ DIESEL ENGINE).

(3) Disconnect the upper radiator hose from the radiator.

(4) Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the switch connector receptacle.

(5) Disconnect the headlamp and dash wire harness connector for the washer pump/motor unit from the motor connector receptacle.

(6) Disconnect the washer hose from the barbed outlet nipple of the washer pump/motor and allow the washer fluid to drain into a clean container for reuse.

(7) While pulling the washer reservoir away from the fan shroud, lift the reservoir upwards far enough to disengage the reservoir mounting tabs from the keyed upper and lower mounting slots in the fan shroud (Fig. 4).

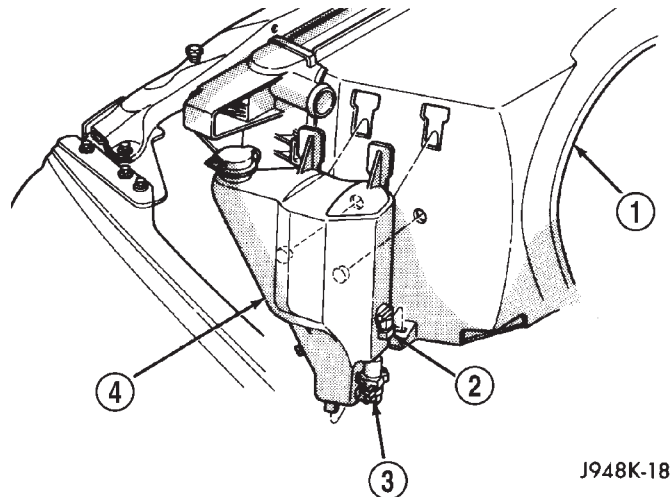


Fig. 4 Washer Reservoir

- 1 - FAN SHROUD
- 2 - WASHER FLUID LEVEL SWITCH
- 3 - WASHER PUMP
- 4 - WASHER RESERVOIR

(8) Remove the washer reservoir from the engine compartment.

INSTALLATION

(1) Position the washer reservoir into the engine compartment (Fig. 4).

(2) Align and insert the upper and lower washer reservoir mounting tabs into the keyed upper and lower mounting slots in the radiator fan shroud. When all the tabs are inserted, use hand pressure to push the reservoir downwards far enough to engage the mounting tabs in the keyways of the mounting slots.

(3) Reconnect the washer hose to the barbed outlet nipple of the washer pump.

(4) Reconnect the headlamp and dash wire harness connector for the washer pump/motor unit to the motor connector receptacle.

(5) Reconnect the headlamp and dash wire harness connector for the washer fluid level switch to the switch connector receptacle.

(6) Reconnect the upper radiator hose to the radiator.

(7) Refill the engine cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE - REFILL/ ALL EXCEPT DIESEL ENGINE) or (Refer to 7 - COOLING - STANDARD PROCEDURE - REFILL/ DIESEL ENGINE).

(8) Refill the washer reservoir with the washer fluid drained from the reservoir during the removal procedure.

(9) Reconnect the battery negative cable.

WIPER ARM

DESCRIPTION

The wiper arms are the rigid members located between the wiper pivots that protrude from the cowl plenum cover/grille panel near the base of the windshield and the wiper blades on the windshield glass. The wiper arm has a die cast metal pivot end. On the underside of this pivot end is a socket formation with internal serrations and a small, movable, stamped steel latch plate that is secured loosely under a small strap that is staked to the pivot end. The wide end of a tapered, stamped steel channel hinges on and is secured with a hinge pin to the pivot end of the wiper arm. One end of a long, rigid, stamped steel strap, with a small hole near its pivot end, is riveted and crimped within the narrow end of the stamped steel channel. The tip of the wiper blade end of this strap is bent back under itself to form a small hook. Concealed within the stamped steel channel, one end of a long spring is hooked through a hole in a small stamped steel strap on the hinge pin within the die cast pivot end, while the other end of the spring is hooked through the small hole in the steel strap. The entire wiper arm has a satin black finish applied to all of its visible surfaces.

A wiper arm cannot be adjusted or repaired. If damaged or faulty, the entire wiper arm unit must be replaced.

