



Specialized High Performance Accessories for your Dodge/Jeep, Ford, and GM Vehicles

---

## SpeedTweaks - Tips and Tricks (Dodge)

---

### How to Reset the PCM

- Disconnect NEG Battery Terminal
  - Turn the ignition key to the START position and hold for 15-20 seconds
  - Release key (OFF) and reconnect the battery
- 

### When should I reset the PCM?

If you change items such as the Throttle Body, Headers, Ignition System (or any internal parts with aftermarket, performance parts), then you should reset the PCM. Items such as: Plug Wires, Cap, Rotor, Spark Plugs, Muffler, and Air Filter (not intake...filter) don't require this at all. The PCM will gradually relearn as you drive anyway...that takes about 200 miles for a complete long-term learn.

---

### How to Clean the IAC Solenoid

This is recommended at every Tune-Up to prevent excess carbon buildup on the IAC plunger. In some cases, you'll notice a slightly erratic idle quality. This is the first step in taking care of that problem. IAC = Intake Air Control (Solenoid).

- Remove the Air Hat from the Throttle Body
  - Disconnect the sensor harness from the IAC Solenoid (Rear of Throttle Body)
  - Remove the two Torx-25 Screws
  - Remove the IAC Solenoid (Be care ful not to lose the rubber O-Ring)
  - Spray some Carb/TB Cleaner in the IAC port on the Throttle Body and let it sit
  - Spray some Carb/TB Cleaner on the tip of the IAC Solenoid and wipe clean (Do NOT forcefully twist or push the plunger - You will damage the Solenoid. Wipe very gently.)
  - Spray a little bit more Carb/TB Cleaner in the IAC port on the Throttle Body and wipe clean with a thin/lint-free rag
  - Reinstall the IAC Solenoid (Make sure you don't lose the rubber gasket on the solenoid)
  - Reinstall the sensor connector and airhat
  - Start the engine and let idle for about 1 minute.
-

## How to clean your Throttle Body

Most people think that cleaning the throttle body requires a can of Carb/Throttle Body Cleaner and a quick "wash" of the bores. This may work, but only washes the dirt and cleaner down into your intake manifold where it can puddle up and break down the belly-pan gasket. Then, it also is pulled into the combustion chamber where it can foul up the spark plugs.

The proper way to clean your throttle body is to remove it from the engine (you'll need a small pan, some compressed air, and a new throttle body gasket for this procedure):

1. Remove your air hat from the throttle body
2. Disconnect the sensor connectors (TPS, MAP, and IAC)
3. Remove the four throttle body bolts
4. Lift the throttle body up and away from the intake manifold (place a rag over the manifold opening to prevent anything from falling inside)
5. Remove the three sensors (Do not drop them)
6. Remove the three screws for the throttle linkage (Not required...can be done with linkage attached)
7. Place the throttle body in a small pan and spray Carb/Throttle Body Cleaner in the bores, underside passages, and ports. Let soak for about a minute.
8. Clean the IAC Solenoid - Refer to "[How to clean the IAC Solenoid](#)"
9. Spray some more Carb/Throttle Body Cleaner in the bores and ports of the throttle body
10. Wipe clean with a lint free rag (baby diaper works well) and blow out all the ports with some compressed air (a small can from an electronics store works just fine).
11. Reinstall all sensors, then reinstall on your vehicle with a new Throttle Body gasket (don't forget to remove the rag)

---

## Initial Performance Recommendations

Always start with the basics first. Your engine (no matter who built it) is an air pump (plain and simple). The more efficiently you get the air in and the more efficiently you get it out, the more power you'll make. Simple Intake and Exhaust modifications are always the least expensive route and can even increase your fuel economy. Not to get into the technical details, here's a simple list to follow:

- Install a Cold Air Kit (K&N, Intense Performance, PaceSetter, etc.)
- Install a Performance Muffler (Flowmaster, Dynamax, and Gibson are just three of many out there)
- Install a 180 Degree Thermostat (Keeping the engine slightly cooler makes more power. The factory 195+ T'Stats are mainly for emissions purposes)
- A good set of Spark Plug wires, Brass Contact Cap and Rotor, and a quality set of plugs will always help out your ignition system (DIS, or "Distributor-Less" ignition systems not included in this recommendation)
- Run a quality fuel. Chevron or Exxon are good choices...just stay away from the "Mom and Pop" stations. Putting old or dirty fuel in your tank won't help your engine. Also, try to stay away from your favorite gas station when they're filling up the tanks. Any sediment on the bottom of the tank will be mixed in with the new fuel and may get into your tank.

Those are just the basics. There are many options on ignition systems, throttle bodies, headers, etc., but it all comes down to "What goes in, must come out". Take care of that department first and you're on your way to making more power.

---

## Oil Recommendations

There's a lot of "Hocus Pocus" on who's oil is better and Synthetic vs. "Dino" Oil. We've run Redline, Royal Purple, Amsoil, Mobil-1, Castrol, Valvoline, and a few others just to see what would happen. What ultimately happened was that we were a few dollars shorter in our pocket book...*with the exception of the Royal Purple oil (mileage went up .5mpg and overall engine operation was much smoother and more responsive)*. If you change your oil at the recommended intervals (normally 3500-5000 miles), a good Non-Synthetic oil won't hurt your engine one bit (unless it's low-grade "El-Cheapo" oil). If you want those last few HP out of your engine or race your vehicle every weekend, switch over to Synthetic Oil. It will last slightly longer in your engine but does cost more than regular oil. Which do we recommend? We're not going to recommend any since it causes problems between vendors and personal preferences.

---

## Spark Plug Recommendations

While the factory and factory replacement spark plugs work, the Magnum engines have shown slightly better performance with the Autolite 3923 Spark Plugs. The Autolite 3923's are a standard tip spark plug that is one heat range colder than stock, as compared to the extended "Special Power Tip" plugs that the engine came with. Why the difference? A standard tip plug is less susceptible to detonation, is a good replacement for modified Magnum engines, and work very well with modified engines as well...especially when using Nitrous or a Supercharger. In some cases, the Autolite 3923's also showed a **4-5HP** difference at the rear wheels on the Dyno. (The test was performed with new OEM Spark plugs vs. the Autolite 3923's. No changes to the engine and the plugs were tested on the same day under the same conditions.)

---

## O2 Sensor Replacement

The O2 sensor(s) on your vehicle are designed to sense Oxygen in the exhaust stream. When they sense too much "air", they richen up the mixture and when they don't sense enough "air", they lean out the fuel mixture. Under normal conditions, they should last you 60-80K miles. However, we all drive in varying traffic conditions so the life of the O2 sensor is diminished. We recommend that you change the O2 sensor(s) every 60K miles to keep your engine running in optimal condition. (This includes the regular service intervals and tune-up schedules.)

---

## Which exhaust system is better?

Many people have debated this and a lot of it has to do with loyalty to a company label. We have personally run Dynomax, MagnaFlow, Flowmaster, Ravin, JBA mufflers and exhaust systems, and found that the single exit systems were slightly better than the dual exit systems...on the Dyno and at the track. The reason for this is that on a single exit system, the exhaust pulses don't fight each other on the exit.

They all sounded good, all performed much better than stock, and all had a slightly different price tag on them. Which one should you use? The one that sounds and looks the best to you. We all have different tastes when it comes to our idea of what sound good so base your opinion on the sound quality...not the advertised flow ratings or who sponsors what race.

A brief note on the advertised flow ratings of mufflers: Mufflers are rated on a Flow bench. This uses a regulated flow rather than the random pulses found in the exhaust stream which doesn't say anything in regards to the performance quality on street driven (or weekend racer) vehicles. So why buy a 1000+CFM

muffler that you can see through rather than the chambered style? If you want to spend the money, like the sound, and own a race car (Bracket, Drag, etc.)...by all means, go for it. Just remember, just because you can see through it doesn't mean its any better than a chambered.

---

### **Ignition Systems (MSD)**

Most people choose the MSD Ignition Systems as their "High Performance" ignition system. There's nothing wrong with them and the only reason we don't provide the MSD systems on this site is that MSD doesn't seem to want to work with the smaller shops on pricing. If you do decide to run with the MSD system, make sure that you get the following parts with your order:

- MSD Tach Adapter Harness - P/N# 8910. It prevents Code-43 from tripping in the PCM. "Diagnostic Trouble Code P0351 Ignition Coil A Primary/Secondary Circuit Malfunction, Peak Primary circuit current not achieved with maximum dwell time."
  - MSD Universal Harness - P/N# 8873. It minimizes the excessive cutting of the factory wiring harness.
- 

### **Ignition Systems (Accel)**

The Accel 300+ System is a complete "Plug and Play" system but does require a few pieces if you only choose to run with the Accel Coil that's designed as a factory replacement fit (#140021). You'll need to pick up the adapter harness for the '98 and newer Dakota/Durango/Ram Trucks. The part number is: 140021AH. *This coil and adapter is included in the Accel 300+ Digital Ignition System Kit for the Dodge trucks.*

---

### **"Budget Modifications" for your V6/V8**

- Build yourself a "Home -Brew" 3" Intake system from Black Plastic tubing found at Home Depot and grab a Fernco rubber coupling (to attach to your airhat) - \$10 approximately
- Add a 6x9" K&N Cone Filter - \$35 approximately
- Remove the rubber flap on the passenger-side/radiator support (adds cold air to the intake) - FREE
- 180 Degree Robert Shaw High-Flow Thermostat - \$9 approximately
- Relocate IAT Sensor into the intake tube - FREE (or use the IAT Adjuster from SpeedTweaks - \$35)
- Readjust TPS Sensor to .7v ([see below](#))
- DynoMax Super-Turbo or MagnaFlow (#12256) - Single 2.5" IN/OUT (Replaces factory muffler) - \$100 Installed approximately (Parts + Labor)

Total cost of the modifications listed is around \$150-\$200. You can also add a V6 to V8 Throttle Body conversion kit to your V6 for an extra \$210 + Shipping...we carry the kits in stock.

---

### **Poor idle with big cam (Less than 112 degrees on Lobe Separation)**

If you install a larger cam that has a Lobe Separation of less than 112 degrees, you will notice a very poor idle (sometimes dies at the light) and running too rich at idle as well. This is caused by the MAP signal being too low due to the cam. The MAP vacuum at idle (with a stock cam) is 12-13" at the MAP port on the throttle body. With a larger cam, that has a 108-110 degree Lobe Separation, the vacuum at the MAP port is 6-8". This is too low and will cause poor idle qualities. Also...make sure you set the distributor in properly as there is only ONE WAY that is correct. Set the distributor index (fuel sync) at 4 (+/-1) after the initial break-in (fire up).

Plug the MAP port on the throttle body and relocate the MAP line to manifold vacuum (should be about 12-13" at idle). This will simulate the factory signal and your idle quality will be back to normal. There is no adverse affect on the cruise or WOT performance with this modification.

Recommendation: Select a Cam with 112-114 degrees Lobe Separation. They are MAP friendly.

---

### **4.7L Throttle Body Swap**

For those who don't know, the 4.7L comes with two flavors of throttle bodies. The '99-'00 models use a 65mm and the '01 models use a 68mm throttle body. You can easily swap out the later model 68mm throttle body for your performance-limiting 65mm without any problems. You can tell which one you have by looking at the stamped number on the throttle plate. "65" = 65mm / "68" = 68mm

---

### **Throttle Body Spacers (Primarily the "Helix" style)**

These spacers do not provide any gains in HP at all. They claim to increase TQ and MPG but we tested one and it gained nothing. The Dyno showed no gains in HP or TQ. We also had contacted one of the manufacturers for their comments on them and here's the direct quote (from email):

-----

From: AirAid Info  
Subject: Re: AIRAID.COM Contact Form  
Date: Fri, 09 Mar 2001 09:20:36 -0700

Dear Sir, thank you for your inquiry in our products. The spacer makes no HP on the Dyno. It makes all of it's power in torque in the low end. If you haven't noticed any power on the Dyno or the track then it's doing what it's supposed to. You would not see any gains down the 1/4 mile or increases on the Dyno. The idea of the spacer is to improve overall drivability and fuel mileage. In most cases when people install a bolt on part they expect better mileage and power, what happens is they are into the throttle a lot more than before trying to test performance and that's when the decrease in mileage happens.

Sincerely,

<Airaid Technician>

-----

Points to look at:

- *"The spacer makes no HP on the Dyno. It makes all of it's power in torque in the low end."*
- *"If you haven't noticed any power on the Dyno or the track then it's doing what it's supposed to."*
- *"The idea of the spacer is to improve overall drivability and fuel mileage."*

So...it doesn't make any more HP, is not supposed to help in 1/4 mile performance (or on the Dyno), and is mainly for mileage and bottom end Torque. Well, Dyno's show TQ figures and there were no changes, mileage stayed the same, and 1/4 mile performance wasn't affected on the several others who have tried it (including us). They also are still not able to explain how the spacer keeps the swirl effect through the two turns (90 degree and 45 degree) in the intake plenum of the Dodge Ram/Dakota/Durango manifolds.

While the Throttle Body Spacer showed no gains on the 3.9/5.2/5.9L Magnum engines, the 4.7L engines have been reported to show noticeable gains from the spacer. Why? It's a much more efficient intake system with less restrictions than the Magnum engines. It may work just fine for the 4.7L crowd but we'll look into this at a later date for Dyno and long term MPG testing.

