MAINTAINING YOUR EQUIPMENT

ROUTINE PM WILL SAVE MONEY OVER TIME AND HELP DETERMINE WHEN TO TRADE

Preventive maintenance can be expensive, but neglect is even more costly. Systematic PM saves you money in the long run by reducing the chances of equipment failure on the road and reducing time lost to repairs. It also helps reduce the severity of failures if they do occur. Some industry estimates say preventive maintenance can cut breakdown costs in half, and a properly maintained engine will last much longer and also use less fuel.

Nearly all owner-operators change their oil often or use oil analysis to determine precisely when to change if at more distant intervals. Also important is using quality oil and filters, as well as timely coolant servicing (including system flushing), because these practices will help make an engine last longer. Using synthetic transmission and axle lubricants and changing at required intervals also will help extend component life.

Don't neglect other less-familiar practices. Adjusting the overheads after break-in and then at the required infrequent intervals saves fuel, reduces oil sooting and wear and is likely to prolong the life of both valves and injectors. Replacing injectors before combustion gets too dirty also will prolong life. Using quality fuel filters will, in turn, prolong injector life. Various long-life antifreeze options, such as extended life coolants and coolant filters that add supplemental coolant additives on a controlled basis, should be considered even though the initial cost may be higher.

A simple maintenance plan that doesn't require technical skills and special equipment will include tires, engine oil, wipers, lights, filters, coolant and belts/hoses. A more technical PM will include brakes, drive axles, wheel seals, transmission, batteries, exhaust, driveline, suspension, steering, clutch and engine.

AN OUNCE OF PREVENTION

Become familiar with every inch of your truck, and know which components can fail and under what circumstances. You don't have to be a mechanic, but you should be familiar with a truck's mechanical operation and how systems interact. Manufacturers recommend a standard PM schedule for every model. The Technology & Maintenance Council of the American Trucking Associations also provides PM guidelines for tractors and trailers. Follow these schedules diligently, and you'll head off a lot of trouble.

Daily pre-trip inspections, required by the U.S. Department of Transportation, can help identify problems before they become emergency situations. A leaking differential should be repaired before the lubricant loss causes component failure. Early warning signs found by engine or driveline component oil analysis can alert you to serious problems before costly troubles occur. If you have a truck with more than 300,000 miles, consider running a dynamometer test once a year.

Always look for common problems such as seal leaks, loose bolts, chafed wires and hoses, improper adjustments and worn, broken or missing parts. If you cannot recognize these problems, have a qualified technician inspect your rig every six months or even more frequently. An alternative is having lubrication service done at a dealer or truck stop where experienced technicians will look for problems as they work.

The same can be said for maintaining a trailer. For a dry van, check the suspension during pre- and post-trip inspections, perform a pre-load adjustment and annual inspection on the bearings, check the brake lines regularly, and check tire inflation and wear regularly. Also replace the work scuff liner to protect the trailer walls, check the roof during pre- and post-trip inspections for holes and leaks, inspect the threshold plate often, and inspect the floor to spot weak spots or small holes.

WATCH YOUR BATTERIES.
Winter weather often is blamed for battery failures, but damage caused by hot weather often is the primary culprit. Battery wear can go undetected for months, but routine checks can head off potential failures.

Lead acid batteries have a higher discharge rate in elevated temperatures, shortening service life. To counter this, many operators running trucks with Auxiliary power units have migrated to absorbed glass mat batteries, which are not susceptible to electrolyte loss like lead acid batteries.

KEEP ENGINE COOLANT CLEAN AND STRONG
While today's trucks don't leak coolant as much as older trucks, coolant still degrades over time. As coolant's protective additives become depleted, its corrosion-fighting properties are diminished. Also, if undiluted coolant and coolants of different types are continuously topped off with water, it can degrade the fluid's freeze and boil protection. Today's coolants can reach 600,000 miles, with many warranted to 1 million miles. Coolant quality can be checked with an inexpensive bulb or strip test, preferably in spring or fall before severe temperatures arrive.

