Component Procedures: Wiper and Washer Systems

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Component Procedures: Wiper and Washer Systems

Parts and Labor (itype_189)

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Remove & Replace	Headlamp Washers/Wipers > Washer Pump, R&R	B	0.9	0.0
Remove & Replace	Switches > Wiper Switch, R&R	B	0.5	0.3
Remove & Replace	Wipers > Reservoir, R&R	C	1.1	0.6
Remove & Replace	Wipers > Washer Pump, R&R	B	0.9	0.6
Remove & Replace	Wipers > Wiper Arm, R&R > Each	C	0.2	0.0
Remove & Replace	Wipers > Wiper Blade, R&R > Each	C	0.1	0.0
Remove & Replace	Wipers > Wiper Motor, R&R	B	0.8	0.4
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Wiper/Washer System (Article 10497)

Wiper /Washer System Components

The wiper/washer system consists of the following electrical components:

- Windshield Wiper Relay
- Windshield Wiper Speed Control Relay
- Windshield Washer Pump Relay
- Windshield Washer Fluid Pump
- Windshield Wiper Motor
- Window Wiper/ Washer Switch
- Body Control Module (BCM)
- Headlamp Washer Fluid Pump Relay
- Headlamp Washer Fluid Pump Fuse

Windshield Wiper System

The BCM determines the front wipe/wash system mode of operation by monitoring several signals from the front wipe/wash switch as indicated in the wiper switch .

The front wipe/wash switch receives a reference ground signal from the BCM. Each input of the BCM provides a switched battery pull-up for each front wiper/washer switch output signal it receives. All the BCM inputs are recognized as active when the wiper switch provides a path to the referenced ground signal. The first signal received by the BCM is the result of 6 resistors in the front wiper switch configured as a resistor ladder network. This signal is connected to a BCM analog to digital input. Depending on the function selected (High, Low, Intermittent 1 to 5, Mist, Off), the front wiper control switch connects a different set of resistors into the circuit resulting in different voltages appearing on the BCM A/D input. By monitoring this voltage, the BCM determines how to control the wiper motor On/Off Relay. It should be noted that High, Low, and Mist all have the same value on this signal circuit. The second signal received from the front wiper switch is active only when the front wiper switch is in the high speed wiper position. When the wiper switch is not in the high speed position, the switch is open and the signal circuit is pulled to battery by the BCM. When the wiper switch is in the high speed position, the switch pulls the circuit low. The BCM determines how to control the Wiper high/low speed relay from this input. The third signal received from the front wiper switch is from the momentary windshield wash control switch. When the washer switch is not active the switch is open and the signal circuit is pulled to battery by the BCM. When the washer switch is active, the switch pulls the circuit low. The BCM controls the windshield wash and windshield wash activated wiper operation based on this input.

The BCM controls front wiper motor operation through two output signals and the monitoring of one input signal. The two outputs (one high side drive, one low side drive) are used to control two external wiper motor relays: front wiper motor on/off relay: which provides the wiper motor with battery power when it is activated by the high side drive signal (switched battery) from the BCM. When left deactivated, the normally closed contacts provide a ground to the wiper motor. Wiper high/low speed relay: when activated by a low side drive signal (ground) from the BCM, it switches the power supplied by the wiper motor's on/off relay to the motors high speed input. When left deactivated, the normally closed contacts connect the power supplied by the wiper motor's on/off relay to the motor's low speed input. The input used by the BCM is from the park switch located in the wiper motor assembly. When the wiper blade s are not in the park position, the wiper park switch is open and the circuit is pulled up to battery by the BCM. When the wiper blades are in the park position at the bottom of the glass, the wiper park switch closes to ground pulling the park signal circuit low.

