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Fault Diagnosis and Maintenance of the Rear Lighting System of Volkswagen Magotan

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Abstract

Study the rear lighting system of the Volkswagen Magotan B8L model, analyze the composition and control principle of the brake lights, reversing lights, and fog lights in the rear lighting system. Through typical fault cases of brake lights, reversing lights, and fog lights, analyze the fault phenomenon, conduct fault diagnosis, and achieve troubleshooting.

Keywords

Volkswagen Magotan; Fault Diagnosis; Maintenance; Rear Lighting System.

1. Introduction

The lighting system is one of the important components of a car, and various lights with different functions in the lighting system can play a decorative, lighting, reminder, and warning role, which is crucial for the normal driving and driving safety of the car. The Volkswagen Magotan is a best-selling flagship B-class car with a high market share. Its lighting system is relatively complex, and diagnosing and repairing common lighting faults is of universal significance. This article selects the rear lighting of the Volkswagen Magotan B8L for research.

2. Composition and Control Principle of Rear Lighting System

The rear lights of the Volkswagen Magotan mainly include brake lights, reversing lights, and fog lights.

2.1. Composition and Control Principle of Brake Lights

The Volkswagen Magotan brake light control system is centrally controlled through the on-board power grid control unit J519. The system mainly includes brake light signal switch, engine control unit J623, data bus diagnostic interface J533, combination instrument control unit J285, onboard power grid control unit J519, left and right brake light assemblies, and high mounted brake lights.

The Magotan brake light adopts a high brightness LED, which can save power and improve brightness to achieve better warning purposes.

For the brake light in the tail light, the 2xLED photoconductors in the fixed section and luggage compartment cover section light up, while the following segments light up:

The two longitudinal light groups in the fixed section are 16xLEDs, with four dimmed LEDs also used for the tail lights. A longitudinal light group 8xLED is located in the luggage compartment cover, with two dimmed LEDs also used for the tail lights.

Analyze the working process of the Magotan brake light system. When the brake pedal is pressed, the engine control unit J623 will detect two status signals (related to the brake pedal). J623 uses the drive CAN to send these two status signals to the dual clutch transmission electromechanical device J743 and the data bus diagnostic interface J533. After processing the data, J533 uses the comfort CAN bus to send the information to the onboard power grid control unit J519 and the combination instrument control unit J285.

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After receiving this information, J285 controls the brake pedal status indicator light on the instrument panel to turn off; After receiving this message, J519 switches on the LED power supply in the left rear, right rear, and high mounted brake light assemblies, and the LED (brake light) lights up.

2.2. Composition and Control Principle of Reversing Lights

The Volkswagen Magotan reverse lamp control system is centrally controlled through the on-board power grid control unit J519. The system includes a gear lever E313 control unit (with gear sensor), a dual clutch transmission electromechanical device J743, a data bus diagnostic interface J533, a combination instrument control unit J285, an on-board power grid control unit J519, and left and right reverse lamps.

Analyze the working process of the Magotan reverse light system. When the gear lever is pulled to reverse gear, the gear lever control unit E313 will detect a gear change signal and light up the "R" light on the gear lever. Next, E313 will send the gear change signal to the engine control unit J623, dual clutch transmission electromechanical device J743, and data bus diagnostic interface J533 through the drive CAN bus. J533 will process the signal into information that J519 and J285 can understand.

Then J533 sends the processed data to the vehicle power grid control unit J519 and the combination instrument control unit J285 through the comfort CAN bus. After receiving the data, J285 will light up the "R" symbol on the instrument panel. After J519 receives the data, it will respectively connect the six LED power supplies in the left and right rear reversing lamp assemblies, and the LED (reversing lamp) will light up.

2.3. Composition and Control Principle of Fog Lights

The Volkswagen Magotan fog lamp control system is centrally controlled through the on-board power grid control unit J519. The system mainly includes the light rotary switch, front fog lamp switch, rear fog lamp switch, left front fog lamp assembly, right front fog lamp assembly, left rear tail lamp assembly, data bus diagnostic interface J533, combination instrument control unit J285, and on-board power grid control unit J519.

In order to save electricity and increase the brightness of the fog lights, the Magotan rear fog light warning lighting adopts LED unit lighting, as shown in Figure 1.

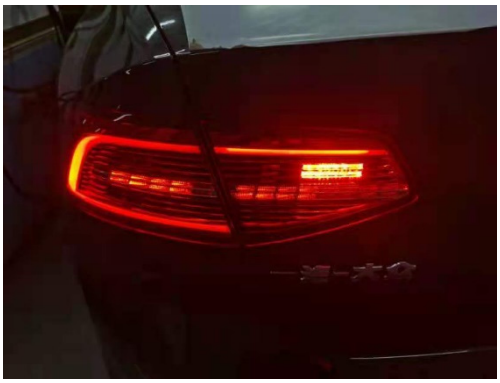

Fig 1. Rear Fog Lamp

Analyze the working process of the fog lamp control system, in order to turn on the rear fog lamps, you need to turn the EX1 switch to the side marker or low beam position. The rear fog lights cannot be turned on separately in the side marker position, but can be turned on separately in the low beam position. By rotating the light rotary switch, E313 receives a signal to turn on the small lights or low beams. E313 converts this signal and sends it to J519 through the LIN bus. J519 controls the front and rear small lights or low beams to turn on. At this time, by pressing the rear fog light button again, E313 receives a signal to turn on the rear fog lights.

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E313 converts this signal and sends it to J519 through the LIN bus, which controls the rear fog lights to turn on.

