

Exterior Lighting Systems Description and Operation

Exterior Lamps

The exterior lighting consist of the following lamps:

- The Headlamps
- The Daytime Running Lamps (DRL)
- The Fog Lamps
- The Park, Tail, Licence and Marker Lamps
- The Turn Signal Lamps
- The Stop Lamps
- The Backup Lamps

Headlamps

Manual Operation

Place the headlamp switch in the ON position, for normal operation. Battery positive voltage is then applied at all times from the HDLP circuit breaker to the headlamp switch. When the headlamp switch is placed to the HEAD position, battery positive voltage is applied to the headlamp dimmer switch. Battery positive voltage is then applied to the underhood fuse block. When the headlamp dimmer switch is in the LOW position, battery positive voltage is applied to the HDLOBML fuse and the HDLOBMR fuse. When the headlamp switch is in the HIGH position, battery positive voltage is applied to the HDHIBML fuse and the HDHIBMR fuse. Battery positive voltage is then applied from the fuse to the individual headlamps. the ground circuit for the left headlamps is provided from G101 and the ground circuit for the right side is provided by G102.

Automatic Lamp Control/Twilight Sentinel

To turn on or off the automatic lamp control/twilight sentinel feature:

- Turn the ignition switch to the ON position.
- Press the OPTIONS button located on the DIC, until the twilight option appears.
- Press the RESET button to the desired mode.

Place the headlamp switch in the OFF position, for automatic lamp control (ALC). During ALC control the headlamps will be OFF during daylight conditions but will turn ON when the ambient light sensor detects low light level. The ambient light sensor is a light sensitive transistor that varies its voltage signal to the body control module (BCM) in response to changes to the outside (ambient) light level. The BCM will apply a ground to the coil side of the ALC HDLP relay 44. This energizes the relay, closing the switch and applies battery positive voltage to the headlamp switch and to the headlamp opening door actuator control module. With the headlamp switch in the OFF position battery positive voltage is then applied from the headlamp switch to the HDLOBML fuse and HDLOBMR fuse in the underhood fuse block. Battery positive voltage is then applied from the fuse to the individual headlamps. The ground circuit for the left headlamps is provided from G101

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and the ground circuit for the right side is provided by G102 for low beam operation in low light conditions.

If the headlight switch is left in the ON position, the inadvertent power control feature will turn off the headlights approximately 30 seconds after the ignition switch is turned to the OFF position. If the driver places the headlight switch in the ON position after the ignition switch has been turned OFF, or if the ignition switch is in the ACCY position, the headlights will remain on until turned off or until the battery runs dead.

Lights On Warning

The IPC activates the lights on warning as requested by the body control module (BCM). The BCM sends a class 2 message to the IPC indicating the chime frequency (fast rate) and duration (continuous). The lights on warning sounds when the following occurs:

- The ignition is OFF.
- The BCM determines that the driver's door is open (signal circuit is low). The IPC receives a class 2 message from the BCM indicating the door ajar status.
- The IPC determines that the headlamp switch is in the park or head position.

Daytime Running Lamps (DRL)

Battery positive voltage is applied at all times from the APPROACH fuse 2 in the underhood electrical center to both the coil side and switch side of the DRL R relay 38 and the DRL L relay 40 in the instrument panel electrical center. The ambient light sensor is a light sensitive transistor that varies its voltage signal to the BCM in response to changes to the outside (ambient) light level. The BCM will apply a ground to the coil side of the DRL L and DRL R relays. This energizes the relays and allows battery positive voltage to be applied from the switch side of the relays to the front turn signal lamps. The front turn signal lamps will be ON steady (non-flashing). Any function or condition that turns on the headlights will cancel the daytime running lamps operation. With the headlight switch in the OFF position, the turn signal lamps will either be turned ON or OFF after a 30-second delay, depending on whether daylight or low light conditions are sensed. The DRL operates when the ignition switch is in the RUN position, and the parking brake is not set or the transmission is not in park. When these conditions have been met and the ambient light sensor indicates daytime conditions, the DRL will illuminate.

Headlight Doors

Battery Positive voltage is applied from the HDLP circuit breaker in the instrument panel fuse block to both the coil and switch side of the ALC HDLP relay 44. When the BCM receives this signal it will apply a ground to the coil side of the ALC HDLP relay 44. This energizes the relay, closing the switch, and applies battery positive voltage to the headlamp switch and to the headlamp opening door actuator control module. This actuator allows battery positive voltage from the HDLP MOT LH fuse and HDLP MOT RH fuse in the underhood electrical center to be applied to the headlamp opening door assemblies. The ground circuit is applied from G102.

Fog Lamps

With the ignition switch in the ON position, and the park lamps or low beam headlights on, the fog lights will illuminate when the driver presses the fog lamp switch. The F/TNKDR fuse 32 in the instrument panel fuse block supplies battery positive voltage to the fog lamp switch contacts. Battery positive voltage may also be applied to the FOG LP relay 39. When the fog lamp switch is

pressed, battery positive voltage is applied to the BCM. The BCM applies a ground to the FOG LP relay 39 coil circuit, which energizes the fog lamp relay coil control circuit. The current flow is now from the fog lamp relay to both front fog lamps and to ground G102 and to the fog lamp switch turning ON the fog lamp indicator. The state of the fog lamps either ON or OFF will remain the same until the front fog lamp switch is pressed again, or the ignition switch is cycled OFF and ON. The park lamps or low beam headlights must be ON in order for the fog lights to be illuminated. Fog lamp operation will be cancelled whenever the park lamps are turned OFF or when the high beam headlights are selected.

The rear fog lamps are controlled in much the same way, however the front fog lamps must be ON in order to turn on the rear fog lamps. The rear fog lamps have their own relay, and both the relay and current flow are the same.

