

Volume 1

# TURBO DIESEL Buyer's Guide



A Publication of the *Turbo Diesel Register*

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# Vintage '94-'04 Transmission Lock/Unlock Problem

How do you stop the automatic transmission from unlocking when your truck is in overdrive or third gear?

Unfortunately there is not a “one size fits all” answer to this question. However, at Geno’s Garage we benefit from the millions of miles of knowledge from members of the Turbo Diesel Register magazine and from our own busted knuckle experiences.

Before we suggest some different part numbers and repair techniques we have to break this lock/unlock problem down into year models of the truck:

- '94-'98, 12V with P7100 injection pump
- '98.5-'04, 24V engine with VP-44 injection pump
- '03-'04 with HPCR

All year model trucks may benefit from a noise isolation product from BD Power, part number BD 1300030. Interference in the throttle position sensor circuits (APPS) on Dodge Cummins engines from '94-'04 will create false voltage readings in the APPS/TPS circuit and cause the lock-up torque converter to rapidly cycle on and off as you drive. This part removes the RF interference.

If the noise isolation is not the problem, for '98.5-'04 owners the next step is to look at the Accelerator Pedal Position Sensor (APPS), also known as the Throttle Position Sensor (TPS). The Geno’s Garage replacement is an aftermarket item that is half the price of the factory unity. Our part number is TPS98502.

You can read further about the lock/unlock and related problems in these TDR magazine articles:

## Transmission Noise – Page 3

- Issue 99, page 8
- Issue 73, page 32
- Issue 70, page 28
- Issue 69, page 30
- Issue 62, page 25
- Issue 54, page 38
- Issue 53, page 10

## Accelerator Pedal Position Sensor (APPS) – Page 8

- Issue 68, page 29
- Issue 66, page 30
- Issue 61, page 120
- Issue 60, page 92
- Issue 52, page 39

## Shift Problems – Page 12

- Issue 60, page 28

# TRANSMISSION NOISE PROBLEMS

## VENDOR RESPONSE—TORQUE CONVERTER LOCK-UP

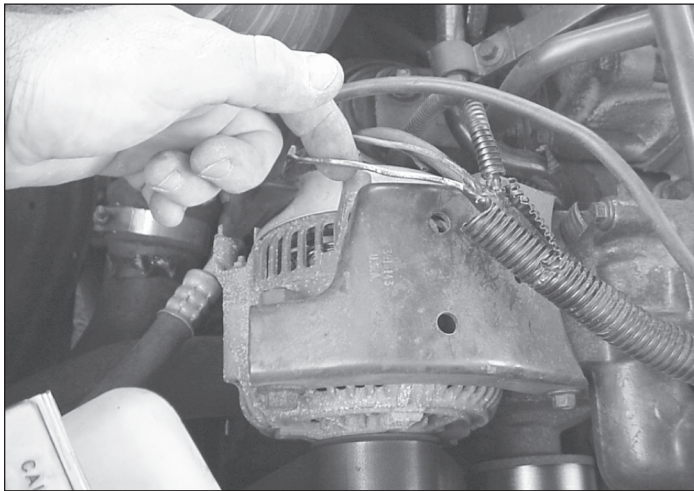
Issue 52, page 39, offered an in-depth look at torque converter lock-up. Although the author was specifically talking about the '98.5 and newer trucks, this tip applies to torque converter lock-up on '94 and later Turbo Diesel.

As documented, many people have replaced the TPS or APPS, trans temp sensor and numerous other parts to try to correct the on going converter clutch problem with varying degrees of success.

Well, for all of the shadetree-mechanics in Turbo Diesel land, before replacing any parts or wasting time connecting a scan tool or volt meter to the electrical circuit, start with the easiest step first.

I have found the cause of the lock-unlock problem to be an AC frequency-induced electrical noise into the ground circuit of the battery which causes a fluctuating voltage signal from the TPS to the PCM.

The solution is to locate the 10-gauge ground wire that runs from the negative post of the passenger battery to the back of the alternator. This wire is often tan with a black stripe.



Starting at the back of the alternator loom where the tan/black striped wire originates and then goes to the battery, wrap the wire with a piece of tin foil about 4 to 6 inches in length. Wrap tinfoil with black electrical tape to secure it.

Road test the vehicle. If the problem is corrected, be happy.

*From Issue 53, page 10.*

## TORQUE CONVERTER IN AND OUT OF LOCKUP

The torque converter in my '01 Turbo Diesel is cycling in and out of lockup at steady speed and sometimes during acceleration. I have cleaned all battery terminals and added a ground from each battery to the body. I disconnected the battery cables for several hours, then reconnected them. It cures the cycling for a while. I have tried resetting the APPS, but it has been a temporary fix too

Do you think a noise filter will cure the problem?

**CAfricano**

The noise filter should fix the cycling problem.

**Bajabob**

My torque converter was doing the same thing. The noise filter from [Diesel Transmission Technologies \(DTT\)](#) fixed mine.

**lukesdiesel**

The DTT noise filter did the trick for me too. However, you may wish to try the tip in TDR Issue 53, page 10, on the right hand side of the page. The writer suggests wrapping the alternator ground cable with aluminum foil and tape to isolate the electrical noise. It's easy and cheap.

**Joe Mc, Levittown, PA**

Thanks. The DTT noise filter fixed the problem.

**CAfricano**

*From Issue 54, page 38.*

## TORQUE CONVERTER LOCK/UNLOCK PROBLEM

At around 50 mph, the tachometer is intermittently jumping up and down 200 rpm until I increase the speed to over 55 mph or slow to below 45 mph. If I turn the overdrive off, the rpm jumps to over 2000 rpm, which is normal. It feels like the torque converter is locking and unlocking.

**DirtyDodge, Fairfield, CA**

The same thing recently happened to my Turbo Diesel for the first time while towing a cattle trailer. Later when I went up the hill to my house, it shifted into overdrive at 45 mph and surged a few times until the speed reached about 50 mph.