OPERATION

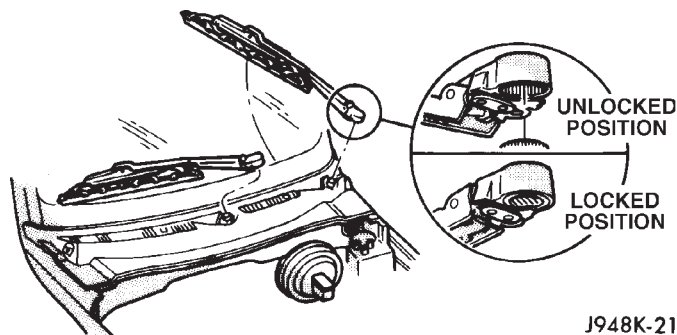
The wiper arms are designed to mechanically transmit the motion from the wiper pivots to the wiper blades. The wiper arm must be properly indexed to the wiper pivot in order to maintain the

WIPER ARM (Continued)

proper wiper blade travel on the glass. The socket formation with internal serrations in the wiper arm pivot end interlocks with the serrations on the outer circumference of the wiper pivot driver, allowing positive engagement and finite adjustment of this connection. The latch plate on the underside of the wiper arm pivot end locks the wiper arm to the wiper pivot when in its installed position and, when in its unlocked position, also serves as a blocker to hold the spring-loaded wiper arm off of the glass to facilitate removal and installation. The spring-loaded wiper arm hinge controls the down-force applied through the tip of the wiper arm to the wiper blade on the glass. The hook formation on the tip of the wiper arm provides a cradle for securing and latching the wiper blade pivot block to the wiper arm.

REMOVAL

- (1) Unlatch and open the hood.
- (2) Lift the wiper arm far enough to raise the wiper blade off of the glass and permit the wiper arm latch plate to be pulled out to its holding position, then release the arm (Fig. 5). The wiper arm and blade will remain off the glass with the latch in this position.



J948K-21

Fig. 5 Wiper Arm Remove/Install - Typical

CAUTION: The use of a screwdriver or other prying tool to remove a wiper arm may distort it. This distortion could allow the arm to come off of the wiper pivot during wiper operation, regardless of how carefully it is reinstalled.

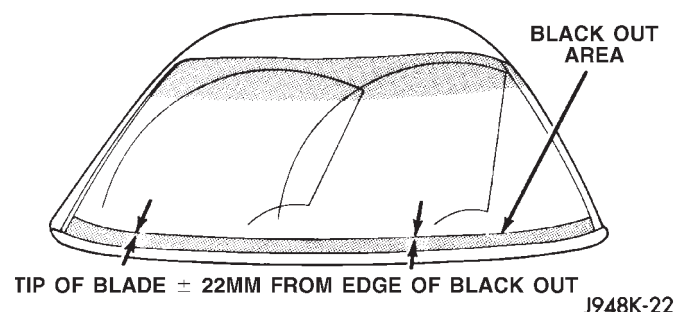
- (3) Using a slight rocking motion, remove the wiper arm pivot end from the wiper pivot.

INSTALLATION

NOTE: Be certain that the wiper motor is in the park position before attempting to install the wiper arms. Turn the ignition switch to the On position and move the wiper control knob on the end of the multi-function switch control stalk to its Off position. If the wiper pivots move, wait until they stop moving, then turn the ignition switch back to the

Off position. The wiper motor is now in its park position.

- (1) The wiper arms must be indexed to the wiper pivots with the wiper motor in the park position to be properly installed (Fig. 6). Position the wiper arm pivot ends onto the wiper pivots so that the lower edge of the wiper arm tip is on the upper edge of the lower windshield blackout area ± 22 millimeters (± 0.86 inches).



J948K-22

Fig. 6 Wiper Arm Installation

- (2) Once the wiper arm is indexed to the wiper pivot, lift the wiper arm away from the windshield slightly to relieve the spring tension on the latch plate, then push the latch plate into the locked position. Gently lower the wiper arm until the wiper blade rests on the glass.

