



FREQUENTLY ASKED QUESTIONS

Revised and edited February 2014

Over the years there have been many changes to the Ram truck and Cummins engine. For detailed information, we would suggest that you download the **300+ page PDF file "Turbo Diesel Buyers Guide"** from the Turbo Diesel Register website (www.turbodieselregister.com). Better yet, join the TDR by using the brochure we've provided.

In this FAQ document you will find that we've given a concise answer to each question and often referenced detailed (often four to six page articles) where the reader can get more information. If you are new to the TDR you'll find the answers and references helpful; if you are an old time TDR member you can test your (and our) knowledge.

➤ EXPECTATIONS ◀

Q What mileage can I expect from my Turbo Diesel truck?

A Regardless of the year/model of the truck, you can expect:

- 12 - 18 mpg – without a load
- 9 - 13 mpg – with a load

Q How do I get better fuel economy?

A This answer is far too lengthy for a FAQ format. There is a section in the aforementioned "Turbo Diesel Buyer's Guide" that devotes 14 pages to this topic. It is a "must read" for all '89 to current truck model owners.

Q Why is there such a disparity in mpg?

A Driver variables; truck variables (gearing, 4x4 or 4x2, automatic, five-speed or six-speed, 2500 or 3500); load variables; seasonable variables (winter mileage is 5% - 10% less); vehicle speed. Each situation is as unique as the individual with the inquiry. As you can imagine, the "worst" combination for mileage is a heavy truck (a 3500, Extended Cab, 4x4) with an automatic transmission and a low gear ratio (4.10) and a driver trying to go 75 mph. Slow down, reduce anxiety and save fuel!

➤ PROGRESSION OF POWER RATINGS ◀

Q Back in '98 there was a mid-year engine introduction. The engine went to electronically-controlled fuel injection. What was the reason for the mid-year change?

A The reason for the change? To meet a new set of diesel exhaust emission laws that went into effect on January 1, 1998. Hence, the mid-model year introduction of the engine that has come to be known as the 24-Valve Engine. The ratings that were introduced at that time were as follows:

Five-speed:

215 hp @ 2600 went to 235 hp @ 2700
440 ft-lb @ 1600 went to 460 lb-ft @ 1600

Automatic:

180 hp @ 2600 went to 215 hp @ 2700
420 ft-lb @ 1600 went to 420 lb-ft @ 1600

At its introduction we covered the engine in detail. Since then we have used a "Question and Answer" column with member comments and factory updates to spotlight the engine.

Q So, what's the difference between the "electronic" 24-valve engine versus its mechanical fuel-injected predecessor?

A To be brief, a new electronic controlled fuel system, a four valve/cylinder cylinder head, and an extended power range. The engine now revs from 2800 rpm to 3200 rpm versus a rpm drop-off of the old engines that occurred at approximately 2600 rpm. Remember the equation for horsepower: $HP = \text{torque} \times \text{rpm} / 5252$ (a mathematical constant). By virtue of the higher rpm the new engine can rev up to, we're able to mathematically make horsepower.

Q How about the 2001 High Output, 24-valve, electronic engine?

A In 2001 Dodge released higher engine ratings for the Turbo Diesel trucks. Concurrent with the new ratings, they elected to change the model year for all Turbo Diesel trucks. Thus, the model year '00 was a short production. A collector's edition? Well, let's not get carried away.

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For those who wanted a manual transmission, one could have elected to stay with the five-speed, NV4500 transmission and the established engine rating of 235 horsepower @ 2700 rpm and 460 torque @ 1600 rpm. The high-output version required the six-speed, NV5600 transmission and the engine rating went to 245 horsepower @ 2700 rpm and 505 torque @ 1600 rpm.

Interested in an automatic? The engine was boosted from the established 215 horsepower @ 2700 rpm and 420 torque @ 1600 rpm to 235 horsepower @ 2700 and 460 torque @ 1600 rpm. There was not a high-output designation for the automatic-equipped trucks.

Q As model year '03 has come and gone there was a new body style 2500 and 3500 series truck. What can you tell us about these vehicles?

A They were introduced at the Chicago Auto Show in February, 2002. We've covered the product introduction with a new column—the Third Generation—to specifically discuss the new truck's features and benefits.

