

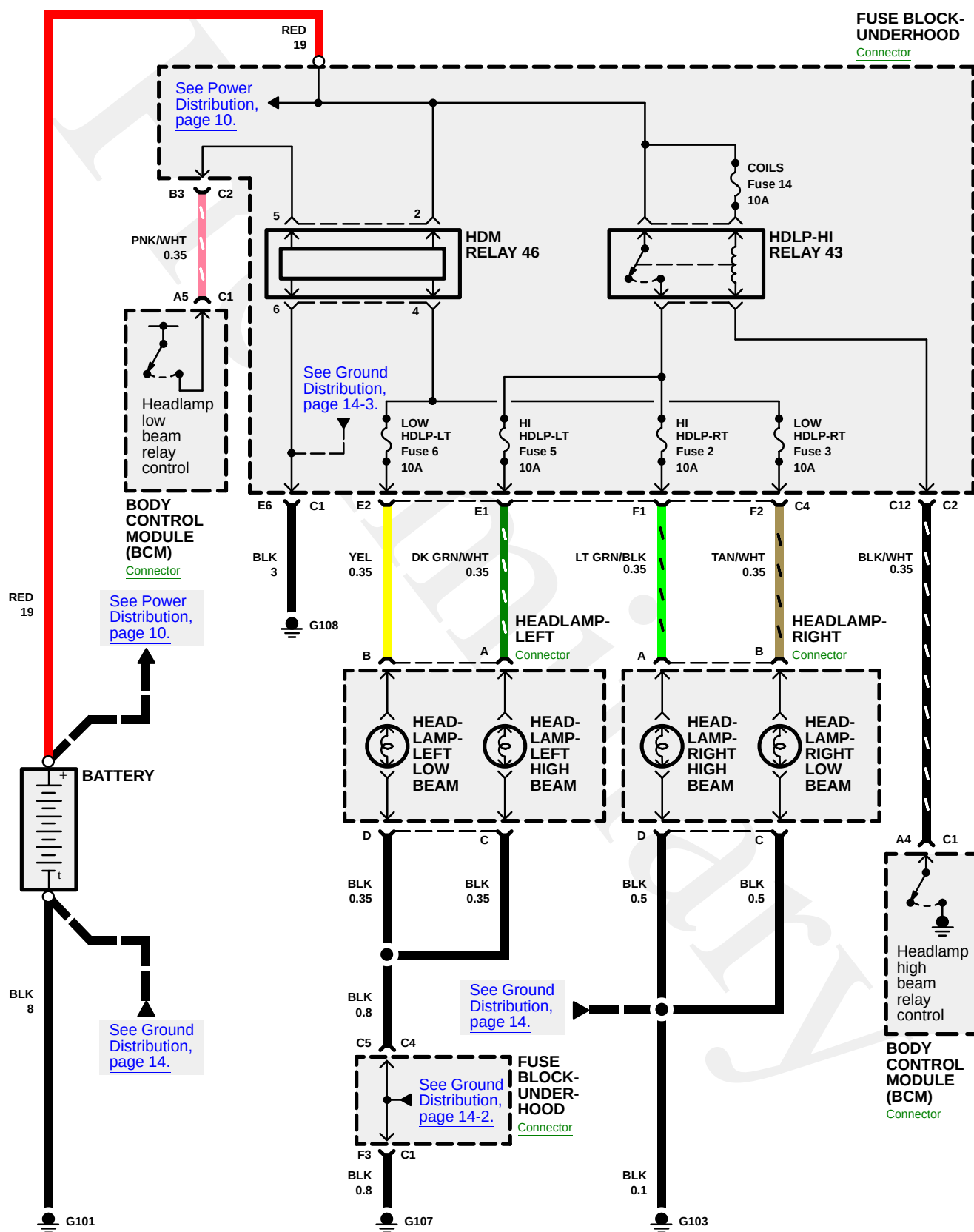
HEADLIGHTS AND FOG LIGHTS

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- Ambient Light Sensor
- Ambient Light/Sunload Sensor Assembly
- Body Control Module (BCM)
- Fog Lamp-LF
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- Headlamp Switch
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- SP201
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HEADLIGHTS AND FOG LIGHTS