- (3) Wet the windshield glass, then operate the wipers. Turn the wiper control knob on the end of the multi-function switch control stalk to the Off position, then check for the correct wiper arm position and adjust as required.

WIPER BLADE

DESCRIPTION

Each wiper blade is secured by an integral latching pivot block to the hook formation on the tip of the wiper arms, and rests on the glass near the base of the windshield when the wipers are not in operation. The wiper blade consists of the following components:

- **Superstructure** - The superstructure includes several stamped steel bridges and links with claw formations that grip the wiper blade element. Also included in this unit is the latching, molded plastic pivot block that secures the superstructure to the wiper arm. All of the metal components of the wiper blade have a satin black finish applied.

- **Element** - The wiper element or squeegee is the resilient rubber member of the wiper blade that contacts the glass.

- **Flexor** - The flexor is a rigid metal component running along the length of each side of the wiper element where it is gripped by the claws of the superstructure.

WIPER BLADE (Continued)

All Ram truck models have two 50 centimeter (19.69 inch) wiper blades with non-replaceable rubber elements (squeegees). These wiper blades also include an anti-lift feature. The wiper blades cannot be adjusted or repaired. If faulty, worn, or damaged the entire wiper blade unit must be replaced.

OPERATION

The wiper blade is moved back and forth across the glass by the wiper arms when the wipers are being operated. The wiper blade superstructure is the flexible frame that grips the wiper blade element and evenly distributes the force of the spring-loaded wiper arm along the length of the element. The combination of the wiper arm force and the flexibility of the superstructure makes the element conform to and maintain proper contact with the glass, even as the blade is moved over the varied curvature found across the glass surface. The wiper element flexor provides the claws of the blade superstructure with a rigid, yet flexible component on the element which can be gripped. The rubber element is designed to be stiff enough to maintain an even cleaning edge as it is drawn across the glass, but resilient enough to conform to the glass surface and flip from one cleaning edge to the other each time the wiper blade changes directions.

REMOVAL

NOTE: The driver side and passenger side wiper blades are not interchangeable. The driver side wiper blade has an extra bridge and eight pairs of claws securing the wiper element. The passenger side wiper blade has six pairs of claws securing the wiper element. The notched retainer end of both wiper elements should always be oriented towards the end of the wiper blade that is nearest to the wiper pivot.

(1) Turn the wiper control knob on the end of the multi-function switch control stalk to the On position. Cycle the wiper blades to a convenient working location on the windshield by turning the ignition switch to the On and Off positions.

(2) Lift the wiper arm to raise the wiper blade and element off of the glass.

(3) To remove the wiper blade from the wiper arm, push the pivot block latch release tab under the tip of the arm and slide the blade away from the tip towards the pivot end of the arm far enough to disengage the pivot block from the hook (Fig. 7).

(4) Extract the hook formation on the tip of the wiper arm from the opening in the wiper blade superstructure ahead of the wiper blade pivot block/latch unit.

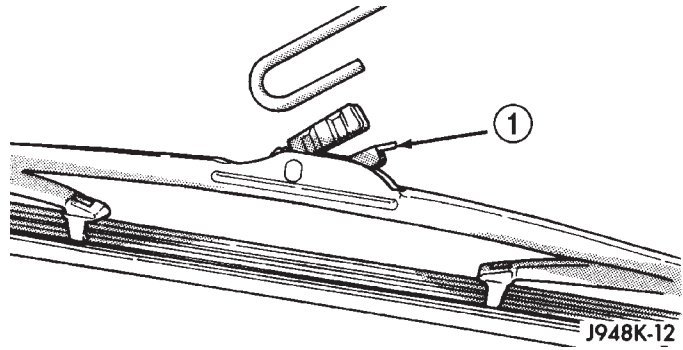


Fig. 7 Wiper Blade Remove/Install - Typical

1 - RELEASE TAB

CAUTION: Do not allow the wiper arm to spring back against the glass without the wiper blade in place or the glass may be damaged.

(5) Gently lower the wiper arm tip onto the glass.

