NAVISTAR®

Generation 4 Body Controller Overview

Study Guide

Course Code: 8812

Contents

Introduction

Welcome to the Navistar® training course: Generation 4 Body Controller Overview. After completing this course, the viewer will be able to:

- Describe the functions of the Generation 4 Body Controller.
- Identify and describe the capabilities of the Generation 4 Body Controller.
- Describe 500k communication baud rate
- Identify components that communicate different baud rates.

If you have questions or concerns regarding the playback of this program, please contact Navistar Service Education by submitting a case file (Dealer Personnel); or by calling 1-800-365-0088.

The information provided within this course is for training purposes only. Always consult the latest service, diagnostic, and tool information, located on Navistar's Service Portal, prior to performing service on engines, vehicles, and equipment.

Course Navigation

Navigation of this course may be performed in several ways. At the bottom of the screen are the "NEXT," "PREVIOUS," and "REPLAY" buttons. Clicking either the "NEXT" or "PREVIOUS" buttons will take you to the next or previously viewed course topic. After all information on a topic has been covered, the arrow on the "NEXT" button will pulse red to indicate you are ready to continue.

Clicking the "REPLAY" button will replay the topic you are currently viewing.

Near the bottom right-hand corner of the screen are the "PAUSE/PLAY" and "NOTES" buttons. Clicking the "PAUSE/PLAY" button allows you to pause the course and resume when you're ready to continue.

Clicking the "NOTES" button will bring up a small window containing the narrated text for the currently viewed topic. Click the "NOTES" button again to hide this window. That's all for course navigation.

Body Control Module Operation

Function Overview

The Body Control Module, or BCM, is a central component of a vehicle's electrical system. The BCM is an electronic computer that provides multiple analog and digital input and output interfaces. These interfaces are used to monitor vehicle sensors and control vehicle functions. Some of the internal devices used to do this are solid state switches, relay driver outputs, and serial data communication buses.

In other words, the BCM receives an electrical signal from a component, then uses programmed logic to identify what the signal means. From there, the BCM determines what action needs to take place based on the signal. For example, if the driver presses the Fog Light Switch on the switch pack, the BCM receives and interprets the digital signal. Based upon its logic, the BCM will power on the Fog Light relay. The BCM processes all inputs and outputs multiple times a second.

Communication

All of the modules on a vehicle are wired together, which form a network. Navistar utilizes a Controller Area Network, or CAN, arrangement of modules. Modules communicate with each other by sending and receiving data through this network wiring

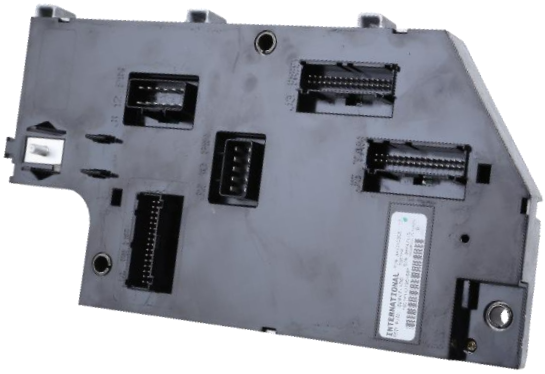
When multiple modules communicate over a pair of wires, it is known as multiplexing. These wires are often twisted together to prevent electromagnetic inference from other components on the vehicle. This twisted pair of wires is known as a data link.

The two wires on the data link are commonly referred to as CAN high (+), and CAN low (-).Data links will be covered in greater detail later on this course.

Evolution

Navistar BCM's have evolved with advances in technology and computer hardware. Each generation Body Controller has unique exterior features.

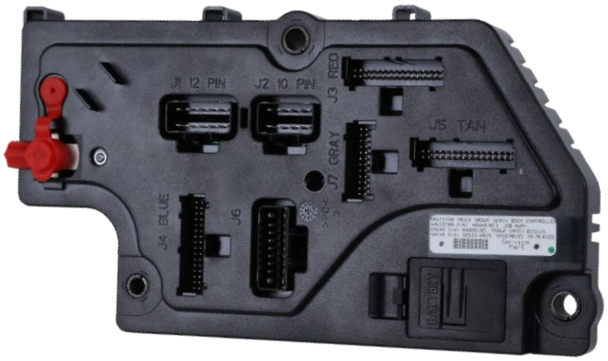
Launched in 2001, the **Electrical System Controller**, or ESC, was the first module used by Navistar to control many of the vehicles electrical functions. ESC's are capable of monitoring various inputs and controlling a number of switch and driver outputs, all wired through the unit's connectors.



In 2007, the BCM, known as the **Generation 2 Body Controller** was introduced. The outputs evolved to keep pace with the advances in vehicle technology and utilizes a 5-connector configuration.

