

# **Component Procedures: Heated Glass Element**

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# Component Procedures: Heated Glass Element

## Rear Window Defogger (Article 10236)

Rear Window Defogger System Components

The rear window defogger system consists of the following components:

- HVAC Control Module
- Radio/HVAC Controls
- Rear Defogger Relay
- Rear Defogger Grid
- Driver outside rearview mirror
- Passenger outside rearview mirror
- 40A Fuse

Figure 1: A20-K33-X50A Defogger Block Diagram

Rear Window Defogger Operation

The rear defog control system utilizes a single zone backlight design, driven with a single relay configuration. Additionally, up to two outside rear view mirrors can be heated if required. A switch for the customer to control the system is provided within the radio/HVAC controls. Also included in the radio/HVAC controls is an indicator to inform the customer with the current state of the system. The system is only operational when engine is running or during remote start.

Pressing the heated rear window switch causes the radio/HVAC controls to send a serial data message to the HVAC control module requesting rear window defog operation. The HVAC control module upon receipt of the serial data message will provide voltage to the coil side of the rear defogger relay, this will energize the relay causing the relay switch contacts to close allowing B+ voltage to flow through the rear defogger grid control circuit to the rear defogger grid.

When the rear heated window switch is pressed and the engine is running, the rear defog control system will remain active for 10 minutes. After the initial cycle has lapsed, pressing the switch again will continue rear window defogger operation, but the cycle will only last 5 minutes. The rear defog control system will function continuously if the vehicle speed is greater than 70 kilometers per hour (45 mph).

Heated Mirrors

The heated mirrors are also controlled through the rear defogger relay. Whenever the rear window defogger is turned on battery voltage is supplied to the mirror heater elements through the left and right mirror heater element control circuits.

## Defogger Schematics (Article 10284)

Figure 1: Rear Defogger

## All Technical Service Bulletins (itype\_100)

Tsbs

- Body - Broken Rear Window Defogger Grid Detection (04-08-48-001D, 2012/04/17)
- Body - Rear Window Defroster Contact or Tab Repair (03-08-48-006J, 2014/12/11)

## Customer Interest Bulletins (itype\_109)

Tsbs

- Body - Broken Rear Window Defogger Grid Detection (04-08-48-001D, 2012/04/17)
- Body - Rear Window Defroster Contact or Tab Repair (03-08-48-006J, 2014/12/11)

## Defogger Grid Lines Diagnosis (Article 10241)

- Engine running, command the Rear Defogger ON with a scan tool.
- Verify that a test lamp illuminates between each rear window defogger grid line and ground. The test lamp should be off when testing at the ground side of the grid and get brighter as the test lamp moves closer to the voltage supply side of the grid. The test lamp should be dim when testing each grid line in the middle
- If the test lamp remains bright at the middle of the grid line. The grid line is open between the test point and the ground side of the grid. Replace the rear window
- If the test lamp remains off at the middle of the grid line. The grid line is open between the test point and the voltage supply side of the grid. Replace the rear window
- If the test lamp remains dim at the middle of each grid line.
- All OK

## Rear Window Defogger Malfunction (Article 10253)

### 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

Rear Defogger Relay B+ 1 1 — —

Rear Defogger Relay Control B0283 02 B0283 05 B0283 05 —

Rear Defogger Grid Control 1 1 2 —

Rear Defogger Relay Ground — B0283 05 — —

Rear Defogger Grid Ground — 1 — —

1. Rear Defogger Inoperative 2. Rear Defogger Always ON

### Circuit/System Description

When the HVAC control module receives a rear window defog request from the radio/HVAC control, the HVAC control module will supply voltage to the relay coil. Battery positive voltage is supplied at all times to the relay switched input and the relay coil is always grounded. This allows current from the relay switched input through the switch contacts and out the relay switched output to the rear window defogger grid.

### Diagnostic Aids

The rear window defogger indicator will still function when the rear defogger switch is pressed, but any of the following conditions may cause the rear window defogger grid not to function:

- The battery state of charge is out of range causing the HVAC control module to suspend the rear window defogger operation.
- The Remote Start Enable ambient temperature is greater than 5°C (40°F).

### Reference Information

Schematic Reference

Defogger Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Rear Window Defogger 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

- Engine running.
- Verify the scan tool Rear Defogger Switch parameter changes between On and Off when pressing the rear window defogger switch.
- If the parameter does not change between On and Off Replace the A20 Radio/HVAC controls.
- If the parameter changes between On and Off
- Verify the E18 Rear Defogger Grid turns ON and OFF when commanding the Rear Defogger On and Off with a scan tool.
- If the E18 Rear Defogger Grid does not turn ON and OFF Refer to Circuit/System Testing
- If the E18 Rear Defogger Grid turns ON and OFF
- Verify the rear defogger indicator turns ON and OFF when pressing the rear window defogger switch.
- If the rear defogger indicator does not turn ON and OFF Replace the A20 Radio/HVAC controls.
- If the rear defogger indicator turns ON and OFF
- All OK.

### Circuit/System Testing

- Ignition OFF and all vehicle systems OFF, disconnect the KR5 Rear Defogger 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
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
- If less than 10  $\Omega$
- Engine Running.
- Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
- If the test lamp does not illuminate Replace the X50A Fuse Block-Underhood
- 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 Rear Defogger On and Off with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the harness connector at the K33 HVAC control module.
- 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  $\Omega$  in the control circuit end to end.
- If less than 2  $\Omega$ , replace the K33 HVAC control module.
- If the test lamp is always ON
- Ignition OFF, disconnect the harness connector at the K33 HVAC 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 K33 HVAC 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 X2 harness connector at the E18 Rear Defogger Grid.  
It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10  $\Omega$  between the ground circuit terminal 1 and ground.
- Connect the X2 harness connector at the E18 Rear Defogger Grid.
- Ignition ON, connect a 30 A fused jumper wire between the B+ circuit terminal 30 and the control circuit terminal 87.
- Verify the E18 Rear Defogger Grid is activated.
- If the E18 Rear Defogger Grid does not activate
- Ignition OFF, disconnect the X1 harness connector at the E18 Rear Defogger Grid.
- If less than 2  $\Omega$ , test or replace the E18 Rear Defogger Grid.
- If the E18 Rear Defogger Grid activates
- Test or replace the KR5 Rear Defogger Relay.

#### Component Testing

##### Relay Test

- Ignition OFF, disconnect the KR5 Rear Defogger Relay.
- Test for 60-180  $\Omega$  between terminals 85 and 86.
- If less than 60  $\Omega$  or greater than 180  $\Omega$  Replace the KR5 Rear Defogger Relay.
- If between 60-180  $\Omega$
- 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 KR5 Rear Defogger Relay.
- Install a 3 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 2  $\Omega$  between terminals 30 and 87.
- If 2  $\Omega$  or greater Replace the KR5 Rear Defogger Relay.
- If less than 2  $\Omega$
- All OK

##### Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Rear Window Replacement
- Electrical Relay Replacement
- Control Module References for HVAC control module and radio/HVAC controls replacement, programming and setup