SAVING FOR MAINTENANCE

Every good PM schedule begins with establishing a maintenance escrow savings account. An industry standard for maintenance escrow savings is based on a time-proven formula:

ESCROW SAVINGS SCHEDULE

AGE OF TRUCK	MAINTENANCE SAVINGS
New	5 cents/mile
1 year or 150,000 miles	6 cents/mile
2 years or 300,000 miles	7 cents/mile
3 years or 450,000 miles	8 cents/mile
4 years or 600,000 miles	10 cents/mile
5 years & older or 750,000+ Miles	15 cents/mile

BEGIN AT THE DEALER
The best time to start a regular PM program is when you're buying your truck. If the dealer doesn't volunteer detailed information on maintenance, ask for it. A good dealer is happy to give advice about oil changes, lubricant and filter replacement and other maintenance. Take advantage of your leverage before you buy to get all the information you can. Manufacturers' websites often offer detailed information.

Separate warranties often are written on the engine, transmission and other components because they are supplied by different entities. Find out the duration of the warranties and what it will take to maintain their validity. You might want to consider extended warranties when available.

Choose a dealer carefully. Make sure its service department has the technicians and equipment to handle major repairs and that they have a helpful attitude. Talk to the parts and service managers, and form a relationship. From there, take the same relationship-building approach to local tire and engine shops, an alignment shop and an air-conditioning shop. Dealing with professionals who specialize

TIPS FOR BRAKE MAINTENANCE

It's no surprise that violations for brakes are among the most cited, given their constant wear and critical safety role. While that's enough reason to keep them in shape, another big factor is cost.

The cost of a brake-related mobile service repair easily can exceed $1,000, and that's without a tow.

Pre- and post-trip inspections are critical for identifying issues before violations occur. Obvious red flags include rust streaks, air leaks, oil stains, air lines rubbing on crossmembers or frame rails, bad or missing gladhand seals and brake components that are worn, missing, broken or loose.

Look at components such as air chambers that may be corroded or rusted. Also check the air system for contamination or water, slack adjuster, brackets and air lines that may be hanging low.

Also listen for leaks by building pressure in the air system while keeping the parking brakes applied, then walking around the truck listening for leaks. When doing this, look at your air gauges to make sure the compressor is building correctly, and make sure none of the warning lamps are illuminated on your dash.

Finally, inspect the pad thickness visually, measure caliper position with a ruler, and inspect rotors for cracks every four to six months.

Catching any of these issues during your inspections can eliminate accelerated wear, brake damage and damage to other components.

in one maintenance item is key to holding costs down in the long term. Take time to let the service manager or even the owner of the shop know of your goals and plans. Ask their advice about maintenance scheduling.

KEEP GOOD RECORDS

Only with complete and accurate records can you track the work done on your truck and prove that required work has been done. Committing every shop visit to paper and creating a calendar of scheduled visits will pay off. You also should keep a schedule of future work to be done. This schedule will help you avoid overlooking something vital.

Devise your own maintenance service report, and use it to keep a record of every dollar you spend on your truck. Keep receipts on repairs. Keep old parts in case of a warranty dispute. When you use the truck service report, note all warrantable purchases and repairs, and include a record of your out-of-pocket expenses such as cab fares, meals and motel stays related to time lost due to repairs. Otherwise, you won't be able to file warranty claims properly, and your profits will suffer.

Good maintenance records can help you determine average miles per gallon, expenses on a per-mile basis and other key benchmarks that are helpful in cutting costs. They also can help you spec your next truck.

TIME TO TRADE

Maintenance costs typically rise in the third and fourth ownership years. Fifth-year costs often drop because the truck needs certain work in its fourth year that isn't required the next. However, the cumulative cost of maintenance — your average cost per year since you took ownership — and your cost per mile still increase each year.

No matter how rigorous your PM efforts, the time will come when you'll spend more on maintenance than you would for a new truck. How will you know when that time comes? Your maintenance records will tell you.

Create a maintenance budget, and track your maintenance expenses. When they rise to a point that seems excessive, check with your business services provider, who can help you determine how much your fuel, oil and maintenance costs have increased due to the truck's age.