Q What are the horsepower and torque ratings for the '03 Turbo Diesel trucks?

A Just the facts, just the facts. The ratings are as follow:

Standard Engine

Five-Speed:	Automatic:
250 hp @ 2900	235 hp @ 2700 (Five State)*
460 ft-lb @ 1400	460 ft-lb @ 1400 (Five State)*

High-Output Engine

Six-Speed or Automatic (after 1/1/03)
305 hp @ 2900
555 ft-lb @1400

*California, Maine, Massachusetts, New York and Vermont

For detailed information on the '03-'07 Cummins high pressure, common rail (HPCR) engine you'll want to read Issue 40 or the Turbo Diesel Register magazine and the seven page review of the new engine.

Q What is the story on the '04.5 Turbo Diesel engine and the even higher 325 horsepower/600 torque output?

A You may have noticed a pattern of mid-year engine introductions. Specifically there was a 91.5 engine (the addition of an intercooler), the 98.5 engine (electronic fuel injection and a 24-valve cylinder head), and now, the '04.5 engine. These mid-year changes coincide with emission legislation that was enacted on January 1 of the truck's model year.

There are several reasons that the '04.5 engine introduction was an exciting event for Ram Turbo Diesel owners. First, in the never-ending race for horsepower and torque supremacy, the Cummins engine held the advantage in both power categories over Ford and Chevy. Second, the '04.5 engine is 50-state certified without having to use exhaust gas recirculation. Third, all engines are rated at 325/600. No longer is there a rating based on transmission (automatic or six-speed) selection. Fourth, we were assured that Cummins will be a major player in the future diesel pickup marketplace. The next emissions hurdle was January 1, 2007, and there are supply agreements in place that are good up until 2016.

Q This brings us up to, yet another, mid-year engine introduction, the '07.5 Turbo Diesel (the 6.7-liter engine) with its 350 horsepower/610 torque (manual) and 650 torque (automatic) rated engine. Was this also done to meet tighter emissions legislation?

A Yes, you *have* noticed the mid-year introductions! We started our coverage of this engine in Issue 52 and have a column to spotlight any problems that owners encounter with the '07.5 engine. This column is called "The 6.7-Liter HPCR."

Just like the previous mid-year introductions, the reason for the 6.7-liter engines was the need to meet emissions standards that were enacted on January 1 of the truck's model year. The new 6.7-liter and its emissions control hardware will be the source for topics in the Turbo Diesel Register for years to come.

Q In mid-year 2011 the folks at Ram introduced a "Max Tow" option and a new engine rating of 350 horsepower/800 torque. What was changed on this engine?

A Unlike the '07.5, '04.5, '98.5 and '91.5 engine introductions that were done to meet emissions standards, this 2011 engine introduction (announced in February 2011 with trucks finally at dealerships in May 2011) was done to one-up the competition at Ford and GM with a higher torque number. The changes to the engine: a recalibration to the engine's control module.

Interestingly, this 350/800 rating was only released with the automatic (68RFE) trucks.

For 2012 all of the automatic-equipped Turbo Diesel trucks get the 350/800 engine rating. The manual -equipped trucks are 350/610 torque-limited due to the inability of the clutch to hold the torque.

↻ **VARIOUS TOPICS** ↻

Q Tell me about the latest-and-greatest. What did the folks at Ram and Cummins do to leapfrog the Ford and Chevy guys with the tow rating of 30,000 pounds for a consumer 3500 series truck in 2013?

A Long story: See TDR Issue 78, Issue 80 and Issue 81. Short story: Changes to the truck's frame; automatic transmission; engine, transmission and air intake cooling; and engine output ratings combined to give Ram/Cummins the confidence to give a tow rating (30,000 pounds) that was 5,000 pounds better than any other available pickup truck.

Granted, the 30k rating required you to check the right boxes when ordering a 2013 truck, but the changes carried over to the 2014 trucks and gave Ram the ability to increase the tow ratings throughout the *entire* product lineup.

