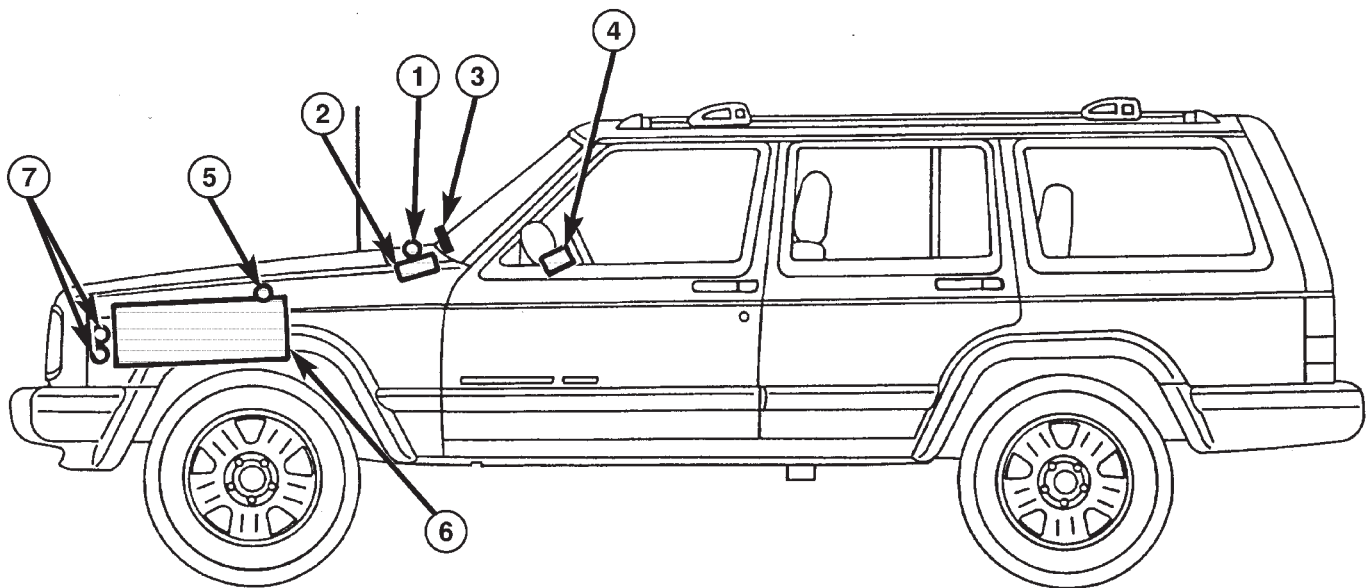
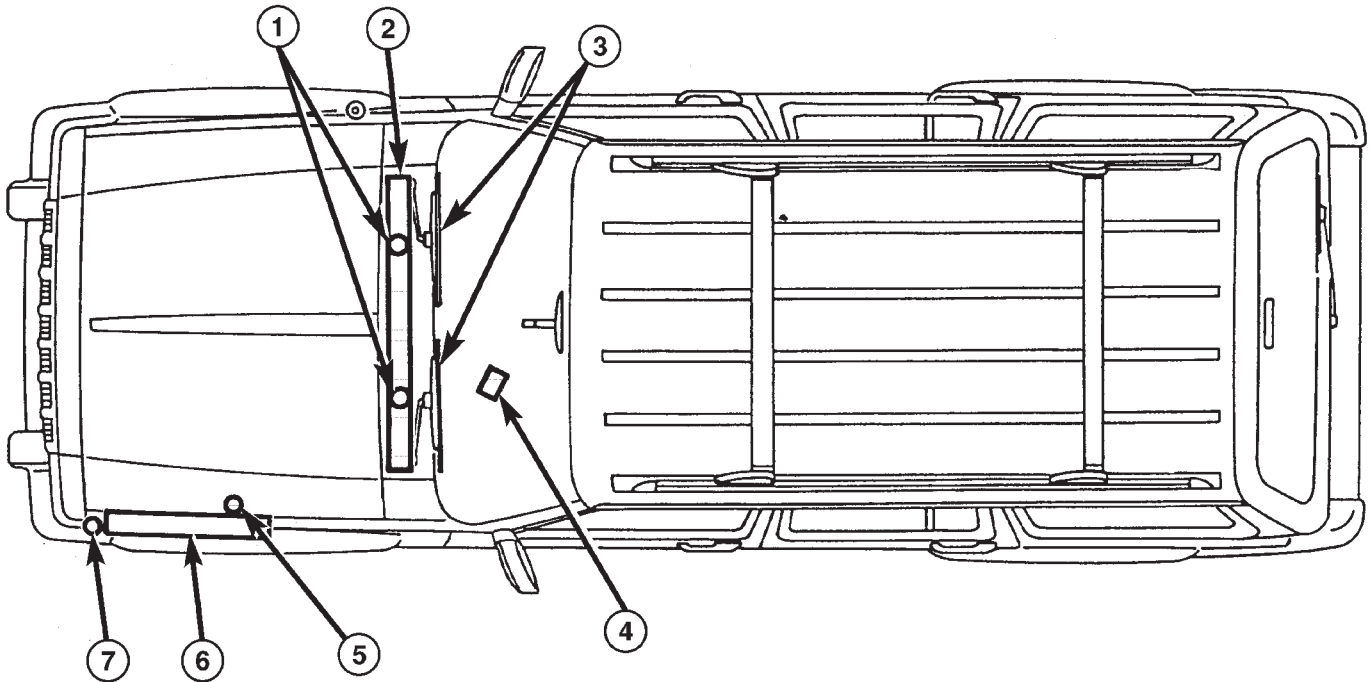


