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Welcome to the Nexteligence Newsletter!

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

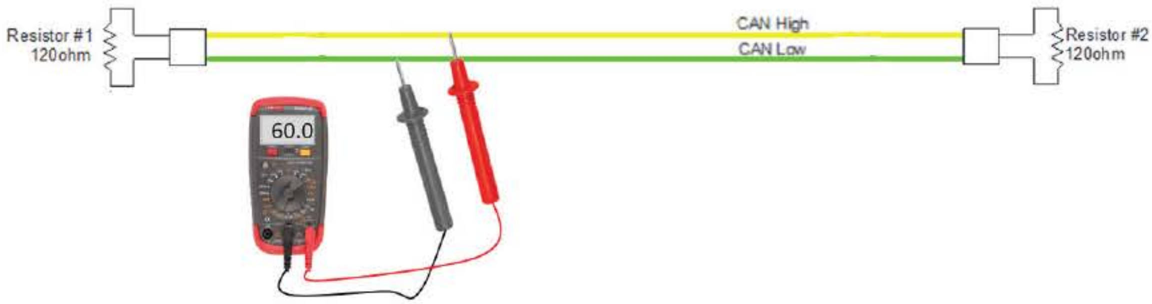
Don't Miss The Bus...CAN Bus That Is!

Troubleshooting the CAN Bus - Part 2

In last month’s edition of the Nexteligence Newsletter, we described what it takes to construct a CAN Bus network. In this edition, we will discuss what it takes to troubleshoot and repair a nonfunctional network.

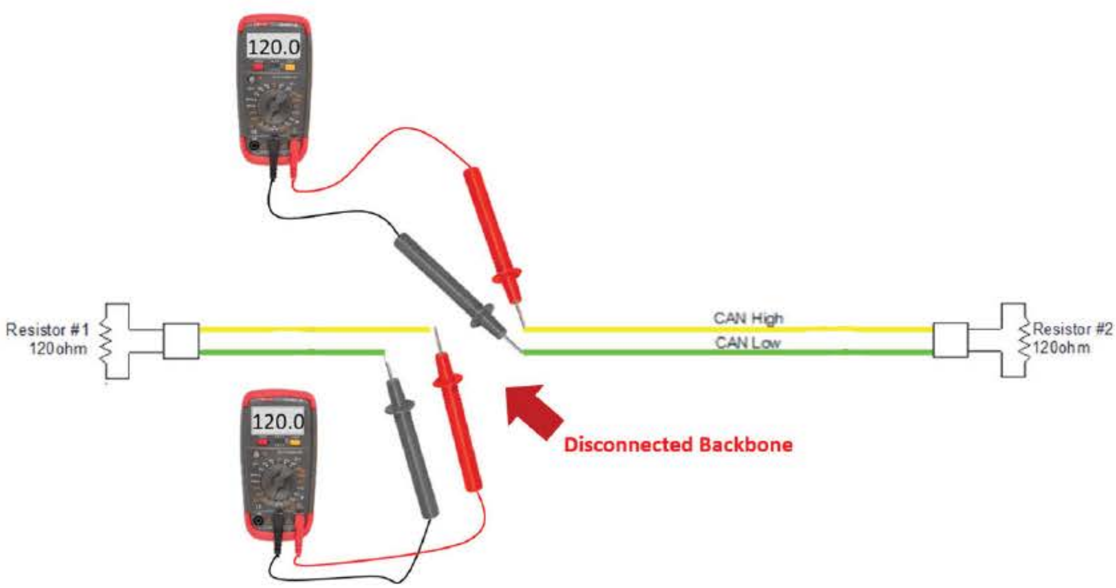
What is a healthy network?

A Heil CAN Bus network, when it is functioning properly, will test 60 ohms (Ω) of resistance (+ or – 5%, so 57Ω or 63Ω) on the yellow and green CAN wires with the power turned off the network. We get this measurement from (2) 120Ω resistors in parallel at each end of the network. 120 divided by 2 = 60Ω.