INSTALLATION

NOTE: The driver side and passenger side wiper blades are not interchangeable. The driver side wiper blade has an extra bridge and eight pairs of claws securing the wiper element. The passenger side wiper blade has six pairs of claws securing the wiper element. The notched retainer end of both wiper elements should always be oriented towards the end of the wiper blade that is nearest to the wiper pivot.

(1) Lift the wiper arm off of the windshield glass.

(2) Position the wiper blade near the hook formation on the tip of the arm with the notched retainer for the wiper element oriented towards the end of the wiper arm that is nearest to the wiper pivot.

(3) Insert the hook formation on the tip of the wiper arm through the opening in the wiper blade superstructure ahead of the wiper blade pivot block/latch unit far enough to engage the pivot block with the hook (Fig. 7).

(4) Slide the wiper blade pivot block/latch up into the hook formation on the tip of the wiper arm until the latch release tab snaps into its locked position.

(5) Gently lower the wiper blade onto the glass.

WIPER MODULE

DESCRIPTION

The wiper module is secured with screws to the cowl plenum panel and concealed within the cowl plenum area beneath the cowl plenum cover/grille panel. The ends of the wiper pivot shafts that protrude through dedicated openings in the cowl plenum

WIPER MODULE (Continued)

cover/grille panel to drive the wiper arms and blades are the only visible components of the wiper module. The wiper module consists of the following major components:

- **Bracket** - The wiper module bracket consists of a long tubular steel main member that has a stamped pivot bracket formation near each end where the two wiper pivots are secured. A stamped steel mounting plate for the wiper motor is secured with welds near the center of the main member.

- **Crank Arm** - The wiper motor crank arm is a stamped steel unit that has a slotted hole on the driven end that is secured to the wiper motor output shaft with a nut, and has a ball stud secured to the drive end.

- **Linkage** - The two wiper linkage members are each constructed of stamped steel. A driver side drive link with a plastic socket-type bushing in the left end, and a plastic sleeve-type bushing in the right end. Socket bushing is snap-fit over the pivot ball stud on the left pivot, while the sleeve bushing is fit over the longer wiper motor crank arm pivot stud. The passenger side drive link has a plastic socket-type bushing on each end. One end of this drive link is snap-fit over the pivot ball stud on the right pivot, while the other end is snap-fit over the exposed end of the longer ball stud on the wiper motor crank arm.

- **Motor** - The wiper motor is secured with three screws to the motor mounting plate near the center of the wiper module bracket. The wiper motor output shaft passes through a hole in the module bracket, where a nut secures the wiper motor crank arm to the motor output shaft. The two-speed permanent magnet wiper motor features an integral transmission, an internal park switch, and an internal Positive Temperature Coefficient (PTC) circuit breaker.

- **Pivots** - The two wiper pivots are secured to the ends of the wiper module bracket. The crank arms that extend from the bottom of the pivot shafts each have a ball stud on their end. The upper end of each pivot shaft where the wiper arms will be fastened each has an externally serrated drum secured to it.

The wiper module cannot be adjusted or repaired. If any component of the module is faulty or damaged, the entire wiper module unit must be replaced.

OPERATION

The wiper module operation is controlled by the vehicle operator through battery current inputs received by the wiper motor from the multi-function switch on the steering column. The wiper motor speed is controlled by current flow to either the low speed or the high speed set of brushes. The park switch is a single pole, single throw, momentary switch within the wiper motor that is mechanically actuated by the wiper motor transmission compo-

nents. The park switch alternately closes the wiper park switch sense circuit to ground or to battery current, depending upon the position of the wipers on the glass. This feature allows the motor to complete its current wipe cycle after the wiper system has been turned Off, and to park the wiper blades in the lowest portion of the wipe pattern. The automatic resetting circuit breaker protects the motor from overloads. The wiper motor crank arm, the two wiper linkage members, and the two wiper pivots mechanically convert the rotary output of the wiper motor to the back and forth wiping motion of the wiper arms and blades on the glass.

REMOVAL

- (1) Disconnect and isolate the battery negative cable.

- (2) Remove the wiper arms from the wiper pivots. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - REMOVAL).

- (3) Remove the cowl plenum cover/grille panel from the cowl plenum. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).