FRONT WIPERS/WASHERS (Continued)



809a80ab

Fig. 1 Front Wiper & Washer System

1 - FRONT WASHER NOZZLES

2 - FRONT WIPER MODULE

3 - FRONT WIPER ARMS & BLADES

4 - RIGHT MULTI-FUNCTION SWITCH

5 - WASHER RESERVOIR FILLER NECK

6 - WASHER RESERVOIR

7 - FRONT WASHER PUMP/MOTOR & FLUID LEVEL SWITCH

FRONT WIPERS/WASHERS (Continued)

- **Front Washer Pump/Motor** - The front washer pump/motor unit is located in a dedicated hole on the lower outboard side of the washer reservoir, ahead of the left front wheel housing. The front washer pump is located below the optional rear washer pump mounting hole.

- **Front Wiper Arms** - The two front 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.

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

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

- **Right Multi-Function Switch** - The right multi-function switch is secured to the right side of the upper steering column housing. Only the control stalk for the right multi-function switch is visible, the remainder of the switch is concealed beneath the steering column shrouds. The right multi-function switch contains all of the switches and control circuitry for the front wiper and washer system.

- **Washer Fluid Level Switch** - The washer fluid level switch is located in a dedicated hole near the center of the forward surface of the washer reservoir, ahead of the left front wheel housing.

- **Washer Reservoir** - The washer reservoir is concealed between the left inner fender shield and the left outer fender panel, above and forward of the left front wheel housing.

- **Washer Reservoir Filler Neck** - The washer reservoir filler neck is located on the left inner fender shield, above the left front wheel housing in the engine compartment.

Features of the front wiper and washer system include the following:

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

- **Intermittent Wipe Mode** - The internal circuitry of the right multi-function switch provides an intermittent wipe mode with adjustable delay intervals between wipe cycles of about one second to about fifteen seconds.

- **Washer Mode** - When the front washer system is activated with the right multi-function switch while the front wiper system is operating, washer

fluid will be dispensed onto the windshield glass through the washer nozzles for as long as the front washer pump is energized.

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

Hard wired circuitry connects the front 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 front 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 front 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 front wiper and washer system functions with the right multi-function switch control stalk that extends from the right side of the steering column, just below the steering wheel. Moving the control stalk upward selects the front wiper system operating mode. The front wiper system allows the vehicle operator to select from two continuous wiper speeds, Hi or Lo, or

FRONT WIPERS/WASHERS (Continued)

the intermittent wipe Delay mode. Rotating the knob on the end of the control stalk allows the vehicle operator to select the Delay interval. Pulling the control stalk towards the steering wheel activates the front washer pump/motor, which dispenses washer fluid onto the windshield glass through the front washer nozzles.

