

2022 CHEVROLET CORVETTE SERVICE MANUAL

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Exterior Lighting Systems Description and Operation

The exterior lighting system consist of the following lamps:

- Backup lamps
- Daytime running lamps
- Hazard warning lamps
- Headlamps
- Headlamp Leveling
- Park, tail, license, and marker lamps
- Rear fog lamps (T79)
- Stop lamps
- Turn signal lamps

Low Beam Headlamps

The headlamps may be turned ON in 3 different ways:

- When the turn signal switch is placed in the ON position, for normal operation
- When the turn signal switch is placed in the AUTO position, for automatic lamp control
- When the turn signal switch is placed in the AUTO position, with the windshield wipers ON in daylight conditions, after a 6 second delay

The K219 Lighting Control Module will also command the low beam headlamps ON during daylight conditions when the following conditions are met:

- Turn signal/multifunction switch in the AUTO position
- Windshield wipers ON
- Vehicle in any gear but PARK

When the Lighting Control Module commands the low beam headlamps ON, the operator will notice the interior backlighting for the instrument cluster and the various other switches dim to the level of brightness selected by the instrument panel dimmer switch.

The K9 Body Control Module (BCM) monitors three signal circuits from the S78 Turn Signal Switch. When the turn signal switch is in the AUTO position, the three signal circuits are unaffected (open) and the BCM relies on the B10D Sun Load and Ambient Light and Security Indicator Sensor input to determine if headlamps are required or if daytime running lamps will be activated based on outside lighting conditions. When the turn signal switch is placed in the headlamp OFF position, the turn signal switch headlamps OFF signal circuit 306 is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the turn signal switch in the PARK LAMPS position, the turn signal switch park lamps ON signal circuit 13 is grounded, indicating that the park lamps have been requested. When the turn signal switch is in the HEADLAMP position, both the turn signal switch park lamps ON signal circuit 13 and the turn signal switch headlamps ON signal circuit 103 are grounded. The BCM responds to these inputs by sending a serial data message to the K219 Lighting Control Module. The Lighting Control Module responds by applying pulse width modulated (PWM) voltage to both headlamp low beam control circuits, illuminating the LED low beam headlamps.

High Beam Headlamps

The high beam and flash to pass (FTP) functions are contained within the turn signal switch. The K9 Body Control Module (BCM) provides the S78 Turn Signal Switch with two signal circuits, the high beam signal circuit 524 and the FTP signal circuit 307. When the low beam headlamps are ON, and the turn signal switch is placed in either the high beam position or FTP position, ground is applied to the BCM through the high

beam/FTP signal circuit. The BCM responds to the high beam request by sending a serial data message to the K219 Lighting Control Module. The Lighting Control Module responds by applying pulse width modulated (PWM) voltage to both headlamp high beam control circuits, illuminating the high beam headlamps. The status of the high beam lamps is shown by a blue indicator located on the instrument cluster. When high beams are commanded on, the indicator will be illuminated continuously. If the driver turns the high beams off, the indicator will also turn off.

Animation Lighting

Animation lighting illuminates in the front lamps of the vehicle anytime the vehicle is unlocked during dark ambient light conditions. Animation lighting is commanded on with a pulse width modulated (PWM) signal voltage from the K219 Lighting Control Module through signal circuit 2024. The front lamps have a separate B+ supply voltage used for controlling the animation lighting feature.

Automatic Lamp Control

The K9 Body Control Module (BCM) monitors three signal circuits from the S78 Turn Signal Switch. When the turn signal switch is in the AUTO position, the three signal circuits are unaffected (open) and the BCM relies on the B10D Sun Load and Ambient Light and Security Indicator Sensor input to determine if headlamps are required or if daytime running lamps will be activated based on outside lighting conditions. During automatic lamp control, the headlamps will be off during daylight conditions but will turn on when the ambient light sensor detects low outside light level. The ambient light sensor is a light sensitive transistor that varies the voltage signal to the K9 Body Control Module (BCM). The BCM provides a 5 volt reference signal circuit 278 and a low reference circuit 407 to the ambient light sensor. During low light conditions the BCM will request the low beam headlamps ON by sending a serial data message to the K219 Lighting Control Module. The Lighting Control Module responds by applying pulse width modulated (PWM) voltage to both headlamp low beam control circuits, illuminating the LED low beam headlamps.