**VoIsFan**

You can install the noise filter, or make a modification to the accelerator pedal position sensor (APPS). I rewired the APPS ground wire to run directly to the battery ground. Find the black wire with a yellow tracer coming from the harness on the APPS. Cut the wire and splice in a section long enough to run to the driver side battery. Use a ring terminal on the end and install it under the bolt that holds the battery ground to the radiator support. I was hesitant to cut the harness, but I am glad I did.

**Cummins Thunder, San Leon, TX**

It sounds like torque converter unlock-lock up.

I soldered all the connections and soldered a ring terminal to each end that is grounded. I used the ground connection on the radiator support where the driver side battery is grounded and wrapped the wires in electrical tape.

Basically, the ground wire is cut and each end is grounded. I suspect there is a bad connection somewhere causing electrical noise which is confusing the electronics. I tried to find a bad connection, but could not. Also I disconnected the batteries for a few hours and reset the APPS which did not solve the problem. The modification has worked great and cost almost nothing.

**BSander**

I used the link to the Sun Transmission modification and tried the repair TDR member BSander suggested and it works great. I tested the repair by driving the truck around the same hill where I noticed the surging and it didn't reappear. I think this modification has fixed the problem.

This same problem has been occurring to my father's '99 Turbo Diesel with over 300,000 miles on the odometer. I will modify his truck while he is out of town and see if he notices that the transmission is shifting properly again.

**VoIsFan**

I made the modification to the wiring and took my truck for a quick drive. I did not notice the torque converter locking and unlocking as before. Since the problem has been intermittent, I should know definitely in the next couple days. Thanks.

**DirtyDodge, Fairfield, CA**

Since many members are having transmission shifting problems due to electrical noise, I have listed two other websites that have modifications to repair the problem:

<http://www.atsdiesel.com/PDF/120505/4th%20hunt%2046%2047%20RE.pdf>

[www.kentsoil.com/dodgebug1.htm](http://www.kentsoil.com/dodgebug1.htm)

**JoeCanuck**

*From Issue 62, page 25.*

4 Reprint from the *TURBO DIESEL REGISTER*

## MORE INTERMITTENT TORQUE CONVERTER LOCKING/UNLOCKING

There has been a lot written in the TDR Magazine and on the web site about solutions for the intermittent locking and unlocking of the transmission torque converter. I have read most of them, but I decided to post my situation with my Turbo Diesel.

I have installed the DTT noise filter and it has not proven helpful. I also followed the splicing and grounding directions as suggested by Sun Coast Converters. Despite these attempts at eliminating the problem, it still lingers. Does anyone have a suggestion that might help?

**Seth**

Did you solder the connections when installing the DTT filter? Apparently anything less makes the filter less effective. I feel your frustration. Recently, I replaced the alternator with a properly rebuilt unit that had no noise issues and a fully functional rectifier. Time will tell if the positive result lasts.

**Soot4Life**

At 190,000 miles I also had problems with converter lockup on my '96 Turbo Diesel with the 47RE transmission. My problem was system noise. The source of the noise that scrambles the Powertrain Control Module (PCM) controlling converter lockup is primarily alternator noise. The power circuit of the alternator is filtered and the batteries floating on the 12-volt DC circuit minimize ripple effects. However, the alternator excitation circuit has no filtering and aging slip rings/brushes dump any noise developed there into the PCM. Contributing factors are battery circuit resistance due to sulfating batteries and battery post connections deteriorating over time. When the converter lockup gets erratic, cleaning of the battery terminals and connectors is a good place to start.

If that doesn't help, go to the noise source and make sure that the alternator slip rings are in good condition. If not, turn the slip rings on a lathe taking a light cut to clean and then polish them. Replace the brushes which will minimize the primary noise source. Geno's Garage sells a kit for \$35 or purchase a new brush set for about \$7. Before spending any time rebuilding the alternator, have it checked to make sure it is fully functional.

If that doesn't work, there are four enablement sources for the Torque Converter Clutch (TCC) signal controlling converter lockup.

1. Vehicle Speed Sensor (VSS) left side rear transmission
2. The Module Timer, a PCM function
3. Engine Speed Sensor, (ESS) front engine damper area
4. Throttle Position Sensor, (TPS) left side engine next to injection pump

Of these, the TPS and the VSS are most likely the problem. The TPS can wear and there are many posts on this problem and suggested repairs in the TDR. The VSS can be missadjusted or be defective. When adjusting the VSS, use a 0.050-inch non-magnetic feeler gauge. Match books are useful for this purpose.

Finally, there is the TCC loop. Modifications to the lockup circuit result in breaking this control loop to insert additional controllers in the loop. If any of controllers are defective, or if the TCC loop wire connections are intermittent, they can also create lockup problems.

**JMalik**

*From Issue 69, page 30.*

## SLIGHT SURGE WHEN SHIFTING INTO OVERDRIVE

I am experiencing a surge when my '99 Turbo Diesel 3500 shifts into overdrive (OD). My Dodge dealer tech advised me to wrap the alternator wire in aluminum foil which worked for a while. The surge has returned, but not as often as before I wrapped the wire with aluminum foil. I was told this is a computer problem.

**RHarper**

I discovered on a couple of occasions that when one of the batteries began to fail the transmission would start hunting (shifting into and out of overdrive). I replaced both batteries and solved the problem. I always replace both batteries when one of them fails.

**barryg41, Baton Rouge, LA**

Something a lot of owners overlook, even if the truck starts easily, is that one of the batteries could be weak or beginning to fail, usually the passenger side battery, and it can cause the torque converter to lock/unlock frequently between 40 and 50mph. A defective ground on a battery can also cause this as well as Diagnostic Trouble Code P0122.