3. Fault Diagnosis and Maintenance of Rear Lighting System

3.1. Fault Diagnosis and Maintenance of Brake Light System

Case analysis:

Fault symptom:

Turn on the ignition switch, the backup brake lights M86 and M87 will continue to light up, and the instrument panel will display "Please check the left brake light" and the light fault indicator will light up. The other lights can be controlled normally.

Fault analysis:

Turn on the ignition switch and the brake light will continue to light up. Possible cause: M86 and M87 have their own faults; Abnormal control circuit; J519 is partially damaged.

Diagnostic process:

Step 1: Turn on the ignition switch, use a decoder, and read fault code 14090: Left brake signal light bulb 2 open circuit/short circuit to positive.

Step 2: Turn on the ignition switch, do not step on the brake pedal, and measure the output voltage of J519 terminal T73c/11. Turn on the ignition switch and use a voltmeter to measure the J519 terminal T73c/11 output of 12.6V, the actual measurement is abnormal.

Step 3: Turn on the ignition switch, do not step on the brake pedal, and measure the input voltage of lamp terminals M86 and M87. Turn on the ignition switch and use a voltmeter to measure the voltage between M86, M87 terminal T8o/5, and T8i/5 terminal to ground at 12.6V. The voltage is abnormal. Measure the battery voltage at 12.68V, which is normal.

Based on step 2, turn on the ignition switch without stepping on the brake pedal. The backup brake lights M86 and M87 have inputs. It is preliminarily determined that the power supply lines of M86 and M87 are short circuited to the positive. Disconnect the negative terminal of the battery, check the continuity of the line, and obtain a resistance of 0.12 ohms between T8o/5 and the positive terminal of M86. The result is that the power supply lines of M86 and M87 are short circuited to the positive. Finally, troubleshoot the problem, turn on the ignition switch to clear the fault code, operate the brake light switch again, and check if the problem still exists.

3.2. Fault Diagnosis and Maintenance of the Backup Lamp System

Case analysis:

Fault symptom:

Turn on the ignition switch, press the brake, and the vehicle can shift into R gear normally, but the backup lights M16 and M17 do not light up. The instrument panel displays "Please check the right backup light" and the light fault indicator light is on. The other lights are controlled normally.

Fault analysis:

Turn on the ignition switch and the vehicle can shift into R gear normally, but the backup lights do not light up. Possible reasons: M16 and M17 have their own faults; Abnormal control circuit; J519 is partially damaged.

Diagnostic process:

Step 1: Turn on the ignition switch, use a decoder, and read fault code 12810: Right reverse lamp bulb open circuit/short circuit to positive.

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Step 2: Turn on the ignition switch, press the brake pedal, shift the vehicle into R gear, and measure the output voltage of J519 T73a/64. Turn on the ignition switch, use a voltmeter to measure the J519 terminal T73a/64 output of 12.6V, and the measured value is normal.

Step 3: Turn on the ignition switch, press the brake pedal, put the vehicle into R gear, and measure the input voltage of the M16 and M17 lamp terminals. Turn on the ignition switch and use a voltmeter to measure the voltage between M16, M17 terminal T8o/7, and T8i/7 terminal to ground as 0V, indicating abnormal voltage.

Based on step 2, there is a voltage difference between J529 and lamp terminals M16 and M17. It is preliminarily determined that the power supply lines of M16 and M17 are open circuit. Disconnect the negative electrode of the battery, check the continuity of the line, and the resistance between T8l/7 at M17 terminal and T73a/64 at J519 terminal is infinite. The result is that the power supply lines of M16 and M17 are open circuit. Finally, troubleshoot the problem, turn on the ignition switch to clear the fault code, operate the reverse operation again, and check if the problem still exists.

3.3. Fault Diagnosis and Maintenance of Fog Lamp System

Case analysis:

Fault symptom:

Turn on the ignition switch, turn the EX1 switch to the low beam position, press the front fog lamp button, and the front fog lamp will turn on normally. Press the rear fog lamp button, and the rear fog lamp L46 will first light up and then go out. The instrument panel will prompt "Please check the left rear fog lamp" and the light fault indicator will light up. The other lights will be controlled normally.

Fault analysis:

Turn on the ignition switch, and the rear fog lights will light up first and then go out. Possible cause: L46 has its own fault; Abnormal control circuit; J519 is partially damaged.

Diagnostic process:

Step 1: Turn on the ignition switch, use a decoder, and read fault code 11783: Left rear fog lamp bulb short circuit to ground.

Step 2: Turn on the ignition switch, turn on the rear fog light, and measure the output voltage of J519 terminal T73a/72. Turn on the ignition switch and use a voltmeter to measure the J519 terminal T73a/64 output 0V, the actual measurement is abnormal.

Step 3: Turn on the ignition switch, turn on the rear fog lamp, and measure the input voltage of lamp terminal L46. Turn on the ignition switch and use a voltmeter to measure the voltage between terminal T8o/6 of L46 and ground as 0V, indicating an abnormal voltage.

Based on Step 2, there is no voltage on the rear fog lamp power supply line. It is preliminarily determined that the L46 power supply line is short circuited to ground. Disconnect the negative electrode of the battery, check the continuity of the line, and the T8o/6 resistance to ground at the L46 terminal is 0.3 ohms. The conclusion is that the L46 power supply line is short circuited to ground. Finally, troubleshoot the problem, turn on the ignition switch to clear the fault code, operate the rear fog light switch again, and check if the problem still exists.

4. Conclusion

In the Volkswagen Magotan lighting system, the composition and control of the brake lights, reversing lights, and fog lights in the rear lighting system are closely related to EX1 and J519. According to the troubleshooting logic of the fault tree, by observing the fault phenomenon and following the prompts of the decoder fault code, conducting circuit and component inspections

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can accurately diagnose and troubleshoot the lighting system faults at the rear of the Volkswagen Magotan.

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