When the ignition switch is in the Accessory or On positions, battery current from a fuse in the Power Distribution Center (PDC) is provided to the wiper and washer system circuit breaker in the Junction Block (JB). This automatic resetting circuit breaker provides battery current through separate fused ignition switch output (run-acc) circuits to the right multi-function switch, and to the front wiper motor. Within the right multi-function switch, this battery current is fed to one side of the control coil in the wiper motor relay, and to the electronic intermittent wipe logic circuit, which are both integral to the switch. When the Lo position of the right multi-function switch control stalk is selected, the Lo position circuitry within the switch directs battery current to the low speed brush of the front wiper motor, which causes the front wipers to cycle at a low speed. When the Hi position of the control stalk is selected, the Hi position circuitry within the switch directs battery current to the high speed brush of the front wiper motor, which causes the windshield wipers to cycle at a high speed.

The intermittent wipe and wipe-after-wash features of the front wiper and washer system are both provided by the electronic intermittent wipe logic circuit within the right multi-function switch. In order to provide the intermittent wipe feature, the logic circuit monitors the wiper switch state, the intermittent delay resistance setting, and the wiper motor park switch state. In order to provide the wipe-after-wash feature, the logic circuit monitors both the front washer switch state and the wiper motor park switch state. When the Delay position of the right multi-function switch control stalk is selected, the Delay position circuitry within the switch directs battery current to a request input of the logic circuit. The Delay position circuitry also directs battery current through an internal variable resistor to the intermittent wipe delay sense input of the logic circuit, which indicates the delay interval that has been selected by the vehicle operator. The logic circuit responds to the Delay mode request inputs by calculating the correct delay interval. The logic circuit then energizes the wiper motor relay by pulling the relay control coil to ground. The energized wiper motor relay directs battery current from the normally open relay terminal through the common feed relay terminal and the Delay position wiper switch circuitry to the low speed brush of the wiper motor. The logic circuit monitors

the front wiper motor operation through the wiper park switch sense circuit, which allows the logic circuit to determine the proper timing to begin the next wiper blade sweep.

When the Off position of the right multi-function switch control stalk 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 front 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 the fused ignition switch output (run-acc) circuit of the front wiper motor. The park switch sense circuit directs this battery current to the low speed brush of the wiper motor through the normally closed circuit of the wiper motor relay and the Off position circuitry of the wiper 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 right multi-function switch control stalk is selected, the Wash position circuitry within the switch directs battery current to the front washer pump motor. The intermittent wipe logic circuit monitors the washer switch state through a washer switch sense input. When the washer switch is closed with the front wiper system turned Off, the intermittent wipe logic circuit operates the front wiper motor through the wiper motor relay in the same manner as it does to provide the Delay mode operation, but uses the Off position circuitry of the wiper switch to feed battery current to the low speed brush of the front wiper motor. When the Wash position circuitry state changes to open, the intermittent wipe logic circuit monitors the front wiper motor through the wiper park switch sense circuit, which allows the logic circuit to count the number of wiper blade sweeps.

Refer to the owner's manual in the vehicle glove box for more information on the features and operation of the front wiper and washer system.

DIAGNOSIS AND TESTING - FRONT WIPER & WASHER SYSTEM

WIPER SYSTEM

The diagnosis found here addresses an electrically inoperative front wiper system. If the front wiper motor operates, but the wipers do not move on the windshield, replace the faulty front wiper module. If the wipers operate, but chatter, lift, or do not clear

FRONT WIPERS/WASHERS (Continued)

the glass, clean and inspect the wiper system components as required. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - INSPECTION) and (Refer to 8 - ELECTRICAL/FRONT 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.