Park, Tail and Marker Lamps

The park, tail and marker lamps, including the license lamps, are turned ON when the headlamp switch is placed in either the PARK or HEADLAMP position, or anytime the headlights are requested. The PK/TLP fuse in the instrument panel fuse block supplies battery positive voltage to both the ALC PRK LP relay 43 coil and switch contacts. The park lamp relay coil is controlled by the BCM. When the headlamp switch is placed in the PARK position, the BCM energizes the relay 43 coil control circuit. Current flow is now from the ALC PRK LP relay 43 to the headlamp switch and then to the park, tail, license, and marker lamps. The front park lamps are grounded at G102. The rear park lamps are grounded at G401. The license plate lamps are a part of the rear park lamp circuit and are grounded at G401. The inadvertent power control feature prevents the park lights from remaining on more than 10 minutes if left ON. If the park lights are turned ON after the ignition switch has been turned OFF, or is in the ACCY position, they will remain ON until turned OFF or until the battery runs dead.

Remote Keyless Entry Exterior Lamp Illumination

When the remote function actuation (RFA) module receives a door unlock command from the remote function actuator transmitter, the RFA module will ground the door unlock signal circuit to the BCM and will send a class 2 message to the BCM, indicating that an UNLOCK command has been received. The BCM will then flash the park lamps twice. If all the doors closed, and the RKE transmitter is used to lock the doors, the park lamps will flash twice. The park lamps will not flash if the rear compartment is opened using the RKE transmitter.

Turn Signal Lamps

Ignition positive voltage from the HAZT/SIG fuse 15 in the instrument panel fuse block is supplied to the hazard warning switch. The turn signal lamps may only be activated with the ignition switch in the ON or ACCY position. When the turn signal switch is placed in either the left or right position, the flasher module sends an ON/OFF voltage to the turn signal switch assembly. For the rear turn lamps, battery voltage is applied directly to either the left or right turn signal lamps. The ground for the rear turn lamps is supplied from G401. For the front turn lamps, battery positive voltage is applied from the turn signal switch to the instrument panel electrical center. From the instrument panel fuse block, battery positive voltage is applied to the instrument cluster (IC) indicators and to the normally-open switched side of either the DRL L or DRL R relay, depending on the turn signal switch position. Battery positive voltage is then applied to either the left or right turn signal lamps. The front turn signals are grounded at G102.

For the hazard lamps, voltage is applied from the STP HAZ fuse 8 to the hazard warning switch. When the hazard switch is pressed, all the turn signal lamps will flash, including both IPC turn

signal indicators. The hazard warning switch is grounded at G201.

Turn Signal Reminder

The IPC activates the turn signal warning as requested by the IPC. The IPC receives a low input signal from the turn signal switch indicating the chime frequency (medium rate) and duration (continuous). The turn signal warning sounds when the following occurs:

- The ignition is in RUN.
- The turn signal switch is in either turn position, sensing, within 1 second, an open to B+ transition in the turn signal control circuit (left or right turn).
- The vehicle has traveled a distance of 1.2 km (0.75 mi) by counting pulses on the vehicle speed input circuit.

The IPC turns off the turn signal reminder when either the ignition switch is turned to the OFF position, or the turn signal switch returns to the OFF position, or the turn signal switch returns to the OFF position, sensing, within 1 second, no transitions from open to B+ in either of the turn signal control circuits (left turn or right turn).

Stop lamps

The STP HAZ fuse in the instrument panel fuse block supplies battery positive voltage to the normally-open stop lamp switch.

Export

When the driver presses the brake pedal, the switch contacts close and the stop lamp output signal is supplied to both left and right stop lamp assemblies and to the center high mounted stop lamp (CHMSL). The stop lamps are grounded at G401.

Domestic

When the driver presses the brake pedal, the switch contacts close and the stop lamp output signal is applied to the CHMSL and to the hazard warning switch. The stop lamp signal is applied from the hazard warning switch to the turn signal switch. The turn signal switch applies the stop lamp switch signal to both of the rear stop/turn lamps, turning them on full bright. The stop/turn lamps ground is applied from G401.

Backup Lamps

The BTSI BU 21 fuse in the instrument panel fuse block supplies battery positive voltage to the park neutral position switch (automatic) or backup lamp switch (manual). When the gear selector lever is in the REVERSE position, power is supplied to both of the backup lamps. The backup lamps are grounded at G401.

The BCM also can control the backup lamps for theft deterrent operations. Battery positive voltage is applied at all times from the APPROACH fuse 2 to the coil and switched side of the BACKUP relay 38. When the BCM detects a theft alarm activation or deactivation, the BCM will apply a ground to the BACKUP relay coil. Battery positive voltage is then applied to the backup lamps flashing them ON.

Battery Rundown Protection / Inadvertent Power

The BCM controls the lighting system through circuits that enable both the exterior lamp functions of the park lamps, the head lamps, the fog lamps, and the interior lamps. The BCM opens these enabling circuits 20 minutes after the ignition switch is turned OFF with no lamp switch activity. If the ignition switch is turned to any position other than OFF, or if a lamp switch is activated during this 20 minute period, the timer resets for another 20 minutes.

Lighting System Indicator(s)

High Beam

The IPC illuminates the high beam indicator when the high beams are on or the flash to pass feature is activated. The IPC receives a discrete input from the headlamp dimmer switch requesting illumination.

Turn Signals

The IPC illuminates the right or left turn signal indicator when a turn signal or a hazard request is received. The IPC receives a discrete input from the turn signal switch requesting illumination. If the BCM determines that the turn signal is active for more than 1.2 km (0.75 mi), the BCM activates the audible warning.