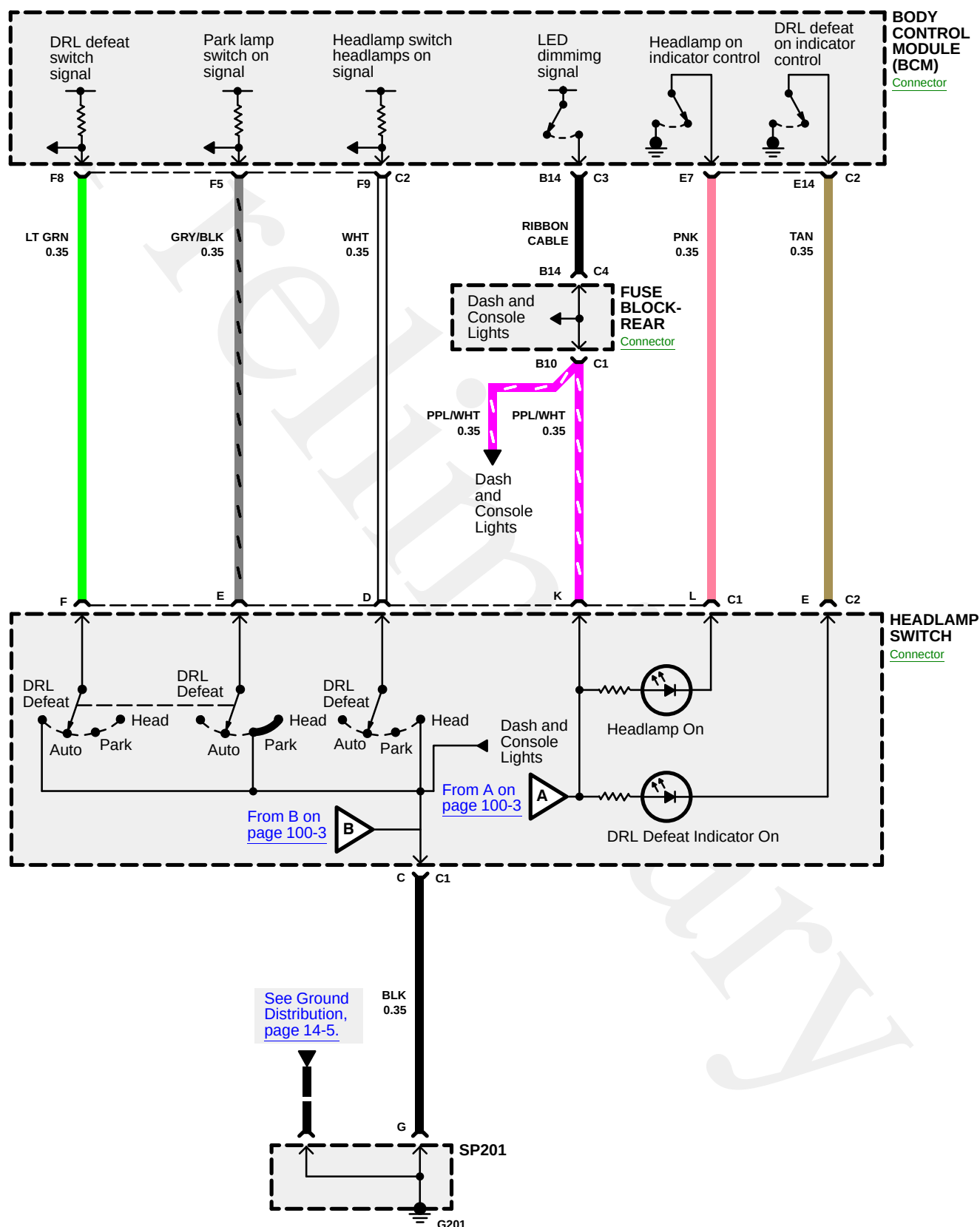
Circuit Schematic



100-0

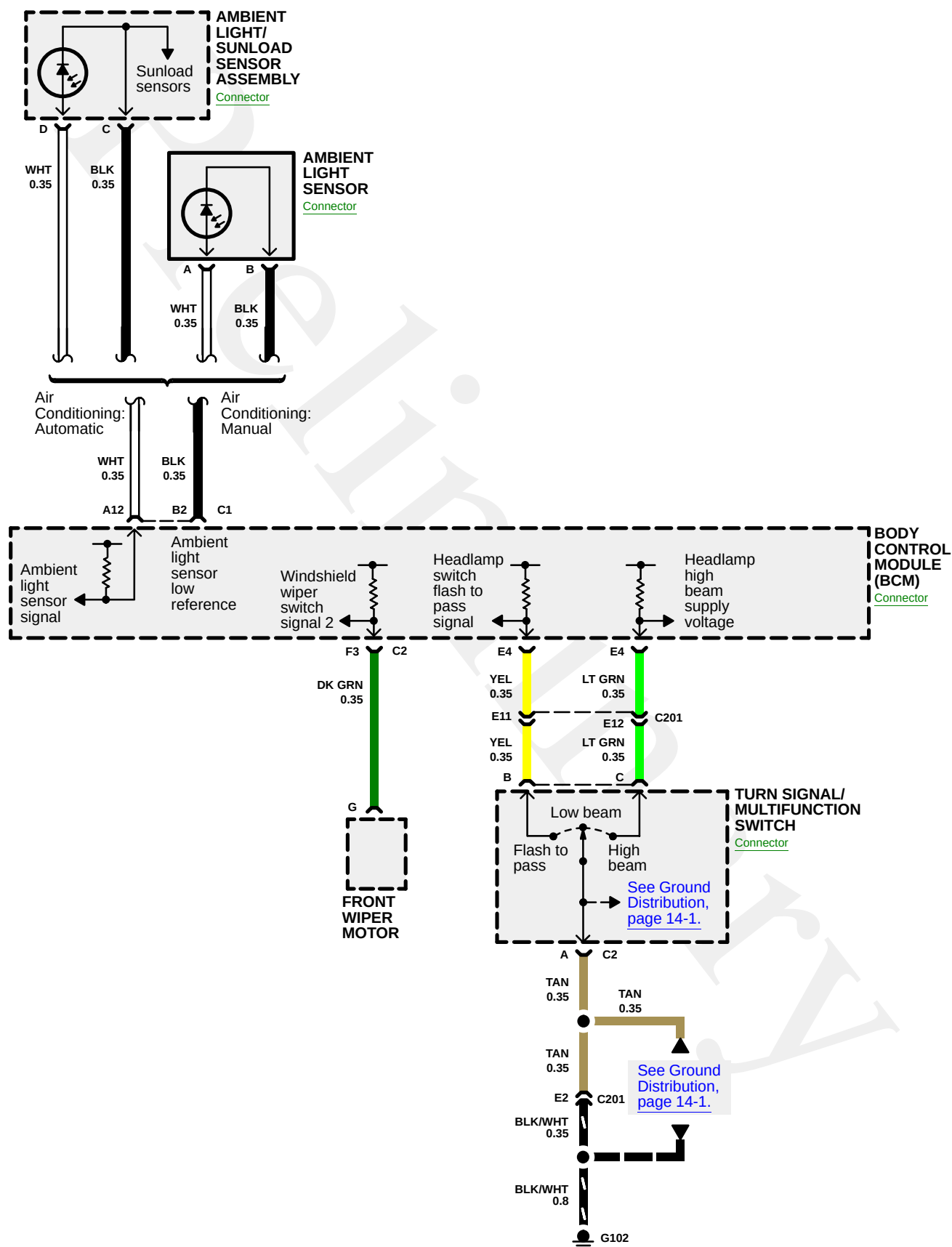
HEADLIGHTS AND FOG LIGHTS

Circuit Schematic



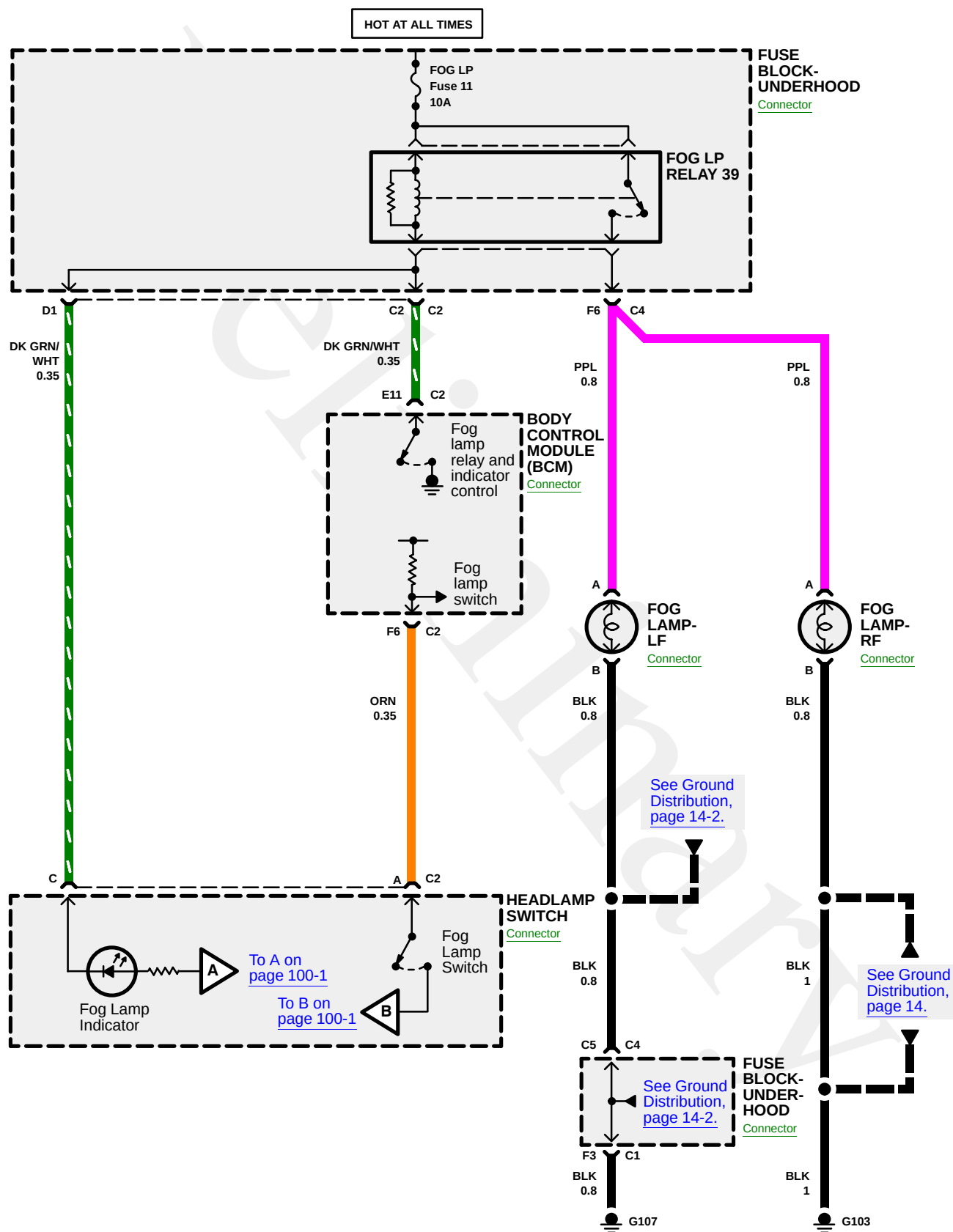
HEADLIGHTS AND FOG LIGHTS

Circuit Schematic



HEADLIGHTS AND FOG LIGHTS

Circuit Schematic



HEADLIGHTS AND FOG LIGHTS

Circuit Operation

Headlamps

The headlamp driver module (HDM) is an electronic module that provides electrical power to the vehicle low beam headlamps. The HDM is controlled by a pulse width modulated (PWM) ground signal from the body control module (BCM). The BCM determines the desired lamp intensity using the ambient light sensor, multifunction switch and the park brake switch as inputs. In general, the HDM will operate in 1 of 3 modes:

- **Reduced Intensity Mode:** This mode is used by features that do not require or allow maximum low beam headlamp intensity such as daytime running lights (DRL) (nominal: 85% duty cycle).
- **Full Intensity Mode:** This mode is used by features that require full low beam headlamp intensity such as low beam headlamp operation in manual or auto modes (nominal: 100% duty cycle).