---

### **Which Thermostat temperature should I use?**

The Magnum engines respond very well to a 180 degree thermostat. The factory thermo stat is a 195 degree which is great for emissions but not so great for performance. Changing it out to a 180 degree model will keep the engine slightly cooler which will help make more power. Please be aware that just swapping the thermostat, without any other modifications, won't gain you a whole lot of extra power. All modifications work together and most will complement each other. Example: 180 T'Stat used with a Cold Air Kit, Headers, and a good Cat-Back system. The 180 degree thermostats will not affect your emissions output either.

---

### **What Gap to set your Sparkplugs at:**

This is a common question with an easy answer. Whatever the factory recommends for the stock ignition system on your vehicle.

If you are running an aftermarket coil and/or ignition system (MSD, Accel, etc.), normally you can open the gap up by .005" - .010" more than factory specifications. However, with Supercharging or Nitrous applications, you would want to reduce the gap about .005" due to the higher cylinder pressures that occur with both Superchargers and Nitrous. If you plan on using the Autolite 3923 sparkplugs in your Magnum engine, stick with the same guidelines.

---

**Open and Closed Loop Operation:**

There are 7 different modes (conditions) that are used (besides Key-ON and Key-Off mode). Here is a table of what sensors are monitored and what determines the mode. One thing to remember, under OPEN LOOP Operation, the O2 Sensor(s) are ignored by the PCM.

<p><b>Engine Start-Up Mode (OPEN LOOP)</b>          Battery Voltage          Coolant Temp          Crank Position          Intake Air Temp (IAT)          MAP          TPS          Starter Motor Relay          Cam Position</p>	<p><b>Engine Warm-Up Mode (OPEN LOOP)</b>          Battery Voltage          Coolant Temp          Crank Position          Intake Air Temp (IAT)          MAP          TPS          Cam Position          Park/Neutral Safety Switch (Automatics Only)</p>
<p><b>Idle mode (Once at Operating Temp: CLOSED LOOP)</b>          A/C Select (if equipped)          A/C Request (if equipped)          Battery Voltage          Coolant Temp          Crank Position          Intake Air Temp (IAT)          MAP          TPS          Cam Position          O2 Sensors          Park/Neutral Safety Switch (Automatics Only)</p>	<p><b>Cruise Mode (CLOSED LOOP)</b>          A/C Select (if equipped)          A/C Request (if equipped)          Battery Voltage          Coolant Temp          Crank Position          Intake Air Temp (IAT)          MAP          TPS          Cam Position          O2 Sensors          Park/Neutral Safety Switch (Automatics Only)</p>
<p><b>Acceleration Mode (OPEN LOOP)</b>          A/C Select (if equipped)          A/C Request (if equipped)          Battery Voltage          Coolant Temp          Crank Position          Intake Air Temp (IAT)          MAP          TPS          Cam Position          Vehicle Speed Sensor          Park/Neutral Safety Switch (Automatics Only)</p>	<p><b>Deceleration Mode (OPEN LOOP)</b>          A/C Select (if equipped)          A/C Request (if equipped)          Battery Voltage          Coolant Temp          Crank Position          Intake Air Temp (IAT)          MAP          TPS          Cam Position          Park/Neutral Safety Switch (Automatics Only)          Vehicle Speed Sensor</p>
<p><b>Wide Open Throttle - WOT (OPEN LOOP)</b>          Battery Voltage          Coolant Temp          Crank Position          Intake Air Temp (IAT)          MAP          TPS          Cam Position</p>	

## Will aftermarket parts void my warranty?

This is a common question with an easy answer: NO.

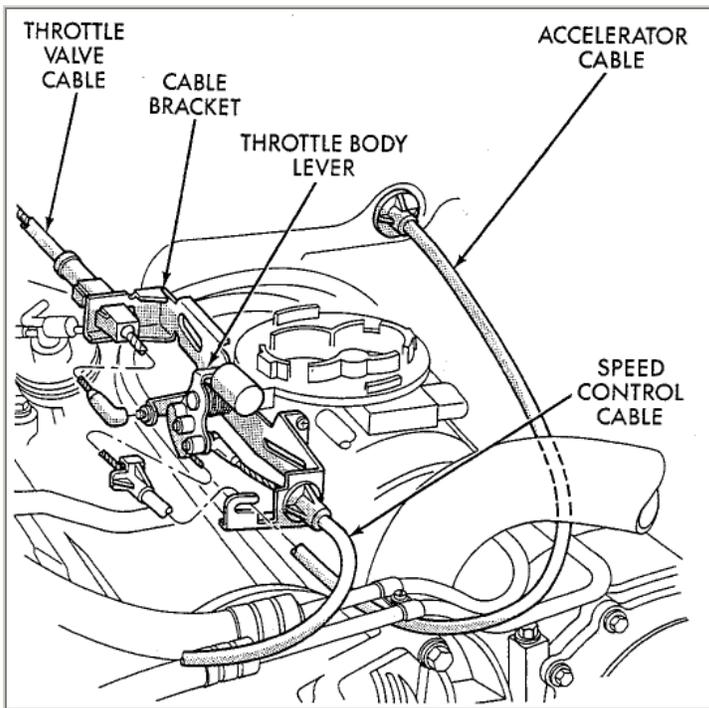
Federal law sets forth requirements for warranties and contains a number of provisions to prevent vehicle manufacturers, dealers and others from unjustly denying warranty coverage. With regard to aftermarket parts, the gist of the law is that warranty coverage cannot be denied simply because such parts are present on the vehicle, or have been used. ***The warranty coverage can be denied only if the aftermarket part caused the malfunction or damage for which warranty coverage is sought.*** Disputes in this area usually boil down to arguments over facts and technical opinions, rather than arguments over interpretations of the law.

You can read more about this at: <http://www.sema.org/warranty>

---

## TV Cable Adjustments (V6/V8 Magnum Engines)

**\*\* Does not apply to the 4.7L Engine as it is electronically controlled \*\***



### GENERAL INFORMATION

The transmission throttle valve is operated by the valve body throttle lever. The throttle lever is actuated by a cable connected to the engine throttle body lever. A lock button at the engine end of the cable provides for cable adjustment.

A correctly adjusted throttle valve cable will cause the throttle lever on the transmission to move simultaneously with the throttle body lever from the idle position. Proper adjustment allows simultaneous movement without causing the transmission throttle lever to move ahead of, or lag behind the throttle body lever.

## CHECK

1. Turn ignition key to OFF position.
2. Remove air cleaner.
3. Verify that throttle body lever is at curb idle position. Then verify that transmission throttle lever is also at idle (full forward) position.
4. Slide cable off attachment stud on throttle body lever.
5. Compare position of cable end to attachment stud on throttle body lever:
  - a. Cable end and attachment stud should be aligned (or centered on one another) to within **1 mm (0.039 inch)** in either direction.
  - b. If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in following procedure.
6. Reconnect cable end to attachment stud. Then with aid of a helper, observe movement of transmission throttle lever and lever on throttle body.
  - a. If both levers move simultaneously from idle to half-throttle and back to idle position, adjustment is correct.
  - b. If transmission throttle lever moves ahead of, or lags behind throttle body lever, cable adjustment will be necessary. Or, if throttle body lever prevents transmission lever from returning to closed position, cable adjustment will be necessary.

## PROCEDURE

1. Turn ignition switch to OFF position and shift into Park.
2. Remove air cleaner.
3. Disconnect cable end from attachment stud on throttle body.
4. Verify that transmission throttle lever is in idle (full forward) position. Then be sure lever on throttle body is at curb idle position.
5. Insert a small screwdriver under edge of retaining clip and remove retaining clip.
6. Center cable end on attachment stud to within **1 mm (0.039 inch)** and release cable button.
7. Install retaining clip onto cable housing.
8. Check cable adjustment. Be sure transmission throttle lever and lever on throttle body move simultaneously and as described in cable adjustment checking procedure.

---

### Alternative connections for your A/F Meter

Most people will drill a hole in their floor board to install the wire from their Air/Fuel Meter to the O2 sensor (in front of the Catalytic Converter). First of all, you don't need to drill any holes at all. Second, you can use the wire harness at the PCM instead for a cleaner installation. On the '97 - '99 Dodge Dakota models, it's the 18ga. Orange w/Tan stripe wire. This is for the forward O2 signal to the PCM. Just carefully strip away a small section of the insulation from the Orange/Tan wire and, preferably, solder the A/F Meter signal wire to it. Then, put a small dab of silicone over the solder joint and tape it back up with your favorite electrical tape.

**However, the best way still is to connect an Air Fuel meter is with it's own O2 sensor.**

---

## **Crower Rocker Arm Installation**

- Disconnect coil wire. Remove air cleaner and inlet hose. Clear a path to remove the valve covers
- Remove spark plug wires and valve cover hold down bolts.
- Remove valve covers. Clean them and set them aside.
- Remove stock rockers, leaving pushrods in place. Don't let pushrods drop down into engine.
- Install Crower studs (#88416 for V6, V8, V10 Magnum / #88417 for V10 Viper).
- Torque studs to 20-24 ft lbs for #88416 or 30-38 ft lbs for #88417.
- Install Crower rockers arms and sure-lock nuts. Make sure that the pushrods are still seated in the tappets. **DO NOT TIGHTEN DOWN NUTS.**
- Turn engine over (may require another person) so that cylinder you're adjusting has both the intake and the exhaust lifters on base circle of cam (rocker arms should be level to each other).
- Adjust sure-locks down until clearance at pushrod is zero, then crank down sure-lock a 1/2 to 3/4 turn.
- Lock down Allen-head screw into sure-lock nut.
- Repeat steps rocker adjustment on each cylinder individually.
- When all cylinders are adjusted, pre-lube the rockers with engine oil.
- Reinstall valve covers and valve cover bolts.
- Disable distributor and turn engine over to pump up hydraulic lifters. Enable distributor.
- Start engine and let idle at normal speed.

Note: Initial fire-up may produce tappet noise for a short period of time until lifters have a chance to adjust themselves. If tappet noise continues for more than 30 seconds, shut engine off for about 2 minutes. Start engine again and let idle. Tappet noise should be going away or be gone. Caution: If after 3 or 4 starts and stops (with 2 minute intervals in between) the tappet noise is still there, repeat the rocker arm adjustment steps.

Test drive vehicle, keeping the engine below 4500 rpm for the first 50 miles to allow proper rocker break-in and allow the vehicle's computer to adjust to the new modifications.

V10 Magnum: Must remove upper half of intake manifold. Requires new upper plenum gasket (#530006838). If you have any questions regarding installation, do not hesitate to call Crower's Tech Line at 619-422-1191.

---

## **What Flowmaster is best for my V6?**

You have several options on the V6 from Flowmaster for custom exhaust systems:

Flowmaster 50-Series SUV: 525552 (2.5" IN/Dual 2.25"OUT)  
Flowmaster 50-Series SUV: 52555 (Single 2.5" IN/OUT)  
Flowmaster 50-Series Performance: 425502 (2.5" IN/Dual 2.0" OUT)  
Flowmaster 40-Series Performance: 42540 (Single 2.5" IN/OUT)  
Flowmaster "Delta-Force" Series: 425509 (Single 2.5" IN/OUT)

---

## How to bleed the Brake System (Base Instructions)

Use Mopar brake fluid, or an equivalent quality fluid meeting SAE J1703-F and DOT 3 standards only. Use fresh, clean fluid from a sealed container at all times.

Do not pump the brake pedal at any time while bleeding. Air in the system will be compressed into small bubbles that are distributed throughout the hydraulic system. This will make additional bleeding operations necessary.

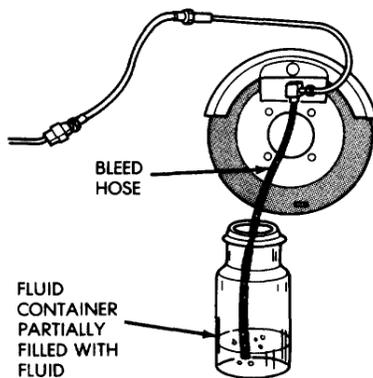
Do not allow the master cylinder to run out of fluid during bleed operations. An empty cylinder will allow additional air to be drawn into the system. Check the cylinder fluid level frequently and add fluid as needed.

Bleed only one brake component at a time in the following sequence:

- Master Cylinder
- Combination Valve
- Rear Antilock Valve
- Right Rear Wheel
- Left Rear Wheel
- Right Front Wheel
- Left Front Wheel

## MANUAL BLEEDING

1. Remove reservoir filler caps and fill reservoir.
2. If calipers or wheel cylinders were overhauled, open all caliper and wheel cylinder bleed screws. Then close each bleed screw as fluid starts to drip from it. Top off master cylinder reservoir once more before proceeding.
3. Attach one end of bleed hose to bleed screw and insert opposite end in glass container partially filled with brake fluid. Be sure end of bleed hose is immersed in fluid.
4. Open up bleeder and then have a helper press down the brake pedal. Once the pedal is down close the bleeder. Repeat bleeding until fluid stream is clear and free of bubbles. Then move to the next wheel.



## **PRESSURE BLEEDING**

Follow the manufacturer's instructions carefully when using pressure equipment. Do not exceed the tank manufacturer's pressure recommendations. Generally, a tank pressure of 15-20 PSI is sufficient for bleeding.