- (4) Remove the four screws that secure the wiper module bracket to the cowl plenum panel and the dash panel (Fig. 8).

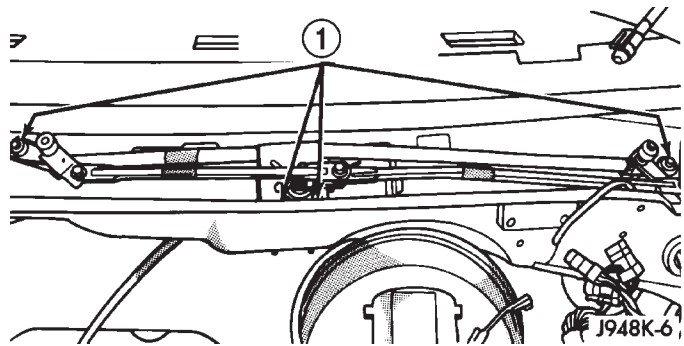


Fig. 8 Wiper Module Remove/Install

1 - WIPER MODULE MOUNTING SCREWS

- (5) Reach into the cowl plenum to move the wiper module far enough to access the wiper module electrical connections (Fig. 9).

- (6) Disconnect the headlamp and dash wire harness connector for the wiper motor from the wiper motor pigtail wire connector.

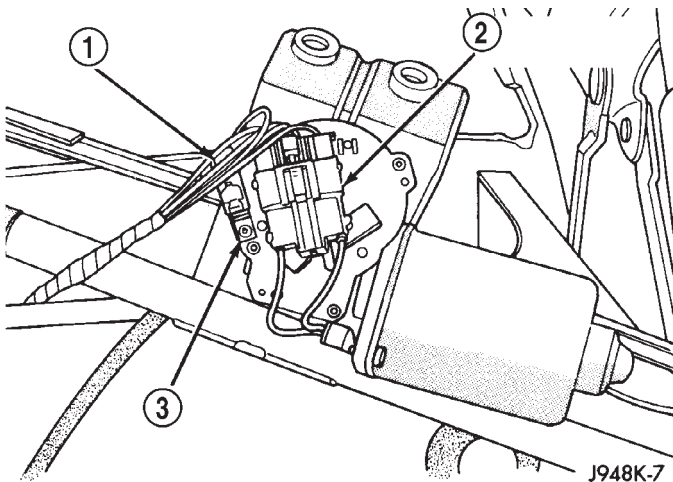
- (7) Disconnect the headlamp and dash wire harness ground connector from the wiper motor ground terminal.

- (8) Remove the wiper module from the cowl plenum as a unit.

INSTALLATION

- (1) Position the wiper module into the cowl plenum as a unit.

WIPER MODULE (Continued)

**Fig. 9 Wiper Module Electrical Connections**

- 1 - GROUND CONNECTOR
2 - WIPER MOTOR CONNECTOR
3 - GROUND TERMINAL

(2) Reconnect the headlamp and dash wire harness ground connector to the wiper motor ground terminal (Fig. 9).

(3) Reconnect the headlamp and dash wire harness connector for the wiper motor to the wiper motor pig-tail wire connector.

(4) Reach into the cowl plenum to align the wiper module mounting bracket with the locations for the mounting screws (Fig. 8).

(5) Install and tighten the four screws that secure the wiper module bracket to the cowl plenum panel and the dash panel. Tighten the screws to 8 N·m (72 in. lbs.).

(6) Reinstall the cowl plenum cover/grille panel onto the cowl plenum. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).

(7) Reinstall the wiper arms onto the wiper pivots. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - INSTALLATION).

(8) Reconnect the battery negative cable.