So, for 2014 we now have three diesel engine options offered for the consumer 2500/3500 trucks with the following ratings:

- 350hp/660 torque with manual G56 six-speed
- 370hp/800 torque with automatic Chrysler 68RFE six-speed
- For 3500 only - 385hp/850 torque with automatic Aisin AS69RC six-speed

For the Chassis/Cab 3500/4500/5500 trucks, the diesel engine options are:

- 320hp/650 torque with manual G56 six-speed
- 325hp/750 torque with automatic Aisin AS69RC six-speed

Q My truck seems low on power. The dealership says that it is within specifications. How can I tell? Also, how do I get more power?

A First, let's discuss the subject of more power. The most important ingredient is more money. Internal combustion engines are nothing but air pumps. Let them breathe easier. Add a low restriction air filter and exhaust system. Bingo, this is a low-cost modification that helps reduce exhaust gas temperature. Unfortunately it has little net effect on diesel engine performance. More importantly, you have to increase the fuel delivered to the engine. However, an unauthorized adjustment to the factory's engine's fuel delivery system will present a potential warranty invalidation. Did we mention exhaust emissions violations? Your truck, your money—your choice. Issue 60 and updates to the [Turbo Diesel Buyer's Guide \(TDBG\)](#) covered all of the ifs-and-buts of performance upgrades.

The following list is a starting point for determining if performance is as it should be and/or if a performance upgrade may be the right choice for you. Also, log on to our web site at: <http://www.turbodieselregister.com> and review the discussion or join in the fray with your questions. (Membership to the TDR is necessary to post on the bulletin board.)

- How is your truck equipped? Gearing, tires, transmission, etc.?
- Describe your camper/trailer loading. Be honest.
- What are your measured performance results? Zero-to-60 mph time with no load on the truck (Issue 13, page 37).
- What are your performance expectations? (Issue 40, page 132)
- A check of the low-power-complaint basics. Following is a list of easy-to-do items the owner can perform:
 - check for quality of fuel
 - check for full travel of the throttle lever at the fuel pump
 - check all turbo-to-intercooler and intercooler-to-intake manifold hoses and clamps for a tight fit
 - check the condition of your fuel filter
 - check for fuel inlet restriction
 - check the condition of your air filter
 - check for exhaust leaks prior to the turbocharger
 - check for exhaust system restriction for automatic trucks; check your transmission fluid level

Finally, for First and Second Generation owners (1989-2002) our digital copy of Issue 40, page 132, has a four-page article on performance expectations based on Cummins' Vehicle Mission Simulation computer program.

Q Tell me more about exhaust brakes for my '89-'07 model year five-speed/six-speed truck?

A As a kid, did you ever stuff a potato up a tailpipe? The same principle is at work with an exhaust brake. You close off the exhaust, and you build up back-pressure. All of the manufacturers' units work with varying degrees of success. Issue 41 and 42 had articles on exhaust brake installation on the 5.9-liter HPCR engine.

In TDR Issue 71 we published a "final answer" article that was 5 pages in length covering all of the technical data needed to make an informed decision. All of these magazines are digitally available at our website. Finally, the [TDBG](#) has a recap of the exhaust brake story.

Q How about an exhaust brake for my automatic truck?

A Exhaust brakes are not recommended for use with automatic transmission equipped vehicles. This controversial subject was covered in a lengthy discussion in Issue 24 and Issue 36. Issue 55 confirmed that the 5.9-liter HPCR engine/48 RE transmission in '03-'05 model year trucks were not approved for exhaust brake use. The exhaust brake for use with an automatic truck was finally approved for model year '06 (Issue 49, page 35).

Again, TDR Issue 71 has the "final answer" and details about exhaust brakes for years '89-'07.

Q Now I am all confused. I thought that an exhaust brake came standard on the newer trucks.

A Standard equipment? Yes indeed! Starting with the '07.5 introduction of the 6.7-liter engine, the engine's turbocharger design was changed. The new sliding vane turbocharger functions as an exhaust brake and works wonderfully with both kinds of transmissions: automatic or manual. TDR Issue 70 has the complete story on the Cummins/Holset turbocharger (HE351).

Q I'm looking at a used truck (vintage '94-'02). Can you discuss the 3.54 vs. 4.10 rear gears? What is the best choice?