Fill the bleeder tank with recommended fluid and purge air from the tank lines before bleeding.

Do not pressure bleed without a proper master cylinder adapter. The wrong adapter can lead to leakage, or drawing air back into the system. Use adapter provided with the equipment or Adapter 6921.

---

## **I want to run Nitrous on my V6/V8**

You can run a basic Nitrous system (NX preferred for the Mopar Magnums) without any modifications but the recommended modifications will provide you with not only better all around performance, but also improved performance with the Nitrous.

- Cold Air Intake System (K&N Gen-II or Intense Performance)
- Modified Throttle Body (48mm Flometrics or Fastman V6 - 50-52mm for V8)
- Headers (JBA/Mopar)
- A good flowing cat-back system (Gibson, Flowmaster, Dynomax, etc.)
- 180 Degree thermostat
- One heat range colder spark plug (Autolite 3923 - Gapped at no more than .038" for Nitrous. Can use Autolite 3922's as well)
- A good ignition system (at least replace the factory coil but MSD preferred - You WILL need a timing retard system for anything higher than 100HP on a V6/V8.

Those are the modifications that will not only pep up your stock V6/V8, but will also help the Nitrous work much more efficiently. Adding Nitrous to a stock intake, exhaust is not going to give you the full effect/performance...but it will "work".

---

## **Can I Adjust my Ignition Timing?**

Simple answer...NO. The base (initial) ignition timing is NOT adjustable. Do not attempt to adjust ignition timing by rotating the distributor. All ignition timing functions are controlled by the Powertrain Control Module (PCM).

A DRB-III or equivalent scan tool may be used to verify base timing and electronic timing advance. Refer to the Scan Tool instructions for procedure. Fuel synchronization can be verified and set by rotating the distributor. Refer to the Distributor Removal/Installation/Checking Distributor Position.

Some people have modified their crank position sensors to allow for minor timing adjustments...this is NOT an easy modification and requires a scanner to get the timing set properly. We do NOT recommend this at all.

---

## **Distributor Indexing - Without using a Scanner**

*(We highly recommend setting the Fuel-Sync with a scanner but this will work for an initial setting)*

### **SYMPTOM/CONDITION:**

Vehicles may exhibit surging, light bucking, or intermittent engine misfiring. This will most likely occur when the vehicle is at operating temperature, and under a light load at approximately 2000 RPM. This condition may be caused by a mis-indexed distributor. The following procedure is an alternative to the indexing procedure outlined in the service manual.

### **REPAIR PROCEDURE:**

This procedure outlines an alternative distributor indexing procedure.

Connect a voltmeter to the distributor sensor connector by removing the end seal and carefully back probing the connector. Connect the positive lead to the sensor output pin (pin 3, either a tan wire with a yellow tracer or a gray wire, depending on vehicle application). Connect the negative lead to the sensor ground pin (pin 2, a black wire with a light blue tracer).

Rotate the engine clockwise as viewed from the front, until the number one piston is at Top Dead Center (TDC) of the compression stroke. The timing mark on the vibration damper should line up with the zero degree

(TDC) mark on the timing chain case cover.

Continue to rotate the engine slowly clockwise until the V6 or V8 mark (depending on engine type) lines up with the zero degree (TDC) mark on the timing chain case cover. The V8 mark is 17.5° after TDC and the V6 mark is 147° after TDC. **NOTE: DO NOT ROTATE THE ENGINE COUNTER CLOCKWISE. IF THE ENGINE IS ROTATED BEYOND THE MARK, RETURN TO STEP 2 AND REPEAT THE PROCEDURE.**

Loosen the distributor clamp bolt.

With the ignition switch in the ON position, rotate the distributor slightly in either direction until the voltmeter switches between the sensor transition point of 0 and 5 volts.

Adjust the distributor as close as possible to either side of this transition point and tighten the distributor clamp bolt to 19-26 N-m (170-230 in.lbs.) .

---

## Electrical - Multiple Systems Inoperative

NO: 08-10-98  
GROUP: Electrical  
DATE: Mar. 13, 1998

SUBJECT:  
G202 Ground Diagnosis

MODELS:  
1997-1998 (AN) Dakota  
1998 (DN) Durango

### DISCUSSION:

Inspect the G202 ground connection when multiple electrical complaints are encountered, such as the following:

- Blower Motor Inoperative
- Power Door Locks Inoperative
- Dome Light Inoperative
- Chime Inoperative
- Keyless Entry Inoperative
- Cigar Lighter Inoperative
- Power Outlet Inoperative
- Console Lights Inoperative
- Radio Inoperative
- Overhead Console Inoperative
- Instrument Cluster Gauges Inoperative

The G202 ground connection uses the same bolt that secures the right and left lower instrument panel to the side cowl panel (Figure 1). After verifying that the mating surfaces of the ground connections are good, re-torque both right and left lower instrument panel bolts to 28 N.m (250 in. lbs.).

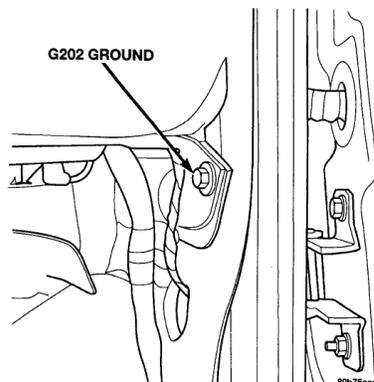


FIGURE 1 - G202 Ground  
(Right Side Shown)

## **How to check codes on a 1997 Dodge**

### **OBTAINING DTC'S USING MIL LAMP**

Cycle the ignition key On-Off-On-Off-On within 5 seconds.

Count the number of times the MIL (check engine lamp) on the instrument panel flashes on and off. The number of flashes represents the trouble code. There is a slight pause between the flashes representing the first and second digits of the code. Longer pauses separate individual two digit trouble codes. An example of a flashed DTC is as follows:

Lamp flashes 4 times, pauses, and then flashes 6 more times. This indicates a DTC code number 46.

Lamp flashes 5 times, pauses, and flashes 5 more times. This indicates a DTC code number 55. A DTC 55 will always be the last code to be displayed. This indicates the end of all stored codes.

### **OBTAINING DTC'S USING VEHICLE ODOMETER**

Cycle the ignition key On-Off-On-Off-On within 5 seconds.

After a short pause, the mileage shown on the vehicles digital odometer will be temporarily deleted. After this occurs, read the DTC number displayed on the odometer. Each two-digit number will be displayed with a slight delay between numbers.

A DTC number 55 will always be the last code to be displayed. This indicates the end of all stored codes. After code 55 has been displayed, the odometer will return to its normal mode.

---

## **How to check codes on a 1998 Dodge**

There is no way to check codes on a 1998 Dodge without the help of a Scantool. We recommend the following tools:

### Actron

Kal Global OBD II Code Reader - KM9040

Kal Global OBD II Scan Tool - KM9620

### Ease

Standard PC, Laptop, Wireless, PDA OBD-II Scantool

### OBD-2

OBD-II On Board Diagnostics Phase 2 Browser (1996+ Vehicles - Requires Laptop)

### SnapOn

MT-2500 Series Computer Diagnostics Scanner (Our Personal favorite but expensive)

### Top

---

## How to check codes on a 1999 Dodge

The 1999 Dodge Dakota shop manual, page 8E-6 has the following self diagnostic test that checks the instrument cluster and CCD data bus message-controlled indicator lamps, for the other codes a DRB scan tool is required.

**NOTE: If the ignition switch is turned to the off position during this test, or if a Vehicle speed message indicating the vehicle is moving is received from the PCM on the CCD data bus during the test, repeat test if required.**

### This is one continuous test

1. Ignition switch off
2. Press and hold the trip reset knob
3. Turn the ignition switch to on but do not start.
4. Hold the reset knob for approx 10 seconds or until the word CHEC appears in the display then release.

### *INSTRUMENT CLUSTER FAILURE MESSAGE*

MESSAGE	DESCRIPTION	CORRECTION
110	A failure has been identified in the cluster CPU, RAM, or EEPROM.	Replace the faulty cluster
900	The CCD data bus is not operational.	<ol style="list-style-type: none"> <li>1. Check the CCD data bus connection at the cluster.</li> <li>2. Check the cluster fuses.</li> <li>3. Check the CCD data bus.</li> <li>4. Check the CCD data bus voltage.</li> <li>5. Check the CCD data bus terminations.</li> </ol>
920	The cluster is not receiving a vehicle message from the PCM.	<ol style="list-style-type: none"> <li>1. Check the PCM software level and re-flash if required.</li> <li>2. Use a DRB scan tool to verify that the vehicle speed message is being sent by the PCM.</li> </ol>
921	The cluster is not receiving a distance pulse message from the PCM.	<ol style="list-style-type: none"> <li>1. Check the PCM software level and re-flash if required.</li> <li>2. Use a DRB scan tool to verify that the distance pulse message is being sent by the PCM.</li> </ol>
940	The cluster is not receiving an airbag message from the ACM	<ol style="list-style-type: none"> <li>1. Check the CCD data bus connections at the ACM.</li> <li>2. Check the ACM fuse.</li> </ol>
		1. Check the CCD data bus

950	The cluster is not receiving an ABS lamp-on message from the CAB.	connections at the CAB 2. Check the CAB fuse.
999	An error has been discovered.	1. Record the failure message. 2. Depress the trip odometer reset button to continue the self diagnostic test.

If no fault codes appear the instrument cluster will begin a **walking segment and gauge test**.

### **Walking segment and gauge test**

This test requires a visual inspection of each odometer segment as it is displayed to determine a pass or fail condition.

1. All segments will be illuminated at once.
2. Then each individual segment of the odometer display will be illuminated in sequence.
3. If any segment fails to illuminate, repeat test to confirm the failure.
4. If failure is confirmed replace the faulty instrument cluster.

The instrument cluster will perform a bulb check of each indicator lamp that the instrument cluster controls.

1. If a individual amber indicator lamp does not illuminate the instrument cluster should be removed, however check that bulb is not faulty and bulb holder is properly installed on the circuit board before considering replacing instrument cluster. If bulb and holder are ok replace faulty instrument cluster.
2. Each of the red indicators are illuminated by a **LED**. If a LED fails to illuminate the Instrument cluster must be replaced.

The instrument cluster will perform a gauge actuator test. In this test the instrument cluster circuitry positions each of the gauge needles at three different calibration points, then returns them to their relaxed position.

1. If an individual gauge does respond properly or at all remove the instrument cluster and check the gauge terminal pins are properly inserted through the spring clip terminal pin receptacles on the instrument cluster.
2. If the gauge terminal connections are ok replace the faulty cluster.

This ends the Self Diagnostic test. The instrument cluster will automatically exit the test and return to normal operation.

### **Spark Plug Wire Reroute - TSB (1997-1999 V6/V8 Models)**

Dodge Magnum Engine - [3.9L Plug Wire Reroute](#) (MSWord)

Dodge Magnum Engine - [5.2/5.9L Plug Wire Reroute](#) (MSWord)

## **I've got Four (4) O2 Sensors...What do they do?**

### **OXYGEN SENSOR-PCM INPUTS**

When the vehicle is equipped with a this engine and two-wheel-drive (2WD), four heated O2S sensors Will be used. They are: Left, right, pre-catalyst and post catalyst. The left, right and post catalyst sensors will fine-tune air-fuel ratio. The pre-catalyst and post catalyst sensors will determine catalytic converter efficiency.

Two of these sensors are installed into the left and right exhaust manifold down pipes. The left O2S sensor will monitor cylinders 1, 3, 5 and 7. The right sensor will monitor cylinders 2, 4, 6 and 8.

The sensors produce voltages from 0 to 1 volt , depending upon the oxygen content of the exhaust gas in the exhaust manifold. When a large amount of oxygen is present (caused by a lean air/fuel mixture), the sensors produces a low voltage. When there is a lesser amount present (rich air/fuel mixture) it produces a higher voltage. By monitoring the oxygen content and converting it to electrical voltage, the sensors act as a rich-lean switch.

The oxygen sensors are equipped with a heating element that keeps the sensors at proper operating temperature during all operating modes. Maintaining correct sensor temperature at all times allows the system to enter into closed loop operation sooner. Also, it allows the system to remain in closed loop operation during periods of extended idle.

In Closed Loop operation, the PCM monitors the O2S sensor input (along with other inputs) and adjusts the injector pulse width accordingly. During Open Loop operation, the PCM ignores the O2 sensor input. The PCM adjusts injector pulse width based on preprogrammed (fixed) values and inputs from other sensors.

The Automatic Shutdown (ASD) relay supplies battery voltage to both oxygen sensors. The oxygen sensors are equipped with a heating elements. The heating elements reduce the time required for the sensors to reach operating temperature.

### **PRE-CATALYST OXYGEN SENSOR**

The pre-catalyst O2S sensor is located in the inlet end of the catalytic converter. It provides an input voltage to the PCM. By comparing the input from the pre-catalyst O2S sensor, with the input from the post catalyst oxygen sensor, the PCM calculates catalytic converter efficiency.

### **POST CATALYST OXYGEN SENSOR**

The post catalyst heated oxygen sensor threads into the outlet end of the catalytic converter. The post catalyst heated oxygen sensor input is used to detect catalytic converter deterioration and fine tune the air fuel ratio. As the converter deteriorates, the input from this sensor begins to match the pre-catalyst sensor input except for a slight time delay. By comparing the inputs from both of these sensors, the PCM calculates catalytic converter efficiency.