To initiate low speed operation, the BCM only energizes the front wiper motor on/off relay. This allows

battery voltage from the wiper fuse to be applied through the switched contacts of the wiper motor on/off relay, through the normally closed contacts of the wiper high/low speed relay, to the low speed control circuit of the windshield wiper motor.
The BCM provides redundant circuitry which places battery power on its wiper motor on/off relay output with activation of its low assertion high speed wiper switch input. The BCM shall be capable of doing this, even if the module has lost all microprocessor control. This redundant circuit shall supply power while in the RUN and CRANK power modes. however; while in the CRANK power mode, the pass through shall only be active if the BCM is NOT in a computer operating properly state.
To initiate high speed operation, the BCM energizes both the front wiper motor on/off relay and the wiper high/low speed relay. This allows battery voltage from the wiper fuse to be applied through the switched contacts of the wiper motor on/off relay, through the switched contacts of the wiper high/low speed relay, to the high speed control circuit of the windshield wiper motor.
In order to perform an accurate read of the park switch and to ensure the wipers will come to rest while still in the park position, parking of the wipers only occurs while in a low speed wiper mode. This requires that if the wipers are performing a high speed wiper operation at the time they are required to park, the BCM shall transition the Wipers to low speed by deactivating the wiper high/low relay before attempting to park. In order to park the wipers, the BCM monitors the park circuit until the park switch pulls the park circuit to ground. At this time, the BCM will immediately deactivate the wiper motor on/off relay. The relay contacts will switch back to their normally closed position and will apply ground to the wiper motor power inputs through the normally closed contacts of the wiper high/low relay. This deactivates and dynamically brakes the wiper motor in the park position. When the wiper switch is turned to the OFF position while the wiper motor is somewhere in mid-cycle, the BCM will continue to operate the motor until the wipers reach the park position. If the BCM is running the wiper motor and does not see a state transition of the park switch after 8 s, the wipers will stop immediately when the wiper switch is turned to OFF. If the ignition is turned OFF while the wipers are in mid-cycle, the wipers will stop immediately, regardless of position. The BCM will park the wipers next time the ignition is turned ON.
The windshield wiper system MIST operation is identical to LOW speed operation, except that the MIST switch is a press and release type switch. When the wiper switch is moved to the MIST position and released, low speed wiper motor operation is started and will continue until 1 cycle is complete. If the wiper switch is moved to the MIST position and held, the wiper motor will operate in the LOW speed mode until the switch is released.
Windshield wiper intermittent operation is a low speed wiper motor function with a variable delay interval between the wiper motor cycles. The duration of the delay is controlled by the front wiper control switch's intermittent 1 to intermittent 5 settings. The wiper operation is as follows:
- The BCM will initiate a single wipe by activating its front wiper ON/OFF relay output.
- At the completion of a single wipe, the BCM will park the wipers as described above.
- The BCM will then pause the wipers in their park position for the time duration associated with intermittent delay switch setting.
- When the delay time expires repeat Steps 1 and 3 until the system is turned off or taken out of intermittent mode. If the wiper switch is moved from a longer delay interval to a shorter delay interval, the BCM will command an immediate wipe cycle and reset the delay timer to the shorter delay interval.
Intermittent wiper operation may be vehicle speed sensitive. When enabled, the speed compensated intermittent feature causes the intermittent wiper delay intervals to become shorter as a function of increased speed. As vehicle speed is reduced the intervals will become closer to the predetermined.
Figure 1: Front Wiper Block Diagram

Windshield Washer System

The BCM controls the windshield wash operation and windshield wash activated wiper operation. When the BCM detects the activation of the momentary windshield wash control switch, it activates its washer pump relay drive output which supplies battery power to the coil of the washer pump relay. This energizes the relay, which switches battery power to the pump motor. The BCM will also activate continuous low speed windshield wipes as described above. Upon deactivation of the windshield wash control switch, the wiper control module (BCM) shall deactivate the wash motor and will also park the wiper motor as described above unless the drip wipe feature is enabled. On some vehicles the drip wipe feature will be enabled and cause the system to provide additional wiping of the windshield after the switch has been released and fluid is no longer being applied. The front wash feature may attempt to detect a stuck switch. When enabled, activation of the wash feature shall be limited to 10 s.
Figure 2: Front Washer - Washer Fluid Level Block Diagram

Headlamp Washer System

When Headlamp Wash Equipped, the headlamps shall be sprayed with wash fluid as a result of an extended Windshield Wash Switch Activation. In order to preserve wash fluid, the feature shall only be allowed to activate if the Low or High Beam Headlamps are active. In addition, after the initial Headlamp Wash operation

has been performed, additional headlamp washes shall not be performed for the next 4 Windshield Wash activations or for 48 hours whichever comes first. In the event that the system has detected a Stuck Front Wash Switch condition, the Headlamp Wash Feature shall be disabled.
Figure 3: Headlamp Washer Pump Block Diagram

