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Technicians Service Training

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Editor

"G" Jerry Truglia

Prius - "Transmission Inop"

This vehicle came from the same shop with a different problem. The issue on this 2005 Toyota Prius with 236K miles on the odometer was that the transmission would not go into any gear. Th e shop told us that they had replaced the transaxle since the MG2 (Motor/Generator 2) was burned out, preventing the vehicle from moving. Once again, the Toyota Techstream was connected to this Toyota and came up with the following on the Techstream Health Report **(Figure 1)**

P3000 "Battery Control System"

• P3102 "Transmission Control ECU" • P1118 "Coolant Temperature Sensor High for Coolant Storage System" • P0A80 "Replace Hybrid Battery Pack" • P0102 "MAF Sensor" • B1421 "AC Sun Load Sensor Circuit" • B2775 "Interior Verification Abnormal To Theft Deterrent ECU" • B2796 "No Communication Malfunction Immobilizer" • B1260 "Gateway Transmission Control ECU Communication Stop"

(Con't on page 4)

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- *Provide training seminars for a reasonable price.*
- *Deliver information that the technician can use now.*
- *Keep technicians informed of information affecting our industry.*
- *Increase consumer awareness of what a good technician is.*

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Technicians Service Training
11 Lupi Plaza
Mahopac, NY 10541
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Fax: (845) 628-9109
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Prius - "Transmission Inop" (con't from p. 1)

Almost all of the DTCs were stored as both "current" and in "history." With that many DTCs, you must make sure to look at the current and history ones first. The reason to check the current DTCs first is that they are causing a problem right NOW! No matter how the other DTCs are stored, always diagnose current DTCs before moving to the others. Having some background information on the vehicle helped us build a diagnostic path. The shop had told us that this Prius was sitting around for a while, and this was the most likely reason for the P0300 and the HV battery having an issue.

The next important DTC on the list to diagnose would be the transmission P3102 DTC that prevented the vehicle from being shifted out of park. Bill, my technician, started his diagnosis by looking at the P3102 Freeze Frame data to see if the information would provide a good starting point for this issue **(Figure 2)**. As Bill reviewed the data, he looked up service information on the DTC. The information he found in ALLDATA, ProDemand, Identifix and MotoLogic was not leading him to the root cause of the problem. Bill decided to search iATN, Diag.net and Google and found something that a few vehicle owners had complained about. That information provided Bill with a good starting point so he could research the location and wiring diagram for the transmission interlock control wires.

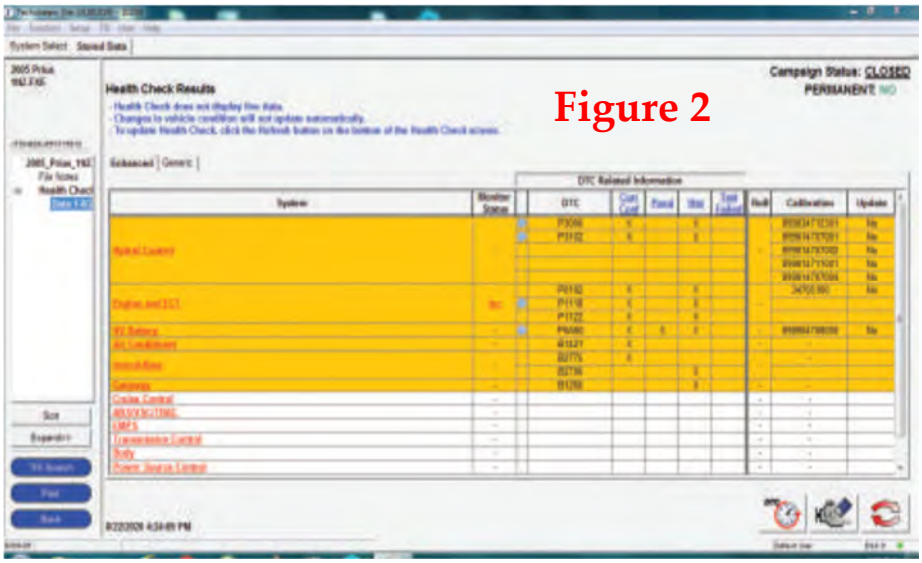
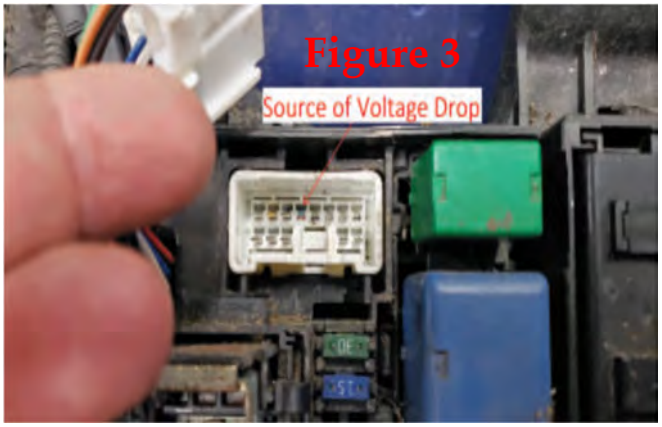