When the catalytic converter efficiency drops below emission standards, the PCM stores a diagnostic trouble code and illuminates the Malfunction Indicator Lamp (MIL).

---

## Supercharged V6 Tuning Tips

- (1) Use a V8 Throttle Body, Flometrics 48mm (50mm if running 9# boost), or APS 50mm modified throttle body (preferably with V8 cable as well for ease of installation)
- (2) 3923 Spark Plugs
- (3) A good ignition coil
- (4) 180 Degree T'Stat
- (5) Boost Bypass Valve (not the MAP/Boost Bypass Valve) REQUIRED for anything at 9# or above (also helps with 6# but not really required)
- (6) Ford Motorsport – FV-140 PCV Valve
- (7) Headers (recommended but not required unless you plan on higher boost levels - 9# really wakes up the V6 and they don't blow head gaskets like the 5.2/5.9's)
- (8) Get rid of the Powerdyne Filter...it only flows 339CFM and the blower flows 850CFM @ 6#. The S&B Filters (or K&N) 6"x9" Cones fit perfectly but you will have to build a small bracket to hold the filter steady (this goes for the V8 folks as well...Powerdyne has been made aware of this it's with R&D right now.)

The SuperChips ICON allows you to custom program your timing curve in 400rpm increments (+/- 20 degrees at each increment starting at 1600rpm and up to 7000rpm). We're not running BTM at all on our V6 Truck...just the MSD Digital-6+ (Rev limiter set at 5500rpm) and the SuperChips box...and we just installed a custom built Billet Pulley from Worldwide Performance Parts (11#) for testing...no pinging with Super Unleaded and a bottle of ProBlend "Nitro Power".

We set the timing curve right at the detonation point, back it off .5 degrees across the board, and add a bottle of ProBlend. Runs VERY well and is real "peppy" across the board.

If you're running an IAT Adjuster, set it at 70-60 degrees but no colder on the S/C'd V6. The FMU compensates for the boost and the factory injectors will keep up with the added fuel from the FMU. At 9# or higher, you'll need to swap out to the FMS 24#...and they don't run rich at idle on the V6's at all.

The diagram for the MAP/Boost Bypass Valve setup is here: [MAP/Boost Bypass System](#) You can use the FMU line to tap into but with 9# or higher, move the line to a different vacuum source.

---

## I want more boost out of my Powerdyne Supercharger

- (1) Replace the inefficient air filter that comes with the kit (It only flow 339CFM according to K&N - The Powerdyne puts out 850CFM @ 6# Boost)
  - (2) ATI, Paxton, K&N, and a few other companies make aftermarket air hats for the 5 1/8" opening of the Dodge Throttle Body. These are all metal and can withstand much more than 10# boost...unlike the factory Dodge Air Hat which comes apart with 9# or more boost.
  - (3) If you're really wanting a lot of boost, grab a spare alternator pulley, cut a keyway groove on the inner hole (to match the grove depth on the Powerdyne Pulley), and install it. The factory Alternator pulley makes 13# boost!! **WARNING - USE AT YOUR OWN RISK...You WILL void the warranty on the Supercharger and risk damaging your engine unless it's built for this type of boost level (Pistons, Crank, Rods, O-Rings Head/Block Surface).**
-

## Upper Control Arm Bushing Problem

It's a known fact that the passenger-side, upper control arm bushings deteriorate much quicker than the driver-side. This is due to the offset of the engine in the engine bay. The heat from the factory manifold causes the rubber to deteriorate prematurely...not because of headers as some dealerships claim. (It happens to both factory manifolds and headers...even Mopar headers.)

There is a TSB (Technical Service Bulletin) on this from 1997-2000 vehicles (Dakota/Durango).

Upper Control Arm Bushing TSB - [MS Word](#)  
Upper Control Arm Bushing TSB - [Adobe PDF](#)

---

### TPS Modification: (Applies to '92 - Current models)

Have you ever noticed that slight stumble right off idle when you mash the pedal to the floor? Here's an easy fix for the sluggish response of the throttle (which is related to the TPS Sensor).

Here's a chart that shows the change in the Absolute TPS% that the PCM sees

TPS Voltage      Absolute TPS%

.44v	7.9%
.53v	10.1%
.685v	12.5%
.75v	13.7%
.82v	15.3%

Check your TPS voltage before doing this modification as none of the factory sensors are calibrated the same. We've seen ranges from .3v-.7v...from the factory. Connect a Digital Volt Meter to the middle terminal on the TPS sensor (with the harness connected and the Key-ON/Engine-OFF). If it's close to .7v...leave it alone.

- (1) Remove your TPS Sensor from the vehicle (Located on the drivers side of the throttle body - 3-Wire Connector)
- (2) Put the TPS into a vice and drill the two brass inserts out of the casing with a 1/4" or 7/32" drill bit (drill from the back of the sensor...not the front). You'll need to push on the drill as it will only spin the inserts...once they're heated up enough, they'll pop right out.
- (3) Clean up the holes with either the drill or (preferred) a small round file.
- (4) Reinstall the TPS Sensor on the throttle body. You'll need two small washers on the screws as the holes are now bigger than the screw head. Leave it slightly loose as you're going to have to set the initial Key ON/Engine OFF Voltage before starting the engine.
- (5) Reconnect the TPS sensor harness and connect a Digital Volt Meter to the **middle** terminal on the TPS Sensor (you can poke through the weather-proof connector).
- (6) Turn the ignition key ON but do NOT start the engine.
- (7) Set the initial voltage (by turning it with your fingers) on the TPS at about .7 volts. (Optimum range is from .7 - .75 volts)
- (8) Tighten down the TPS screws and check the voltage one more time (yes...it can move slightly when tightening it down)

(9) Start the engine but do NOT step on the accelerator pedal...let the computer learn the new initial voltage setting.

(10) Turn the engine off and close the hood...drive away if you want...your throttle response should be much more precise now.

Here are some pictures for the various steps:



Factory TPS Sensor w/Brass Inserts



TPS Sensor in the vice (ready to drill)



Modified TPS Sensor Holes



TPS Sensor reinstalled with washers

Some have claimed that the TPS Sensor is adjustable on the actual throttle body without any modifications...this is completely false. There is no room for adjustment unless you drill the inserts out.

---

### Denso-Iridium Spark Plugs

We spoke with the folks from Denso at the SEMA show on the Iridium plugs and decided to purchase a set (\$8.50/plug approximately). We're using the recommended IQ16's in our '97 Dakota and, quite honestly, they don't perform any better than the Autolite 3923's (or 3922's) I normally run. We'll check out the long-term fuel economy as well...but the initial results aren't too promising.

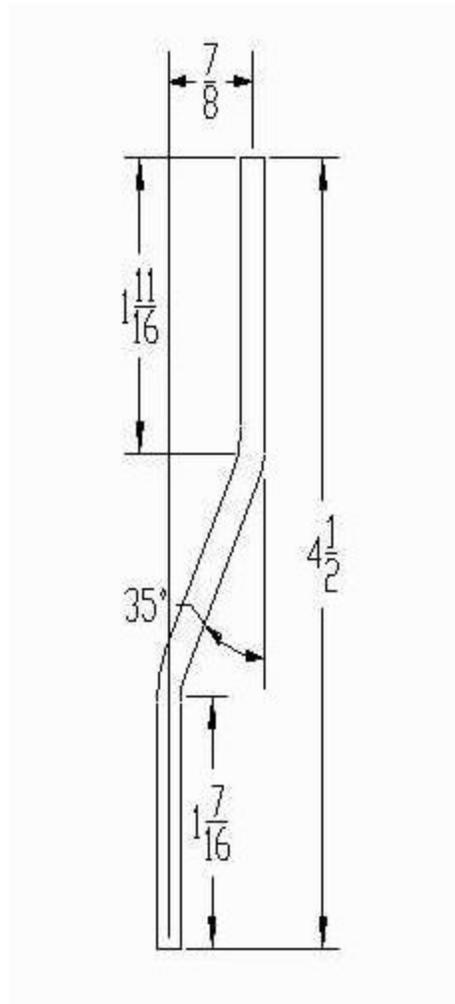
**Update - 11/12/01:** We've put about 100 miles on the plugs and they do seem to work better on the highway under light acceleration. Please keep in mind that we are testing them on a Supercharger/Nitroused/Intercooled V6 and the performance increases from the plugs may not be as noticeable as on a normally aspirated engine. Our personal opinion, not a bad plug at all but don't see spending over \$8.00 per plug. We're still keeping an eye on the fuel economy so there will be one or two more updates on that parts of the test.

**Update 02/20/02:** We've run the truck with over 5000 miles on the Denso spark plugs and are switching back to the Autolites. While the Denso Iridium plugs will outlast the Autolites, the Accel ignition, boost, and nitrous have taken a toll on the plugs. For the average daily driver, they Iridium plugs are a good alternative/replacement (especially for Platinum plugs) but don't work any better than the Autolites in our specific case.

---

**What is a "S-Bolt" and how do I make one?**

Here are the actual measurements. You'll need about 12" of 1/4"x20 rod from your local Home Depot. (The reason for the 12" is in case you make a few mistakes...this leaves you extra material for practice.)



## **Engine - Rattling/Lifter Type Noise**

**NO:** 09-07-97

**GROUP:** Engine

**DATE:** June 27, 1997

### **SUBJECT:**

Timing Chain Noise

### **MODELS: (Applies to '98+ models as well)**

1990 - 1997 (AN) Dakota

1990 - 1997 (AB) Ram Van/Wagon

1990 - 1993 (AD) Ram Pickup/Ram Cab & Chassis/Ramcharger

1994 - 1997 (BR) Ram Truck

NOTE: THIS BULLETIN APPLIES TO VEHICLES EQUIPPED WITH A 3.9L ENGINE.

### **SYMPTOM/CONDITION:**

A Rattling or lifter type noise coming from the front (chain case) area of the engine.

### **DIAGNOSIS:**

Start the engine and bring it to operating temperature. Increase and decrease engine RPM slightly while listening to the front end of the engine for a rattling or lifter type noise. A stethoscope can be used to help pin point the noise location. If the noise is found coming from the timing chain case, perform the Repair Procedure.

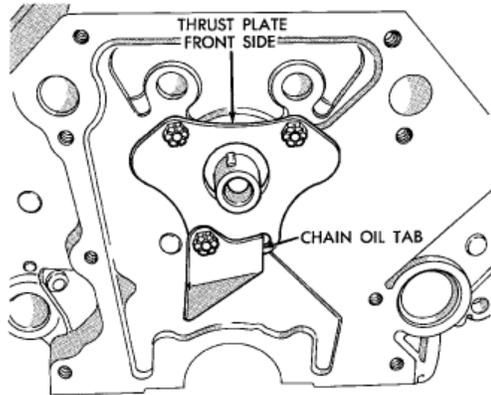
### **PARTS REQUIRED:**

1	83507095	Timing Chain and Sprocket Package
1	53021057	Gasket, Timing Chain Case
1	02129013	Gasket, Water Pump 1990 - 1991
1	04483757	Gasket, Water Pump 1992 - 1997
1	4897297AA	Seal, Front Case 1992 - 1997
1	03830109	Seal, Front Case 1990 - 1991
1	53021195AA	Tensioner, Timing Chain

### **REPAIR PROCEDURE:**

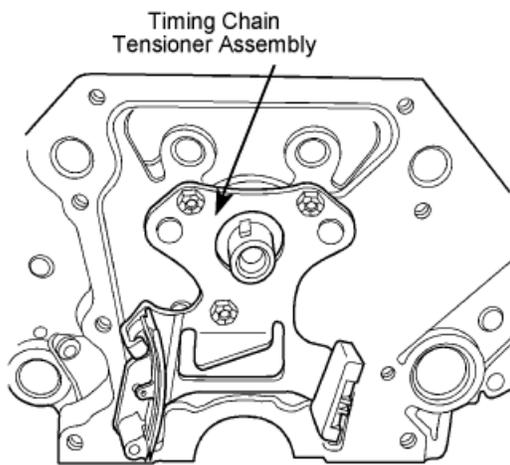
This bulletin involves replacing the timing chain and sprockets and installing a timing chain tensioner.

1. Following the appropriate service manual procedures, disassemble the front end of the engine to gain access to the timing chain and sprockets.
2. Remove the chain and sprockets from the engine. Discard the parts



**Figure 1**

3. Remove the thrust plate and chain oil tab (Figure 1). Discard the parts.



**Figure 2**

4. Install the timing chain tensioner p/n 53021195AA in the position where the thrust plate and oil tab was installed (Figure 2). Torque the bolts to 24 Nm (210 in. lbs.).
5. Install the new timing sprockets and chain p/n 083507095. Align the timing marks per the appropriate service manual procedure. Torque the camshaft bolt to 68 Nm (50 ft. lbs.).
6. Remove the lock pin that holds the tensioner plate for the chain. Discard the pin.

**NOTE: WITH THE TIMING CHAIN TENSIONER INSTALLED, THE CAMSHAFT END PLAY WILL BE 0.051 - 0.330 MM (.002 TO .013 IN).**

7. Reinstall the remaining components per the appropriate service manual procedures.

**POLICY:** Reimbursable within the provisions of the warranty.

TIME ALLOWANCE:

Labor Operation No:	09-10-05-92	2.3 Hrs.
Optional Equipment:	09-10-05-61 Power Steering	0.2 Hrs.
	09-10-05-63 Air Conditioning	0.4 Hrs.