WIPER RELAY

DESCRIPTION

The wiper relay (or intermittent wipe relay) is located in the Power Distribution Center (PDC) near the battery in the engine compartment. See the fuse and relay layout label affixed to the inside surface of the PDC cover for wiper relay identification and location. The wiper relay is a conventional International Standards Organization (ISO) micro relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained

within a small, rectangular, molded plastic housing. The relay is connected to all of the required inputs and outputs through its PDC receptacle by five male spade-type terminals that extend from the bottom of the relay base. The ISO designation for each terminal is molded into the base adjacent to the terminal. The ISO terminal designations are as follows:

- **30 (Common Feed)** - This terminal is connected to the movable contact point of the relay.
- **85 (Coil Ground)** - This terminal is connected to the ground feed side of the relay control coil.
- **86 (Coil Battery)** - This terminal is connected to the battery feed side of the relay control coil.
- **87 (Normally Open)** - This terminal is connected to the normally open fixed contact point of the relay.
- **87A (Normally Closed)** - This terminal is connected to the normally closed fixed contact point of the relay.

The wiper relay cannot be adjusted or repaired. If the relay is damaged or faulty, it must be replaced.

OPERATION

The wiper relay (or intermittent wipe relay) is an electromechanical switch that uses a low current input from the Central Timer Module (CTM) to control a high current output to the low speed brush of the wiper motor. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor or diode is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The wiper relay terminals are connected to the vehicle electrical system through a connector receptacle in the Power Distribution Center (PDC). The inputs and outputs of the wiper relay include:

- The common feed terminal (30) is connected to the wiper motor low speed brush through the wiper control circuitry of the multi-function switch on the steering column. When the wiper relay is de-energized, the common feed terminal is connected to the wiper park switch output through the wiper park switch sense circuit. The wiper park switch output may be battery current (wipers are not parked), or ground (wipers are parked). When the wiper relay is energized, the common feed terminal of the wiper is

WIPER RELAY (Continued)

connected to battery current from a fuse in the Junction Block (JB) through a fused ignition switch output (run-acc) circuit.

- The coil ground terminal (85) is connected to the relay control output of the CTM through the wiper motor relay control circuit. The CTM controls the ground path for this circuit internally to energize or de-energize the wiper relay based upon its programming and inputs from the wiper and washer control circuitry of the multi-function switch and from the wiper motor park switch.

- The coil battery terminal (86) is connected to battery current from a fuse in the Junction Block (JB) through a fused ignition switch output (run-acc) circuit whenever the ignition switch is in the On or Accessory positions.

- The normally open terminal (87) is connected to battery current from a fuse in the Junction Block (JB) through a fused ignition switch output (run-acc) circuit whenever the wiper relay control coil is energized by the CTM. This circuit provides fused ignition switch output (run-acc) current to the wiper motor low speed brush only when the wiper relay control coil is energized.

- The normally closed terminal (87A) is connected to the output of the wiper motor park switch through the wiper motor park switch sense circuit. This circuit provides battery current (wipers are not parked) or ground (wipers are parked) to the wiper motor low speed brush whenever the wiper relay control coil is de-energized and the Off position of the wiper control of the multi-function switch is selected.

The wiper relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - WIPER RELAY

The wiper relay (or intermittent wiper relay) (Fig. 10) is located in the Power Distribution Center (PDC) in the engine compartment. See the fuse and relay layout label affixed to the inside surface of the PDC cover for wiper relay identification and location. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(1) Remove the wiper relay from the PDC. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER RELAY - REMOVAL).

(2) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 5 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, test the relay input and output circuits. Refer to RELAY CIRCUIT TEST. If not OK, replace the faulty relay.

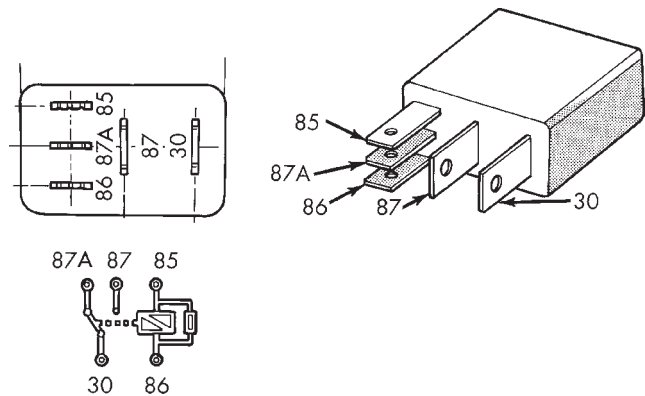


Fig. 10 Wiper Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

RELAY CIRCUIT TEST

(1) The relay common feed terminal cavity (30) is connected to the multi-function switch. There should be continuity between the receptacle for terminal 30 of the wiper relay in the PDC and both driver low speed wiper motor driver circuit cavities of the instrument panel wire harness connector for the multi-function switch at all times. If OK, go to Step 2. If not OK, repair the open driver low speed wiper motor driver circuit(s) between the PDC and the multi-function switch as required.