NOTE

Navistar did not release a Generation 3 Body Controller

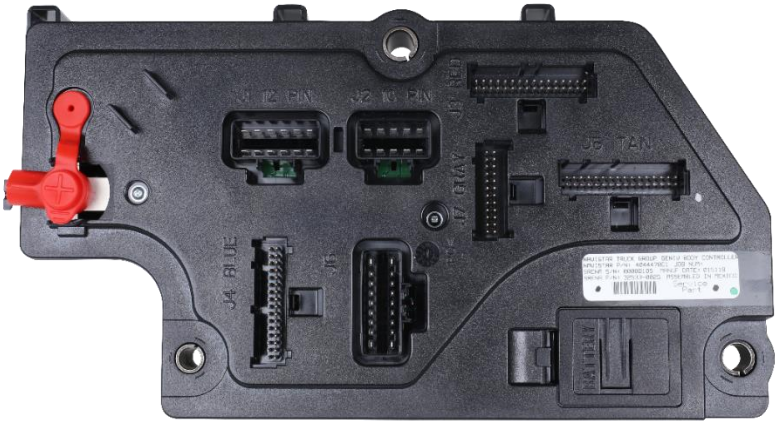


Released in 2015, the **Generation 4 Body Controller** is the latest version of the BCM. It utilizes a 7-connector configuration and features additional input and output capabilities.

Generation 4 Body Controller

Exterior Overview

Now that we know the basic function of a BCM, let's take a look at the Generation 4 Body Controller specifically. The Generation 4 Body Controller's shell is made of polycarbonate.



Seven connectors are located across the top of the module, with molded identification for each. These connectors are identified as: J1 12 Pin; J2 10 Pin; J3 Red; J4 Blue; J5 Tan; J6; and J7 Gray.

A battery stud supplies the Generation 4 Body Controller with voltage. There is also a cap that protects the stud.

Internal Components

In addition to the external changes of the Generation 4 Body Controller, there have been internal upgrades and changes as well.

The **Real Time Clock**, or RTC, has been integrated into the Generation 4 Body Controller and broadcasts the time and date information to modules on the network.

NOTE

The time and date of the RTC can be updated using Diamond Logic Builder.

With the addition of the RTC, vehicles equipped with the Generation 4 Body Controller from the factory do not require a Stand Alone Real Time, or SART, Module.

A replaceable backup battery supplies power to the RTC to maintain the time and date information when battery power is removed.

Cross Functionality

The Generation 4 Body Controller is unique because it has been designed with internal relays which reduce the number of relays, wires, and circuits used on Navistar® vehicles.

> **NOTE**
>
> **Refer to the Service Portal or Diamond Logic Builder (DLB) to view a vehicle's specific feature codes.**

The Generation 4 Body Controller is backwards compatible, meaning it can be installed on a vehicle that was originally equipped with a Generation 2 Body Controller. Backward compatibility is possible in part due to the changes in electrical architecture, or the way the BCM is designed to operate with other modules.

These 5 connectors utilize the same design of the connectors found on the Generation 2 Body Controller.

Programming and Architecture

The kernel is the program that translates the electrical communication signals from various modules into a common signal the BCM can understand. It also allows for backward compatibility. The Generation 4 Body Controller is factory equipped on multiplexed and non-multiplexed Navistar® vehicles.

NOTE

Installing a Generation 4 Body Controller on a non-multiplexed vehicle does not make vehicle multiplexed.

Diagnostics

Diamond Logic® Builder

Vehicle-related issues can be diagnosed by using Diamond Logic Builder (or DLB) software, along with step-based diagnostics. With the reduction of relays and wiring used in the vehicle, along with changes in the Generation 4 Body Controller, the diagnostic procedures have evolved to better suit the technician. Some of these new and unique step-based diagnostic procedures will include connector and harness views. Some will also utilize visual graphics as diagnostic aides.

500k Baud Rate

Data Links

The J1708 data link is commonly used by the switch pack and communicates at 9600 bits per second on the Generation 4 Body Controller. It is known as the 'Switch Data Link'.

The Generation 4 Body Controller utilizes multiple data links that can communicate at 250,000 bits per second and data links that communicate at 500,000 bits per second.

Communication Speeds

Earlier, we discussed how a BCM communicates with other modules, now let's take a closer look at this type of communication. It was mentioned that modules communicate over a data link using electronic 'messages'. Each 'message' that is sent or received is known as a bit.

The speed at which a module is able to receive, process, and send messages is measured in bits per second (bits/s). Another term for this type of communication speed is baud rate.

A module communicating at 500,000 bits per second processes messages twice as fast as a module communicating at 250,000 bits per second. When referring to a module's baud rate, 500,000 bits per second is abbreviated as 500k bits/s, and 250,000 bits per second is abbreviated as 250k bits/s.

