

Freightliner Cascadia PACMod 3.0 System

Automated research development vehicle

Overview

The AutonomouStuff PACMod 3.0 System delivers comprehensive drive-by-wire control for the Freightliner Cascadia automated research development vehicle. PACMod stands for Platform Actuation and Control Module, which is the proprietary system designed and built by ASTuff engineers. It provides precise by-wire control of core driving functions and ancillary components with intuitive safety features, such as immediate return to full manual control in urgent situations. Audible and visual signals from the PACMod 3.0 alert occupants to the vehicle's operational mode, as well as any faults in the



by-wire platform and some stock vehicle components. The platform can be fully customized to accommodate a wide range of applications, while also harnessing vehicle feedback for analysis. The range of available feedback expands with firmware updates, enhancing research potential.

Control and feedback

In the ASTuff Freightliner Cascadia, the PACMod 3.0 System allows by-wire control of driving and other functions, while generating vehicle feedback data.

Controlled by-wire:

- Accelerator
- Brake
- Steering
- Shifting
- Horn
- Turn signals
- Hazard lights
- Headlights (off/on & high beam/low beam)
- Wipers
- Front Windshield Sprayer
- Marker Lamp
- Engine Brake
- Cruise Control

Feedback generated:

- Throttle percentage (0% - 100%)
- Steering wheel angle
- Gear (Park, Neutral, Drive and Reverse)
- Turn signal status
- Hazard status (button press only)
- Headlight status
- Vehicle speed
- Individual wheel speeds
- Driver and passenger door status
- Transmission gear (1-10)
- Brake pressure
- Brake on/off

Safety maneuvers

AutonomouStuff prioritizes safety and has designed safeguards for the AStuff Freightliner Cascadia automated platform that are triggered by a driver's natural reactions to hazards, allowing full manual control to be easily regained through some simple, intuitive maneuvers. The system also automatically alerts operators to faults in a variety of stock and aftermarket components.

Operators can immediately regain manual control using the following safety takeovers.

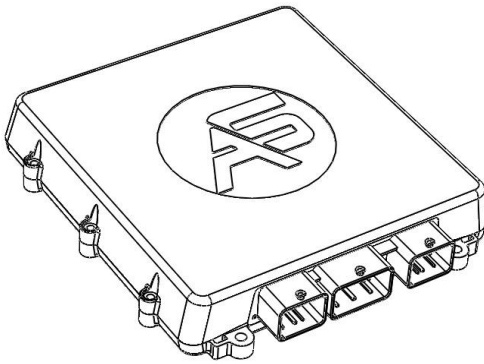
- Press the emergency stop (E-Stop) button.
- Push the brake pedal.
- Push the accelerator pedal.
- Turn the steering wheel.

The PACMod 3.0 System also detects certain faults and instantly communicates them to operators with audible and visual signals. Monitored functions include steering, acceleration, braking and shifting. Others may be monitored, but the system is not designed to be comprehensive.

Key features

The AStuff Freightliner Cascadia and PACMod 3.0 System include the following features and options.

- CAN interface
- Mode status indication
- Visual and audible fault alerts
- Joystick control interface
- Speed and steering controller available
- ROS node available
- DBC file
- Mute for audible alarms



The AStuff PACMod

What is the PACMod 3.0 System?

The AStuff Platform Actuation and Control Module (PACMod) 3.0 System provides drive by-wire control and can be installed into virtually any vehicle. At a minimum, PACMod will provide control of acceleration, braking, steering, shifting and turn signals. It can be customized to fit into any research and development platform.

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