25

Lighting Systems

FIGURE 25.1 Dual-filament (double-contact) bulbs contain both a low-intensity filament for tail lights or parking lights and a high-intensity filament for brake lights and turn signals. Bulbs come in a variety of shapes and sizes. The numbers shown are the trade numbers.

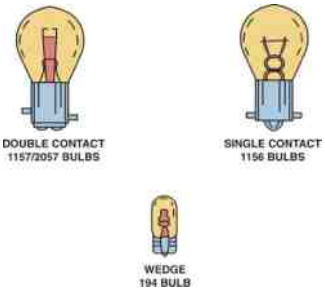

FIGURE 25.2 Bulbs that have the same trade number have the same operating voltage and wattage. The NA means that the bulb uses a natural amber glass ampoule with clear turn signal lenses.

FIGURE 25.3 Close-up of a 2057 dual-filament (double-contact) bulb that failed. Note that the top filament broke from its mounting and melted onto the lower filament. This bulb caused the dash lights to come on whenever the brakes were applied.

FIGURE 25.4 Corrosion caused the two terminals of this dual filament bulb to be electrically connected.

FIGURE 25.5 This single-filament bulb is being tested with a digital multimeter set to read resistance in ohms. The reading of 1.1 ohms is the resistance of the bulb when cold. As soon as current flows through the filament, the resistance increases about 10 times. It is the initial surge of current flowing through the filament when the bulb is cool that causes many bulbs to fail in cold weather as a result of the reduced resistance. As the temperature increases, the resistance increases.

FIGURE 25.6 The typical turn signal switch includes various springs and cams to control the switch and to cause the switch to cancel after a turn has been completed.

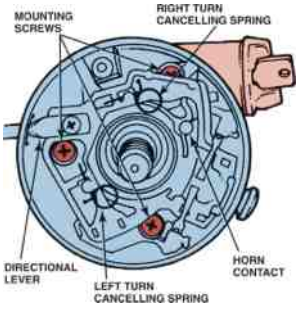

FIGURE 25.7 Two styles of two-prong flasher units.

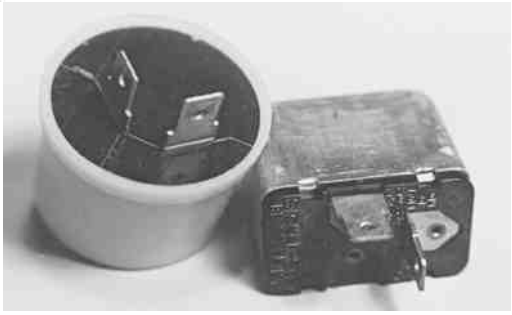

FIGURE 25.8 A hazard warning flasher uses a parallel resistor across the contacts to provide a constant flashing rate regardless of the number of bulbs used in the circuit.

FIGURE 25.9 A typical four-headlight system using sealed beam headlights.

FIGURE 25.10 A typical composite headlamp assembly. The lens, housing, and bulb sockets are usually included as a complete assembly.

FIGURE 25.11 Handle a halogen bulb by the base to prevent the skin's oil from getting on the glass.

FIGURE 25.12 The igniter contains the ballast and transformer needed to provide high-voltage pulses to the arc tube bulb.

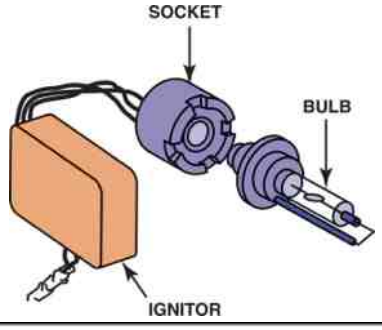

FIGURE 25.13 HID (xenon) headlights emit a whiter light than halogen headlights and usually look blue compared to halogen bulbs.

FIGURE 25.14 Typical headlight aiming diagram as found in service information.

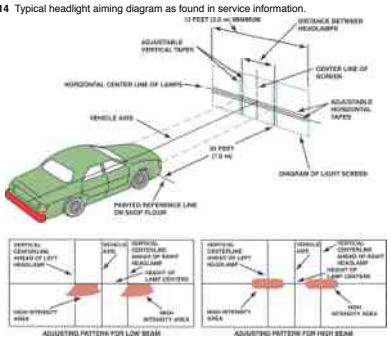

FIGURE 25.15 Many composite headlights have a built-in bubble level to make aiming easy and accurate.