- **Off Mode:** This is the default mode of the system that will occur when none of the features described above are active. The BCM will deactivate its PWM output (0% duty cycle) during this mode.

The normal battery voltage input to the HDM must be between 6 and 16 volts DC to operate. Any deviation to these values could cause improper operation.

Major components of this system are the BCM, HDM, ambient light sensor, multifunction switch, park brake switch and low beam headlamps.

The headlamps may be turned on in 3 different ways. First, when the driver places the headlamp switch in the HEADLAMP position, normal operation occurs. Second, with the headlamp switch is placed in the AUTO position, automatic lamp control (ALC) occurs. During ALC control, the headlamps will be in daytime running lamp (DRL) operation in daylight conditions, or low beam operation in low light conditions. Third, in wiper activated headlamp (WAH) mode. Only when the wiper system is activated while the vehicle is in gear, the wiper blades have completed at least 3 cycles, and then a 35 second time period expires, will the BCM switch from DRL mode to headlamp mode during daylight conditions. When the gearshift lever is placed in the PARK or NEUTRAL position or if the wipers are turned off, normal manual or ALC operation will resume after approximately 60 seconds.

The HDM and high beam relay receive battery positive voltage directly from the battery. The BCM supplies a 100% duty cycle PWM ground signal to the HDM for automatic headlight control and normal headlight operation. The BCM also supplies ground to the high beam relay coil for high beam headlight operation. When the driver places the headlamp switch in the HEADLAMP position and the dimmer switch is in the low beam position, the HDM switches to full output sending current flow through the left and right low beam headlamp fuses to both low beam headlamps. The dimmer switch sends a ground signal to the BCM in the high beam position and a momentary ground signal in the flash-to-Pass (FTP) position from G102 to deactivate the low beam headlights and activate the high beam headlights. With the headlights in the low beam position, the high beams may be momentarily turned on or flashed by activating the FTP portion of the switch.

