

Intelligent Braking Control System



Version 1.0



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What is it?

The **Intelligent Braking Control System (IBCS)**, standard on the Fifth Generation Cascadia, is the next evolution of braking technology. This advanced **Electronic Braking System (EBS)** replaces traditional air-only brakes with electronic brake-by-wire controls—meaning the brake pedal sends an electronic signal instead of relying solely on air pressure. This allows the system to respond instantly and precisely, delivering faster, more consistent stopping power and improved safety.

IBCS constantly monitors driver input and sensor data to apply the appropriate braking force in real time. The system adjusts for factors such as wheel speed, air pressure, vehicle weight, traction, and trailer connection to ensure safe, smooth braking in any situation.

Key components include:

- **Electronic Control Unit (ECU)** for rapid processing and communication.
- **Wheel speed sensors and pressure transducers** for accurate air pressure measurement and control.
- **Corrosion-resistant polymer modulator valves** designed for long-lasting reliability in harsh conditions.
- **Backup pneumatic system** for full braking capability in case of electrical failure.

IBCS introduces **four advanced braking features** designed to improve safety, comfort, and efficiency:

1. **Endurance Braking** - Automatically blends the engine retarder with service brakes when the foot pedal is applied, reducing brake pad wear and improving control on long descents. Drivers may hear the engine brake engage, but at a significantly lower noise level compared to traditional engine retarder use. This feature is enabled by default at engine start and can be turned off using a dash switch.
2. **Comfort Braking** - Delivers a smoother braking experience by evenly distributing brake pressure based on weight and load. This reduces uneven brake wear and eliminates the “lurching” feel in stop-and-go traffic, docking, or during low-speed maneuvers.
3. **Brake Assist** - Extra stopping power when you need it most. When the brake pedal is pressed harder and faster than normal—like in an emergency—IBCS senses this and automatically adds extra braking force beyond what you apply. This helps the truck stop quicker and more safely, giving drivers confidence and control during sudden stops.
4. **Brake Temperature Warning** - Continuously monitors speed, brake duration, load, and force to estimate brake temperature. During long descents, heavy loads, or extended braking, temperatures can rise to dangerous levels. When this happens, the system displays a yellow warning on the dash and automatically disables Adaptive Cruise Control (ACC) to help prevent overheating and maintain safety.



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Why it is important?

The Intelligent Braking Control System doesn't just change how braking works—it enhances the driving experience. By combining advanced electronics with smart control logic, IBCS delivers benefits that matter every day:

1. **Smoother driving experience:** Cruise control slows the truck gradually and predictably, while the brake pedal requires less effort and delivers a consistent response—whether bobtail or fully loaded.
2. **Faster reaction time:** Brake-by-wire technology shortens the time between pedal input and brake application, improving safety in sudden-stop situations.
3. **Lower operating costs:** Balanced brake pad application reduces wear, extending brake life and cutting maintenance downtime.
4. **Improved efficiency:** The system uses less air during hard braking, conserving resources and reducing strain on the air system.

Key Features:

- Closed-loop electronic braking applies precise brake force in real time, improving control and safety.
- ECU and advanced sensors deliver faster processing and accurate pressure control for consistent braking.
- Plastic modulator valves resist corrosion, extending component life in harsh environments.
- Backup pneumatic system ensures full braking capability if electrical power is lost.
- **Endurance Braking** blends engine retarder and service brakes, reducing pad wear and improving control on long downhill grades and heavy-load descents.
- **Comfort Braking** balances brake pressure for smooth stops, reducing lurching during docking, stop-and-go traffic, and ACC-to-zero situations.
- **Brake Assist** adds stopping power when the pedal is pressed hard and fast, helping in sudden traffic stops, hazard avoidance, and bobtail/full-load transitions.
- **Brake Temperature Warning** Estimates brake temperature based on vehicle and braking conditions, alerts drivers via dash pop-up, and disables ACC at critical thresholds to prevent overheating on steep grades and heavy-load braking.

New system combines ECU & modulator valves



Engine Retarder Off Switch



Dash pop-up warning



Affected models: Fifth Generation Cascadia

Resources: Highspot: [Fifth Generation](#) | [Safety - Cascadia Braking Enhancements](#) | [Freightliner](#); [Fifth Generation](#) | [Intelligent Braking Control System Video](#) | [Freightliner](#)

Data Codes:

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| 412-006 | INTELLIGENT BRAKING CONTROL SYSTEM | STANDARD |
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