Also consult your insurance agent to help determine how an equipment upgrade will affect your premiums. Your financing source can discuss various options for the purchase of a new truck, and your accountant can explain potential depreciation benefits that would accompany a new purchase.

Industry experts say you should consider replacement when your fuel mileage drops 2 mpg or more in spite of conservation efforts, or if truck technology develops to the point that a new truck would get an additional 2 mpg. Another indication to trade is when your total maintenance costs reach 15% of your gross revenue.

As a rule of thumb, consider a new purchase when the principal, interest, maintenance and operating costs of an old vehicle are higher than the comparable costs attached to a new vehicle. The estimated resale value of the old vehicle, coupled with any manufacturer's incentive on a new vehicle, may off set the higher cost of a new vehicle's principal and interest. At this point, a trade makes sense.

WAYS TO SAVE MONEY ON MAINTENANCE

When asked why they've done a poor job of preventive maintenance, too many owner-operators say they were trying to save money. But there are many ways to save money on maintenance without skimping and courting disaster.

STAY ON SCHEDULE

Plan your maintenance schedule as thoroughly as you plan this week's haul, and stick to it.

SHOP AROUND

Few owner-operators cite price as their primary factor in deciding where to buy their oil. They give more weight to convenience, but sometimes the cost of convenience can be high. Try to do a few price comparisons online or over the phone – especially if you haven't done

EXTENDING OIL LIFE

Oil might cost more than you realize, especially if you're not getting maximum use of it. Do a typical change yourself, and it still costs about $250 or more for the oil alone. But assume you extend your change interval from 15,000 miles to, say, 25,000 miles. That extension over the million miles of an engine's expected lifetime would save a lot. Allowing a modest amount for disposal costs and nothing for downtime or labor the total savings from adding 10,000 miles to change intervals over 1 million miles would amount to almost $8,000.

Oil life is quite flexible. A competent operator can extend that life significantly by paying attention to maintenance and altering his operational behavior. Minimizing idling time alone will extend the life of oil significantly because idling puts more undesirable stuff in the oil than even hard driving. Responsible refiners are willing to stand behind their products even when extending changes.

THREE KEYS TO EXTENDED DRAINS

- *Use good filtration practices. Proper filtration extends the life of oil. Use a filter that will meet all the engine manufacturer's specifications, and always change it at the recommended interval. Involve the filter supplier in considerations of extended drains. You might need better capacity for dirt or better internal construction.*
- *Choose the right oil grade. All premium oil refiners offer diesel oils that are extended drain-capable. Lubricants with a lower initial viscosity grade number are better for cold starting under harsh conditions. This allows many operators to curtail idling, which helps extend change intervals. New oils that hit the market in late 2016 are classified as CK-4 for pre-2017 engines and FA-4 for 2017 or newer engines.*
- *Get routine oil analysis by a qualified laboratory. At the point of a potential oil change, the oil is either clean enough to keep using it or dirty, already causing damage. New engines exhibit levels of contaminants that remain from initial construction of the radiator, oil cooler and exhaust gas recirculation cooler. Knowing not only the miles on the oil, but also the total hours the engine has run, is critical to knowing whether a contaminant is coming from outside and likely to cause damage.*

If you buy oil from an oil supplier and consistently use the same brand, it's possible the oil refiner will offer free oil analysis. If not, ask your supplier or engine dealer for information on a reputable lab. A good analysis report will cost $30 to $50. Analysis should be performed at every drain if using extended intervals. The lab will test for wear metals. This tells if components are wearing out and which component it might be. Lead and copper together indicate bearing wear, while iron and chromium together could mean cylinder and ring wear. Are necessary additives present in the correct quantities? The test will tell, as well as if contaminants such as fuel dilution, soot, water or coolant are present in dangerous quantities. Finally, the test will show the oil's physical properties, such as viscosity, total base number (TBN), oxidation and nitration.