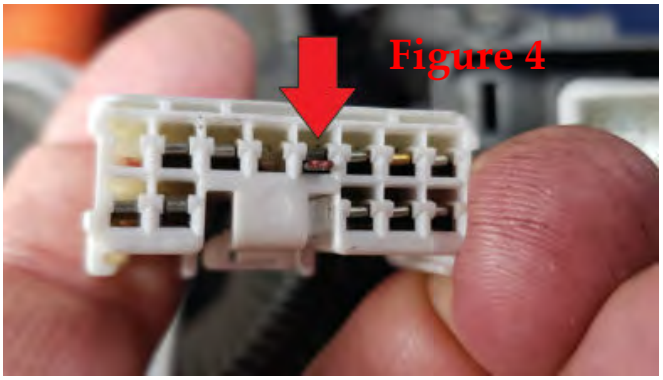
Figure 2

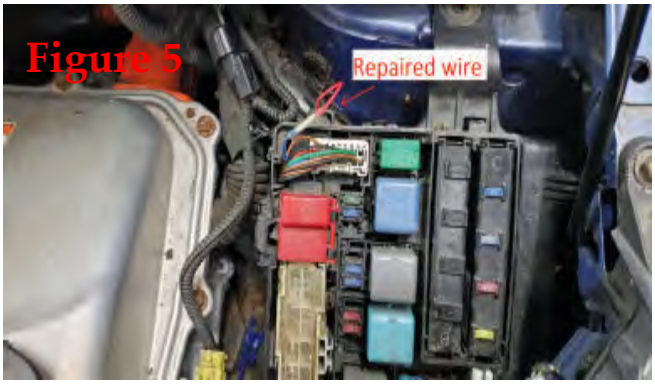
What Bill uncovered was VD (voltage drop) in a fuse box connector under the hood, near the left strut tower **(Figure 3)**.

(Con't on page 5)

Prius - "Transmission Inop" (con't from p. 4)







Look at the fourth pin, upper level from the left to view the voltage drop issue. On the connector end you can also see the problem on pin 4, from the right **(Figure 4)**. We tried to clean the pins and connector end with connector files and chemical cleaner, but they were too far gone. We proved out the connector issue by using two insulation piercing clips and a jumper wire. With the clips attached to the wire at each end of the connector, the vehicle was now able to move in and out of all gear ranges, proving out our jumper test on the circuit.

We called the shop and informed them of what we found and explained that the repair would require new terminals on both ends. Since the terminals were not readily available because they were back ordered from the dealer, the shop asked if we could just use the jumper wire rather than replacing the terminals. We repaired the problem connectors by installing a jumper wire as a repair **(Figure 5)**. Bill made up a proper jumper wire that he soldered and heat shrank for a permanent repair.

Moving on to the P0300 HV battery problem, we performed an HV battery test by selecting the important HV battery PIDS and graphing them as we ran the ICE at a high idle, checking for passing scan data results. Normally we would have to discharge the HV battery first before

(Con't on page 6)

Prius - "Transmission Inop" (con't from p. 5) **Fig. 4**

No. trying to recharge it, but since this 2005 Prius had been sitting for years, we could skip that step. The results of the HV battery test was not good. It failed, and the battery had to be replaced. The shop approved the HV battery replacement, so we ordered a replacement.

While we were waiting for the HV battery to come in, we moved on to the P1118 "Coolant Temperature Sensor High." We found that the coolant sensor wire was disconnected, so Bill reconnected the wire connector and continued checking the HV cooling system. He uncovered dirty, weak coolant/antifreeze and a bad inverter cooling pump. The inverter pump mounting bracket was almost completely rusted away. The inverter pump bracket was so rusted that the pump was no longer mounted to the fender, causing a whining noise.

This pump looked to be the original pump that has been on this 2005 Prius since it was built. We ordered a new hybrid circulator pump with a bracket, drained and flushed the coolant from the HV side, followed by installing a new pump and then bleeding the cooling system.

With the new pump installed, we made sure that the ICE cooling system and HV cooling system reached the proper operating temperature before we opened the front bleeder valve (near the inverter) to ensure the system was air free. With all the air removed, we checked for leaks and made sure the data PID for ECT (Engine coolant temperature) was at the correct operating temperature.

