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Welcome to the Nexteligence Newsletter!

Welcome to the eight edition of the Nexteligence Newsletter. We look forward to continuing to provide the latest news in the Nexteligence training community.

Don't Miss The Bus...CAN Bus That Is!

Basics of CAN Bus Construction

In this edition of the Nexteligence Newsletter, we will look at what is a CAN bus network, the basics of a CAN bus network, and what it takes to construct a CAN network.

What is a CAN bus network?

A Controller Area Network (CAN) is simply described as wires that are

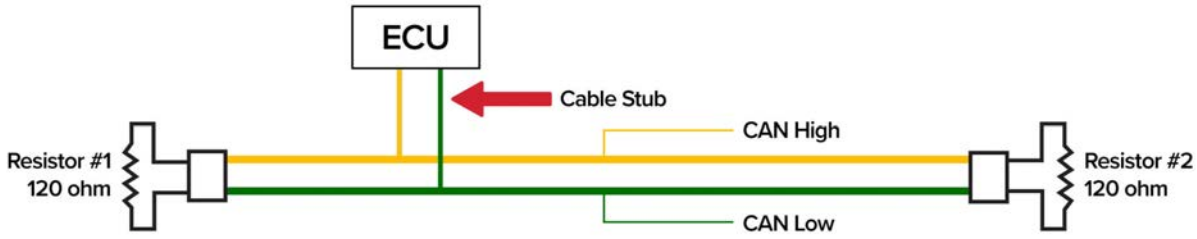
connected to devices that allow those devices to communicate with each other without a complicated series of wires. Two wires make up the CAN communication network, but the network requires a power and ground to be functional. Those four wires that are required for a network to function are power, ground, CAN high (yellow CAN wire), and CAN low (green CAN wire). In this newsletter, we will only show and describe the high and low CAN communication wires (green and yellow).

First, let's look at what we call the backbone.

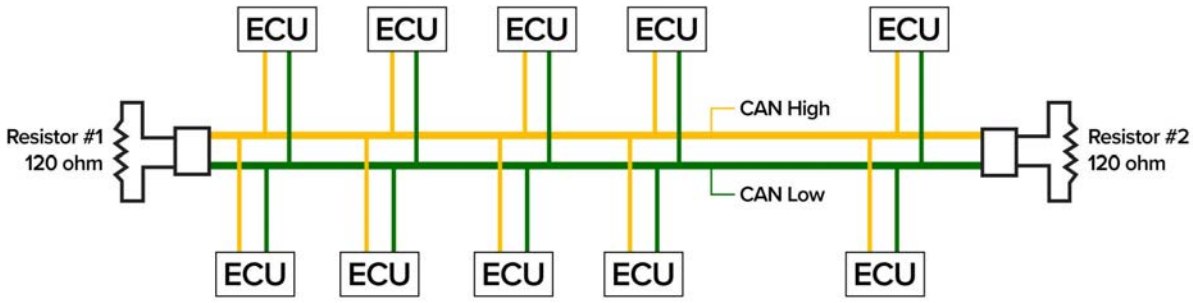
The first part of a physical network is the backbone and there are resistors that terminate each end of the network. Here is an example of the backbone of a single network.

The backbone can only be 40 meters (120ft) long. The wires will be twisted or what is called twisted pair. Each end of each network will have a 120 Ohm (Ω) resistor. The resistors are in the network to eliminate what are called reflections. Reflections are when the signal is sent from a device down the network cable that may have the potential to travel back in the wire. In some instances, the signal could be reflected in the network and sent back to the original device. The terminating resistors eliminate this signal reflection. For example, if I were to push the pump "on" button, the resistors make sure the signal reaches the controller to allow the pump to turn on rather than returning to the button.

We attach devices such as joysticks, pushbuttons, controllers, and cylinder sensors to can bus networks. These connections are made with extensions called cable stubs. Cable stubs can only be 3 meters or 9 feet in length.