Wiper/Washer Schematics (Article 10523)

Figure 1: Wiper System
Figure 2: Headlamp Washers (T90)

Wiper/Washer (Article 10480)

Wiper /Washer
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Wipers and Washers - Fastener Specifications (Article 10525)

Application Specification
Metric English
Windshield Washer Solvent Container Bolts 15 Nm 11 lb ft
Windshield Wiper Arm Nut 37 Nm 27 lb ft
Windshield Wiper Transmission Assembly 6 Nm 53 lb in

All New Technical Service Bulletins (itype_432)

Tsbs
- Information on an Oily Substance Found on Inside Windshield Surface Near Rearview Mirror Area (25-NA-189, 2025/07/14)

All Technical Service Bulletins (itype_100)

Tsbs
- Information on an Oily Substance Found on Inside Windshield Surface Near Rearview Mirror Area (25-NA-189, 2025/07/14)
- Wipers/Washers - Windshield Wiper Cleaning/Maintenance (06-08-43-003E, 2014/10/23)
- Recall - Windshield Wiper Motor Failure (15789, 2015/10/26)

Repair Tips (itype_110)

Tsbs
- Wipers/Washers - Windshield Wiper Cleaning/Maintenance (06-08-43-003E, 2014/10/23)

Headlamp Washer Malfunction (Article 10502)

Diagnostic Instructions
- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC Descriptor
Headlamp Washer Relay Circuit Short to Ground
Diagnostic Fault Information
Circuit Short to Ground Open/High Resistance Short to Voltage Signal Performance
B+ — 1 — —
Headlamp Washer Pump Relay Control B3810 02 1 2 —
Headlamp Washer Pump Relay Coil Ground — 1 — —
Headlamp Washer Pump Control 1 1 2 —
Headlamp Washer Pump Ground — 1 — —
1. Headlamp Washer Inoperative 2. Headlamp Washers Always ON
Circuit/System Description
The headlamp washer pump is controlled by the body control module (BCM) via a removable relay. If the headlamp lights are on, the BCM will activate the headlamp washer pump the first time the windshield washer pump is activated. After the initial headlamp washer activation, the BCM will only allow headlamp washer function every 5 windshield washer cycles. When the headlamp washer function is requested by the BCM’s internal logic, it applies voltage through a control circuit to the headlamp washer pump relay. With the relay energized, battery voltage is applied through the switch contacts of the relay and the fused control circuit to activate the headlamp washer pump.

Conditions for Running the DTC
- Ignition ON.
- The system voltage is between 9–16 V.
Conditions for Setting the DTC
A short to ground is detected in the Headlamp Washer Relay control circuit.
Action Taken When the DTC Sets
Washer operation is suspended.
Conditions for Clearing the DTC
- A current DTC clears when the diagnostic runs and passes.
- A history DTC will clear after 50 consecutive ignition cycles without a fault present.
Diagnostic Aids
The headlamp wash feature will only be activated if the low or high beam headlamps are active as well.
Reference Information
Schematic Reference
Wiper/Washer Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Wiper/Washer System Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information
Circuit/System Verification
- Verify the headlamp washers turn ON and OFF when commanding the Headlamp Washer Relay Active and Inactive with a scan tool.
- If the Headlamp Washer Relay does not turn ON and OFF Refer to Circuit/System Testing
- If the Headlamp Washer Relay turns ON and OFF
- All OK.
Circuit/System Testing
- Ignition OFF and all vehicle systems OFF, disconnect the KR2 Headlamp Washer Pump Relay. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminal 86 and ground.
- If 10 Ω or greater
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 10 Ω
- Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
- If the test lamp does not illuminate and the circuit fuse is good Replace the X50A Fuse Block – Underhood.
- If the test lamp does not illuminate and the circuit fuse is open
- Ignition OFF, remove the test lamp, disconnect the harness connector at the G16 Headlamp Washer Pump.
- Test for infinite resistance between the control circuit terminal B and ground.
- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the G16 Headlamp Washer Pump.
- If the test lamp illuminates
- Connect a test lamp between the control circuit terminal 85 and the ground circuit terminal 86.
- Verify the test lamp turns ON and OFF when commanding the Headlamp Washer Relay Active and Inactive with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, remove the test lamp, disconnect the X5 harness connector at the K9 Body Control Module.
- Test for infinite resistance between the control circuit terminal 14 and ground.
- If infinite resistance
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 Body Control Module.
- If the test lamp is always ON
- Ignition OFF, remove the test lamp, disconnect the X5 harness connector at the K9 Body Control Module,