Checking the vehicle that was now running well, we moved on to the remaining DTCs. This led us to the P0102 "MAF Sensor" code that we found was due to a connection issue. We cleaned up the connector and reconnected it to the MAF sensor. That cleared that DTC.

(Con't on page 11)

Prius - "Transmission Inop" (con't from p. 6)

The next one we never worry about, since every Toyota with a sun load sensor has a code B1421 "AC Sun Load Sensor Circuit." This DTC is due to indoor lighting (no ultraviolet rays sensed). The next DTC B2775 "Interior Verification Abnormal To Theft Deterrent ECU" may have been set due to the 12-volt battery being weak. We also checked the key fob battery that was found to be inoperative, so we replaced it and got it working. The next DTC B2796 "No Communication Malfunction Immobilizer" would also be traced back to a 12-volt battery issue. Our last DTC, B1260 "Gateway Transmission Control ECU Communication Stop" may have also been due to a 12- volt issue.

We cleared all the DTCs and road tested the Prius to make sure none of the DTCs reappeared. Now that Toyota was running well after addressing the 12-volt battery, HV battery, inverter pump and bracket, MAF wires and the main issue of the selector shifter not going into gear.

I hope the information on both these problem hybrid vehicles helps you make a game plan in diagnosing and repairing hybrid vehicles.

Article by "G" Jerry Truglia
TST Founder- President - ASE Master Technician

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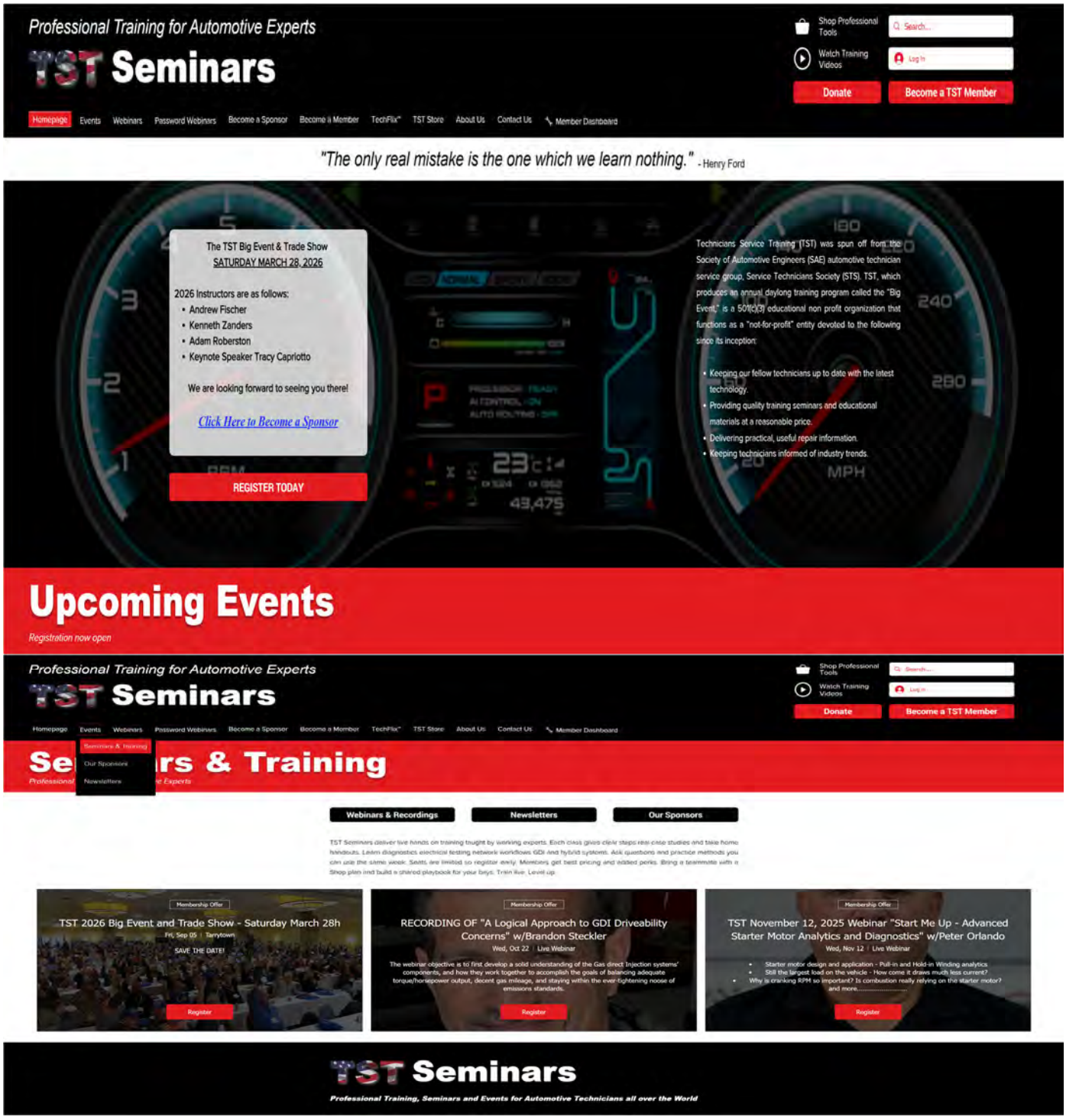