Automatic Headlamp Leveling

The automatic headlamp leveling system consist of the following components:

- K9 Body Control Module
- E13LA Front Headlamp - Left
- E13RA Front Headlamp - Right
- K218 Front Suspension Leveling/Lifting Hydraulic Power Pack Module
- B11LF Front Suspension 4 Corner Leveling System Position Sensor - Left
- B11RF Front Suspension 4 Corner Leveling System Position Sensor - Right

The front suspension position sensors provide the K218 Front Suspension Leveling/Lifting Hydraulic Power Pack Module with suspension position information. The front suspension sensors are connected to the front suspension control arms. As the vehicle travels, the suspension compresses and rebounds moving the front suspension sensors. This causes the signal output of the sensor to change. The Front Suspension Leveling/Lifting Hydraulic Power Pack Module sends this information through serial data to the K9 Body Control Module (BCM). The BCM responds by sending this information through serial data on LIN BUS 13 on circuit 2859 to each headlamp assembly. The headlamp assemblies respond by adjusting the headlamp low/high beams to the appropriate position to compensate for the suspension position of the vehicle.

Daytime Running Lamps

The daytime running lamps (DRL) will illuminate continuously when the following conditions are met:

- Ignition on, engine running
- The turn signal switch is in the AUTO position
- Ambient light conditions are daytime intensity

The B10D Sun Load and Ambient Light and Security Indicator Sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The K9 Body Control Module (BCM) provides a 5 volt reference signal and a low reference ground to the ambient light sensor. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lamps (DRL) or automatic lamp control when the headlamp switch is in the AUTO position. In bright daylight conditions the BCM will send a serial data message to the K219 Lighting Control Module to command the DRLs ON, the Lighting Control Module responds by applying pulse width modulated (PWM) voltage to both DRL control circuits, illuminating the DRLs at a high intensity. During low light conditions the Lighting Control Module will command the low beam headlamps and park lamps ON which will illuminate the daytime running lamps at a low intensity as part of the park lamps illumination.

Flash to Pass

When the S78 Turn Signal Switch is momentarily placed in the flash to pass position, ground is applied to the turn signal switch. The turn signal switch applies ground to the K9 Body Control Module (BCM) through the flash to pass switch signal circuit 307. The BCM responds to the flash to pass request by sending a serial data message to the K219 Lighting Control Module. The Lighting Control Module responds by applying pulse width modulated (PWM) voltage to both headlamp high beam control circuits, illuminating the high beam headlamps. This causes the high beam headlamps to illuminate at full brightness until the turn signal switch is returned to the at rest position.

Hazard Lamps

The hazard flashers may be activated in any power mode. The S26 Hazard Switch signal circuit 111 is momentarily grounded when the hazard switch is pressed. The K9 Body Control Module (BCM) responds to the hazard switch signal input by sending a serial data message to the K219 Lighting Control Module. The Lighting Control Module responds by supplying battery voltage to all turn signal lamps in an ON and OFF duty cycle. When the hazard switch is activated, the BCM also sends a serial data message to the instrument cluster requesting both turn signal indicators to be cycled ON and OFF.

The S36 Dimmer Switch is used to increase and decrease the brightness of the interior backlighting components. When the instrument panel dimmer switch is placed in the desired brightness position, the K9 Body Control Module (BCM) receives the signal from the instrument panel dimmer switch. The BCM interprets the signal and applies pulse width modulated (PWM) voltage to the backlight dimming circuits, illuminating the hazard warning switch backlighting to the requested level of brightness.

Park, Tail, and License Lamps

When the S78 Turn Signal Switch is placed in the HEAD or PARK position, ground is applied to the park lamp switch ON signal circuit 13 to the K9 Body Control Module (BCM). The BCM responds to the park lamp switch signal input by sending a serial data message to the K219 Lighting Control Module. The Lighting Control Module responds by applying battery voltage to the park lamps, tail lamps, and license lamps control circuits illuminating the park, tail, and license lamps.