In addition to wrapping the ground wire in foil (usually a brown wire with a black tracer), one should also consider installing a noise filter, cleaning and resetting the accelerator pedal position sensor (APPS), and checking it for worn contacts, and checking the transmission output shaft speed sensor.

**FDavid**

*From Issue 70, page 28.*

## INTERMITTENT TORQUE CONVERTER UNLOCK/LOCK

The torque converter in my '98 Turbo Diesel 2500 was constantly going through the lock and unlock cycle while driving at speeds between 40 and 50mph. I had the accelerator pedal position sensor (APPS) Noise Isolator installed based on reading many of the posts in this forum. The problem is twofold now. The transmission does not like to shift into Overdrive unless I am driving on a perfectly flat road or a downhill and the cruise control is turned off. The transmission shift points, based on load and speed, seem way off from what they used to be. It appears that fixing one problem has left me with another problem. I do not want to start throwing parts at the system without a plan.

**turretplug**

If your transmission is having difficulty going into Overdrive (4th gear), then there may be a problem with the 3rd to 4th gear shift solenoid. If you have a lot of miles on the transmission, without resorting to doing a bunch of tests to determine the exact problem, it can't hurt to replace the 3rd to 4th lockup solenoid, the governor pressure sensor, the governor pressure solenoid, and the output shaft speed sensor. All of these parts wear out in time and can be ordered online for very reasonable prices at Transmission Parts USA online at: [www.transmissionpartsusa.com](http://www.transmissionpartsusa.com) or 239-790-5401. You can easily replace these parts yourself.

**JLandry, Shoreline, WA**

Replace the governor pressure sensor, governor solenoid, and output speed sensor as a start since they are the source of about all the shifting problems aside from a hard part failure. If you have not replaced them in 40,000 miles, they are due.

Try removing the APPS filter and see if that makes a difference. If it does you will know you are on the right track. It is usually not good as a permanent fix.

If the solenoid is holding lockup the rest of the time and you have no obvious slipping issues, don't waste the money on the solenoids and harness. You need to remove the source of the noise that causes the lockup fluctuation and the only way to do that is get the alternator ground wire and charge wire out of the main harness and reroute them.

Rerouting those two wires will cure most of the lockup fluctuation problems. The rest is just because it's a flaky system and it's getting old. If you really want to spend some money, installing a triple disk Torque Converter and shift kit will usually solve the problem, too.

**cerberusiam, McDonough, GA**

I don't have any slippage issues with the transmission. With the APPS filter removed, the Torque Converter goes back into its lock and unlock cycling. Concerning the reroute of the alternator ground and charge wire, what am I trying to reroute them away from? Do I need to use a shielded wire like something that would be used for a strobe? The truck has 153,000 miles on it and has received regular 30,000-mile transmission service. I recently changed to synthetic transmission fluid and installed a Mag-Hytec double deep pan. The Torque Converter lock and unlock problems were present before I changed the fluid and the pan.

**turretplug**

Does the transmission shift correctly without the APPS filter, but the Torque Converter lock/unlock at a steady speed? Does the Torque Converter only lock/unlock at steady throttle in the 35 to 50mph range, or does it do it at any steady speed like at 65 to 70mph?

Look at the harness where the wires are bundled. Both the battery ground wire and the alternator charge wire run in the same harness as all the wires that run to and from the engine control module (ECM) and the powertrain control module (PCM). With the possible fluctuations from the alternator charging in the charge wire and the battery ground wire running right through or close to the alternator fields, there is the potential for a lot of electrical noise passing into the main harness.

If you remove those two wires and reroute them separately, one over the radiator support and one on the firewall, it takes most of the noise potential away from the harness that runs the transmission controls. It has worked better than anything else on at least three problematic trucks that I know of. Shielded wire on both circuits would be the optimal solution. The ground circuit is maybe not as critical, but stray induced noise in the ground circuit will raise havoc at times also.

If that doesn't completely cure it, a triple disk Torque Converter usually does. The triples take a lot longer to lock/unlock, so the slight variations in signals to the lockup solenoid aren't as noticeable. The PCM may still have a fluctuation in the ground circuit for lockup, but it's so short that the Torque Converter never unlocks.

**cerberusiam, McDonough, GA**

For shielding of the wires previously mentioned, the wire shielding (available on the following web site) grounded to the chassis on one end might work nicely. <https://buyheatshrink.com/braided-sleeving/metal-and-conductive-braid> or (954) 978-0056.

**JLandry, Shoreline, WA**

Additional update: The truck does shift properly without the APPS filter, and the Torque Converter lock/unlock cycle is confined to approximately 35 to 50mph. When I am at highway to freeway speeds it locks and holds fine. I will remove the APPS filter and run shielded battery charge and alternator ground wires. Intent on saving as much money as possible, I will use a Triple Disk Torque Converter as a fallback position if the rewiring does not work.

**turretplug**

When you remove the passenger side battery ground cable from the harness, you should find the ground wire splits into four different pins on the ECM harness. We ran the ground cable back along the firewall and into the harness where it splits for ease. My son got ambitious tracing wires and actually removed the charge wire from the harness, but you could just disconnect both ends and make sure they are out of any possible contact with the alternator and run the new one over the radiator support and to its mounting point. Moving those two wires completely cured the lock/unlock problems. The only intermittent glitch is in very rare circumstances at low throttle, on a grade, certain engine load, acceleration, and in Overdrive, we get a pulsed unlock/lock that seems to be the PCM just not able to decide what it wants to do. A little more throttle or locking out Overdrive and no issues. A Triple Disk and mild shift kit should address that. The previous owner had the transmission rebuilt because of this issue, but it just got worse with time. We tried a filter, tin foil, move the wires, reset the APPS and they all had limited effect. The only way to cure the noise problem is to remove the source and it works quite well.