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) Pull the wiper system circuit breaker (Circuit Breaker 30 - 20 ampere) slightly out from the circuit breaker receptacle in the Junction Block (JB). Turn the ignition switch to the On position. Check for battery voltage at both sides of the circuit breaker. If OK, go to Step 2. If there is no battery voltage at either side of the circuit breaker, repair the open fused ignition switch output (run-acc) circuit between the JB and the ignition switch as required. If there is battery voltage at only one side of the circuit breaker, replace the faulty circuit breaker.

(2) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness for the right multi-function switch from the switch connector receptacle. Check for continuity between the ground circuit cavity of the instrument panel wire harness connector for the right multi-function switch and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open ground circuit to ground (G108) as required.

(3) 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 right multi-function switch. If OK, go to Step 4. If not OK, repair the open fused ignition switch output (run-acc) circuit between the right multi-function switch and the JB as required.

(4) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable.

Remove the right multi-function switch from the steering column and check the switch continuity. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/RIGHT MULTI-FUNCTION SWITCH - DIAGNOSIS AND TESTING). If OK, go to Step 5. If not OK, replace the faulty switch.

(5) Disconnect the headlamp and dash wire harness connector for the front wiper motor from the wiper motor pigtail wire connector. Check for continuity between the ground circuit cavity in the headlamp and dash wire harness connector for the front wiper motor and a good ground. There should be continuity. If OK, go to Step 6. If not OK, repair the open ground circuit to ground (G106) as required.

(6) 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 headlamp and dash wire harness connector for the front wiper motor. If OK, go to Step 7. If not OK, repair the open fused ignition switch output (run-acc) circuit between the front wiper motor and the JB as required.

(7) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. The instrument panel wire harness connector for the right multi-function switch is still disconnected. Check each of the following circuits at the proper cavity of the headlamp and dash wire harness connector for the front wiper motor for continuity to ground. In each case, there should be no continuity. If OK, go to Step 8. If not OK, repair the shorted circuit between the front wiper motor and the right multi-function switch as required.

- Wiper park switch sense
- Wiper switch low speed output
- Wiper switch high speed output.

(8) Check the continuity of each of the following circuits between the proper cavities of the headlamp and dash wire harness connector for the front wiper motor and the instrument panel wire harness connector for the right multi-function switch. In each case, there should be continuity. If OK, replace the faulty front wiper module. If not OK, repair the open circuit between the front wiper motor and the right multi-function switch as required.

- Wiper park switch sense
- Wiper switch low speed output
- Wiper switch high speed output.

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/

FRONT WIPERS/WASHERS (Continued)

FRONT 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.

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) Turn the ignition switch to the On position. Move the right multi-function switch control stalk to the Lo or Hi wiper position. Check whether the front wiper system operates. If OK, go to Step 2. If not OK, repair the wiper system as required before you proceed with washer system diagnosis. Refer to WIPER SYSTEM .

(2) 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 front washer pump/motor from the pump/motor connector receptacle. Check for continuity between the ground circuit cavity of the headlamp and dash wire harness connector for the front washer pump/motor and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open ground circuit to ground (G106) as required.

(3) Reconnect the battery negative cable. Turn the ignition switch to the On position. While pulling the right multi-function switch control stalk toward the steering wheel to close the washer switch, check for battery voltage at the front washer switch output circuit cavity of the headlamp and dash wire harness connector for the front washer pump/motor. If OK, replace the faulty front washer pump/motor. If not OK, go to Step 4.

(4) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the right multi-function switch from the switch connector receptacle. Check for continuity between the front washer switch output circuit cavity

of the headlamp and dash wire harness connector for the front washer pump/motor and a good ground. There should be no continuity. If OK, go to Step 5. If not OK, repair the shorted front washer switch output circuit between the front washer pump/motor and the right multi-function switch as required.

(5) Check for continuity between the front washer switch output circuit cavities of the headlamp and dash wire harness connector for the front washer pump/motor and the instrument panel wire harness connector for the right multi-function switch. There should be continuity. If OK, replace the faulty right multi-function switch. If not OK, repair the open front washer switch output circuit between the front washer pump/motor and the right multi-function switch as required.

CLEANING - FRONT 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.