Stop Lamps

The B22 Brake Pedal Position Sensor is used to sense the action of the driver application of the brake pedal. The brake pedal position sensor provides an analog voltage signal that will increase as the brake pedal is applied. The K9 Body Control Module (BCM) provides the brake pedal position sensor with low reference, signal, and 5 volt reference circuits. When the variable signal reaches a voltage threshold indicating the brakes have been applied, the BCM will respond by sending a serial data message to the K219 Lighting Control Module requesting the stop lamps to be turned ON. The Lighting Control Module responds by applying battery voltage to the left and right stop lamp control circuits as well as the center high mounted stop lamp control circuit illuminating the left and right stop lamps and the center high mounted stop lamp. If serial data communication is lost between the BCM and the Lighting Control Module, the Lighting Control Module will receive a serial data message from the Electronic Brake Control Module indicating that the brakes have been applied. If serial data communication is lost between all three modules, the Lighting Control Module still receives a hard wired voltage signal from the BCM to signal the brake lamps ON.

Turn Signal Lamps

Turn Signals

The K9 Body Control Module (BCM) provides the S78 Turn Signal Switch with a left turn signal switch signal circuit 2915 and a right turn signal switch signal circuit 2619. Ground is applied at all times to the turn signal switch. The turn signal lamps may only be activated with the ignition switch in the ON or START positions. When the turn signal switch is placed in either the turn right or turn left position, ground is applied to the BCM through either the right turn or left turn signal switch signal circuit. The BCM responds to the turn signal switch input by sending a serial data message to the K219 Lighting Control Module. The Lighting Control Module responds by applying a pulsating voltage to the turn signal lamps through their respective control circuits. When a turn signal request is received by the BCM, a serial data message is also sent to the instrument cluster requesting the respective turn signal indicator be pulsed ON and OFF.

Turn Signal Animation

The rear turn signals have an animation feature that will illuminate one LED at a time within the tail lamp assembly from the inner portion of the assembly to the outer portion until all four LEDs are illuminated and repeat. If an animation circuit has a fault, normal turn signal operation will operate through the stop lamp control circuits as a normal on/off duty cycle.

Turn Signal Outage Detection

Vehicles with LED turn signals require additional turn signal outage detection circuits that provide turn signal feedback to the K219 Lighting Control Module. The Lighting Control Module uses the feedback information to send a serial data message to the instrument cluster to alert the driver anytime a turn signal fault is detected. If a fault is detected on a turn signal circuit or a turn signal feedback circuit, the turn signals will flash in a rapid manner to alert the driver of the fault.

Backup Lamps

With the engine running and the transmission in the reverse position, the transmission control module (TCM) sends a serial data message to the

multiple control modules. The message indicates that the gear selector is in the reverse position. The K9 Body Control Module (BCM) responds to the reverse position message by sending a serial data message to the K219 Lighting Control Module to request the backup lamps on. The Lighting Control Module responds by applying battery voltage to the backup lamps control circuit illuminating the backup lamps. The applied voltage is also sent to the A11 Radio and A10 Inside Rearview Mirror for rearview camera purposes. Once the driver moves the gear selector out of the reverse position, a serial data message is sent by the TCM that the transmission is no longer in the reverse position. The BCM responds to the reverse position message by sending a serial data message to the Lighting Control Module to request the backup lamps off. The Lighting Control Module responds by removing battery voltage from the backup lamp circuits. The engine must be running for the backup lamps to operate.

Rear Fog Lamps (T79/T40)

The S78 Turn Signal Switch is used to control the fog lights when equipped (T79/T40). When the fog light button is pressed, the momentary contact signal circuit 187 becomes grounded and voltage from the BCM will decrease accordingly. The BCM interprets the signal and responds by sending a serial data message to the K219 Lighting Control Module. The lighting control module responds by applying pulse width modulated (PWM) voltage to circuit 122 illuminating the rear fog lights.

Battery Run Down Protection/Inadvertent Power

To provide battery run down protection, the exterior lamps will be deactivated automatically under certain conditions. The K9 Body Control Module (BCM) monitors the state of the S78 Turn Signal Switch. If the turn signal switch is in the park or headlamp position when the ignition switch is ON and then the ignition switch is placed in the OFF position, the BCM initiates a 10 minutes timer. At the end of the 10 minutes, the BCM will send a serial data message to the K219 Lighting Control Module to deactivate the exterior lamps to prevent total battery discharge. This feature will be cancelled if any power mode other than OFF becomes active.

The BCM will disable battery run down protection if any of the following conditions exist:

- The park or headlamp switch is placed in the ON to OFF position, and back to the ON position during battery run down protection.
- The BCM determined that the park or headlamp switch was not active when the ignition was turned OFF.