The instrument panel cluster (IPC) illuminates the high beam indicator when the body control module (BCM) detects that the high beams are requested. The IPC receives a class 2 message from the BCM requesting illumination.

The Headlamps On at Exit and Perimeter Lighting modes can be adjusted using the steering wheel controls to select the desired fuction as displayed in the driver information center. The Headlamps On at Exit selection will allow the driver to customize the period of time that the headlamps remain illuminated upon exiting the vehicle. This period can be adjusted from 0 seconds to 180 seconds. The Perimeter Lighting feature allows the driver to select if they desire the headlamps and backup lamps to illuminate when the door UNLOCK button on the key fob is activated. This feature can be turned ON or OFF by using the driver information center steering wheel control buttons.

HEADLIGHTS AND FOG LIGHTS

Circuit Operation

Daytime Running Lamps (DRL)

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. When the BCM receives this signal it will either turn on the daytime running lamps (DRL) through the HDM using the reduced output or the headlamps at full intensity for auto headlamp operation. Any function or condition that turns on the headlights will cancel the daytime running lamps operation. The daytime running lamps (DRL) are the low beam headlights at a reduced intensity. With the headlight switch in the OFF position, the headlights will either be turned ON or OFF, after an approximate 8 second delay depending on whether daylight or low light conditions are sensed. When the BCM signals the HDM for DRL operation in daylight conditions, the HDM illuminates the low beam headlights at a reduced intensity. The DRL will operate when the ignition switch is in the RUN position, the gear selector is not in the PARK position and the parking brake is released. When these conditions have been met and the ambient light sensor indicates daytime conditions, the DRL will illuminate.

On vehicles equipped with the 4-position headlamp switch, the DRL feature can be temporarily disabled by momentarily placing the headlamp switch in the DRL defeat position. This will signal the BCM to disable the DRL function until the headlamp switch is momentarily placed in the DRL defeat position again or until the next ignition key cycle.

DRL operation in Manual Transmission equipped vehicles will occur when the ignition switch is in the RUN position, and the parking brake is released.

Fog Lamps

With both the ignition switch in the RUN position and the park lamps or low beam head lamps on, the fog lights will illuminate when the driver presses the fog lamp switch. The FOG LAMP fuse in the engine wiring harness junction block supplies battery positive voltage to the fog lamp relay. With the headlamp switch in either the park or headlamp position and the fog lamp switch is pressed, the body control module (BCM) will energize the fog lamp relay control circuit. The current flow is from the fog lamp relay to both front fog lamps and to ground G107 and G103. The state of the fog lamps either ON or OFF will remain the same until the fog lamp switch is pressed again, or the ignition switch is cycled OFF and ON. Fog lamp operation will be cancelled whenever the park lamps are turned OFF or the high beam headlights have been selected.

HEADLIGHTS AND FOG LIGHTS

Component Location Index

(Refer to Section 201 for photographs.)

Component	Photo No.
Ambient Light Sensor	In the center of the upper IP trim panel 89
Ambient Light/Sunload Sensor Assembly	In the center of the I/P upper trim panel 89
Body Control Module (BCM)	On Rear Fuse Block, under left rear seat 53
Fog Lamp-LF	Behind left front bumper 28
Fog Lamp-RF	Behind right front bumper 28
Front Wiper Motor	Under cowl cover (cover removed) 17
Fuse Block-Rear	Under the left rear seat 52
Fuse Block-Underhood	Left side of engine compartment 3
HDLP-HI Relay 43	In the Underhood Fuse Block 50
HDM Relay 46	In the Underhood Fuse Block 50
Headlamp Switch	On the left side of the IP 61
Headlamp-Left	Left Front Engine Compartment 2
Headlamp-Right	Right Front Engine Compartment 2
SP201	Near right front of lower console 80
Turn Signal/Multifunction Switch	On the stalk, on the left side of the steering column 71
Connector	
C201 (17-BLK), (18-BLK), and (13-GRY)	At base of steering column 120
Ground	
G101	Left side of engine compartment 4
G102	Left side of engine compartment 4
G103	Right rear of engine compartment 15
G107 (4.2L)	Lower left side of engine 37
G107 (5.3L)	Lower left side of engine 38
G108 (4.2L)	Lower left side of engine 37
G108 (5.3L)	Lower left side of engine 38
G201	Near right front of lower console 80