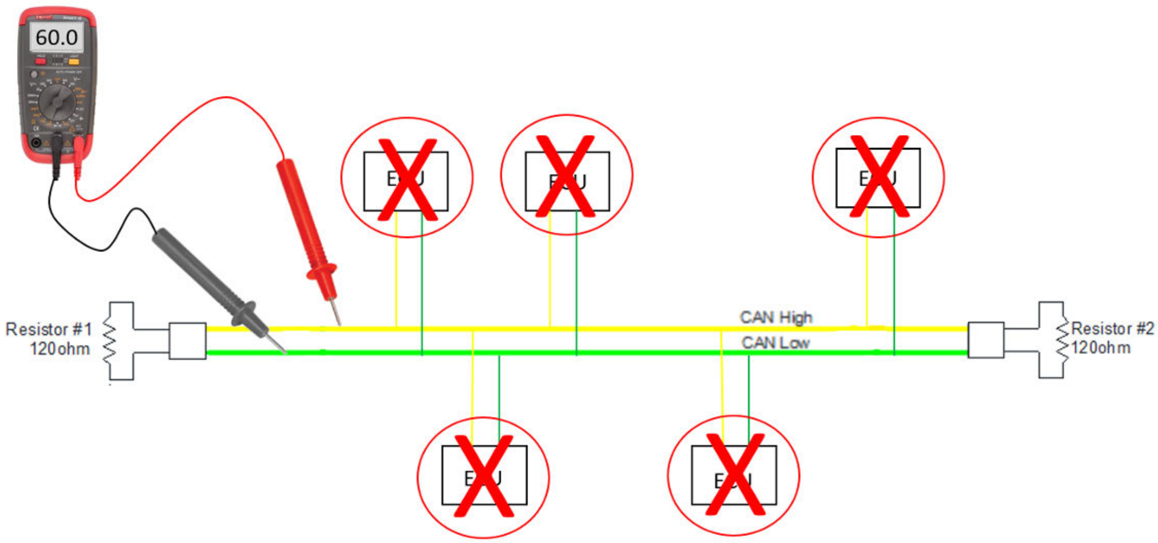


The meter shown above is for reference to the resistance in the network only. DO NOT PIERCE THE BACKBONE OF THE NETWORK WITH METER LEADS!

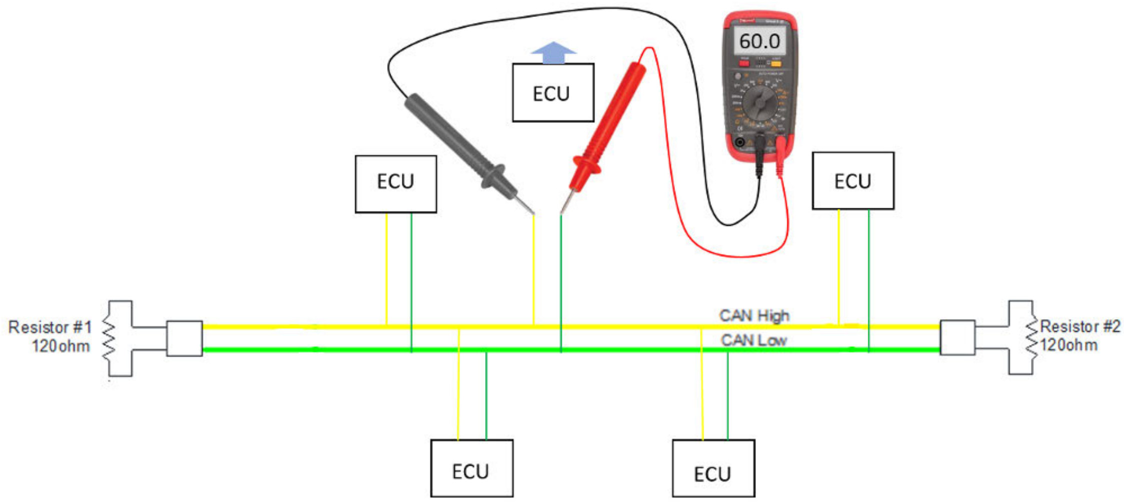
If the backbone is disconnected at any point between the two resistors, the resistance will be 120Ω in either direction. The photo shows the value of each resistor independently. Acceptable range +/- 5% or 114Ω - 126Ω.



