

tom of the “U” portion of the bend in the harness. This harness is part of the main vehicle harness and the cost would be more than this student could pay, so we decided to cut each wire individually and then install heat-shrink tubing on the damaged part of the wire before reconnecting the wire halves and then shrink the tubing to ensure good seal and insulation.

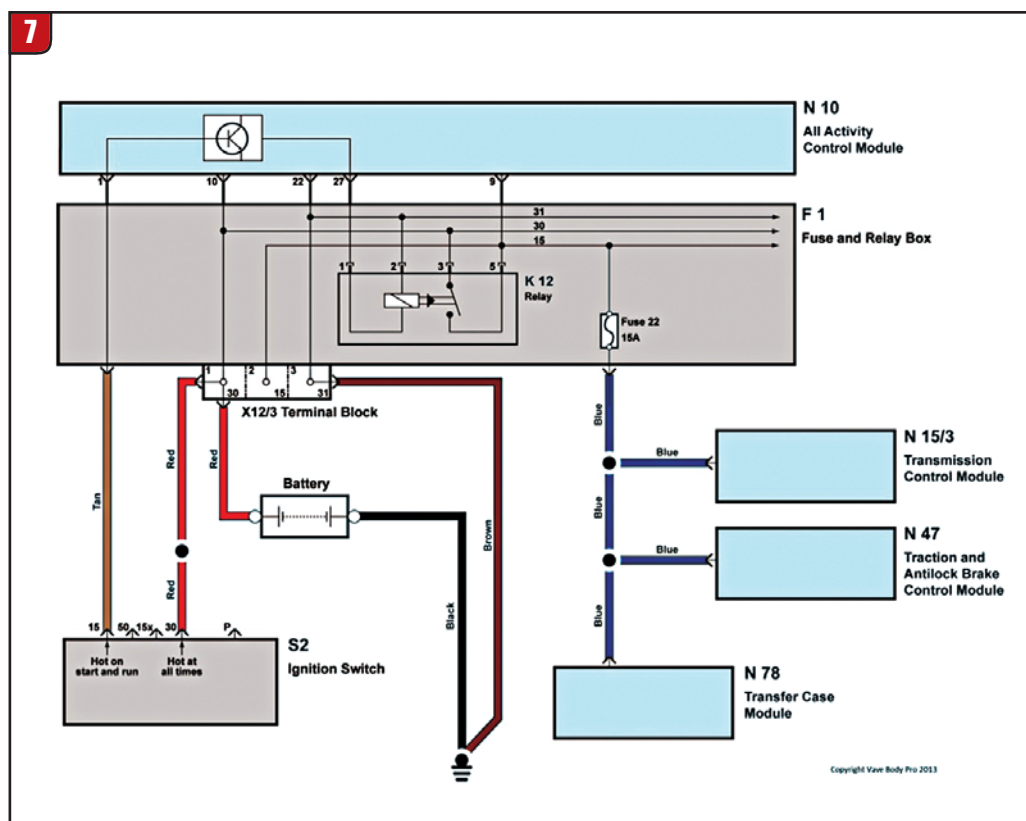
After fixing the harness we cleared the codes and road-tested the vehicle, and all worked well until we turned off the ignition and restarted the vehicle. The transmission refused to shift, and when we checked for

codes on the transmission module, we saw 041 (“no CAN communication with transfer-case module”) and on the transfer-case module we got code P1831 (“Fault with voltage supply to transfer case range motor”).

A close look at the wiring diagram (Figure 7) led us to suspect the K12 relay, and after more voltage-drop checks we found relay K12 to be defective. The relay would fail at times to turn on and supply voltage to circuit 15, which feeds fuse F22, which in turn provides voltage to the transmission control module (N15/3), transfer-case module (N78) and ABS module (N47). With these modules not turned on, no speed-sensor information was provided to the TCM, so the transmission would not shift.

The vehicle was finally finished after we corrected its three problems. It had: bad speed sensors, shorted harness and bad K12 relay. But was not the patient (vehicle) trying to tell us this?

Well, let’s go back to the beginning. The vehicle’s original codes were 014 (“rpm comparison: rpm N2 to rpm N3 implausible”), 109 (“rpm sensor N3”), 110 (“rpm N2 to rpm N3 implausible”) and 137 (“CAN communication with transfer-case control module faulty”). Upon researching the codes (see ATSG 722.6 Tech Trans manual, page 29), we discovered a very important fact about Mercedes codes for this unit: They run from 002 to 065, and codes higher than 098 are INTERMITTENT codes. To find the root DTC in an intermittent code, one needs to subtract 96 from the value.



For example, code 110 is really telling you “rpm N2 to rpm N3 implausible intermittent.” To find the root DTC we subtract 96 and get DTC 14, which is described as “rpm N2 to rpm N3 implausible,” but it is not intermittent. Did we not find that because of the shorted wire the N3 sensor was causing an intermittent short to voltage and thus the 110 code? In a way, the patient was telling us this from the beginning, because code 109 means “rpm sensor N3 intermittent.” The root code obtained by subtracting 96 is code 013, “rpm sensor N3.”

Code 137 means “CAN communications with transfer-case control module faulty intermittent,” and the root code found by subtracting 96 is 041 “CAN communication with transfer-case control module faulty.” So in essence, was not the patient telling us all along, “Hey, I have an intermittent problem with my N3 speed sensor and an intermittent problem communicating between my transfer-case module and my transmission module, and Doc, I need for you to find out why?”

Unlike our doctors, who don’t want to hear more than one problem at a time, we need to listen to all the problems to see whether they are related to one another. If we “listen” well we can save not only time but also money. In our field the customer pays only once when it comes to diagnosing. Are we listening? **TD**

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