(2) The relay normally closed terminal (87A) is connected to the wiper motor park switch through the wiper motor park switch sense circuit. There should be continuity between the receptacle for terminal 87A of the wiper relay in the PDC and the wiper motor park switch sense circuit cavity of the headlamp and dash wire harness connector for the wiper motor at all times. If OK, go to Step 3. If not OK, repair the open wiper motor park switch sense circuit between the PDC and the wiper motor as required.

(3) The relay normally open terminal (87) is connected to a fused ignition switch output (run-acc) fuse in the Junction Block (JB) through a fused ignition switch output (run-acc) circuit. There should be battery voltage at the receptacle for terminal 87 of

WIPER RELAY (Continued)

the wiper relay in the PDC whenever the ignition switch is in the On or Accessory positions. If OK, go to Step 4. If not OK, repair the open fused ignition switch output (run-acc) circuit between the PDC and the JB as required.

(4) The coil battery terminal (86) is connected to a fused ignition switch output (run-acc) fuse in the JB through a fused ignition switch output (run-acc) circuit. There should be battery voltage at the receptacle for terminal 86 of the wiper relay in the PDC whenever the ignition switch is in the On or Accessory positions. If OK, go to Step 5. If not OK, repair the open fused ignition switch output (run-acc) circuit between the PDC and the JB as required.

(5) The coil ground terminal (85) is connected to the output of the Central Timer Module (CTM) through the wiper motor relay control circuit. There should be continuity between the receptacle for terminal 85 of the wiper relay in the PDC and the wiper motor relay control circuit cavity of the instrument panel wire harness connector (Connector C1) for the CTM at all times. If not OK, repair the open wiper motor relay control circuit between the PDC and the CTM as required.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cover from the Power Distribution Center (PDC) (Fig. 11).

(3) See the fuse and relay layout label affixed to the underside of the PDC cover for wiper relay identification and location.

(4) Remove the wiper relay by grasping it firmly and pulling it straight out from the receptacle in the PDC.

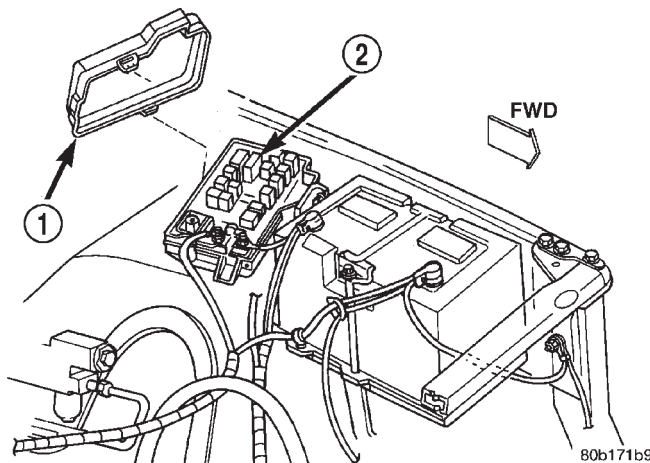


Fig. 11 Power Distribution Center

- 1 - COVER
- 2 - POWER DISTRIBUTION CENTER

INSTALLATION

(1) See the fuse and relay layout label affixed to the underside of the PDC cover for the proper wiper relay location (Fig. 11).

(2) Position the wiper relay in the proper receptacle in the PDC.

(3) Align the wiper relay terminals with the terminal cavities in the PDC receptacle.

(4) Push firmly and evenly on the top of the wiper relay until the terminals are fully seated in the terminal cavities in the PDC receptacle.

(5) Reinstall the cover onto the PDC.