A It all depends. You need to answer about a dozen questions to be sure. But in about 90% of the cases, the 3.54 is the better choice. If you have a service body loaded with tools and compressors, and you pull a back-hoe for a living, and you live in the Sierra or Rocky Mountains, you'll want the 4.10. Certainly, the 3.54 is better for fuel mileage as the engine turns less rpm at highway speeds. Realize if you have a heavy load, the 3.54 may require your patience if and when you tow in the mountainous terrain. What percentage of the time will you be towing in mountains?

Q Has the gearing on the '03-'08 Turbo Diesels changed?

A Yes. Now the ratios offered are 3.73 and 4.10. The change to a 3.73 versus the previous generation's 3.54 ratio is due to a change in axle suppliers (now American Axle, previously Dana) as well as an extended, higher rpm range which the engine can operate. For '09-and newer trucks, there is now a 3.42 drive ratio that is offered.

Q Which engine oil do you recommend for my diesel?

A Many of you inquire about selecting the "best" for your truck. I hear a lot of questions like, "How about Mobil 1 or the Castrol Syntec synthetic lubricants?" Good intentions, but these oils are not blended to meet the requirements of a diesel. The API (American Petroleum Institute) "donut" rating for both oils is CD. Note the first letter "C" stands for compression engine (a diesel). The "D" is the specification test the oil was tested at and was able to pass. The "D" specification was developed in 1952.

The most recent "C" or diesel specification is CI+4. In 2007 it changed again to CJ. Is the CJ specification better than CI+4? Good question and Issue 54 through Issue 59 had a lengthy discussion on why CJ may not be better than CI+4. If you have a new 6.7-liter HPCR engine, you will want to read about the CJ oil. Owners of trucks built prior to '07.5 will want to continue with the CI+4 oil . . . if you can find it. We revisited the lube oil story in TDR Issue 76. Join the TDR and read about the latest updates.

The oil also needs to also pass the API S (S stands for a spark/gasoline engine) category and current specification J. The S classification is needed to address and prevent wear on the sliding camshaft tappets.

Q How about other fluids in the truck? Are there any precautions I should take and are there recommendations you can offer?

A Wow, there are so many items to consider! To be brief, the correct fluids to be used in your truck are those that are referenced in your Owner's Manual. Period. End of conversation. However, often owners will balk at using only the factory supplied part numbers as often the cost is higher than other fluids that can be purchased in the aftermarket. Issue 37 talked at length about the correct fluids and offered suggestions on sourcing specification-equivalent lubricants and fluids. Then in Issue 43 our brake guru, James Walker, spoke about the importance of the right brake fluid. In the [Turbo Diesel Buyers Guide, \(a 300+-page PDF file found at \[www.tdr1.com\]\(http://www.tdr1.com\)\)](#) you will find a four-page article that discusses the proper fluids for your truck.

Q Is it necessary to warm up my diesel?

A Extended warm ups are not necessary (check your Owner's Manual). Above 50 degrees, go ahead and drive after oil pressure is up. Don't "stick your foot in it" until the temperature is up. In cold weather, give it a chance to settle down . . . quit shuddering and shaking. Driving with moderate throttle will bring up running temperature faster. Just use common sense.

Q. The big-rig trucks idle their engines all night. What are the effects of extended idling on my engine?

A Multiple hours of idling over an extended period of time are detrimental. As to what can go wrong, the list is varied. The subject was covered in detail in Issue 63 on pages 52-54. Commentary from the TDR editors, Cummins and quotes from a big-rig magazine, Commercial Carrier Journal, were cited. We summarized by saying, "From the Cummins correspondence and trade journal quotes it is obvious idling your truck for multiple hours over an extended period of time is . . . shall we say, not smart." (Idle time . . . the devil's playground?)

Q What is causing the chirp I hear?

A Mice under the hood? No. Cummins says this noise is normal and is caused by the engine stopping faster than the belt can. High compression says "whoa" while the fan says "go." The result is a chirp from the pulley. If the viscous fan clutch is locked up at shut down, the chirp may be heard in the next county. Belt wear and tensioner condition will also determine the decibel rating of your chirp. The chirp situation is not as common on '98.5 - '02 24-valve engines, nor does it happen often on the '03 or newer engines.