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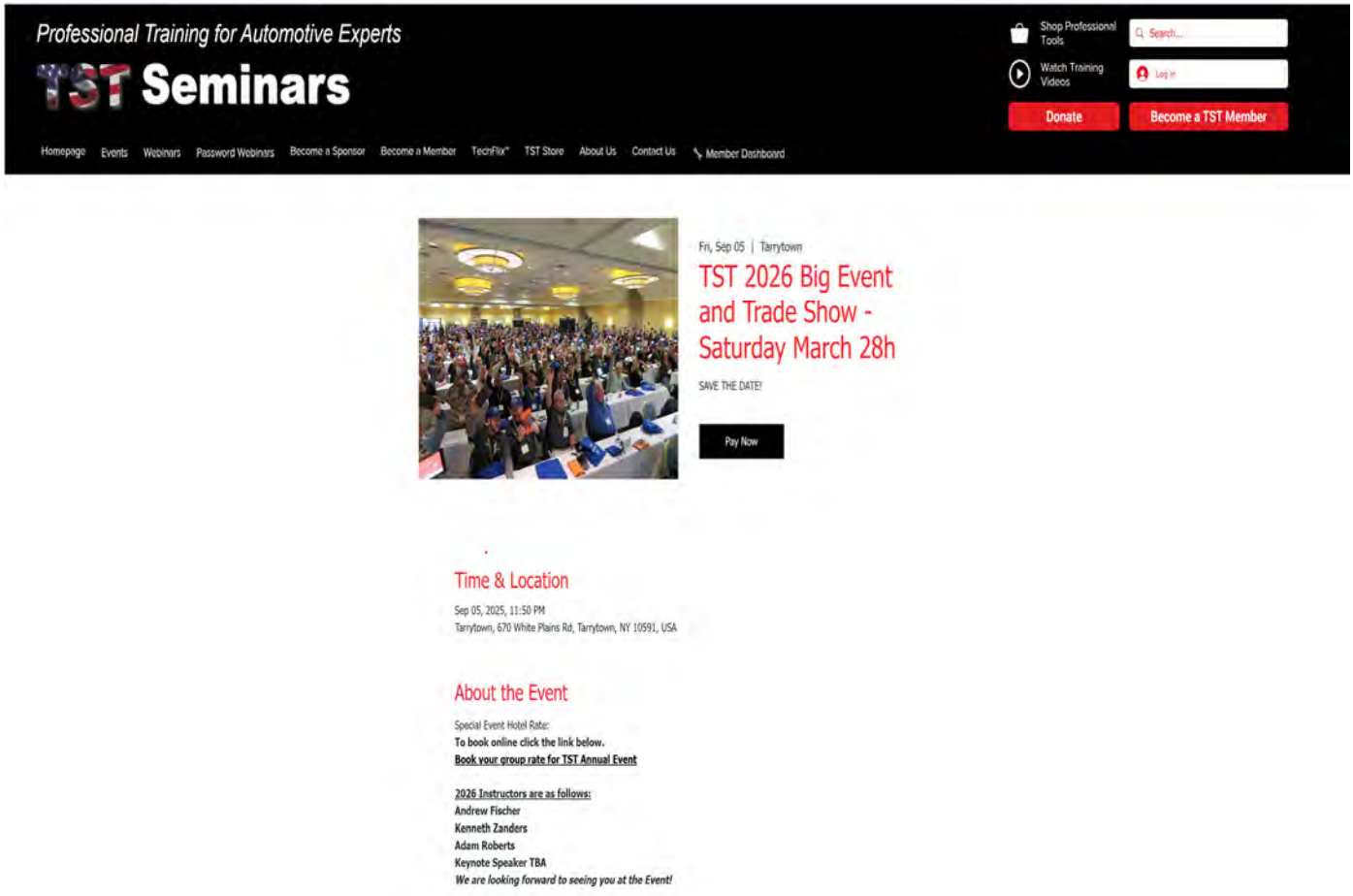

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