Good information also allows you to correct budding problems before they cause damage. An oil analysis report indicating fuel dilution can be a sign of a failing injector; if that goes unrepaired, it will cause excessive wear metals and bearing failure. Coolant intrusion is another problem that can go unnoticed but is detected easily with oil analysis.Coolant in the oil will s trip out the zinc and cause high wear metals and ultimately premature engine failure. When you see high soot levels, check the charge air cooler and for exhaust restriction and low operating temperatures.

Switching from CJ-4 oil to the new CK-4 or FA-4 oil could have caused changes in typical oil analysis properties, such as levels of calcium, magnesium, zinc and phosphorus. There also might be a change in the typical viscosity, but none of that should cause problems.

so in years. Also look into the benefits of buying as part of a group or via a fleet, a membership organization or a truck stop or warehouse chain.

PLAN FOR EMERGENCIES

A front tire with a nail in it, multiple lights out because of a short circuit, or a suddenly failed brake lining might put even the most maintenance-savvy owner-operator out of commission – or out of service, if a DOT inspector finds the problem first. The industry's top truck, engine, tire and certain other manufacturers have created 24/7 help centers accessible via a toll-free number or proprietary smartphone application. These centers can put you in touch quickly with the nearest service outlet for emergency assistance. Independent breakdown services offer similar assistance.

Two widely used services are the FleetNet America (www.fleetnetamerica.com) and National Truck Protection (www.ntpwarranty.com) service networks. The National Truck & Trailer Services Breakdown Directory (www.nttsbreakdown.com) is available to search for services in particular areas.

CATCH OVERLOOKED ITEMS EARLY

Timely fixes to these problems can reduce thousands of dollars a year in operational

costs by helping avoid breakdowns and providing better service to your customers.

CHARGE AIR COOLER

The CAC sits in front of the radiator and looks like a radiator. It is designed to cool superheated air from the turbo before it gets into the intake manifold for more efficient combustion.

Seeing a water leak from a radiator is easy, but your CAC needs to be pressure-tested to find leaks. You can make or purchase a test kit, or have it done at any engine shop. Engine manufacturers differ as to how much CAC pressure loss is acceptable, usually 5 to 7 pounds in 15 seconds.

But given the immediate drop in fuel mileage a leaky CAC causes, it makes sense to replace a unit that leaks just 2 pounds in 15 seconds. At that level, at 2,500 weekly miles at 6 mpg and $3.50 per gallon for diesel, you'd be losing $112 a week.