**cerberusiam, McDonough, GA**

Thanks for all the input. I will get working on this fix this weekend.  
**turretplug**

*From Issue 73, page 32.*

### **'98.5-'02 TRANSMISSION LOCK/UNLOCK: THE FINAL ANSWER?**

Don Fitzwater forwarded the "Lock/Unlock Final Answer" correspondence from a thread in which he participated back in the summer of 2015. Here is the first part of his letter to us.

"I've run into another truck with the same symptoms as the one in the link I provided. There seem to be more and more of these as the trucks are aging. And, for the record, the truck in this thread, "AKgriz's," has been going strong now for over two years. I'm pretty confident it's fixed. I still don't buy some of the root causes of failure such as alternators, wire routing, etc. I believe the noise filters are simply a band aid fix that only work on a small portion of trucks."

#### **The Rest of the Story**

Now let's go back to 8/27/2015 to follow Don's complete tale of woe. The following is his story of discovery.

#### **1999 3500 Auto with TC Lock/Unlock Problem**

My '99 3500 (4x4 automatic transmission with 60K miles) runs well until it's time for overdrive/lockup. The transmission will continuously hunt back and forth, in and out of lockup and will never maintain lockup. We checked the usual suspects like grounds; alternator (disconnected and test drove); replaced the accelerator position switch (APPS) (no change); replaced the output speed sensor (no change). The PCM was sent to a repair center in Iowa and they replaced the torque converter lockup circuit driver. The problem persists.

I wanted to verify that the problem isn't internal to the transmission, so I wired up a mystery switch and it locks up and drives great for as long as I manually ground that circuit.

I've been running my little scanner on it (a smaller Mac tools unit) but it's doesn't sample fast enough to see any real anomalies other than it's been graphing the heck out of the lockup circuit cutting in and out. I finally got it hooked up to a Solus by Snap-On and it showed up a whole bunch of really strange signals that all drop in and out with the same frequency of the lockup circuit going in and out. The voltage out of the TPS/APPS is rock steady to the engine, but the voltage to the PCM seems to be erratic. The charging system voltage seems erratic also but the symptoms still persist, even with the alternator totally disconnected while driving.

Can I install an "overlay" wire from the APPS directly to the input at the PCM in an effort to rule out a potential harness issue and does that sound like the proper direction to be heading? Is this the classic example of needing a noise filter for the charging circuit?

Update: Today I followed the instructions laid out by Suncoast and split the ground wire from the APPS TPS and ran multiple grounds from the TPS to the battery and from the PCM to the battery. The truck ran great and shifted as designed for nearly one hour. After an extended test drive, just when I thought it was good to go, it started locking and unlocking again.

**Don Fitzwater**

The cause could be due to faulty diodes in the alternator sending dirty AC voltage through the system, the noise filters and splitting up the harness are usually just band aids to fixing the real problem. I know you mentioned disconnecting the alternator, but did you test for AC voltage by chance? It takes very little AC noise to cause a problem. Should be under 0.1 VAC.

**JR**

The noise filter fixed it for my '98.5 for years until I sold it.  
**Regcabguy**

Yes, the alternator was tested while running with a volt meter and it registered .015 volts A/C at all speeds.

**Don Fitzwater**

I installed a noise filter and the results were similar. It ran perfectly for about 2 hours, and then the gremlin reared its ugly head again. I was able to get it to drop out of lock and back in simply by turning the headlights on and off, and also did it a few times by using the turn signal.

Don has done just about everything humanly possible with every conceivable fix.

**AKGriz**

**THE FINAL ANSWER?  
MAYBE, BUT NOT ON SCOTT'S TRUCK**

Alternators are rarely the problem. The system will work fine if the correct wires are isolated. Cut the charge wire where it enters the harness on the passenger side, reroute it across the top of the radiator support and connect where the old one in the harness did. Cut the passenger side battery ground wire that is in the harness and route it across the firewall, keeping it away from other harnesses. It would be a good idea to use shielded wire for the power and ground both at this juncture.

The dirty signals that cause the lockup mode to drop in and out come from the charge and ground wires setting up a magnetic field and inducing garbage signals in the rest of the harness. Age and deterioration of the wires just make it worse. Rerouting those 2 wires should solve 99% of the issues, if everything else is relatively good. Random problems after that frequently end up being the VP44. The electronics are crap and after a time they are causing garbage voltage to feed the PCM because the whole works is in the same harness bundle.

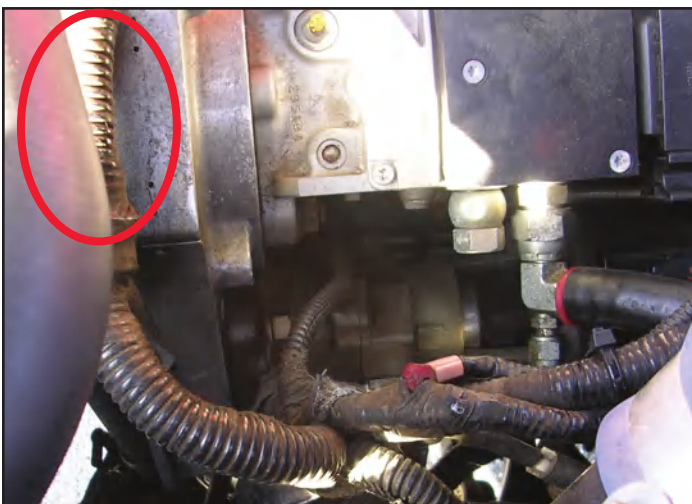
**Cerberusiam**

We left the charge wire alone and pulled the passenger battery small ground (it ties into a bunch of smaller engine grounds directly forward of the injection pump area) apart and started working backwards on the wires. At the driver's side forward corner of the block, we cut open a large splice area. What I found inside made me angrier than any other stupid stuff I've seen Dodge do over the years. There were at least four sensor grounds simply laying on top of the large ground wire and heat shrunk in place. No solder, no crimp connector...no nothing. This was factory wiring. Total garbage.