ignition ON.
- Test for less than 1 V between the control circuit and ground.
- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V, replace the K9 Body Control Module.
- If the test lamp turns ON and OFF
- Verify that a test lamp does not illuminate between the control circuit terminal 87 and ground.
- If the test lamp illuminates Repair the short to voltage on the control circuit
- If the test lamp does not illuminate
- Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the G19 Headlamp Washer Pump.
It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminal A and ground.
- Connect the harness connector at the G19 Headlamp Washer Pump.
- Ignition ON, connect a 15 A fused jumper wire between the control circuit terminal 87 and B+.
- Verify the G19 Headlamp Washer Pump is activated.
- If the G19 Headlamp Washer Pump does not activate
- Ignition OFF, remove the jumper wire, disconnect the harness connector at the G19 Headlamp Washer Pump.
- If less than 2 Ω, replace the G19 Headlamp Washer Pump.
- If the G19 Headlamp Washer Pump activates
- Test or replace the KR2 Headlamp Washer Pump Relay.

Component Testing

Windshield Wiper / Washer Switch
- Ignition OFF, disconnect the harness connector at the S82 Windshield Wiper /Washer Switch.
- Test for infinite resistance between the signal terminal 5 and the low reference terminal 2 with the switch
in the open position.
- If less than infinite resistance Replace the S82 Windshield Wiper/Washer Switch.
- Test for less than 2 Ω between the signal circuit terminal 5 and the low reference circuit terminal 2 with
the switch in the closed position.
- If 2 Ω or greater Replace the S82 Windshield Wiper/Washer Switch.
- If less than 2 Ω
- All OK

Relay Test
- Ignition OFF, disconnect the KR2 headlamp washer pump relay.
- Test for 60–200 Ω between terminals 85 and 86.
- If less than 60 or greater than 200 Replace the KR2 headlamp washer pump relay.
- If between 60–200 Ω
- Test for infinite resistance between the terminals listed below:
- 30 and 86
- 30 and 87
- 30 and 85
- 85 and 87
- If less than infinite resistance Replace the KR2 headlamp washer pump relay.
- Install a 10 A fused jumper wire between relay terminal 85 and 12 V. Install a jumper wire between relay
terminal 86 and ground.
- Test for less than 10 Ω between terminals 30 and 87.
- If 10 Ω or greater Replace the KR2 headlamp washer pump relay.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Electrical Relay Replacement
- Headlamp Washer Pump Replacement
- Windshield Wiper and Windshield Washer Switch Replacement
- Accessory Wiring Junction Block Replacement
- Control Module References for BCM replacement, programming and setup

Washer Malfunction (Article 10504)

Diagnostic Instructions
- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit Short to Ground Open/High Resistance Short to Voltage Signal Performance

B+ 2 2 — —
Windshield Washer Switch Signal 1,3 3 3 —
Underhood Fuse Block Ground — B3873 04 — —
Windshield Washer Pump Relay Control B3873 02 B3873 04 B3873 01 —
Windshield Washer Pump Control 2 2 2 —
Windshield Washer Pump Ground — 2 — —
Windshield Wiper Switch Low Reference — 3 — —
1. Windshield Washer Pump Always ON 2. Windshield Washer Pump Inoperative 3. Windshield Washer Switch Malfunction

Circuit/System Description

The windshield washer function is controlled by the body control module . When the washer switch is pressed, low reference is applied through the switch contacts and the signal circuit to the body control module indicating the wash request. The body control module then applies voltage through the control circuit to the coil side of the windshield washer pump relay energizing the relay. With the relay energized, battery voltage from the fuse is applied through the switch contacts of the relay and the control circuit to the windshield washer fluid pump .