Q Do you recommend the automatic or the five-speed/six-speed?

A Are you a Democrat or a Republican? My wife says it has to be an automatic . . . so guess which one we have? Do you do a lot of stop 'n go driving? Do you like to pretend you are driving a Trans-Am race and enjoy all of those speed shifts? Do you do a lot of mountain driving? How about trailer pulling? If you are a good driver, you have greater overall flexibility in meeting various road conditions with a manual gearbox. Today's computer controlled automatics are infinitely more efficient than previous units. The "lock-up" torque converters have put the fuel consumption on an equal footing with that of the manual gearbox at freeway speeds. Once you look at the pros and the cons, it all boils down to personal preference.

Q What is the story behind the introduction of the 48RE automatic transmission in 2003?

A The 48RE represents another evolutionary change to the transmission that was first coupled to the Turbo Diesel truck in 1989, Chrysler's famous 727 transmission. Since '89 an overdrive was added to the automatic transmission and the nomenclature changed to 518. Next came a lockup feature (47RH), electronic controls (47RE) and now updates to handle higher horsepower and torque. The updates were covered in a detailed article in TDR Issue 41.

Q How about the '07.5 six-speed automatic transmission, the 68RFE?

A Issue 58 had an "Ask the Engineer" write-up on the 68RFE. Thus far the transmission has performed flawlessly. Give this one the stamp of approval.

Q What should be done to break in my engine properly?

A Floorboard it right out of the showroom! Not really! Again, check your Owner's Manual. Specifically, the manual points out the following: "Your Cummins turbo-charged, charge air cooled, diesel engine does not require a break-in period due to its construction. Normal operation is allowed, provided the following recommendations are followed (if it is practical to do so):

- Warm up the engine before placing it under load.
- Do not operate the engine at idle for prolonged periods.
- Use the appropriate transmission gear to prevent engine lugging.
- Observe vehicle oil pressure and temperature indicators.
- Check the coolant and oil levels frequently.

Because of the construction of the Cummins diesel engine, engine run-in is enhanced by loaded operating conditions that allow the engine parts to achieve final finish and fit during the first 6,000 miles. There is little difference from a gas engine except that diesels like to work a little harder.

Other notes on break-in: do not change to a synthetic or partial synthetic oil until after the engine is broken in (give it 10,000 miles).

Today, manufacturing tolerances are so much tighter, that once everything is warmed up with correct lubricants, you aren't going to do any damage to the vehicle.

Q How does high-performance “equate” to engine life?

A Unfortunately, there is not an equation or formula to compute the effect of additional power and the resulting stress imposed on your engine. In the simplest of terms: each engine has a finite life. Assuming proper maintenance, the life is dictated by the amount of fuel that is burned by your engine.

More fuel = more power. Power ÷ time = engine life.

The conclusion: If you use the power (fuel), you use up engine life . . . The Funny Car engine in John Force’s 6,000 horsepower dragster goes how many miles before a rebuild?

Q I’ve heard about a problem with the antifreeze that causes diesel engine cylinder liner pitting. Sounds serious and costly. What’s the story?

A It’s quite a story. The technical term is called “cavitation erosion” and was covered in detail early-on in the TDR. The bottom line is that cavitation erosion is not a problem with your Cummins if you adhere to the proper maintenance schedule and use the proper specification—ASTM 4985/GM 6038M antifreeze. See Issue 54, 62 and 83 for updates.

Q Where can I find more information about diesel efficiency?

A Wow, this could go on for pages. I strongly recommend you begin by reading the related articles in TDR Issue 55. Then, read them again. This is heavy duty stuff. I prefer to think of it as anything that makes that much noise has got to be better. The technical discussions on volumetric efficiency and brake specific fuel consumption are the secret to the engine’s “sweet spot” for fuel efficiency. The quest for better fuel mileage is covered in the Turbo Diesel Buyer’s Guide and there are 14 pages devoted to the topic. The article encompasses all model year truck engines. For your convenience the **Turbo Diesel Buyers Guide (a 300+-page PDF file found at www.tdr1.com)** has 16 pages that talk about fuel mileage, horsepower and your engine warranty (or lack thereof).

