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## ParkSmart™ System Operation

One of the sleeper climate control options in newer model Freightliner vehicles is the ParkSmart system. This system is designed to allow the driver to maintain the temperature of the truck's sleeper compartment for a few hours without idling the engine. This article will discuss the operation and component locations for the ParkSmart system in Cascadia vehicles. Next month's article will provide troubleshooting tips for the system.



### ■ ParkSmart System Function

The Cascadia auxiliary HVAC ParkSmart climate control unit is mounted in place of the standard auxiliary Cascadia HVAC unit. It is located inside the bottom cabinet that is directly behind the driver's seat. Figure 1 illustrates the location of the ParkSmart unit with the cabinet removed. This system operates in two modes. When the engine is running and the truck is driven down the road, the ParkSmart unit works with the front HVAC unit to heat and cool the sleeper compartment. When the vehicle is parked and the engine is not running, the ParkSmart unit may be used to maintain the temperature inside the sleeper compartment using electrical power from a set of auxiliary batteries typically located in a battery box behind the cab and between the frame rails. There are two very important things to remember about the ParkSmart system.



Figure 1 – ParkSmart Unit (shown with cabinet removed)

1. When operating in parked mode, the ParkSmart HVAC unit does not have enough heating or cooling capacity to heat up a cold cab or cool down a hot cab. It is designed just to maintain the temperature inside the sleeper compartment when the truck is parked and shutdown. The sleeper curtains should always be closed when operating the ParkSmart unit in parked mode.

2. The ParkSmart unit contains a standalone refrigerant loop system that operates independently of the truck's HVAC system. The unit has its own compressor, condenser, evaporator, and so forth. The refrigerant loop components are not serviceable. If there is a failure of the refrigerant loop components or it loses its refrigerant charge, the unit must be replaced as an assembly.

When the vehicle is parked and heat is needed to maintain sleeper compartment temperature, a diesel-fired Espar coolant heater is used to heat and circulate hot engine coolant through the heater core inside the ParkSmart unit. An electrically driven water pump located inside the Espar unit circulates coolant when the engine is not running. When the engine is running the engine's water pump circulates engine coolant through the heater core. The Espar diesel-fired coolant heater is mounted under the floor of the sleeper compartment and is plumbed into the heater loop coming from the engine (see Figure 2). It draws diesel fuel from one of the vehicle's fuel tanks through a standpipe installed in the top of the tank.

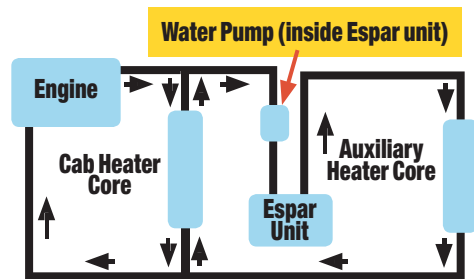


Figure 2 – Coolant Flow

When the truck is parked and the engine is off the ParkSmart system may be started by pressing the "Park" button located in the center of the temperature control knob on the Auxiliary Control Unit mounted on the sleeper control panel (see Figure 3). An LED in the PARK button illuminates for 8 seconds when the button is pressed and will stay illuminated if the parked HVAC unit responds to the "wake-up" request.

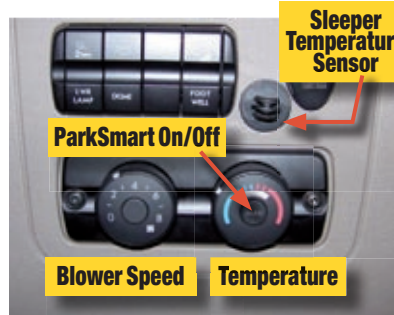


Figure 3 – Sleeper Control Panel

When the key is off and the blower speed switch is in any position other than 0, pressing the "PARK" button puts the ParkSmart system in the parked mode. The unit will draw current from all eight batteries on the truck until the voltage of the main batteries reaches 12.5V. When this occurs the power supply from the main batteries will be shutoff by the Battery Separator to maintain electrical power for cranking the engine. The battery separator consists of a 300 amp bi-stable relay and an integrated control module (see Figure 4). It is typically mounted inside the left-hand frame rail even with the rear of the cab. A bi-stable relay requires current to switch it from open to closed, but requires no current to hold it closed or open. The ParkSmart system will continue to operate using power from only the four auxiliary batteries until their voltage drops to 11.3V for 10

seconds. When that happens the ParkSmart system will go into its own low voltage disconnect mode and shut down. When the engine is running and the alternator is charging, as soon as the charging voltage reaches 13.5V the battery separator will close and connect both sets of batteries to the charging system. Trucks that are equipped with the ParkSmart system will also be equipped with a 270 Amp remote sensed alternator to insure that there is enough charging amperage to operate the truck accessories and keep both sets of batteries charged.