Reference Information

Schematic Reference
Wiper/Washer Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Wiper/Washer System Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification

- Ignition ON.
- Verify the scan tool Windshield Washer Switch parameter changes between Active and Inactive when pressing the windshield washer switch.
- If the parameter does not change Refer to Circuit/System Testing – Windshield Wiper /Washer Switch Malfunction.
- If the parameter changes
- Verify the G24 Windshield Washer Pump turns On and Off when commanding the Windshield Washer Relay Active and Inactive with a scan tool.
- If the G24 Windshield Washer Pump does not turn ON and OFF Refer to Circuit/System Testing – Windshield Washer Pump Malfunction
- If the G24 Windshield Washer Pump turns ON and OFF
- All OK.

Circuit/System Testing

Windshield Wiper /Washer Switch Malfunction
- Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch. It may take up to 11 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the low reference circuit terminal 2 and ground.
- If 10 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the low reference circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, replace the K9 Body Control Module.
- If less than 10 Ω
- Verify the scan tool Windshield Washer Switch parameter is Inactive.
- If not Inactive
- Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
- Test for infinite resistance between the signal circuit terminal 5 and ground.
- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K9 Body Control Module.

- If Inactive
- Install a 3 A fused jumper wire between the signal circuit terminal 5 and the low reference circuit terminal 2.
- Verify the scan tool Windshield Washer Switch parameter is Active.
- If not Active
- Ignition OFF, remove the jumper wire, disconnect the harness connector at the K9 Body Control Module, ignition ON.
- Test for less than 1 V between the signal circuit and ground.
- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V
- Test for less than 2 Ω in the signal circuit end to end.
- If Active
- Test or replace the S82 Windshield Wiper/Washer Switch.

Windshield Washer Pump Malfunction

- Ignition OFF, and all vehicle systems OFF. Disconnect the harness connector at the G24 Windshield Washer Pump. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminal B and ground.
- Test for less than 2 Ω in the ground circuit end to end.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- Connect a test lamp between the control circuit terminal A and the ground circuit terminal B, ignition ON.
- Verify the test lamp does NOT turn ON and OFF when commanding the Windshield Washer Relay Active and Inactive with a scan tool.
- If the test lamp turns ON and OFF Test or replace the G24 Windshield Washer Pump.
- If the test lamp does not turn ON and OFF
- Ignition OFF, connect the harness connector at the G24 Windshield Washer Pump. Disconnect the X1 harness connector at the X50A Fuse Block – Underhood. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminal 71 and ground.
- Verify the G24 Windshield Washer Pump is not activated.
- If the G24 Windshield Washer Pump is activated
- Ignition OFF, disconnect the harness connector at the G24 Windshield Washer Pump, ignition ON.
- Test for less than 1 V between the control circuit terminal A and ground.
- If less than 1 V, replace the G24 Windshield Washer Pump.
- If the G24 Windshield Washer Pump is not activated
- Connect a 20 A fused jumper wire between the control circuit terminal 13 and B+.
- Verify the G24 Windshield Washer Pump activates.
- If the G24 Windshield Washer Pump does not activate
- Ignition OFF, remove the jumper wire, disconnect the harness connector at the G24 Windshield Washer Pump.
- Test for infinite resistance between the control circuit and ground.
- If less than Infinite resistance, repair the short to ground on the circuit.
- If infinite resistance
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the G24 Windshield Washer Pump.
- If the G24 Windshield Washer Pump activates
- Ignition OFF, connect the X1 harness connector at the X50A Fuse Block – Underhood. Disconnect the X4 harness connector at the K9 Body Control Module, ignition ON.
- Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block – Underhood, ignition ON.
- Test for less than 1 V between the control circuit terminal 21 and B+.
- If less than 1 V, replace the X50A Fuse Block – Underhood.
- Connect a 10 A fused jumper wire between the control circuit terminal 14 and B+.
- Ignition OFF, remove the jumper wire, disconnect the X2 harness connector at the X50A Fuse Block – Underhood.
- Test for infinite resistance between the control circuit terminal 21 and ground.
- If less than infinite resistance
- If less than 2 Ω, test or replace the X50A Fuse Block – Underhood.
- Replace the K9 Body Control Module.