FAILURE CODE: P8 - New Part

---

**How to relocate your IAT Sensor (Applies to '92-'03 models except for the 5.7L "Hemi")**

- The IAT Sensor is located on the #2 Intake Runner (3.9/5.2/5.9L) or under the Throttle Body, in the manifold (4.7L) - Big Brass looking sensor with two wires (Grayish connector)
  - Remove the IAT sensor from the manifold and plug the hole with a 1/4" NPT Pipe Plug (Home Depot)
  - Drill a 1/2" hole in the intake tube and thread the IAT sensor into the hole (use some silicone if you want...not required though) - You may have to extend the wires about 6-12" in some cases (use 16ga. wire)
- 

**Looking for that "Pro Street" Look on your Dakota**

For over 17 years now MAGNUMFORCE RACE CAR FABRICATION has been producing some of the finest and fastest cars around. Although our roots began with Drag Racing and Pro Street cars the fact is that virtually every form of motor sports at some time or another has been represented here. Silver State, NASCAR, NHRA, SCCA, Indy cars, Drag bikes, custom Harleys, Off road, Exotic imports, Drag boats, Muscle Cars, Street Rods, Law Enforcement, and even military tanks (yes tanks!).

MAGNUMFORCE Race Car Fabrication

---

**Excessive Oil Consumption and/or Spark Knock (Belly Pan TSB) – 1992-2002 Models**

THIS BULLETIN SUPERSEDES TECHNICAL SERVICE BULLETIN 09-06-99, DATED SEP.10, 1999, WHICH SHOULD BE REMOVED FROM YOUR FILES. THIS IS A COMPLETE REVISION AND NO ASTERISKS HAVE BEEN USED TO HIGHLIGHT REVISIONS.

**SUBJECT:**

Spark Knock And Engine Oil Consumption Due To Intake Manifold Pan Gasket Oil Leak

**OVER VIEW:**

This bulletin involves the replacement of the engine intake manifold plenum pan gasket.

**NOTE:** THIS BULLETIN APPLIES TO VEHICLE EQUIPPED WITH A 3.9L, 5.2L. OR 5.9L GASOLINE ENGINE.

**SYMPTOM/CONDITION:**

An engine intake manifold plenum pan gasket oil leak may occur on some V-6 and V-8 style engines. The oil leak is internal to the engine so no external oil leakage will be present. Two symptoms of this oil leak

condition may be present. The vehicle operator may experience an engine spark knock during acceleration and/or an increase in the amount of engine oil consumed by the engine.

**DIAGNOSIS:**

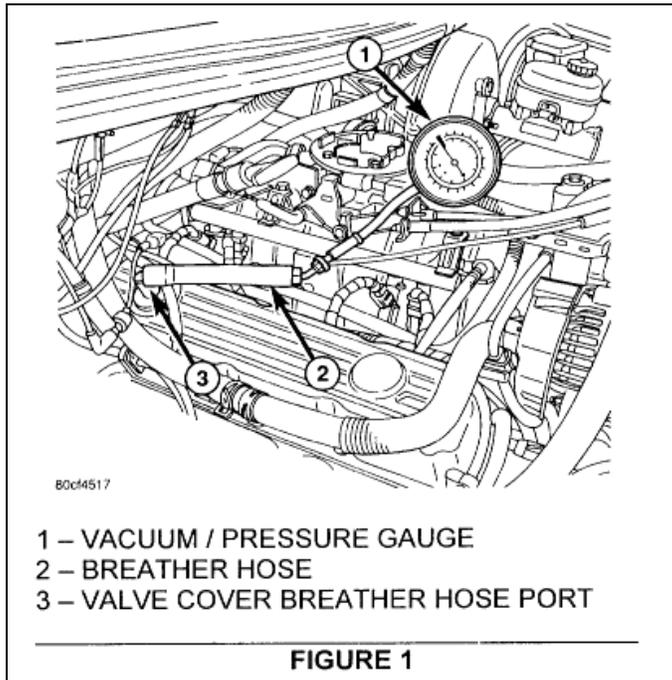
Make sure Technical Service Bulletin (TSB) 18-48-98 has been performed.

**NOTE:** IT IS IMPORTANT THAT THE COIL AND SPARK PLUG WIRES ARE ROUTED EXACTLY AS SPECIFIED IN TSB 18-48-98 TO ACHIEVE THE MOST BENEFIT.

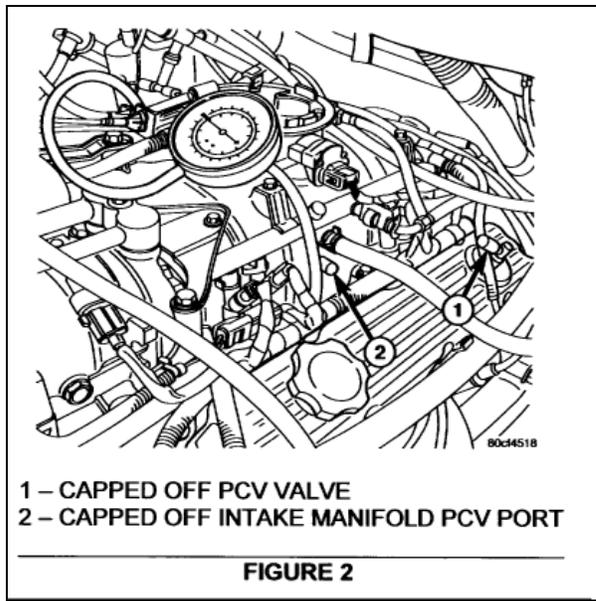
Inspect the Positive Crankcase Ventilation (PCV) valve. Shake the PCV valve to verify that the pintle inside of the PCV valve is free. Replace the PVC if the pintle is not free.

If the intake manifold plenum pan gasket is leaking, an additional vacuum source will be created inside of the engine at the location of the pan gasket leakage. Engine combustion blow-by gases, oil vapor, and air from the crankcase filter/breather may be drawn past the leaking pan gasket and into the intake manifold. In most cases when this condition occurs, an engine at idle will create the highest vacuum and lowest amount of engine blow-by.

1. Allow the engine to reach normal operating temperature.
2. Stop the engine.
3. Disconnect the breather hose from the air cleaner.



4. Attach a vacuum/pressure gauge to the end of the breather hose (Figure 1).
5. Disconnect the PCV valve hose from the intake manifold.
6. Seal off the intake manifold PCV valve hose port opening.
7. Seal off the open end of the PCV valve hose (Figure 2).



**NOTE:** DURING THIS DIAGNOSIS, IT WOULD BE NORMAL FOR THE ENGINE TO DEVELOP PRESSURE WITHIN THE ENGINE CRANKCASE. THIS IS DUE TO THE NORMAL PROCESS OF EXHAUST BLOW-BY GASES LEAKING PAST THE ENGINE PISTON RINGS AND ACCUMULATING IN THE ENGINE CRANKCASE. DO NOT ALLOW MORE THAN 3 PSI (20.7 kPa) OF PRESSURE TO BUILD WITHIN THE ENGINE WHEN PERFORMING THE FOLLOWING DIAGNOSTIC PROCEDURE.

8. Start the warmed engine and observe the vacuum gauge.
9. Allow the engine to idle for approximately 30 seconds. Do not allow more than 3 psi (20.7 kPa) of pressure to develop in the engine crankcase.
10. If the attached vacuum / pressure gauge does not indicate that a vacuum is present in the engine crankcase, then the intake manifold plenum pan gasket is good and no further internal engine vacuum leak diagnosis is required.
11. If an internal vacuum leak is present then perform the Repair Procedure.

**PARTS REQUIRED:**

For the 5.2L / 5.9L:

- 1 04897383AC Package, Intake Manifold Flange Gasket and Bolts
- 1 05017208AA Gasket, Intake Manifold Plenum Pan
- 15 06034583 Bolt, Intake Manifold Plenum Pan
- 1 53030541 Gasket, Throttle Body
- 2(AR) 04318001 Conditioner, Combustion Chamber

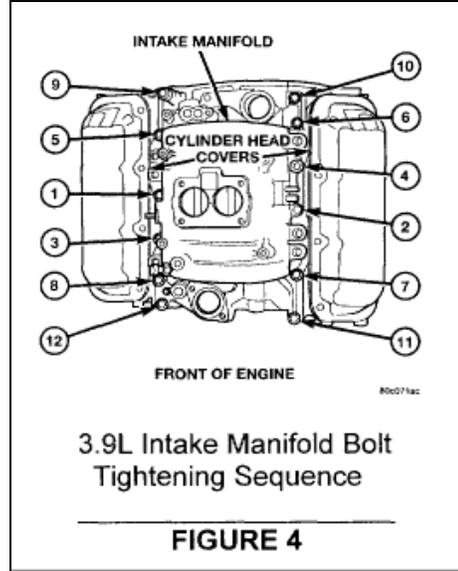
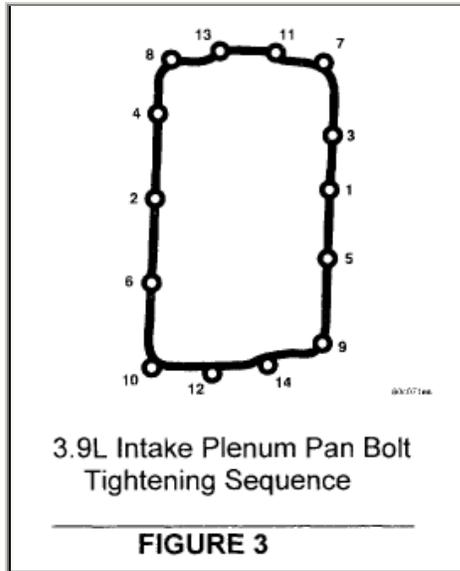
For the 3.9L:

- 1 04897382AC Package, Intake Manifold Flange Gasket and Bolts
- 1 05017207AA Gasket, Intake Manifold Plenum Pan
- 14 06034583 Bolt, Intake Manifold Plenum Pan
- 1 53030541 Gasket, Throttle Body
- 2(AR) 04318001 Conditioner, Combustion Chamber

**REPAIR PROCEDURE:**

1. Refer to the appropriate year Service Manual, Section 9: ENGINE for removal and installation instructions.

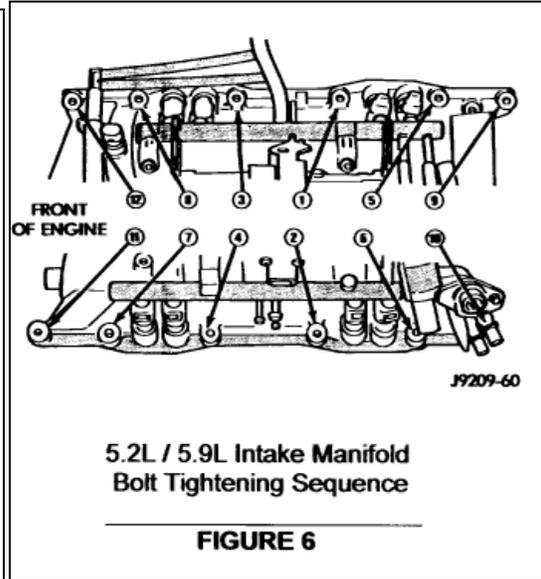
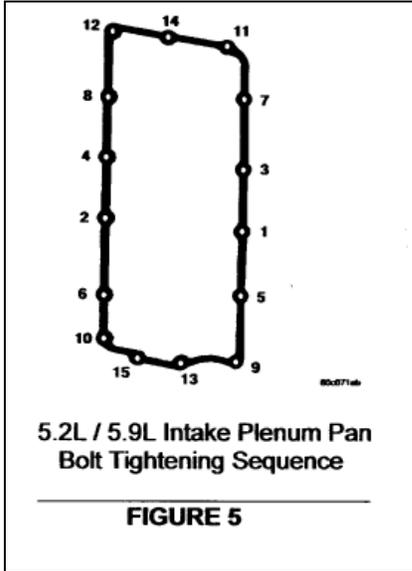
**NOTE:** CLEAN ALL OIL RESIDUE FROM THE INTERIOR SURFACES OF THE PLENUM PAN AND THE INTAKE MANIFOLD PLENUM CHAMBER. THE PROPER BOLT TORQUE AND TIGHTENING SEQUENCE IS CRITICAL AND MUST BE FOLLOWED WHEN TIGHTENING BOTH THE PLENUM PAN BOLTS AND THE INTAKE MANIFOLD FLANGE BOLTS.



3.9L Bolt Tightening Sequence and Torque Procedure:

STEP	WHICH BOLT	TORQUE
1	All Bolts	5.4 Nm (48 in. lbs.)
2	All Bolts	9.5 Nm (84 in. lbs.)
3	Check All Bolts	9.5 Nm (84 in. lbs.)