Figure 4 – Battery Separator

Control of the refrigeration compressor, condenser fan motor, and evaporator blower motor (all located inside the ParkSmart unit) and the Espar diesel-fired coolant heater (located under the sleeper floor) is provided by the Control PCB Assembly. It is located inside the ParkSmart unit and under the Fuse and Relay Control Center and Evaporator Blower.

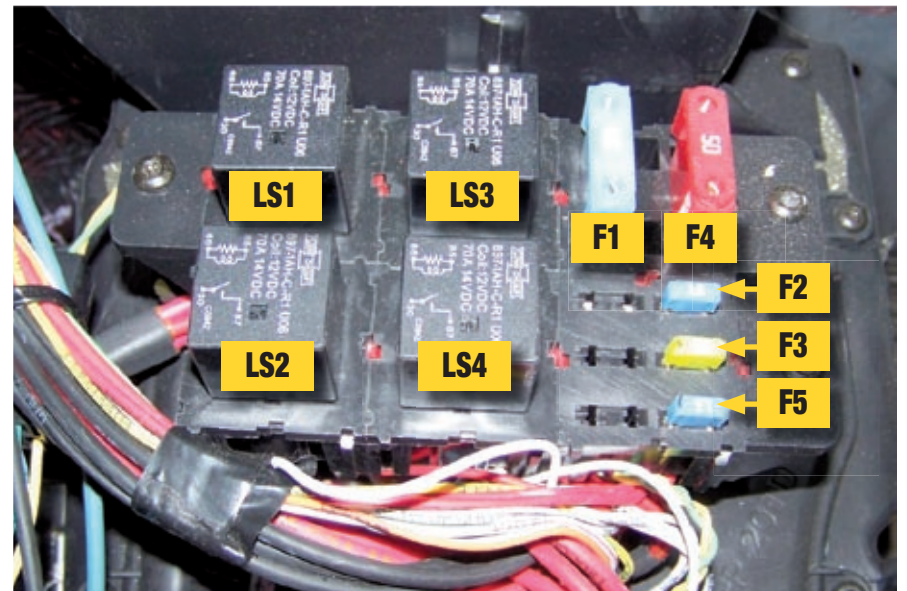


Figure 5 – Fuse and Relay Control Center

Circuit protection for the components in the ParkSmart unit is provided by five fuses located in the Fuse and Relay control Center located on top of the ParkSmart unit (see Figure 5). Fuse functions are:

- F1 (60A Maxi-Fuse) provides power for the variable speed refrigeration compressor located inside the ParkSmart unit.
- F2 (15A Mini-Fuse) provides power for the unit controls.
- F3 (20A Mini-Fuse) provides power for the diesel-fired Espar coolant heater.
- F4 (50A Maxi-Fuse) provides power for the blower motor.
- F5 (15A Mini-Fuse) provides power for the condenser fan motor located inside the ParkSmart unit.

There are also four relays located in the control center.

The functions of these relays are:

- LS1 – controls the voltage to the controlling section of the Control PCB Assembly when in the Engine On mode.
- LS2 – controls the voltage to the condenser fan motor and the evaporator blower motor when in the Engine On mode.
- LS3 – controls the voltage to the compressor controlling section of the Control PCB assembly when in the Parked mode or Engine Off-Key On mode.
- LS4 – controls the voltage to the condenser fan motor and evaporator blower motor when in the Parked Mode or Engine Off-Key On mode.

### ■ Conclusion

Next month's article will provide more detail about troubleshooting complaints with the ParkSmart system. One important thing to remember though is that driver complaints with this system may come from expectations that are unrealistic or from operating the system incorrectly. Selecting high blower speeds and cold temperature set points in extremely hot weather will use more power from the auxiliary battery set and cause the system to shut down early. The Cascadia Driver's manual provides guidelines for how long the unit will operate in various conditions. Weak batteries will also cause the system to shut down prematurely. These batteries are Absorbed Glass Mat (AGM) batteries. Refer to Freightliner Service Bulletin 54-250 before testing these AGM batteries. This bulletin provides new testing procedures for AGM batteries using both the Midtronics tester and a carbon pile load tester. It also provides definite load amperages for both models of AGM batteries used in these vehicles. Troubleshooting information for the ParkSmart system in Cascadia vehicles may be found in the Cascadia Troubleshooting Manual section C02.03. There is also information available at [www.nitesystem.com](http://www.nitesystem.com). Click on Support, then NITE Manuals, then click on the ParkSmart Technical Information and Diagnostics Guide.

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Monte Merritt of Fort Worth Freightliner • Western Star received the First Place Award in the Technician Competition at the Texas Truck Driving/Technician Championships held June 18-19, 2010 in College Station and Bryan, Texas. Monte will represent Texas technicians on October 20-23 at the National Technicians' Skills Competition (TMCSuperTech2010) in Raleigh, NC. Congratulations Monte!