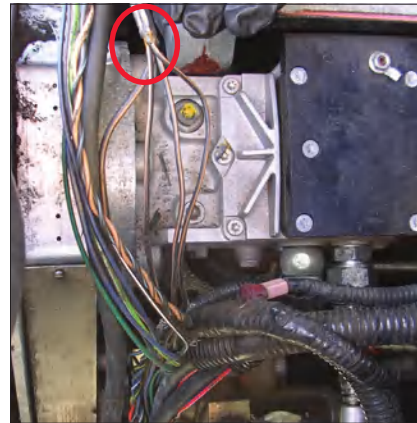
We removed the poor splice and installed some heat shrink butt connectors and added a small length of Ancor brand marine battery cable to the passenger battery connection. The truck has performed flawlessly for about a month now.

This has been one of the worst torque converter lock/unlock problems I've ever contended with. The clue in all of this came when I test drove the truck while using the scope screen on a Snap-On Solus and the voltage readings for every sensor on the engine and transmission were very erratic and what you could call "dirty". I wanted to update anyone interested and Dave (AKgriz) will probably post some photos later. We may even do a quick write-up as this is something you can bet should be looked at on other rigs with persistent lock/unlock gremlins.

**Don Fitzwater**



The "Before" picture. The area Don described runs from the alternator across the top/front of the cylinder head (circled area).



To test the "Final Answer" we cut into this '99 truck's wiring harness. The truck belongs to Geno's Garage employee Scott Sinkinson. We cut off a lot of wiring loom (down in the valley as well as across the front of the engine) to look for poor connections. The connection area is circled.

The above picture showed that we *really* cut into Scott's wiring loom. The actual "four sensor grounds laying on top of the large ground wire" is located just as Don described, forward of the injection pump area. It was easy to spot the wiring junction that Don described. It was not easy to access the wires. While I agree with Don, they are a bundle that is/was heat shrunk together, the bundle is well epoxied, the shrink is epoxied and the wires were air tight. I had to saw sideways through the heat shrink to get down to the wires. The shrink was not "sliceable."



These wires are really secure.

Conclusion: I don't think we have the final answer. Scott and the Geno's staff agreed, his truck's wiring loom was tight and secure. Maybe, maybe if the wires were brittle and you happened to bend them at the junction? We covered the wires back up.

From Issue 99, page 8.

# APPS PROBLEMS

## SECOND GENERATION, 24-VALVE TORQUE CONVERTER LOCK/UNLOCK REVISITED

Thanks to the combined efforts of many, I believe we have finally found the fix for the erratic torque converter lock/unlock (third gear and overdrive) in Second Generation trucks with the 47RE transmission. This problem has been discussed many times in the TDR magazine. However, we sought to discover what causes the converter to unlock backed up by test using a lab scope signal verification prior to and after our fix. To ensure accurate readings we used the same truck, the same shop environment, the same oscilloscope, and the same three people reading the scope. Any questions during our testing were directed to the department chair and senior automotive instructor at the tech school I attend.

We identified the problem as induced voltage noise spikes in the signal wire from the throttle position sensor (TPS) to the ECU. The noise was verified at the JTEC, pin 23 labeled "TPS SENS IN."

In order to track down the problem we had to ensure that all of the following components were in proper operating condition:

- Check voltage, check cold cranking amps, and load test the batteries
- Make sure all grounds are clean and intact, and remember the underdash grounds
- Check brake switch operation
- Check accelerator pedal position switch (APPS)
- Check governor pressure sensor and/or solenoid in the transmission
- Check for any stored codes in either processor.

To test these electrical circuits accurately we used the lab oscilloscope. To replicate our test you will need a factory service manual in order to locate circuits, wires, connectors and processors. Without schematics and a lab scope we would not have been able to accurately choose circuits and view the induced voltage noise spikes in the circuits we tested.

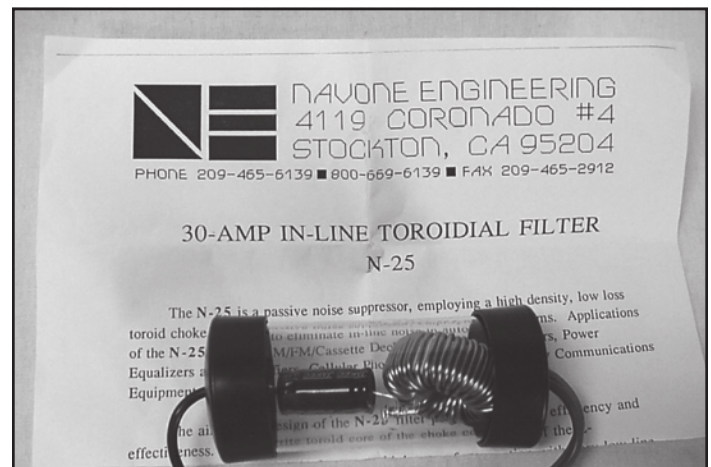
What caused the induced voltage noise? The alternator wire that originates at the alternator, goes across the front of the engine and then goes into the loomed harness that is located on the left side of the engine block. It terminates at the starter. This loom also contains the TPS (all six wires) to ECU wires, eight VP44 wires and many others.

The correction we performed involved taking the twisted wires from the TPS to ECU out of the loom. Before the wires were removed, testing revealed .47 to .48 of a volt spikes on the APPS signal wire. After the wires were removed from the loom, there were no visible voltage spikes on the APPS signal wire.

Another correction technique was described to us by technicians at a local Dodge dealership, assisted by STAR, Chrysler's help hot line for mechanics. In making their repair, they cut four of the six wires from the TPS to the ECU, leaving idle validation wires

alone. Four new wires, 18 gauge, were spliced, using proper soldering techniques and heat shrink. The wires were routed from the TPS to the ECU, well away from the original wiring loom. This procedure may be performed more easily by removing the fuel filter assembly and the air intake assembly. The dealership quoted charges of approximately three hours flat rate for time, plus parts. They stated that the vehicles they have repaired using this procedure have not returned for further work.