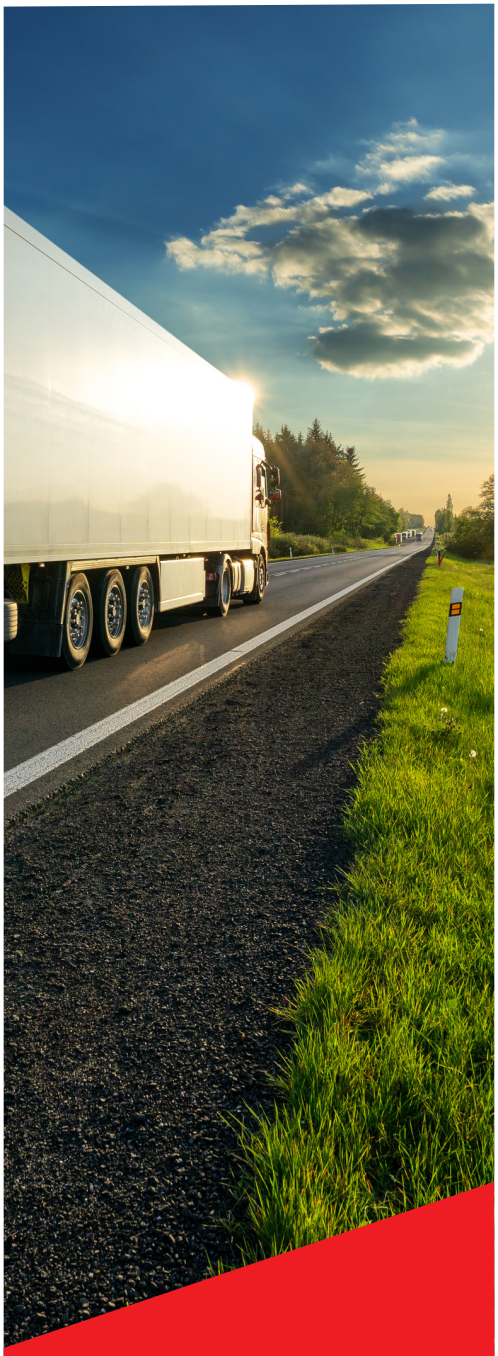
CRANKSHAFT DAMPER

Some engine shops will tell you this doesn't need to be replaced, but that's often a mistake. The crankshaft damper, designed to reduce torsional twisting from the force of the connecting rods being driven down by combustion, wears out. Consequently, engine force and vibration are not transmitted throughout the entire frame and driveline. This leads to many problems, not the least of which is driver fatigue.

Maintenance problems run the range of broken alternator brackets, broken air-conditioning brackets, clutch and driveline problems and even loose or faulty electrical connections. There is no way to inspect a crankshaft damper: Replacing it at 500,000 miles is recommended to avoid problems. It will cost about $1,000 or more.

FLEXIBLE RUBBER FUEL LINES

These can deteriorate internally with no visible wear or damage. Internal deterioration can cause lines to swell and restrict fuel flow, triggering fuel-mileage declines and power loss. Trucks with fuel mileage issues can benefit from line replacement ($300 to $400) to the tune of 0.3 to 0.4 mpg. If your truck has more than 700,000 miles and an unexplained loss in mpg, it would be recommended.



DIY MAINTENANCE RESOURCES

Draw on the wealth of maintenance coverage featured in Overdrive via the magazine's website. A list of how-to articles as well as other stories, with links to the archived stories, is available via OverdriveOnline.com; search "Staying ahead of the inspectors."

Also check out Overdrive's "Highway Hacks" series at **OverdriveOnline.com/tag/highway-hacks** for tips on DIY fixes.

FACTORY MUFFLERS

These can cause exhaust restrictions from day one. The longer they're used, the more soot buildup you see in the muffler itself, and the more exhaust restriction is created.

Restriction robs your engine of performance, power and mpg. You can install a high-performance flow-through muffler on most trucks for less than $200, and your return on investment is nearly immediate. You'll also notice better throttle response.

SHOCK ABSORBERS

When shocks are worn, it can lead to excessive vibration, irregular tire wear and driver fatigue. Many experts recommend replacing shocks every time you replace tires.

BUY OIL IN BULK

The do it-yourself oil change is a standard for many owner-operators, especially those with their own authority. A one-truck operator can save $200 or more a year by moving from gallon jugs to 55-gallon drums for oil purchases, assuming 125,000 miles per year with an oil change every 25,000 miles. A 10-truck fleet can save almost $3,000 a year by changing from gallon jugs to bulk delivery in a tank. A first step in determining whether buying bulk oil makes sense for you is to contact a local distributor and explore pricing. Disposal is normally an associated cost, but if you live near an oil-recycling refinery, you might be able to sell your waste oil. Some small fleet shops use waste oil to heat their facilities.

TIPS ON DOING IT YOURSELF

While your free time is valuable, every maintenance job you can do yourself is a job you don't have to pay someone else to do. Common do-it-yourself jobs include fluid and filter changes, as well as routine work on relatively simple components such as wipers, lights, belts and hoses. The basic rules always apply:

- *Get expert advice for any new project, and be sure you aren't violating warranties.*
- *If you're not comfortable doing any job, take it to the shop.*

Here are some cost breakdowns for a few common jobs:

GREASING

Greasing is simple and inexpensive. You can purchase a high-quality lever-action grease gun, grease and wipes for less than $50. Your cost for each job: About $10. Shop cost: $35 to $50. Time: 45 minutes.