A module on a 250k bits per second data link and a module on a 500k bits per second data link are able to communicate with one another because the Generation 4 Body Controller acts as the 'gateway' that connects them.

For example, a **Full Power Brakes Wabco ABS** Module communicating at 500k bits per second uses the body controller to communicate with a Tire Pressure Monitor module communicating at 250k bits per second. Although the modules process information at different speeds on separate data links, the Body Controller allows them to communicate with one another. This multiple communication speed capability is why the Generation 4 Body Controller can be installed on a vehicle originally equipped with a Generation 2 Body Controller.

As Navistar vehicle technology continues to advance, the Generation 4 Body Controller will be capable of communicating with the new, more advanced, system or vehicle modules being used.

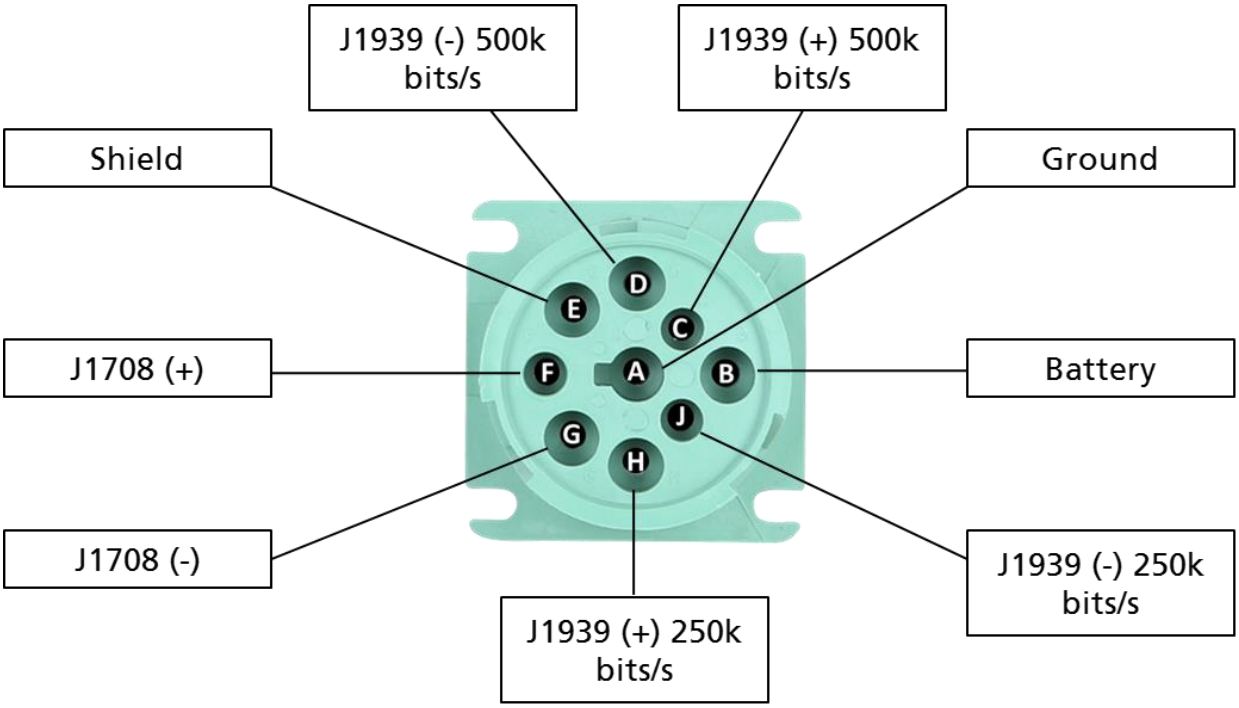
Diagnostic Connector

An Electronic Service Tool (or ESTs) can communicate with the vehicle via the Data Link Connector, or DLC.

The DLC is composed of two parts: the **receptacle and the plug**. The plug is located at the end of the EST interface cable, and plugs into the receptacle.

To assist with diagnostics, various data links are wired into the receptacle. A black receptacle is factory-installed on vehicles that communicate at speeds up to 250k bits per second.

A black 250k bps DLC plug will only connect with a black 250k bps DLC receptacle.



Vehicles that communicate at speeds up to 500k bits per second will have a green receptacle. This receptacle will only accept green 500k bits per second compliant plugs. The green receptacle provides a connection point to the 250k bits per second data link as well as the 500k bits per second powertrain data link. With the addition of this 500k bits per second datalink to the receptacle, the green receptacle now uses all 9 pins.

A green plug will connect with both green and black receptacles. However, a black plug can only connect to a black receptacle.

Conclusion

This concludes the Navistar training course: Generation 4 Body Controller Overview. Thank you for your participation.

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