Component Testing

Windshield Wiper/Washer Switch

- Ignition OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch.
- Test for infinite resistance between the signal terminal 5 and the low reference terminal 2 with the switch

in the open position.
- If less than infinite resistance Replace the S82 Windshield Wiper/Washer Switch.
- Test for less than 2 Ω between the signal circuit terminal 5 and the low reference circuit terminal 2 with the switch in the closed position.
- If 2 Ω or greater Replace the S82 Windshield Wiper/Washer Switch.
- If less than 2 Ω
- All OK

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Windshield Washer Pump Replacement
- Windshield Wiper and Windshield Washer Switch Replacement
- Accessory Wiring Junction Block Replacement
- Control Module References for BCM replacement, programming and setup

Windshield Wiper System Malfunction (Article 10500)

Diagnostic Instructions
- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC Descriptors

Windshield Wiper Relay Circuit
Windshield Wiper High Speed Relay Circuit
For symptom byte information, refer to Symptom Byte List .

Diagnostic Fault Information

Circuit Short to Ground Open/High Resistance Short to Voltage Signal Performance
Windshield Wiper Switch Low Signal terminal 3 1 1 1 —
Windshield Wiper Switch High Signal terminal 1 4 2 2 —
Windshield Wiper Motor Park Switch Signal terminal 1 3 3 — —
Windshield Wiper Relay Control terminal 86 B3715 02 B3715 04 B3715 01 —
Windshield Wiper High Speed Relay Control terminal 86 B3875 02 B3875 04 B3875 01 —
Windshield Wiper Motor Control terminal 5 1 1 4 —
Windshield Wiper Motor High Speed Control terminal 3 2 2 4 —
Windshield Wiper Switch Low Reference terminal 2 — 1, 2 1, 2 —
Windshield Wiper Motor Ground terminal 4 — 1, 2, 3 — —
Windshield Wiper Relay Ground terminal 85 — 1 — —
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON

Circuit/System Description

The body control module (BCM) controls the wiper motor based on input from the windshield wiper/ washer switch . The BCM monitors the wiper/washer switch through two separate signal circuits and a low reference circuit. The windshield wiper switch high signal circuit is used to determine high speed wiper operation, the windshield wiper switch low signal is used to determine low speed, intermittent, and mist operation through the use of a resistor ladder, and the windshield washer switch signal circuit is used to determine washer operation.
The BCM controls the windshield wiper motor through two output controls, controlling two relays which determine the desired wiper speed, high or low.

Conditions for Running the DTC
- The DTC runs only when a wiper output is actively being requested by the BCM.
- The system voltage is between 9–16 V.

Conditions for Setting the DTC
- A short to ground is detected in the Front Wiper Relay control circuit or in the High Speed Relay control circuit.
- A short to voltage or an open/high resistance is detected in the Front Wiper Relay control circuit or in the High Speed Relay control circuit.

Action Taken When the DTC Sets

The BCM will not activate the wiper output.

Conditions for Clearing the DTC
- A current DTC will clear when the condition for setting the fault is no longer present.
- A history DTC will clear after 50 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference
Wiper/Washer Schematics
Connector End View Reference
Component Connector End Views
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- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information
Circuit/System Verification
- Ignition ON.
- Verify the scan tool Windshield Wiper High Speed Switch parameter changes between Active and Inactive when activating the high speed windshield wipers.
- If the parameter does not change Refer to Circuit/System Testing – Windshield Wiper/Washer Switch Malfunction.
- If the parameter changes
- Verify the scan tool Windshield Wiper Switch parameter changes between Off and Low when activating the low speed windshield wipers.
- Verify the scan tool Windshield Wiper Switch parameter changes between Delay 1 and Delay 5 when cycling the intermittent speed windshield wipers.
- If the parameter does not change Test or replace the S82 Windsheild Wiper/Washer Switch.
- Verify the M75 Windshield Wiper Motor changes between Off, Low, and High when cycling the S82 Windshield Wiper/Washer Switch between Off, Low, and High.
- If the Windshield Wiper Motor does not cycle between Off, Low, and High Refer to Circuit/System Testing – Windshield Wiper Motor Malfunction
- If the Windshield Wiper Motor cycles between Off, Low, and High
- Ignition OFF.
- Verify the scan tool Windshield Wiper Park Switch parameter is Active.
- If the parameter does not change Refer to Circuit/System Testing – Windshield Wiper Motor Malfunction.
- All OK.
Circuit/System Testing
Windshield Wiper/Washer Switch Malfunction
- Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch. It may take up to 11 min for all vehicle systems to power down.
- Test for less than 10 Ω between the low reference circuit terminal 2 and ground.
- If 10 Ω or greater
- Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
- Test for less than 2 Ω in the low reference circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, replace the K9 Body Control Module.
- If less than 10 Ω
- Verify the scan tool Windshield Wiper High Speed Switch parameter is Inactive.
- If not Inactive
- Test for infinite resistance between the signal circuit terminal 1 and ground.
- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K9 Body Control Module.
- If Inactive
- Install a 3 A fused jumper wire between the signal circuit terminal 1 and the low reference circuit terminal 2.
- Verify the scan tool Windshield Wiper High Speed Switch parameter is Active.
- If not Active
- Ignition OFF, remove the jumper wire, disconnect the harness connector at the K9 Body Control Module, ignition ON.
- Test for less than 1 V between the signal circuit and ground.
- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V