Q Please explain more about the wastegate turbo.

A In a nutshell, the wastegate design allows a higher boost at low speeds. At high speeds some of the exhaust flow by-passes the turbocharger (the wastegate opens), which limits intake pressure so that the turbo doesn’t spin into orbit. If you want a picture of the wastegate, see Issue 40, page 29. The **Turbo Diesel Buyers Guide (a 300+-page PDF file found at www.tdr1.com)** has all of the production engines’ boost and wastegate specifications.

Q What causes white smoke?

A Careful, you can get arrested for that! Seriously, I had trouble with a cold-start, white smoke problem when my ’94 truck was new. Again, early TDR magazines had detailed explanations about white smoke on start-up. The bottom line is that it is unburned fuel and it is a fact of cold-weather diesel operation.

Q I have a ’07, 4x4, 2500 series truck. When the headlights are on, they blink, dim or flutter somewhat. The dealership cannot find the problem. Here’s hoping you know the answer.

A We’re going to make an assumption that the lights dim/flutter shortly after start-up of the truck. Or, you can get the flutter at a stop light when it is really cold outside (hence cold air into the engine). Having made those assumptions, the problem can be described as “normal.” Do not spend effort at the dealership to correct a “normal” truck characteristic. It is one that has been on-going since the first Turbo Diesel truck was subjected to cold weather back in 1989. Thanks to writer, John Holmes, for the explanation (Issue 20, page 25). The reasoning is as follows:

The Cummins uses a grid type intake air heater. Think of the intake manifold air heater as a powerful hair dryer grid. By design, the Diesel engine is a “heat” engine. For cold weather operation, the Cummins uses the grid heaters to warm the initial charge of air to the cylinders. Never use starting fluid/ether to “help” your Cummins start. Use of such is asking for an explosion in your intake manifold. Ether has a flash point of 360°.

There are two cycles: the pre-heat and the post-heat cycles. When you turn the ignition switch on, and the temperature is 59° or below, the toasters come on for 10 seconds (down to 15°). If it is between 0° and 15° the “wait to start” light will stay on 15 seconds. If it is below zero, thereby freezing portions of a brass monkey, you will have to sit there for a full 30 seconds while the intake manifold rubs its hands and stomps its feet.

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After the engine has been started, the post-heat cycle takes over. If the temperature is below 59°, the heaters are cycled on and off depending on air temperature and how quickly the Cummins gets toasty. You will notice the voltmeter acting like a windshield wiper as the heaters are cycled. Like, man, they draw 120 amps! Thus, the lights flutter as the battery is working to supply current to all circuits.

This condition is normal. It occurs on all trucks manufactured from '89 to current (including the newer '07.5 and up 6.7-liter engines).

Q Who makes the best exhaust gas temperature gauge?

A Great question. The staff at Geno's Garage boxed up \$2,000-worth of different exhaust gas temperature gauges, then sent them out for testing at an independent lab. They were tested for response and accuracy. The ten-page report was written up for the TDR magazine and was published in Issue 34, Fall of '01.

The cliché, "you get what you pay for" proved to be correct. The SPA Technique digital gauge was the top performer, followed by the Westach unit. The other EGT gauges were comparable in performance. With comparable performance, the choice becomes one of aesthetics. Gauge evaluator, Jim Wier, wrote, "In regards to the 'best gauge,' it is how you view the mechanical installation and how you like the color of the dial." So, while we may be biased toward a particular brand, the choice is yours.

Since that time (Weir's article ran in the Fall of '01), there have not been any revelations in the gauge business.

If you have an '07.5 or newer truck with its 6.7-liter engine we now recommend the EDGE "Insight CTS" unit which simply plugs into the OBDII data port. The data available at the OBDII port gives you 20+ data points.

The Insight also has a host of other features that make it an item worthy of your consideration.

Q A lot has been covered in the FAQs. What else do I need to know?

A This FAQ is just the "tip of the iceberg." We strongly suggest that you visit the Turbo Diesel Register website and download the **300+ page PDF file Turbo Diesel Buyer's Guide**.