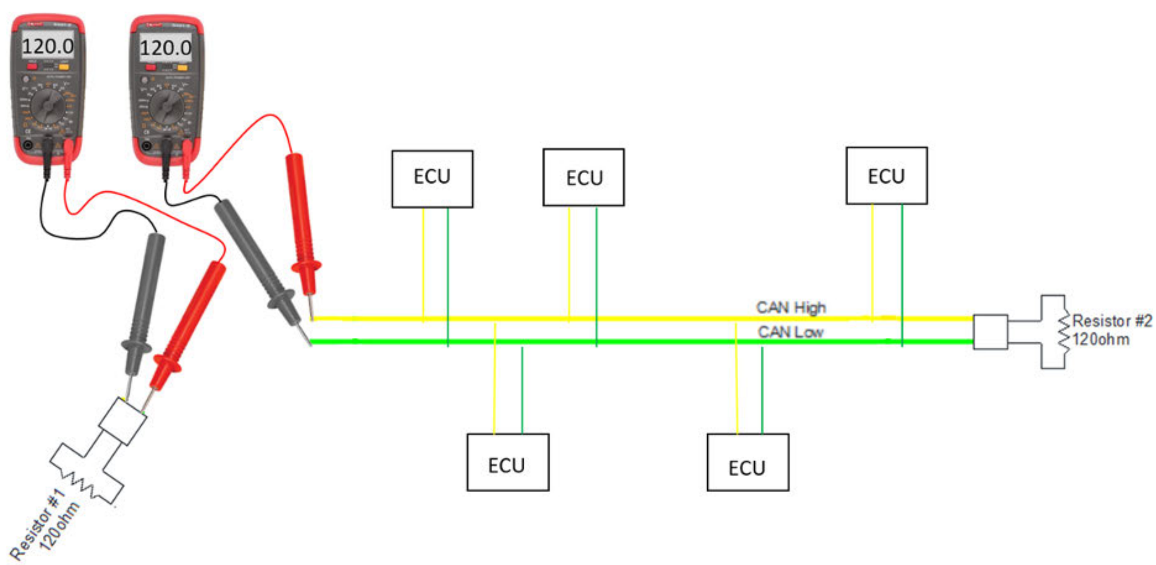
If we disconnect one or all of the ECUs on a single network, this should not change the known resistance of the backbone's 60Ω.



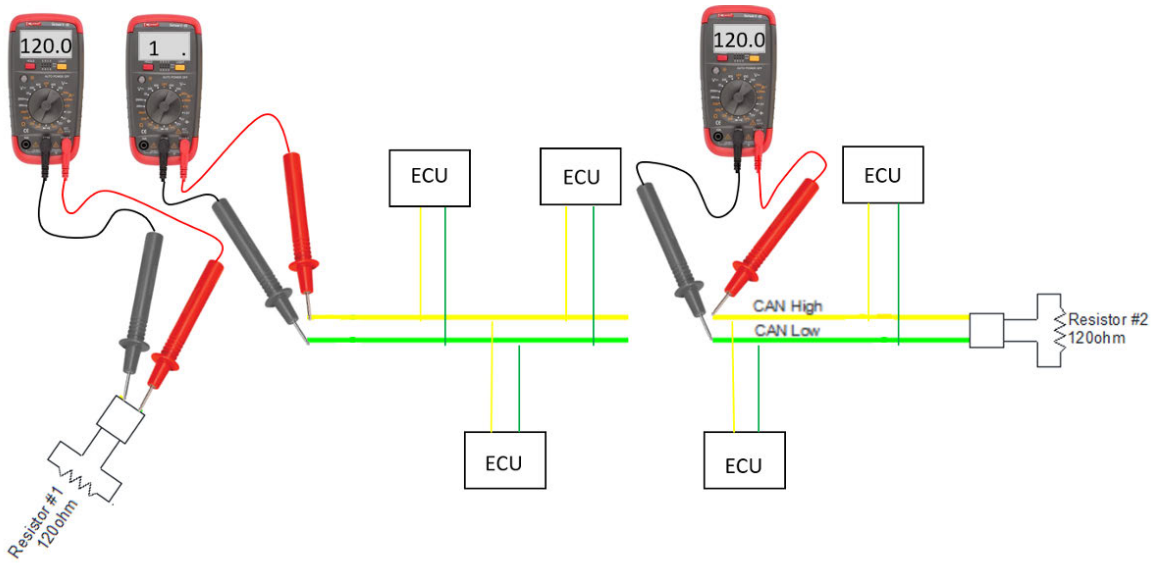
If we disconnect an ECU from the network and test for resistance from the connection point of the ECU, the value should be 60Ω. This is because we have not disconnected the backbone, therefore both resistors are still in the circuit, and the wiring connecting the two are undisturbed. This is an ideal place to test the health of the network wiring without back-probing the wires. However, this only tests the backbone and not each cable stub. Keep in mind if the cable stub is broken, it can mislead you to believe the backbone is broken. If this occurs, test the cable stub(s) individually for a broken wire or connection.