STEP	WHICH BOLT	TORQUE
1	1 and 2	1.4 Nm (12 in. lbs.)
2	1 and 2	2.7 Nm (24 in. lbs.)
3	1 and 2	4.1 Nm (36 in. lbs.)
4	1 and 2	5.4 Nm (48 in. lbs.)
5	1 and 2	6.7 Nm (60 in. lbs.)
6	1 and 2	8.1 Nm (72 in. lbs.)
7	3 through 12	8.1 Nm (72 in. lbs.)
8	Check All Bolts	8.1 Nm (72 in. lbs.)
9	All Bolts	16.3 Nm (12 ft. lbs.)
10	Check All Bolts	16.3 Nm (12 ft. lbs.)



5.2L / 5.9L Plenum Bolt Tightening Sequence and Torque Procedure:

5.2L / 5.9L Plenum Pan Bolt Torque Procedure		
STEP	WHICH BOLT	TORQUE
1	All Bolts	5.4 Nm (48 in. lbs.)
2	All Bolts	9.5 Nm (84 in. lbs.)
3	Check All Bolts	9.5 Nm (84 in. lbs.)

5.2L / 5.9L Intake Manifold Flange Bolt Torque Procedure		
STEP	WHICH BOLT	TORQUE
1	1 and 4	1.4 Nm (12 in. lbs.)
2	1 and 4	2.7 Nm (24 in. lbs.)
3	1 and 4	4.1 Nm (36 in. lbs.)
4	1 and 4	5.4 Nm (48 in. lbs.)
5	1 and 4	6.7 Nm (60 in. lbs.)
6	1 and 4	8.1 Nm (72 in. lbs.)
7	5 through 12	8.1 Nm (72 in. lbs.)
8	Check All Bolts	8.1 Nm (72 in. lbs.)
9	All Bolts	16.3 Nm (12 ft. lbs.)
10	Check All Bolts	16.3 Nm (12 ft. lbs.)

2. With the engine reassembled, inspect the coil and spark plug wires for proper routing. Refer to TSB 09-48-98 for additional assistance.
3. Start the engine and allow it to warm to normal engine operating temperature.
4. Decarbon the combustion chamber using Mopar Combustion Chamber Conditioner (p/n 04318001) per the instructions.

**NOTE:** ALLOW THE COMBUSTION CHAMBER CLEANER TO SOAK INSIDE OF THE ENGINE FOR 2 TO 2.5 HOURS.

**NOTE:** A SECOND APPLICATION OF THE COMBUSTION CHAMBER CONDITIONER MAY BE REQUIRED IF THERE WAS A LARGE QUANTITY OF OIL LEAKAGE PAST THE INTAKE PLENUM PAN GASKET.

5. Verify proper engine oil level.

---

### **Do those "Wonder Oils" really work?**

While we try to refrain from degrading other products that we haven't tested...we've tested these and they do NOT work and have had claims filed against them from the FTC.

**Dura-Lube:** <http://www.ftc.gov/opa/1999/9905/duralub2.htm>

**ProLong:** <http://www.ftc.gov/opa/1999/9909/prolong.htm>

**MotorUp:** <http://www.ftc.gov/opa/1999/9904/motorup5.htm>

**Slick50:** <http://www.ftc.gov/opa/1996/9607/slick.htm>

**Z-Max:** <http://www.ftc.gov/opa/2001/02/zmax1.htm>

Lubricants that work in outer space may not work here on earth at all. Materials like PTFE are claimed to have the lowest coefficient of friction, but even the manufacturer of PTFE do not recommend it to be used in an internal combustion engine. Why? It cannot withstand the heat! It is too fragile a compound and it decomposes and turns into a sticky plastic residue and a corrosive fluorine gas. Are you sure you want this in your crankcase?

---

### **Shocks - Lifted or Lowered Trucks**

So you've lifted or lowered your truck...but does that mean that you need a different length shock? Not necessarily. You need a different length shock if the distance between the shock's upper and lower mounting points have changed drastically.

Say you've lowered your truck with 2 in. drop spindles in front and 3 in. lowering blocks in back. The distances between the shock mounting points have decreased, **but are still within the limits of a stock length shock.**

But what if you go with a 4 in. front/6 in. rear slam? The shock mounting points will be closer together and now you'll need shorter shocks. The same principle applies to trucks with suspension lift kits (**Body lift kits don't affect shock mounting points**).

---

## Cab Mount - Popping Noise on Steep Inclines

NO: 23-65-97 Rev. A

GROUP: Body

DATE: December 31, 1997

SUBJECT: Loud Popping Noise Is Heard When Vehicle Makes A Sharp Turn Onto A Steep Incline

1997-2001 (AN) Dakota

*NOTE: This bulletin applies to 4X2 and 4X4 extended cab vehicles.*

### SYMPTOM/CONDITION:

A loud popping noise is heard coming from the rear of the cab as the vehicle is turned onto a steep incline such as a driveway approach.

### DIAGNOSIS:

Drive the vehicle and turn onto a steep incline while listening for a popping noise coming from the rear of the cab. If a popping noise is heard, perform the following Repair Procedure.

### PARTS REQUIRED:

2 06501557 Bolt, Cab Isolator Mounting

### REPAIR PROCEDURE:

This bulletin involves removing the rear cab isolators and removing 1/4 in. to 3/8 in. of material from the isolator sleeve.

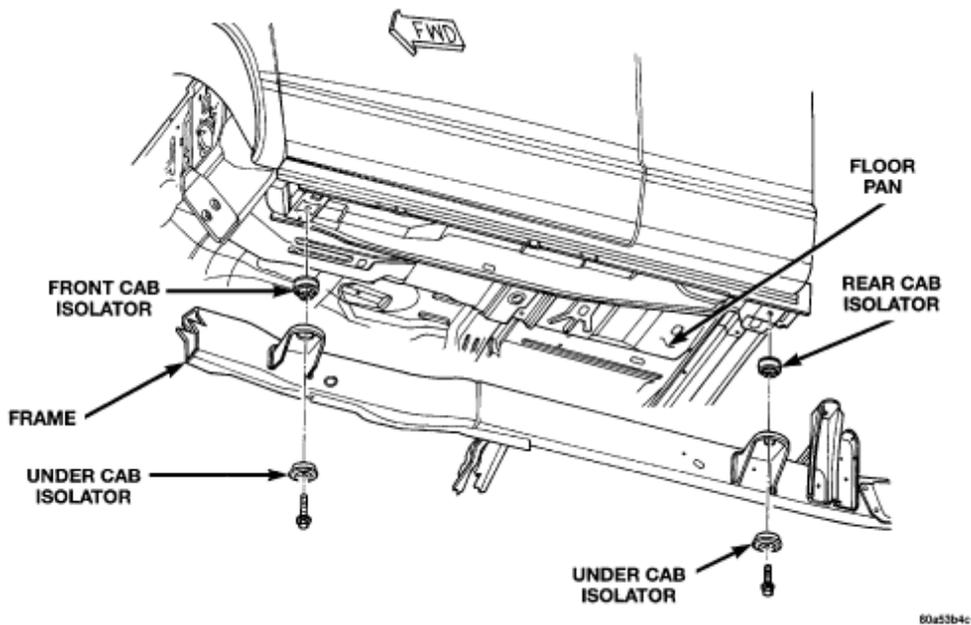
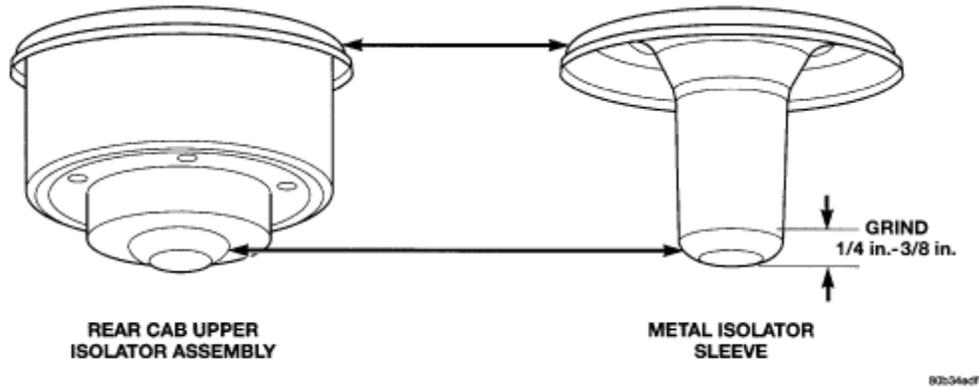


FIGURE 1 - Cab Mounts

- Using a suitable hoist, raise the vehicle.
- Remove the two rear cab isolator mounting bolts (Figure 1) and the rear under-cab isolators.
- Using a suitable jack, raise the cab off the rear cab upper isolator high enough to be able to slide a block of wood between the cab cross member and the frame.

- Place blocks of wood between the cab cross member and the frame and lower the cab onto the blocks of wood.
- Remove both rear cab upper isolators.
- Grind 1/4 in. to 3/8 in. off the metal sleeve of the rear cab upper isolator as shown in Figure 2. Perform this operation on both rear cab upper isolators.



**FIGURE 2 - Rear Cab Isolator**

- Install the rear cab upper isolators back onto the isolator mount.
- With a jack, raise the cab high enough to remove the blocks of wood.
- Remove the blocks of wood and lower the cab back onto the isolators.
- Install the under-cab isolators onto new cab mounting bolts, p/n 06501557, and fasten the mounting bolts to the cab. Tighten the bolts to 81 Nm (60 ft. lbs.).
- Lower the vehicle.

### **Popping Sensation/Noise In Steering Column While Turning**

NUMBER: 19-05-99

GROUP: Steering

DATE: Jul. 23, 1999

#### **SUBJECT:**

Popping Sensation/Noise In Steering Column While Turning

#### **OVERVIEW:**

This bulletin involves repositioning the steering column on the steering column mounting brackets.

#### **MODELS:**

1997 - 2000 (AN) Dakota

1998 - 2000 (DN) Durango

#### **SYMPTOM/CONDITION:**

A popping sensation/noise can be felt and/or heard in the steering column during sharp turns (parking lot maneuvers).

#### **DIAGNOSIS:**

Start the engine. Rotate the steering wheel to the extreme right and then to the extreme left while

monitoring for a popping noise or sensation. If a popping noise or sensation can be heard and/or felt in the steering column while turning, perform the Repair Procedure.

#### **REPAIR PROCEDURE:**

- Start the engine.
- Rotate the steering wheel so that the steering wheel is in an upside down position then remove the ignition key to lock the steering wheel in this position.
- Remove the three screws that secure the lower edge of the steering column opening cover to the lower instrument panel reinforcement.
- Using a trim stick or another suitable wide-bladed tool, gently pry the upper edge of the steering column opening cover. Pry just below the cluster bezel on each side of the steering column away from the instrument panel far enough to disengage the snap clip retainers from the receptacles in the instrument panel.
- Remove the steering column opening cover from the instrument panel.
- Loosen the steering column attaching nuts.
- Bounce the steering wheel lightly in a vertical motion to normalize the alignment.
- Without influencing the new location of the steering column, tighten the passenger side rearward nut to 12 N.m (105 in. lbs.).
- Next, tighten the front driver side nut to 12 N.m (105 in. lbs.).
- Tighten the remaining steering column attaching nuts to 12 N.m (105 in. lbs.).
- Tighten the upper intermediate shaft attachment bolt to 57 N.m (42 ft. lbs.).
- Position the steering column opening cover to the instrument panel.
- Align the snap clip retainers on the steering column opening cover with the receptacles in the instrument panel.
- Press firmly on the steering column opening cover over the snap clip locations until each of the snap clips is fully engaged in its receptacle.
- Install and tighten the three screws that secure the lower edge of the steering column opening cover to the lower instrument panel reinforcement. Tighten the screws to 2.2 N.m (20 in. lbs.).
- Start the engine then, rotate the steering wheel back to its normal position.

---

#### **Hot to properly Dyno Test Modifications**

- Install Modification (Skip to next step if already installed)
- Reset PCM (All Adaptives)
- Drive Vehicle for minimum 50-75 miles to allow for PCM "Learning"
- Dyno Test Vehicle
- Install Test Comparison Modification
- Reset PCM (All Adaptives)
- Drive Vehicle for minimum 50-75 miles to allow for PCM "Learning"
- Dyno Test Vehicle

To keep things somewhat consistent, use the same dyno to eliminate variances between different dynameters. Also, keep the hood **DOWN** when testing. If you want to take "Real World" readings, close the hood as we don't drive around with the hood up. (Use a fan in front of the vehicle though.)

---

### **20HP Timing Advance Kit - eBay (WARNING)**

Folks, it has been brought to our attention that an individual on eBay is selling a "Timing Advance Kit" with claims of a 20HP gain on the Dodge, GM, and Ford engines. This is a scam and is not worth the money spent as it is a simple resistor which costs no more than 50 cents at your local radio shack. It uses the same trick as the old-fashioned "resistor trick" as described on the IAT Adjuster page. Buyers Beware!

#### This is the "20HP Timing Kit"

(The resistor trick uses various 1/4 or 1/2 watt resistors to fool the PCM into thinking the air is cooler than it really is. While this does work, the gains are no more than 6-8RWHP with some cases being only 10RWHP at most. It is weather specific, no same resistor value works for all vehicles, and is primarily used at the track only.)

The seller also uses many different aliases (names) on eBay so watch out as the ads are very similar in format and language. Seller goes by the following names: **rumpshaker, chad302, wholesalerezellers, z2811sec**

---

### **EGR Bypass Kit - eBay (WARNING)**

The same individual who is selling the "Timing Kit" on eBay is also selling a "EGR Bypass Kit". He/she claims that this works on '96+ Dodge models as well which is 100% FALSE. Dodge has NOT used an EGR valve on the Magnum engines since 1995. Plus, bypassing the EGR can possibly cause other problems with the "Check Engine Light" coming on.