FIGURE 25.16 Daytime running lights are available on many makes and models, and vehicles use either separate lights or connect the high beams in series to provide a reduced level of light intensity.

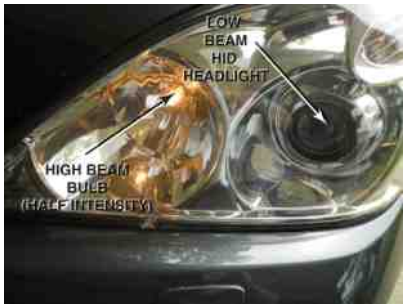

FIGURE 25.17 A typical courtesy light doorjamb switch. Newer vehicles use the door switch as an input to the vehicle computer and the computer turns the interior lights on or off. By placing the lights under the control of the computer, the vehicle engineers have the opportunity to delay the lights after the door is closed and to shut them off after a period of time to avoid draining the battery.

TAIL LIGHT BULB REPLACEMENT

1 The driver noticed that the tail light fault indicator (icon) on the dash was on any time the lights were on.

TAIL LIGHT BULB REPLACEMENT

2 A visual inspection at the rear of the vehicle indicated that the right rear tail light bulb did not light. Removing a few screws from the plastic cover revealed the tail light assembly.

TAIL LIGHT BULB REPLACEMENT

3 The bulb socket is removed from the tail light assembly by gently twisting the base of the bulb counterclockwise.

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TAIL LIGHT BULB REPLACEMENT

4 The bulb is removed from the socket by gently grasping the bulb and pulling the bulb straight out of the socket. Many bulbs required that you rotate the bulb 90° (1/4 turn) to release the retaining bulbs.

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TAIL LIGHT BULB REPLACEMENT

5 The new 7443 replacement bulb is being checked with an ohmmeter to be sure that it is okay before it is installed in the vehicle.

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TAIL LIGHT BULB REPLACEMENT

6 The replacement bulb in inserted into the tail light socket and the lights are turned on to verify proper operation before putting the components back together.

OPTICAL HEADLIGHT AIMING

1 Before checking the vehicle for headlight aim, be sure that all the tires are at the correct inflation pressure, and that the suspension is in good working condition.

OPTICAL HEADLIGHT AIMING

2 The headlight aim equipment will have to be adjusted for the slope of the floor in the service bay. Start the process by turning on the laser light generator on the side of the aimer body.

OPTICAL HEADLIGHT AIMING

3 Place a yardstick or measuring tape vertically in front of the center of the front wheel, noting the height of the laser beam.

OPTICAL HEADLIGHT AIMING

4 Move the yardstick to the center of the rear wheel and measure the height of the laser beam at this point. The height at the front and rear wheels should be the same.

OPTICAL HEADLIGHT AIMING

5 If the laser beam height measurements are not the same, the floor slope of the aiming equipment must be adjusted. Turn the floor slope knob until the measurements are equal.

OPTICAL HEADLIGHT AIMING

6 Place the aimer in front of the headlight to be checked, at a distance of 10 to 14 inches (25 to 35 cm). Use the aiming pointer to adjust the height of the aimer to the middle of the headlight.

OPTICAL HEADLIGHT AIMING

7 Align the aimer horizontally, using the pointer to place the aimer at the center of the headlight.

OPTICAL HEADLIGHT AIMING

8 Lateral alignment (aligning the body of the aimer with the body of the vehicle) is done by looking through the upper visor. The line in the upper visor is aligned with symmetrical points on the vehicle body.

OPTICAL HEADLIGHT AIMING

9 Turn on the vehicle headlights, being sure to select the correct beam position for the headlight to be aimed.

OPTICAL HEADLIGHT AIMING

10 View the light beam through the aimer window. The position of the light pattern will be different for high and low beams.

OPTICAL HEADLIGHT AIMING

11 If the first headlight is aimed adequately, move the aimer to the headlight on the opposite side of the vehicle. Follow the previous steps to position the aimer accurately.

OPTICAL HEADLIGHT AIMING

12 If adjustment is required, move the headlight adjusting screws using a special tool or a 1/4-in. drive ratchet/socket combination. Watch the light beam through the aimer window to verify the adjustment.