- Test for less than 2 Ω in the signal circuit end to end.
- If Active
- Test for greater than 8 V between the signal circuit terminal 3 and ground.
- If less than 8 V
- Test for infinite resistance between the signal circuit and ground
- If infinite resistance
- If 8 V or greater
- Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON.
- Test for less than 1 V between the S82 Windshield Wiper/Washer Switch signal circuit terminal 3 and ground.
- If 1 V or greater Repair the short to voltage on the circuit.
- Test or replace the S82 Windshield Wiper/Washer Switch.

Windshield Wiper Motor Malfunction

- Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the M75 Windshield Wiper Motor. It may take up to 2 min for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminal 4 and ground.
- Test for less than 2 Ω in the ground circuit end to end.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- Verify the scan tool Windshield Wiper Park Switch parameter is Inactive.
- Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 4.
- Ignition OFF and all vehicle systems OFF, disconnect the KR12B Windshield Wiper Relay. It may take up to 2 min for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminals listed below and ground.
- KR12B Windshield Wiper Relay — terminal 85
- KR12B Windshield Wiper Relay — terminal 87A
- Verify a test lamp illuminates between the B+ circuit terminal 87 and the ground circuit terminal 87A.
- If the test lamp does not illuminate and the circuit fuse is good Replace the X50A Fuse Block – Underhood.
- If the test lamp does not illuminate and the circuit fuse is open
- Ignition OFF, remove the test lamp. Disconnect the KR12C Windshield Wiper Speed Control Relay.
- Test for infinite resistance between the control circuits listed below and gound.
- KR12C Windshield Wiper Speed Control Relay — terminal 87A
- KR12C Windshield Wiper Speed Control Relay — terminal 87
- If infinite resistance, replace the M75 Windshield Wiper Motor
- If the test lamp illuminates
- Connect a test lamp between the control circuit terminal 86 and the ground circuit terminal 85.
- Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay Low and Off with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, remove the test lamp, disconnect the harness connector at the K9 Body Control Module.
- Test for infinite resistance between the control circuit and ground.
- Test for less than 2 Ω in the control circuit end to end.
- If the test lamp is always ON
- Ignition OFF, remove the test lamp, disconnect the harness connector at the K9 Body Control Module, ignition ON.
- Test for less than 1 V between the control circuit and ground.
- If less than 1 V, replace the K9 Body Control Module.
- If the test lamp turns ON and OFF
- Ignition OFF, connect the KR12B Windshield Wiper Relay and disconnect the KR12C Windshield Wiper Speed Control Relay, ignition ON.
- Test for less than 10 Ω between the control circuit terminal 30 and ground.
- If 10 Ω or greater Test or replace the KR12B Windshield Wiper Relay.
- Connect a test lamp between the control circuit terminal 30 and ground.
- If the test lamp does not turn ON and OFF Test or replace the KR12B Windshield Wiper Relay.
- Verify a test lamp illuminates between the B+ circuit terminal 85 and ground.
- If the test lamp does not illuminate Replace the X50A Fuse Block – Underhood.
- Connect a test lamp between the B+ circuit terminal 85 and the control circuit terminal 86.
- Verify the test lamp turns ON and OFF when commanding the Windshield Wiper High Speed Relay High and Off with a scan tool.
- Ignition OFF, connect the KR12C Windshield Wiper Speed Control Relay.
- Connect a test lamp between the M75 Windshield Wiper Motor control circuit terminal 5 and ground circuit terminal 4, ignition ON.

- Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay.
- If less than 2 Ω, test or replace the KR12C Windshield Wiper Speed Control Relay.
- Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay, ignition ON.
- If less than 1 V, test or replace the KR12C Windshield Wiper Speed Control Relay.
- Connect a test lamp between the M75 Windshield Wiper Motor control circuit terminal 3 and ground circuit terminal 4, ignition ON.
- Test or replace the M75 Windshield Wiper Motor.

Component Testing

Windshield Wiper/Washer Switch

- Ignition OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch.
- Test for infinite resistance between the signal terminal 1 and the low reference terminal 2 with the high speed switch in the open position.
- If less than infinite resistance Replace the S82 Windshield Wiper/Washer Switch.
- Test for less than 2 Ω between the signal circuit terminal 1 and the low reference circuit terminal 2 with the high speed switch in the closed position.
- If 2 Ω or greater Replace the S82 Windshield Wiper/Washer Switch.
- If less than 2 Ω
- Test for infinite resistance between the signal terminal 3 and the low reference terminal 2 with the low speed switch in the open position.
- Verify the resistance readings are within the specified range listed below between the signal circuit terminal 3 and the low reference circuit terminal 1 by pushing the switch in the listed positions below.
- Delay 1 : 3.75-3.85kΩ
- Delay 2 : 2.75-2.85kΩ
- Delay 3 : 1.95-2.05kΩ
- Delay 4 : 1.25-1.35kΩ
- Delay 5 : 765-775Ω
- If not within the specified range Replace the S82 Windshield Wiper/Washer Switch.
- If within the specified range
- All OK

Relay Test

- Ignition OFF, disconnect the appropriate relay.
- Test for 60–200 Ω between terminals 85 and 86.
- If less than 60 or greater than 200 Replace the relay.
- If between 60–200 Ω
- Test for infinite resistance between the terminals listed below:
- 30 and 86
- 30 and 87
- 30 and 85
- 85 and 87
- If less than infinite resistance Replace the relay.
- Test for less than 5 Ω between terminals 30 and 87A.
- If 5 Ω or greater Replace the relay.
- If less than 5 Ω
- Install a 10 A fused jumper wire between relay terminal 85 and 12 V. Install a jumper wire between relay terminal 86 and ground.
- Test for less than 5 Ω between terminals 30 and 87.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Windshield Wiper Motor Replacement
- Electrical Relay Replacement
- Windshield Wiper and Windshield Washer Switch Replacement
- Control Module References for BCM replacement, programming and setup

Symptoms - Wiper/Washer Systems (Article 10505)

- Perform Diagnostic System Check - Vehicle , in order to verify that all of the following conditions are true:
- No DTCs are set.
- The control modules can communicate via the serial data link.
- Refer to Wiper/Washer System Description and Operation in order to familiarize yourself with the system functions.

Visual/Physical Inspection
- Inspect for aftermarket devices which may affect the operation of the windshield wiper /washer system. Refer to Checking Aftermarket Accessories .
- Inspect the easily accessible or visible system components for obvious damage or conditions which may cause the symptom.
- Inspect the washer fluid reservoir for the proper fluid level.
Intermittent
Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to Testing for Intermittent Conditions and Poor Connections .
Symptom List
Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:
- Windshield Wiper System Malfunction
- Washer Malfunction
- Headlamp Washer Malfunction

Wipers and Washers - Special Tools (Article 10524)

Illustration Tool Number/ Description
Click for full-size image J-39232 Wiper Linkage Separator Brazil– Use local equivalent
Click for full-size image J-39529 Wiper Linkage Installer Brazil– Use local equivalent
Click for full-size image J-39822 Wiper Arm Puller Brazil– Use local equivalent

Safety (itype_107)

Tsbs
- Recall - Windshield Wiper Motor Failure (15789, 2015/10/26)