Another good place to test is at the terminating resistor connector. Disconnect the resistor and check the resistance. This will measure resistance from one end to the other. Don't forget to check the resistor as well.

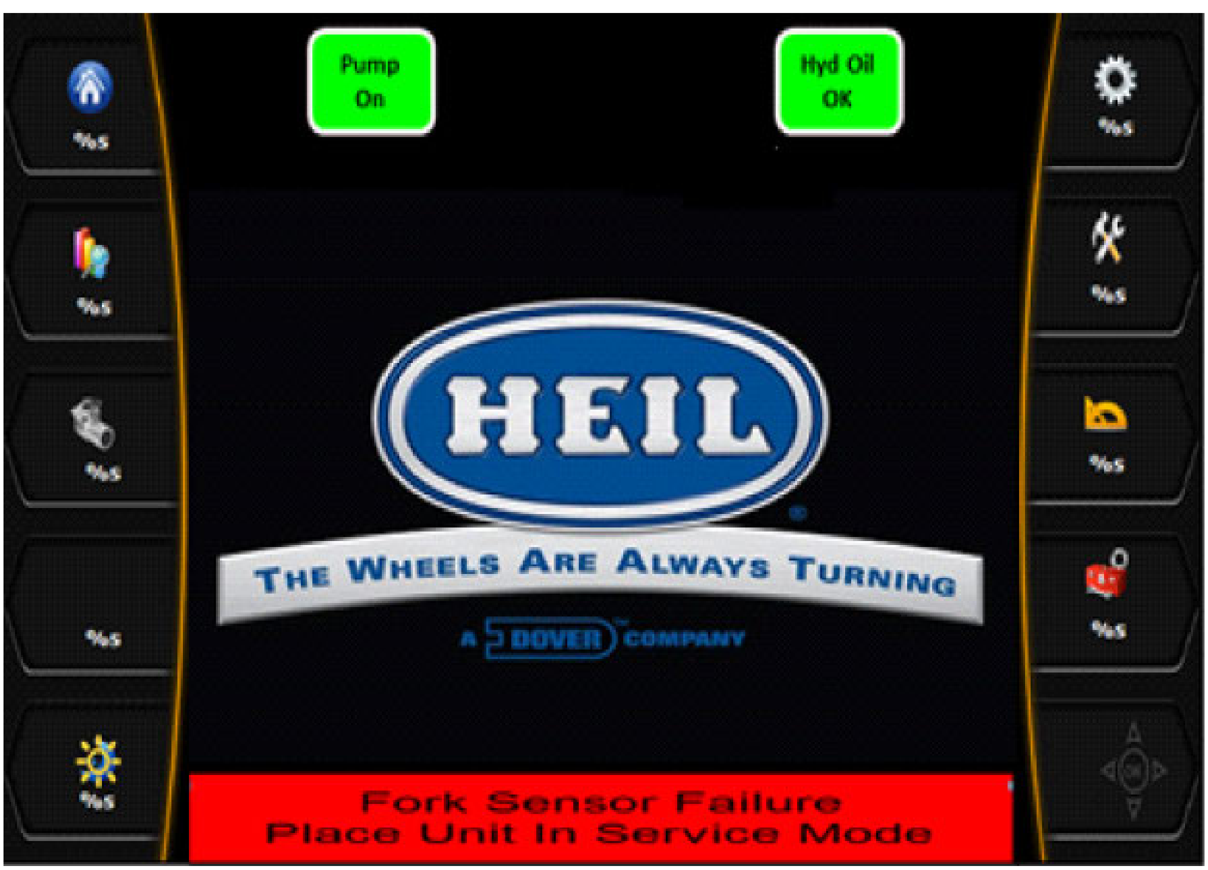


If you have two disconnects on the backbone, you will only have 120Ω resistance on wires connected to the resistor. If no resistor is found, your meter will display 1, indicating an open circuit.