CHANGING FUEL FILTERS

This doesn't require many tools, but learning the proper technique is important, so consult your owner's manual. You'll need a band clamp of the appropriate diameter for fuel filters, a catch pan and a small container of fuel. Your cost: $20 per job. Shop cost: $25 to $30. Time: 30 minutes.

CLEANING CONNECTIONS AND CABLES

Special battery terminal cleaners are inexpensive, and other connections can be cleaned with sandpaper or steel wool. Your cost: $10 per job. Shop cost: $80 to $100. Time: One hour.

INSPECTING COOLING SYSTEM

To check your system, buy test strips and measure antifreeze concentration and the level of anticorrosion additives. Your cost: About 20 cents per test for one test strip. Shop cost: $20. Time: 15 min.

DEALING WITH DEALER SERVICE

Many longtime owner-operators have had at least a minor conflict with a dealer over a repair. Whatever the problem, never underestimate the need for effective communication. As long as you're talking to someone, a compromise is possible.

BASIC STEPS

- *Don't just show up and demand instant service. You're hardly the only one with a "hot load." Making an appointment is ideal.*
- *Make accessible your complete service and warranty records, and never tell the dealer what to fix. Instead, explain all you know about the problem, and, if possible, take a service person on a test run to recreate conditions.*
- *If diagnosis is a problem, ask dealer personnel to discuss the issue with factory service people. If local technicians are too busy, call the factory representatives and ask them to assist the dealer or allow you to relay relevant information.*
- *When a problem is not identified readily, authorize an hour or two of labor for diagnosis. It's cheaper than experimenting with repairs and more likely to yield results.*
- *If speaking to a service representative is a dead end, appeal to the service manager, dealer managers and ultimately the owner. Failing that, a factory representative might be able to influence the outcome. Understand that the manufacturer cannot force the dealer to do anything.*

TIPS FOR KEEPING THE LIGHTS & REFLECTORS SHINING BRIGHT

Flickering or dim lights are usually prefailure symptoms that can be caused by improper bulbs, damaged wiring or corroded sockets. A dim or flickering LED light is even more likely than an incandescent to indicate a problem beyond the light itself – most often corrosion.

Corrosion prevention starts by sealing connections properly when the light is installed. Grease also can prevent further corrosion damage. It also helps to remove any wire probes or picks used by technicians to penetrate the wire to measure voltage or continuity.

Looking at incandescent lighting vs. LEDs, LEDs cost more but offer significant advantages. A red incandescent lamp has a rated life of 5,000 hours, while a red LED lamp has a rated life of 100,000 hours. LED technology also is resistant to mechanical damage, shock and vibration.

To prevent violations related to lighting, don't overlook reflectors and conspicuity tape. These are required on most trailers to be equipped on the sides and rear with a means of making them more visible.

Drivers can receive violations for having defective reflectors and conspicuity tape and should make sure reflectors are free of cracks and dirt. Conspicuity tape also can degrade over time to the point where it no longer is reflective, making that driver a sitting duck for a lighting violation or, worse, an accident.

POTENTIAL FOR LOSS

Suppose your truck's engine blows while you're under a load. Your carrier likely will have to dispatch another driver to deliver the load. Meanwhile, you'll have to pay for the tow and find a replacement engine. If you lose a week's worth of work at, say, $1.10 per mile, you've also lost $2,750 in revenue. The lack of attention to your engine could end up costing more than $20,000:

Rebuilt engine: $18,000
Road service: $650
Lost revenue (current load): $1,100
Lost revenue (future loads): $2,750
Total loss: $22,500

DPF MAINTENANCE

You're gazing idly at the landscape when a yellow light on the dash winks on, spoiling the serenity: Your diesel particulate filter needs attention.

In most situations, the warning doesn't signify any real trouble. It's just telling you a normal function in the life of a post-2006 diesel engine has to take place. If you understand DPF maintenance cycles, you'll have a better idea of how the urgency of the situation.

WHAT A DPF DOES

Any truck manufactured after Jan. 1, 2007, has a DPF. There's actually a lot of heavier than- air stuff in diesel smoke. EPA calls it "diesel particulate," better known as soot. These are ultra-fine particles of elemental carbon with adsorbed compounds such as sulfate, nitrate, metals and organic compounds. A DPF is engineered to trap such particles.