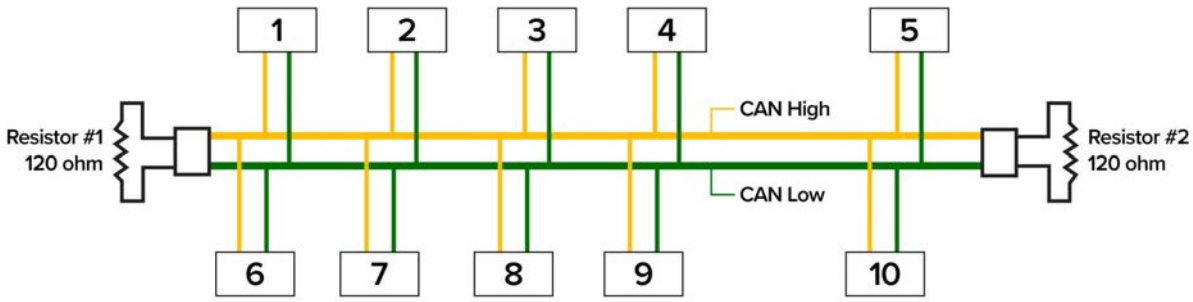


Connected devices are also called ECU's (Electronic Control Units) or nodes. They can also be referred to as the device name joystick, pushbuttons, or cylinder sensor. Another rule of the can bus network is there can only be 10 devices on one network. Only allowing 10 devices on a network can cause other networks to be needed when there are multiple devices needed in the system.



Now that we know how a CAN bus network is constructed, why do we use them and how do they work?

We use CAN bus to eliminate long lengths of wires and multiple wires and for ease of installation and troubleshooting which we will go over in next month's newsletter, but first let's describe how CAN bus works.



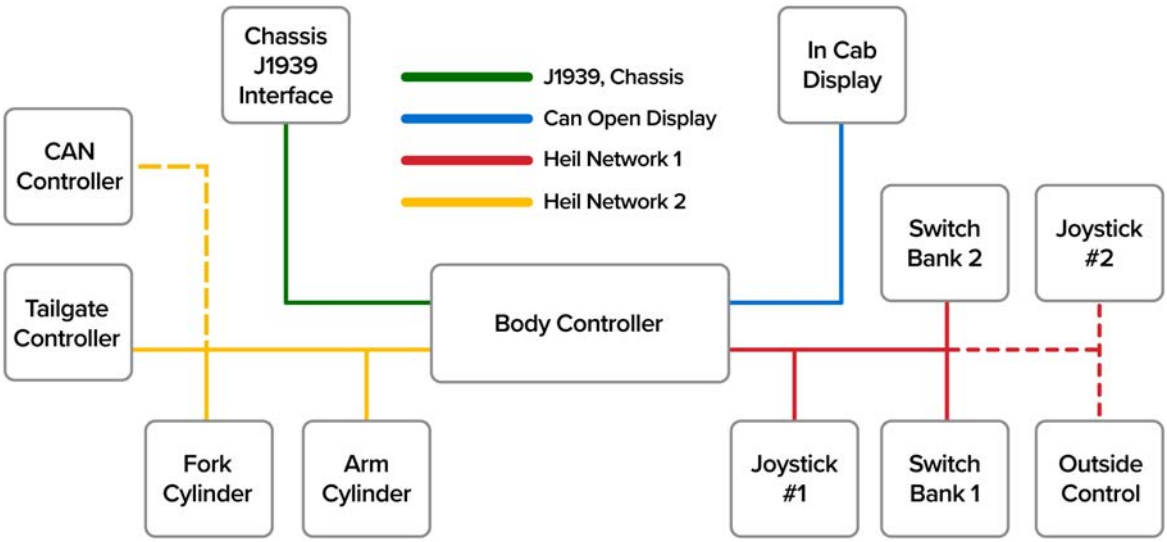
The CAN bus works just like our mail system works today. Each device has an address just like you have a different mailing address than me.

This allows for the mail person to make sure your mail gets to you and my mail gets delivered to me.

For easy reading, we will say that the addresses for each device in the photo are 1-10. Keep in mind a real CAN bus device address will be designated with multiple numbers and symbols to identify the device in the network. The mail person delivers your mail to you and my mail to me because we have different addresses. This is the same way the controller knows who is talking by the device's address.

For example, by pressing the pump button, and then pressing the hopper light button, the controller knows each address assigned to the buttons, joysticks, and sensors, and responds accordingly by turning the pump on/off, the hopper light on/off or by moving the components commanded by the joysticks or other pushbuttons.

In conclusion, below is a basic overview of the 4 independent networks on the Half/Pack with Odyssey controls. You can see how each network is linked with the controllers to communicate with each other and the connected devices.



As previously mentioned, in next month's Nexteligence Newsletter, we will discuss how to troubleshoot and diagnose issues that may arise in the CAN bus network.

Would you like to know more about electrical repairs? Good news! We teach that in our Nexteligence MAT classes. You can get in-depth training by contacting us to register for a Nexteligence MAT class at: Nexteligence@doveresg.com

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