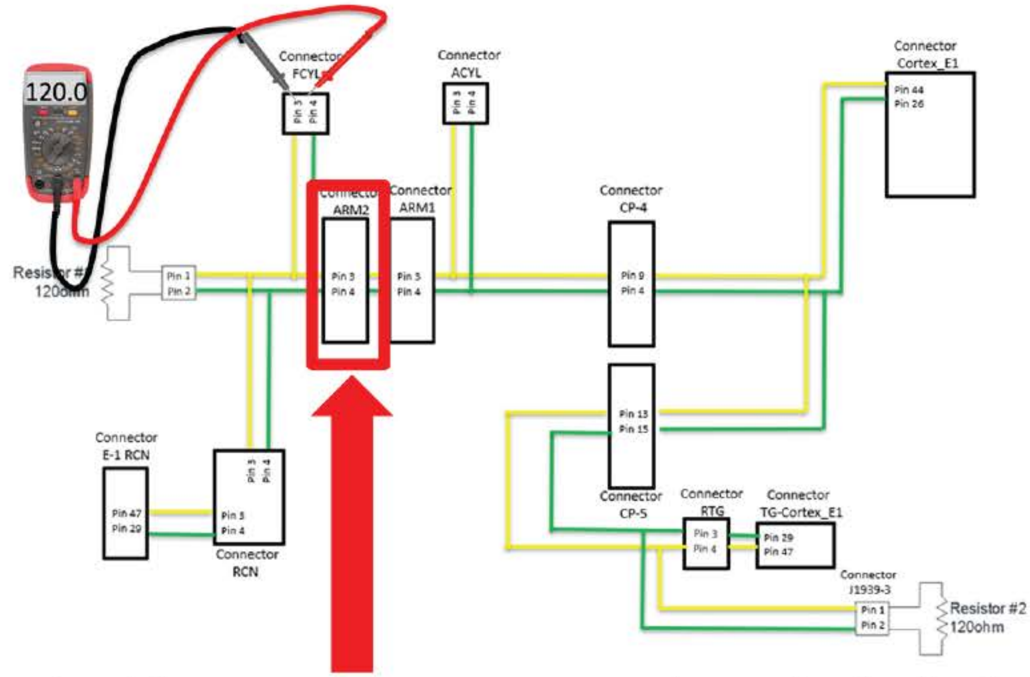


If an open circuit is found, this would be a good indication you have a broken wire or a poor connection at a connector.

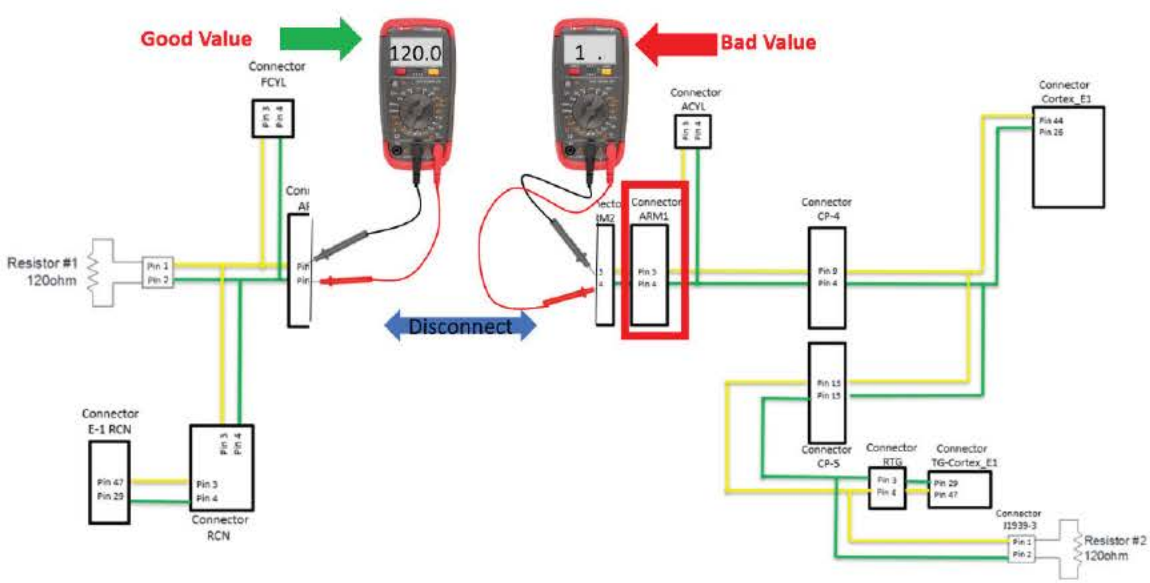
When an error message such as a fork or arm sensor failure is displayed, the technician can use this method to diagnose down to the component level of the network.