A final correction method was provided from a source on the TDR website. I have not tested this fix, but it looks promising. According to the description of the problem and its repair, the noise generated on the TPS signal wire is fed to the ECU, which sends it to the JTEC, which in turn controls torque converter lock/unlock. This fix consists of installing a filter at the JTEC connector C-1, pin 23, an orange/dark blue wire labeled TPS SENS IN. This wire is cut back from the connector, and the filter kit is soldered in place. The red filter wire is soldered to the cut wire on the connector side. The green filter wire is soldered to the cut wire on the harness side. The black filter wire is spliced and soldered to any one of three ground wires on C-1. All splices are secured by heat shrink and taped. It should be noted that the filter kit is not waterproof. The filter kit, with part number N-25, may be sourced through [Navone Engineering](#), telephone number (209) 465-6139.



The Navone Engineering N-25 noise filter kit.

Some final thoughts: We approached this project with service manuals and the proper test equipment. Ensure you do have noise on the circuits that have been discussed. I have enormous hours invested in the research of this problem and I've burned up many dollars in phone calls. My favorite automotive instructor Bob Schultz and two of his senior class students named Bryan and Matt are just a few of the people that have helped me. Use this data that I have taken the time to research and document to save yourself some headaches. My truck is seven years old this month and collectively, we've finally found the solution to the problem.

**David Fettig**  
Moorhead, MN

From Issue 52, page 39.



## POOR DRIVABILITY-INJECTORS?

I was recently contacted by a fellow who owns a '03 six-speed Turbo Diesel with a drivability problem. So-called expert diagnoses by diesel shops had resulted in his spending a lot of money on aftermarket parts that did not fix the problem. He was referred to me for new injectors, as that seemed to be the thing remaining that could be replaced in this "throw parts at it" method of repair. I believe that a big distinction the TDR gives its members, compared to other sources and media, is that we try to solve problems directly. I went for a drive in his truck and it was obvious that there was a huge hesitation around 2000 rpm when going from "cruise" in second or third gear, to "accelerate." Power was down and there was no smoke at all with the stock turbocharger, even with the TST PowerMaxCR on torque/power settings of 5/5. The problem seemed to me to be caused by a bad accelerator pedal position sensor (APPS), not injectors. The owner and I researched the pricing of the APPS and meanwhile I checked his diagnostic trouble codes with my Smarty (from Bob Wagner, 855-456-7627; [www.madselectronics.com](http://www.madselectronics.com)). Sure enough, P2122 "accelerator pedal position sensor 1 circuit low" code came up. Once again the thoughtful TDR approach worked best.

Another source of drivability problems is the fuel control actuator (FCA) on the HPCR CP-3 high pressure pump (Issue 59, page 38). This part costs around \$170 from a Bosch dealer but is easily changed (three T25 Torx-head screws). Rough running, or poor idling with a lot of fuel knock are two symptoms of a bad FCA

*From Issue 60, page 92.*

## '98.5-'03 TORQUE CONVERTER UPDATE

In Issue 56 I wrote two pages about the infamous automatic transmission torque converter lock/unlock problem that plagues many '98.5-'03 Turbo Diesel trucks with the 47RE transmission. Typically the problem is caused by one of two conditions: a faulty accelerator pedal position sensor (APPS); or electrical noise in wiring from the APPS to the truck's powertrain control module (PCM). My article discussed the electrical noise problem and my solution. I offer members a cost-effective noise filter kit (\$35) and I've had great success (as well as a gratifying feeling of helping others) selling these to TDR members. Here is a follow-up story to one of the noise filter kits that I sold.

A member from San Francisco ordered a noise filter kit for his '01 Turbo Diesel. His regard for the truck had been strained by intermittent electrical gremlins for the last several years. The Dodge dealer he uses phoned to say the filter was defective, and to send another. I sent another and it was no good either, they said. After many years of not being able to replicate the customer's problem, they were washing their hands of the customer and the truck. The service manager was amicable and offered to return the "defective" filters. Upon their return they were tested and found serviceable, so I called back to see if I could assist the frustrated TDR member. The service manager recounted the repair history to me verbally. It appears Chrysler authorized a new alternator and the addition of redundant grounds to various engine block and chassis points. They stated the transmission had been in and out of the truck several times as well. Several different valve bodies were tried. The APPS and PCM were changed as well as a myriad of other items.

Feeling sympathy for the customer, I remembered reading a technical article authored by a really sharp diagnostician in his area. So I phoned the shop, Elec Tran Diagnostics (Gilroy, CA, 408-847-3076) and introduced myself. The owner, Jesse Zacarias, asked that I have the TDR member call to schedule an appointment.

A few days later Jesse called me and shared the results. He had found a lot of noise with the oscilloscope on the new alternator (reference my article in Issue 56, pages 144-145). I assisted Jesse's local auto electric rebuilder to source and replace the diode bridge (rectifier), which reduced electrical noise drastically. He also noted that many of the grounds added by the dealer were not good. He corrected them. Jesse did some road testing on many sensors with the multi-channel oscilloscope attached. One of the tests showed that the output shaft speed sensor (on the rear of the transmission housing in the overdrive section) would provide bad signals on an intermittent basis. The output shaft sensor sends the PCM voltage signal data. If it shorts or has a dead spot, it gives a high or low reading and it confuses the transmission shift points and torque converter lockup (reference Issue 55, page 38). This should not be confused with the vehicle speed sensor (input to the speedometer) which is located on the top of the rear differential housing. Jesse stated that the customer's perception of locking/unlocking was the sensor allowing it to downshift from overdrive into drive momentarily, then up-shifting back into overdrive. He replaced the sensor and test drove the truck to validate the repair. He later installed one of the noise filters and returned the truck to the skeptical, but excited, customer. Fast forward to the past winter months and along comes a Christmas card from the still happy customer whose truck now perfectly pleases him (almost 2,500 miles since the repair).