Here is a quote from the seller:

"yes it will work and no your engine light will stay off. thanx"

*bernd@texas.net* wrote:

Will this work on my '97 Dakota and will it trip the check engine light after blocking the EGR?

-----  
Title of item: DODGE DAKOTA EGR Block Off Mod 5-15HP

Seller: rumpshaker420

Starts: Apr-06-02 16:11:06 PST

Ends: Apr-09-02 17:11:06 PDT

Price: Starts at \$9.99

To view the item, go to: <http://cgi.ebay.com/ws/eBayISAPI.dll?ViewItem&item=1819332951>

Don't be fooled by this sellers claims...there is NO EGR Valve on the '96+ engines. The seller also uses many different aliases (names) on eBay so watch out as the ads are very similar in format and language. Seller goes by the following names: **rumpshaker, chad302, wholesalerezellers, and z2811sec**

---

**What grade of fuel should I use - Octane**  
from *Gasoline Questions & Answers for Your Car*  
API Publication 1580, Sixth edition, January 1996

***Q. What is octane?***

A. Octane is a measure of a gasoline's ability to resist knock or pinging noise from an engine. In older vehicles, knock may be accompanied by engine run-on, or dieseling. Knock is the sharp, metallic-sounding engine noise that results from uncontrolled combustion. Severe knocking over an extended time may damage pistons and other engine parts. If you can hear knocking, you should have your engine checked to make sure it is calibrated correctly and does not have a mechanical or electrical problem, or use a higher octane gasoline.

In most vehicles no benefit is gained from using gasoline that has a higher octane number than is needed to prevent knock. However, in some vehicles equipped with a knock sensor (an electronic device installed in many modern engines that allows the engine management system to detect and reduce knock), a higher octane gasoline may improve performance slightly.

***Q. What determines my car's octane requirements?***

A. Your car's octane requirements are mainly determined by its basic design. In addition, variations in engines due to manufacturing tolerances can cause cars of the same model to require a different octane of several numbers. Also, as a new car is driven, its octane requirement can increase because of the buildup of combustion chamber deposits. This continues until a stable level is reached, typically after about 15,000 miles. The stabilized octane requirement may be 3-6 numbers higher than when the car was new. Premium or midgrade fuel may be advisable to prevent knock.

***Other factors also influence your car's knocking characteristics:***

**Temperature** - Generally, the hotter the ambient air and engine coolant, the greater the octane requirement.

**Altitude** - The higher the altitude above sea level, the lower the octane requirement. Modern computer-controlled engines adjust spark timing and air-fuel ratio to compensate for changes in barometric pressure, and thus the effect of altitude on octane requirement is smaller in these vehicles.

**Humidity** - The drier the air, the greater the octane requirement. The recommendations that vehicle manufacturers give are for normal- to low-humidity levels.

**Your engine's spark timing** - The octane requirement increases as the spark timing is advanced. Both the basic setting of the spark timing and the operation of the automatic spark advance mechanisms are important in controlling knock. In some computer controlled engines, the spark timing can only be changed by replacing modules in the computer. If they are equipped with knock sensors, these computer controlled engines have the ability to retard the ignition temporarily when a sensor detects knock. This temporarily reduces the octane requirement and may also temporarily reduce vehicle performance.

**Method of driving** - Rapid acceleration and heavy loading, such as pulling a trailer or climbing a hill, may result in a greater octane requirement. Stop-and-go driving and excessive idling can increase octane requirements by causing the buildup of combustion chamber deposits.

**Malfunctions of emission control systems** - An improperly functioning emissions control system can affect the octane requirement by changing the air-fuel mixture or by not providing dilution gases through the exhaust gas recirculation (EGR) system. If a malfunction occurs, your vehicle should be taken to a qualified vehicle service mechanic. Some problems are indicated by warning lights on the driver's instrument panel.

***Q. How many grades of gasoline are available?***

A. Most places that sell gasoline offer three octane grades of unleaded gasoline--regular at 87 (R+M)/2,

midgrade at 89 (R+M)/2, and premium at 93 (R+M)/2. In high-altitude areas such as the Rocky Mountain Region of the U.S., the (R+M)/2 number may be lower by one or two numbers. After January 1, 1996, no leaded gasoline may be sold for highway use.

***Q. Which octane grade should I use in my car?***

A. Use the recommendation in your car owner's manual as a starting point for selecting the proper gasoline. If you notice engine knock over an extended time and your engine is adjusted correctly, try a higher octane gasoline. Also, higher octane may provide a performance benefit (better acceleration) in cars equipped with knock sensors. Many late model and high-performance (turbo-charged and supercharged) cars fall into this category.

---

**How to bypass the speed limiter ('97-'02 models)**

While this is not recommended by any means, there have been some folks interested in bypassing the speed limiter. We are working on the circuitry for this...but in the mean time, you can bypass it by turning your key to the START position and holding it there. On '98+ models, this will turn your speedometer off but will keep the rest of the gauges operational. (Do NOT do this at high speeds or extended periods as you really need both hands on the steering wheel and we haven't tested it on prolonged periods of time.)

---

**How to read your Dyno run files**

If you had some Dyno work, or just some HP/TQ readings done on a Dyno, you can ask the Dyno operator to save your file to a floppy disk. Once you get home, you can view them with the DynoJet "RunViewer". You can download them from this link: [DynoJet RunViewer](#). This applies only to the DynoJet dynameters.

---

**Factory Intake Manifold Modifications**

*You'll need to remove the intake manifold for this as well as removing the plenum plate - aka: belly pan.*

- (1) If you are one of the unlucky people who received a factory manifold with the plenum divider that runs all the way to the bottom, remove the intake and cut it back by no more than 2". If you don't have the full-length divider, go to step 2
- (2) Remove all casting flash from the runners and port edges.
- (3) Radius all edges on the runners
- (4) Radius the injector bosses on the head mating surface of the manifold
- (5) Radius the edges of the throttle body bores (45 degree angle)
- (6) Install an APS Billet Aluminum Plenum Plate Kit (available through our website)
- (7) Replace the injectors with a set of Ford Motorsports 19# High Flow (optional step)  
\*\* 2000+ models use RED Colored 21# injectors (factory) - Do NOT downgrade the injectors to the Design-III FMS 19# \*\*

Those will help bring out the lower to mid RPM band power and smoothness. The billet aluminum pan will also fix that annoying "belly pan leak" problem.

While the factory manifold can be modified even more by cutting the runners and filling the plenum, save your money on those two steps and buy an M1-2BBL MPI Manifold.

---

## **What do the Tire Wear Ratings mean?**

### ***Uniform Tire Quality Grading - UTQG Ratings***

The Department of Transportation requires each manufacturer to grade its tires under the Uniform Tire Quality Grade (UTQG) labeling system and establish ratings for tread wear, traction, and temperature resistance. These tests are conducted independently by each manufacturer following government guidelines to assign values that represent a comparison between the tested tire and a control tire. While traction and temperature resistance ratings are specific performance levels, the tread wear ratings are assigned by the manufacturers following field testing and are most accurate when comparing tires of the same brand.

#### ***Treadwear:***

Treadwear receives a comparative rating based on wear rate of the the tire in field testing following a government specified course. For example, a tire grade of 150 wears 1.5 times longer than a tire graded 100. Actual performance of the tire can vary significantly depending on conditions, driving habits, care, road characteristics, and climate.

#### ***Traction:***

Straight-a-head wet braking traction has been represented by a grade of A, B, or C with A being the highest. In 1997 a new top rating of "AA" has been introduced to indicate even greater wet braking traction. However, due to its newness, this grade will probably be applied initially to new tire lines as they are introduced and later to existing lines which excel in wet braking, but had been limited to the previous top grade of "A". Traction grades do not indicate wet cornering ability.

#### ***Temperature:***

Temperature resistance is graded A, B or C. It represents the tire's resistance to the heat generated by running at high speed. Grade C is the minimum level of performance for all passenger car tires as set under Federal Motor Vehicle Safety Standards. This grade is established for a tire that is properly inflated and not overloaded.

***Note: UTQG ratings are not required on winter and light truck sized tires.***

---

## **Engine Cooling Fan Noise**

### **MODELS:**

1998 - 1999 (AB) Ram Van/Wagon  
1997 - 2001 (AN) Dakota  
1998 - 2001 (DN) Durango

### **DISCUSSION:**

Some vehicles may exhibit an engine cooling fan "roar" noise. This noise is created by a large cooling fan that is required to provide optimum cooling for low vehicle speed operation in hot weather conditions and for heavy trailer towing. Since the large cooling fan is unnecessary in most operating conditions, these vehicles are also equipped with viscous fan drives that allow the fan to operate at variable speeds based upon temperature loads. The viscous fan drive will engage the fan for maximum cooling when temperatures are high and allow the fan to operate at slower speeds when temperatures are low. In addition, at engine start-up, the viscous fan drive engages the fan for maximum cooling until the fluid in the viscous clutch can dissipate out of the clutch drive grooves allowing the fan to operate at a slower speed.

Because of the viscous fan drive, the noise may occur during high temperature conditions and for the first 1-2 minutes of operation. Due to the roar of the fan, customers may also complain of a perceived loss of power, automatic transmission slippage, or that the transmission is staying in a low gear too long (delayed

up shift).

Customers concerned about this noise should be advised that this condition is normal and no repair attempts should be made.

---

### **A/T - Engine Bucking/Surging at 5,300 RPM**

NO: 18-19-98

GROUP: Driveability

DATE: Apr. 10, 1998

SUBJECT: Vehicle Bucking During Wide Open Throttle Acceleration

MODELS:

1996 + (AB) Ram Van  
1996 + (AN) Dakota  
1996 + (BR/BE) Ram Truck  
1998 + (DN) Durango  
1996 + (ZJ) Grand Cherokee  
1996 + (ZG) Grand Cherokee (International Markets)

#### **SYMPTOM/CONDITION:**

Some vehicles may experience bucking during wide open throttle (WOT) acceleration. The bucking occurs at approximately 5300 RPM. This condition may be caused by reaching the high RPM fuel shut off rev limit before the transmission can shift into the next higher gear and is most likely to occur with high electrical loads (high beams on, heated back light, heated seats, radio, HVAC blower on MAX etc.). During high current demands, the generator may emit electrical noise that can affect the transmission governor pressure sensor output. If this occurs, the transmission may not shift properly to the next higher gear under (WOT) acceleration conditions and therefore reach the fuel shut off rev limiter. This may be seen most often between the 2-3 shifts but can also be experienced between the 1-2 shifts.

#### **DIAGNOSIS:**

Using the Diagnostic Scan Tool (DRB III(R)) with the appropriate Diagnostic Procedures Manual, verify all engine/transmission systems are functioning as designed. If Diagnostic Trouble Codes (DTCs) are present, record them on the repair order and repair as necessary before proceeding further with this bulletin.

**NOTE : ONLY PERFORM THE FOLLOWING PROCEDURE SAFELY ON A HIGHWAY OR ROAD OBEYING ALL POSTED SPEED LIMITS AND LAWS.**

Attempt to duplicate the condition by switching on all accessory loads and driving the vehicle with WOT accelerations through a shift sequence to see if the engine will reach the fuel shut off rev limiter before the 2-3 or 1-2 shift is made.

If the bucking condition is experienced at approximately 5300 RPM before making the appropriate up shifts, switch off all electrical loads and repeat the procedure. Repeat the procedure with the electrical loads on and off a second time. If the bucking occurs with the electrical loads on and does not occur with the loads off, perform the Repair Procedure.

#### **PARTS REQUIRED:**

1 - 56041403AA, Governor Pressure Sensor

#### REPAIR PROCEDURE:

This bulletin involves installing a newly designed governor pressure sensor.

- (1) Following the procedures in the applicable service manual, replace the governor pressure sensor with p/n 56041403AA (See picture below).
- (2) Check the throttle valve cable adjustment. Make appropriate adjustments, if necessary, following the applicable service manual procedure.

---

#### **How to test your Instrument Cluster (Lamps, Gauges, Indicators)**

1. Begin the test with the ignition switch in the Off position.
2. Depress the trip odometer reset button.
3. While holding the trip odometer reset button depressed, turn the ignition switch to the On position, but do not start the engine.
4. Keep the trip odometer reset button depressed for about ten seconds, until CHEC appears in the odometer display, then release the odometer reset button.
5. A series of three-digit numeric failure messages may appear in the odometer display, depending upon the failure mode. If a failure message appears, see the Instrument Panel, Gauges and Warning Indicators/Instrument Panel/Instrument Cluster Failure Message chart for the description and proper correction. If no failure message appears, the Self-Diagnostics will proceed as described in Step 6.
6. The cluster will begin the odometer walking segment test. This test will require the operator to visually inspect each odometer segment as it is displayed to determine a pass or fail condition. First, all of the segments will be illuminated at once; then, each individual segment of the odometer display will be illuminated in sequence. If any segment in the display fails to illuminate, repeat the test to confirm the failure. If the failure is confirmed, replace the faulty instrument cluster. Following the odometer walking segment test, the cluster Self-Diagnostic Test will automatically proceed as described in Step 7.
7. The cluster will perform a bulb check of each indicator lamp that the cluster circuitry controls. If an individual amber indicator lamp does not illuminate during this test, the instrument cluster should be removed. However, check that the incandescent lamp bulb is not faulty and that the bulb holder is properly installed on the circuit board before considering instrument cluster replacement.
8. If the bulb and bulb holder check OK, replace the faulty cluster. Each of the red indicators are illuminated by a Light Emitting Diode (LED) . If an LED fails to illuminate during this test, the instrument cluster must be replaced. Following the bulb check test, the cluster Self-Diagnostic Test will automatically proceed as described in Step 8.
9. The cluster will perform a gauge actuator test. In this test the cluster positions each of the gauge needles at three different calibration points, then returns the gauge needles to their relaxed positions. If an individual gauge does not respond properly or at all during the gauge actuator test, the instrument cluster should be removed. However, check that the gauge terminal pins are properly inserted through the spring-clip terminal pin receptacles on the circuit board before considering instrument cluster replacement. If the gauge terminal connections are OK replace the faulty instrument cluster.