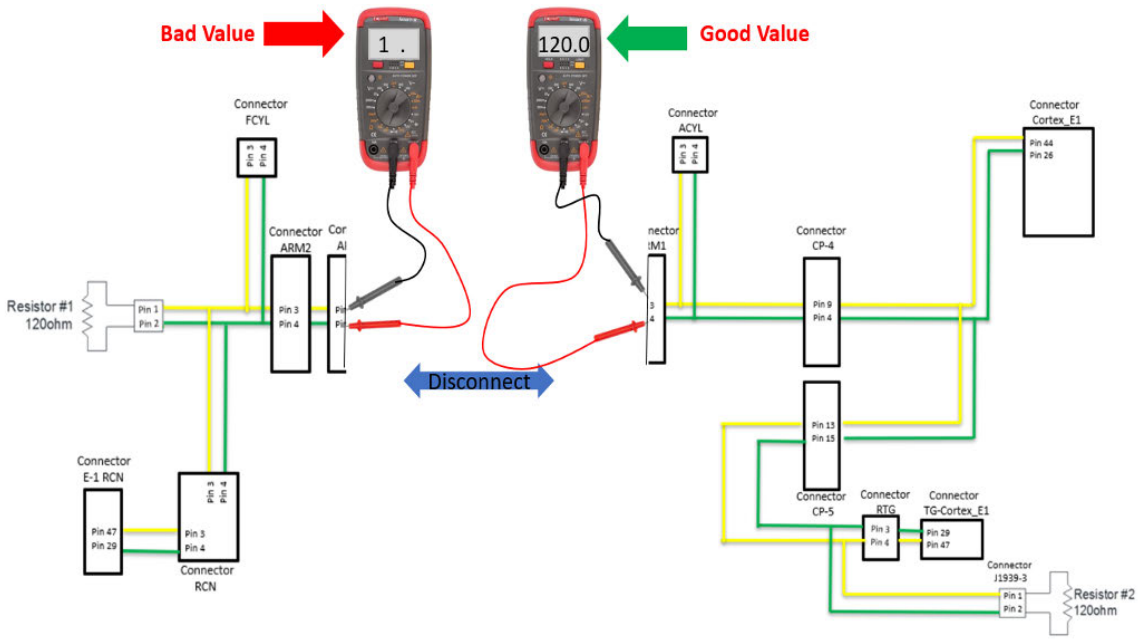
Using the troubleshooting methods we have discussed in this article, there is one other tech tip not to be overlooked, and that is testing between the connectors. This can be used to diagnose broken wires as well as test for interrupted communication in the CAN Bus network.



We should move to the next connection point in the harness



We disconnected connector ARM2 and tested resistance in both directions. We have good resistance in one direction and a bad value in the other. We will follow the direction of the incorrect resistance value. Next, we will reconnect the ARM2 connector and disconnect the ARM1 connector.



Now at the ARM1 connection, we find a good resistance on the right, and the side that had a good resistance now has a bad value. We know we have just passed the wiring problem. The problem is between the ARM2 and ARM1 connections. It could be a broken wire, rodents chewed into the harness, or maybe even a pin that is corroded or pushed out of the harness connector.

By disconnecting the connectors, we eliminate several feet of wire at each connection until we find a change in value. When the change in value is found, now we know that the problem is in between the two connectors, again eliminating the need to trace the entire length of the harness to find the break or short circuit.

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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