A DPF is not a spin-on-type filter like an oil filter or a cartridge-type filter like a fuel filter. The ceramic filter itself, a little smaller than a loaf of bread, sits in a metal canister that also acts as a collection device for soot.

WHEN TO CLEAN

Much like a clogged catalytic converter on your car, a plugged DPF interferes with efficient exhaust flow. It can lead to compression or combustion problems if left untreated. In most cases, the DPF burns off accumulated soot through either a "passive" or "active" regeneration.

Passive regeneration generally takes place automatically while driving, when engine load and drive cycles allow exhaust temperatures to reach roughly 600 degrees or more.

Under active regeneration, triggered by a series of steps taken by the operator while the vehicle is stationary, the system brings temperatures up to 1,100-1,200 degrees to burn off soot.

Either event is likely the reason a yellow dash light came on. If the DPF warning light is blinking, this is what is happening. If the light comes on and stays on, it's time to get the DPF cleaned.

While the regeneration process burns off accumulated soot, it does not clean out the actual filter media that traps the particulates. And because the regeneration process will not burn off all the ash, eventually it will collect in the canister and fill it up.

Driving style, application and more play into how often a DPF needs to be cleaned. Vocational, urban and stop-and-go applications have much shorter intervals than long and heavy. Idling also can shorten the interval. There are two types of DPF ash cleanings. One is changing out the DPF, usually because it is chipped, cracked, burned or melted, which takes about 2.5 hours. A full cleaning takes around four to five hours.

Cleaning is not cheap: A machine to clean a DPF costs about $20,000, which helps explain why getting the unit cleaned can run you about $500. Replacing the DPF costs around $2,000.

If your engine is a 2010 or later emissions specification and you're using diesel exhaust fluid for the selective catalytic reduction system to separate nitrogen and oxygen in NOx emissions, beware long periods of downtime (a month or more) in extreme weather and/or when using DEF stored for long periods without climate control.

- *Even if all else fails, suing can be expensive and is not likely to succeed unless the dealer clearly is violating the terms of a warranty, disobeying an applicable law or acting in bad faith.*

GENERAL TIPS

- *Work through the selling dealer, who has a greater motivation than other dealers to do warranty work or go to bat for you with the factory.*
- *Keep your cool, and demonstrate a positive attitude. No one wants to cooperate when they're treated rudely.*
- *Having a good long-term relationship with dealer personnel will help. Your best leverage is the ability to take your steady business elsewhere.*

23 TOOLS TO TAKE ON THE ROAD

1. *A set of eight hand wrenches and sockets.*
2. *Two standard adjustable crescent wrenches, one 6 inches and one 10 or 12 inches.*
3. *A fuel-filter wrench.*
4. *Two vise grips, one 6 inches and one 8 inches.*
5. *A hacksaw with spare blades.*
6. *A carpenter's hammer.*
7. *A ball-peen hammer.*
8. *A 30-inch crowbar or pry bar.*
9. *A set of flathead, Phillips and star-tip screwdrivers in various sizes.*
10. *Rolls of duct tape and electrical tape.*
11. *A can of WD-40 or some other spray lubricant. Don't lose the straw.*
12. *A knife.*
13. *Wire and metal snips.*
14. *An electrical current tester.*
15. *C-clamps.*
16. *An air-pressure gauge.*
17. *An awl.*
18. *Pliers of various sizes.*
19. *Flashlights of various sizes, including one for your pocket, one for flagging help and a large freestanding lamp for night repairs.*
20. *Jumper cables, at least 20 feet long.*
21. *Towing chains, 20 feet of 20,000-pound strength.*
22. *A torque wrench.*
23. *A handheld remote diagnostics unit that communicates with the truck's onboard computer, or in the case of newer-model trucks, mobile-device/laptop software capable of interpreting ECM fault codes for maintenance troubleshooting.*

POTENTIAL FOR LOSS

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