10. The Self-Diagnostic Test is now completed. The cluster will automatically exit the self-diagnostic mode and return to normal operation at the completion of the test, if the ignition switch is turned to the Off position during the test, or if a vehicle speed message indicating the vehicle is moving is received from the PCM on the CCD data bus during the test.

Go back to Step 1 to repeat the test, if required.

INSTRUMENT CLUSTER FAILURE MESSAGE		
Message	Description	Correction
110	A failure has been identified in the cluster CPU, RAM, or EEPROM.	1. Replace the faulty cluster.
900	The CCD data bus is not operational.	1. Check the CCD data bus connections at the cluster. 2. Check the cluster fuses. 3. Check the CCD data bus bias. 4. Check the CCD data bus voltage. 5. Check the CCD data bus terminations.
920	The cluster is not receiving message \$24 from the PCM.	1. Check the PCM software level and reflash if required. 2. Use a DRB scan tool to verify that the \$24 message is being sent by the PCM.
921	The cluster is not receiving message \$84 from the PCM.	1. Check the PCM software level and reflash if required. 2. Use a DRB scan tool to verify that the \$84 message is being sent by the PCM.
940	The cluster is not receiving message \$50 from the ACM.	1. Check the CCD data bus connections at the ACM. 2. Check the ACM fuse.
950	The cluster is not receiving message \$B0 from the CAB.	1. Check the CCD data bus connections at the CAB. 2. Check the CAB fuse.
999	An error has been discovered.	1. Record the failure message. 2. Depress the trip odometer reset button to continue the Self-Diagnostic Test.

---

## Torque Converter Terminology (Stall Speed and what it really is)

### What is Torque Converter Stall?

The easy answer is: The RPM a torque converter will allow the engine to attain with a given engine torque input.

### How is Torque Converter Stall measured?

That's where the confusion begins between the racer and the high stall torque converter builder. Stall is measured in three different ways - TRUE, BRAKE and FLASH Stall. The only true way to set stall is using TRUE stall math.

### What is TRUE Stall?

True stall is measured with the transmission locked (Trans brake) and the drive shaft still. The throttle is then fully depressed and held to obtain the holding RPM of the torque converter. This is the "TRUE" Stall.

### What is Foot Brake stall?

This is attained with the transmission in gear and the brakes depressed fully. Now, slowly apply the accelerator. The RPM the engine reaches the moment before the tires spin is known as the "BRAKE" stall.

BRAKE stall is not a consistent way to measure your stall converter and has many variables. This method will be lower than TRUE stall by 400-800 RPM.

### **What is FLASH Stall?**

Flash stall is generally read while the car is in motion. While rolling at a slow speed the throttle is depressed fully to see where the RPM will flash (or peak). This method will not be true if tires spin or car is rolling too fast. Due to the turbine already turning in the converter we end up with less torque multiplication. This will give you a lower stall reading of between 200 and 600 RPM under the converters TRUE stall in the same application.

### **Why do I need a custom built high stall torque converter ?**

A torque converter that has a part number has many applications. Many manufactures sell you the same advertised 3200 rpm stall converter for your small block as they would for the next customers big block. This will always result in two very different stall settings. Do you need a custom built high stall torque converter? Perhaps you don't, but building the units on a one to one basis allows us to put out a product that is configured correct the FIRST time.

---

### **At what RPM should I activate my Nitrous System**

The RPM level is not as important as is the motors ability to rev freely when the nitrous is engaged, I.E. If the vehicle is in low gear, nitrous can be engaged at any time, but if the vehicle is in a higher gear moving at a slow speed when the nitrous is engaged the engine will detonate and damage will occur. The same goes for actual differential gearing.

---

### **Moving the MAP Sensor line to Manifold Vacuum**

(Does it really work?)

Some folks have claimed that moving the MAP Sensor signal line (vacuum line) over to Manifold Vacuum generates more HP and TQ. While it "feels" like it, all you're doing is dropping the MAP signal quicker - causing the PCM to think that it's under a load quicker - therefore adding more fuel and retarding the timing slightly quicker (yes...timing is retarded while under a load). In cases where a longer duration camshaft with more overlap (see [Poor Idle with Big Cam](#) tip) is present, this does work...but it's not going to substantially increase HP/TQ on stock cam's engines.

---

### **Charging System Upgrade - 1992-1996**

If you are running a higher than stock performance engine and/or high powered stereo equipment in your 1992-1996 Dakota, you can replace the alternator pulley on your factory unit with the pulley from a 1997 or newer Dakota (2.5/3.9/5.2/5.9L all have the same pulley on them). We checked the voltage output on a 1993 and 1996 Dakota with the stereo, headlights (with high-beams on), A/C turned on, wipers turned on, and with the blower motor set at high...voltage was as 12.6-12.8v. With the smaller diameter pulley from the 1997+ models, the voltage increased to 13.4-13.8v, thus giving you not only more power for your accessories...but also enough to keep the electronics (Sensors/PCM) at optimum voltage as well.

1992-1996 Alternator Pulley = 2.85"

1997-2003 Alternator Pulley = 2.47"

---

## Why we do not recommend O-Ringing the Mopar Cylinder Heads

**Cylinder heads can be o-ringed but you'll need the matching block to make sure they're aligned properly.** No production engine has perfectly aligned combustion chambers or bores so there will be inconsistencies in the exact alignment of the heads vs. block. The best way to o-ring (when using factory style gaskets) is either cutting a groove around the bore for a mechanical lock or using a wire - **on the block**. The block is much less prone to warping and won't distort slightly like cylinder heads when set at proper torque specs. If you want to use the o-ring and receiver groove, you'll need copper gaskets or composite gaskets that work with the o-ring and receiver grooves. You also need to make sure that the o-ring is not too close to the fire-ring on the head gasket. If it's too close, well...you can see what happens in the pictures below (this was with only 4# boost and only 10 miles down the road - no detonation either).



(1) Passenger-Side Head Gasket: Blown cylinder (4-5# boost) - Notice O-Ring impression - Misaligned



(2) Passenger-Side Head Gasket: #2 Cylinder (Notice misaligned O-Ring and partially crushed fire-ring due to misalignment of O-Ring)



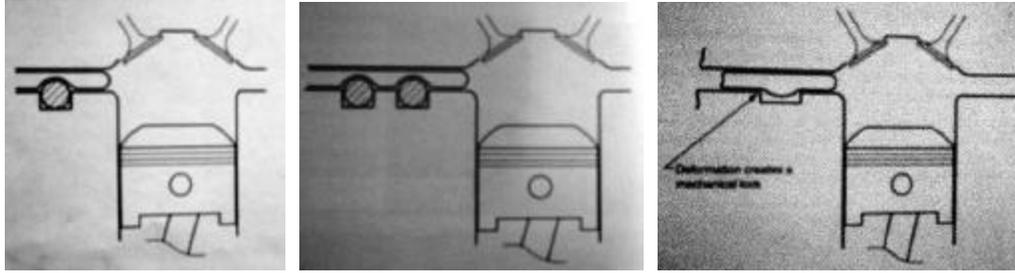
(3) Driver-Side Head Gasket: #4 (Notice the fire ring at the top of the cylinder - ring partially distorted due to misaligned o-ring)



(4) Same as #3 (Better View)



(5) Passenger-Side Head Gasket: #8 Blown (Fire Ring was crushed at top of cylinder - misalignment)



***Proper Methods for O-Ringing the block (with NO receiver groove)***

---

### **Supercharger/Turbocharger - Blow-by/PCV Fix**

For those running either a Supercharger or Turbocharger, you may notice some blow-by on valve cover (via the breather cap). Normally, this is caused by the factory PCV valve not sealing up properly under boost. We've found that the PCV Valve from a late model Ford works excellent even under a 120psi air pressure test.

The part to find is a Ford Motorcraft: **FV-140** PCV Valve.

The only modification to make this PCV valve fit in the factory grommet is to enlarge the hole on the grommet to 3/4". Otherwise, event he factory PCV vacuum hose fits.

---

### **Oil Pan Leak Fix - 408CID Engines (Also covers 360CID)**

On some rebuilds and/or 408CID "Stroker" upgrades, you may experience an oil leak from the rear of the oil pan (at the seal). This is caused by a known machining problem with the Mopar rear mains (verified with Dodge and Mopar direct). The fix is to use the gasket from a '98+ 360 (which has a slightly thicker rear seal) and to use a thin bead of silicone on both sides of the gasket. You can use a different oil pan (as some other shops recommend) but they are all dimensionally the same with the exception of the center portion, which has a indentation on the Dakota engines for the K-Member, and can all leak at the same point. DC has a fix for this but it requires changing out the short block (to change the rear main) which isn't an option for most engine rebuilds. You can NOT just replace the rear main on the vehicle.

---

### **Oil Supplements - Are they really worth it?** *(This is straight from Mopar)*

Engine Oil - Additives/Supplements  
TSB NUMBER: 09-003-01  
GROUP: Engine  
DATE: May 4, 2001  
SUBJECT: Engine Oil Additives/Supplements

#### **OVERVIEW:**

This bulletin reinforces a requirement to cease the current practice of using supplemental oil additive treatments in all DaimlerChrysler engines.

MODELS:

2001 (AB) Ram Van/Wagon  
2001 (AN) Dakota  
2001 (BR/BE) Ram Pickup  
2001 (DN) Durango  
2001 (JR) Sebring Sedan/Stratus Sedan/Sebring Convertible  
2002 (KJ) Liberty  
2001 (LH) Concorde/Intrepid/LHS/300M  
2001 (PL) Neon  
2001 (PR) Prowler  
2001 (PT) PT Cruiser  
2001 (RG) Chrysler Voyager (International Markets)  
2001 (RS) Town & Country/Caravan/Voyager  
2001 (ST) Sebring Coupe  
2001 (SR) Viper  
2001 (TJ) Wrangler  
2001 (WG) Grand Cherokee (International Markets)  
2001 (WJ) Grand Cherokee  
2001 (XJ) Cherokee

NOTE: THIS BULLETIN APPLIES TO ALL DAIMLERCHRYSLER MODELS/ENGINES BUILT BEFORE AND AFTER THE 2001 MODEL YEAR.

DISCUSSION

Engine oil additives/supplements (EOS) **should not be used** to enhance engine oil performance. Engine oil additives/supplements should not be used to extend engine oil change intervals. No additive is known to be safe for engine durability and can degrade emission components. Additives can contain undesirable materials that harm the long term durability of engines by:

\* Doubling the level of Phosphorus in the engine oil. The ILSAC (International Lubricant Standard Approval Committee) GF-2 and GF-3 standards require that engine oil contain no more than 0.10% Phosphorus to protect the vehicles emissions performance. Addition of engine oil additives/supplements can poison, from the added sulfur and phosphorus, catalysts and hinder efforts to guarantee our emissions performance to 80,000 miles and new requirements of 150,000 miles.

\* Altering the viscosity characteristics of the engine oil so that it no longer meets the requirements of the specified viscosity grade.

\* Creating potential for an undesirable additive compatibility interaction in the engine crankcase. Generally it is not desirable to mix additive packages from different suppliers in the crankcase; there have been reports of low temperature engine failures caused by additive package incompatibility with such mixtures.

---

### **What does Short-Term and Long-Term Fuel Trim mean (STFT / LTFT)?**

**Short Term Fuel Trend (STFT)** - Instantaneous fuel trend indicator - a numeric indicator (-) is rich (+) is lean. Any deviation from 0% indicates the short term fuel trim is changing the injector pulse width. The amount of pulse width change depends on how far the short term fuel trim value is from 0%.

**Long Term Fuel Trend (LTFT)** - The long term fuel trim is a matrix of cells arranged by RPM and MAP. Each cell of the long term fuel trim is a register like the short term fuel trim. As the engine operating conditions change, the PCM will switch from cell to cell to determine what long term fuel trim factor to use in the base injector pulse width equation. A value of 0% indicates that fuel delivery requires no compensation in order to maintain the PCM commanded air/fuel ratio.

A negative value significantly below 0 percent indicates that the fuel system is rich and the PCM is reducing the fuel delivery (decreased injector pulse width – trying to reduce the amount of fuel). A positive value significantly above 0 percent indicates that a lean condition exists and the PCM compensates by adding fuel (increased injector pulse width – attempting to increase the amount of fuel).

---