Moral of the story: Don't change parts before utilizing the proper troubleshooting techniques. A shop like Electran is difficult to find. Their skilled technicians were tenacious about troubleshooting. A skilled DIY or electronic technician armed with a quality digital multimeter and a factory service manual can trace problematic wiring harness problems. A good circuit should have less than .5 V (one half-volt) of voltage drop on the power side of a circuit. If it has a greater voltage drop, track down the excessive resistance. Likewise good grounds are important. The ground side of the circuit should have less than .3-V voltage drop. If not, find the source of the excessive resistance in the circuit. In making this repair, a graphing multimeter was necessary to monitor the AC frequency of the speed sensor.

*From Issue 61, p120*

## APPS AND MAP CODES

My '01 Turbo Diesel 2500 has had dead throttle pedal issues off and on, but after I cleared diagnostic trouble code (DTC) P0121, Accelerator Pedal Position Sensor Signal Volts Do Not Agree w/ Idle Validation Signal, and DTC 0237, MAP Sensor/Volts Low, and the companion DTC 1693, they haven't returned in about 500 miles. This morning the check engine light came on and the DTC 0237 has come up. Can the throttle position sensor (TPS) portion of the Accelerator Pedal Position Sensor (APPS) be purchased separately? Should I purchase a MAP sensor too? Are the two codes related? The truck runs fine.

**KevinSmith, Winnemucca, NV**

I went through the same thing and found this information on how to reset and adjust the voltage to agree with Idle Validation. I also had DTC P0121. I have copied and pasted the information for you. This method works.

### Resetting the Accelerator Pedal Position Sensor Second Generation Trucks Only

List of Tools:

- Digital Voltmeter
- No. 1 Phillips
- No. 20 Torx Bit Socket
- 10-mm Socket

A lot of people think that by disconnecting and re-connecting the batteries and stepping on the throttle, it is going to reset the APPS, which is incorrect. It is impossible to adjust your APPS if you do not know where it is supposed to be set which is why you need the voltmeter.

This is the procedure I use to reset the APPS:

With the key on, engine off, probe the APPS wire to check where your voltage is currently set. The best location to probe the wire is on the Powertrain Control Module (PCM), which is located off the passenger side of the firewall.

Look for the C1 connector. The connector is closest to the engine. Find the orange wire with the dark blue tracer, which is pin number 23. The voltage should read somewhere around 0.5 volts. The voltage reading must be written down for later reference.

Turn the ignition switch off.

The APPS sensor is located slightly above and a little to the left of the injection pump.

Remove the black plastic cover that is located by the injection pump. The two screws that are holding the cover are plastic. Do not put any downward pressure on them or you will never get them off. Remove the six 10-mm headed bolts that hold the brackets in place.

Do not remove the cables.

Notice that the APPS is on the back of the brackets that you just removed. It is held in place by two 20 Torx screws. These screws have a small amount of Loctite on them, so use a good socket and gently give a little tap with a hammer before attempting to loosen. Be very careful since these screws strip very easily and you only get one shot at them.

There is a white tag on the APPS that gives the information on what the APPS adjustment should be. After loosening the screws, the APPS can be rotated clockwise and counter-clockwise to get the adjustment needed. The reading at the beginning of the process on connector 1, pin 23, should match the white tag on the APPS—if not, adjust accordingly.

The above information is the correct procedure. To clarify it a little, I will describe my experience:

With the air cleaner box off, the PCM can be seen on the firewall. There are three plugs or connectors and the C1 connector is closest to the engine. I unplugged it and found that the pins are numbered. However, you will be testing the voltage with it connected. I checked continuity between the pin 23 and orange/blue striped wire and I knew I had the correct wire. The wire looked orange with black, but it is the only orange wire on the C1 connector.

With the plug re-connected and the ignition switch on, secure the ground lead on the digital voltmeter to the ground at the battery. Use a needle or safety pin (I have a sharpened piece of music wire) and pierce into the orange/blue striped wire and read the voltage. The voltage is coming from the APPS. Write this voltage down. Later when adjusting the APPS, the voltage will change.

When accessing the APPS, mine only had one screw attaching the plastic. If you have not removed any of these plastic screws before, and if they only turn and do not come out, use a Phillips screw driver and turn the screw. If it doesn't come out, slip a small knife blade or tiny screw driver under the head of the screw and assist it in starting to come out. When the screw or screws are removed, remove the little plastic insert it was screwed into. It will be much easier to replace the cover with the insert(s) out. After the cover is in place, replace the inserts back into the holes after the cover is aligned with the holes on the metal plate and re-install the screw(s).

To remove the cover, pull it away and up and it should come off easily. Visible will be a throttle rod, and if you have the automatic transmission, there will also be two small cables. The top cable is cruise control and bottom is for the transmission. Leave them connected as instructed above. My truck had five 10-mm bolts and one Allen head bolt holding the steel plate in place. I had to use a combination of wrenches to get them out, since there were components in the way. I found a 10-mm deep socket, and 10-mm open-end wrench, and the Allen socket was what worked for me.

With the bolts removed and the plate pulled away, you will see the APPS with the white tag and voltage written on it. Rotate the plate 90 degrees so that the sensor is up and you have good access to the screws. I was confused at first, as I thought I had to take a voltage reading at the sensor, which wasn't true. Only do the adjustment there. The two 20 Torx screws are very tight. Once broken loose, they still turn hard. They won't have to be loosened more than about one turn to get the sensor to move. The adjustment of the sensor may not require more than a ¼-inch. I tried to loosen these screws with a 20 Torx screw driver, but could not budge them. I took a small hammer and gave them a few taps and used a 20 Torx bit socket on a short 3/8-inch drive ratchet and they came loose. Make sure to use a tight fitting bit, or the hole in the screw will be stripped. If that happens, you would have to put it back together without making the adjustment.

## ACCELERATOR PEDAL PROBLEM

With the digital voltmeter connected, watch it while adjusting the sensor. To increase voltage, turn it clockwise. I had to turn clockwise and hold it with pressure as I tightened the screws to get the 0.441-volts. If I adjusted it and tightened the screws, I ended up with only 0.3xx-volts. Try to get the voltage to read the same at the pin 23 wire as the value on the back of the sensor.

Put everything back together and take a test drive.

A DTC PO121 and/or PO122 indicate a voltage problem between the APPS and PCM. If you have those codes, do the adjustment. If not, read the pin 23 pin voltage. If it is a lot lower than 0.5-volts, do the adjustment. If it reads in the 0.5xx range, the problem may be somewhere else.

**MGomez, Fallbrook, CA**

Thanks, MGomez, for the written instructions to adjust the APPS voltage. The procedure worked great. For years, my '99 Turbo Diesel check engine light has come on and gone off at various times and always the same DTC PO122. I checked the voltage as instructed, and it was only 0.466-volts. I adjusted it as instructed and matched the voltage on the back of the APPS of 0.570-volts. I knew if I waited long enough, the problem would be in the TDR, as have so many fixes that have worked for other problems.

**wb6tkr**

I had a check engine light and a dead throttle pedal problem on my '01 Turbo Diesel about 4,000 miles ago. The DTCs were PO121 APPS Voltage Low and 1693, a companion code. I removed the APPS and found the six-plug electrical connector between the harness and the APPS had one pin that was fouled with what looked like oil and dust. The other five pins were clean. I thoroughly cleaned the plug with electrical cleaner and coated the pins with dielectric grease. I cleared the codes and have had no trouble since cleaning the harness plug. It might be worth checking.

**kkreigh, Columbia, MO**

*From Issue 66, p30*

When towing a heavy load at highway speed with my '99 Turbo Diesel 3500 (151,000 miles), the engine suddenly slows and the accelerator pedal becomes stiff. If I disengage the clutch, let the engine speed drop to about 1,000-rpm, then engage the clutch and pull back on the highway, it works fine again. This happens anywhere from every 30 seconds to hours apart and it has been occurring intermittently for about two years. What could be the problem?

**farm hand**

When mine had similar symptoms, the check engine light (CEL) illuminated. It was caused by a failing accelerator pedal position sensor (APPS). I replaced it and had no more problems. I had previously tried replacing the manifold air pressure sensor (MAP) and intake air temperature sensor (IAT) which did not help.

**Bob Cochran, Concho, AZ**

It sounds like you may have a failing APPS. Mine failed similarly. At first the problem was intermittent and then one day the engine would only idle. The accelerator had no affect on engine speed. There are posts on TDR Forum on how to check your APPS. Keep in mind that the instructions are truck specific by engine number in '99.

If it is cruise control related, check the brake light switch. It has two separate contacts, one for lights and one to disengage the cruise control. It is common for the cruise contacts to fail. The switch is easily replaced.

**JAIford, Lebanon, OH**

Everyone I talked to about my problem said it could be the APPS or the injection pump. I checked the voltage to the APPS and it was low. I adjusted it as instructed in TDR Issue 66, page 30. If that doesn't work, I will purchase new APPS. Thank you for your help. It is nice to get information from people who have solved problems like mine.

**farm hand**

If you need an APPS, contact Timbo at: [www.dodgecumminsapps.com](http://www.dodgecumminsapps.com). He has the best price for a replacement.

**SHuber**

I recently installed Timbo's APPS on my '99 Turbo Diesel 2500. It runs great now. The price was \$160 and a little of my labor is much better than buying the whole unit.

**Soot4Life, San Diego, CA**

*From Issue 68, p29*

# SHIFT PROBLEMS

## 47RE TRANSMISSION PROBLEM SOLVED, THANKS TDR

Recently, the 47RE automatic transmission in my '99 Turbo Diesel 2500 delayed the first 1-2 shift and I had to lift the accelerator pedal to get it to shift. After the first shift it was fine. A couple of days later, it wouldn't shift at all and stayed in first gear.

I went to the TDR forums and started searching. I found a thread by TDR member ISBPilot saying that if the problem is electronic and that if I unplug the transmission relay in the box under the hood, I will be able to shift the transmission manually. I unplugged the relay and I could manually shift the transmission. Then I found several threads suggesting the problem could be the governor regulator/pressure switch or the output shaft speed sensor. The speed sensor is external, behind the pan on the driver's side, and it is easy to replace. So, I started with the speed sensor. I checked the sensor's resistance (sources said it should be between 600 and 1200-ohms). My sensor resistance was open. A call to the Dodge dealer and \$21 later my transmission is good to go. TDR members are an amazing resource. Thanks TDR.

**tking, Wakarusa, IN**

The transmission in my '98 Turbo Diesel 3500 had the same symptoms. Like you, using the information I found here, I solved my transmission shifting problem with the same part.

**John - K5AWO, Mesa, AZ**

In a side story, I had a problem that wasn't related to a transmission, but an ABS rear sensor that checked open that should have had 1800 ohms resistance. I can't add up how much the TDR web site has saved me in money spent for simple repairs. Information on additional buying sources for spare/replacement parts is another benefit that I could never find in one place like the TDR. It's worth the membership price. A good friend questioned why I would spend time on the internet or the magazine for my truck. I knew I'd never get him to understand, so I gave up.

**rotohead, Reno, NV**

For anyone with the ability to use a Crescent wrench, the membership in TDR is paid for many times over. I've saved plenty over the years. You guys are a great resource!

**mhenon, Austin, TX**