



## 1994-1998 DODGE 12 Valve:

The following information has been put together to help you troubleshoot complaints and to better understand the basic operation of the engine and fuel system. The correct tools and service manuals for performing the repair procedures will be needed.

### Hard start, no start

1. Check that the shutoff solenoid is working and getting full travel.

### Low Power

1. Low fuel galley pressure. (see Overflow valve/supply pump) [Buy Cummins Fuel Supply Pump](#)
2. Dirty fuel filter.
3. Restricted air intake, dirty air filter.
4. Check throttle for full travel at injection pump.
5. Check to see that the shut off solenoid is pulling completely UP into the run position. [Buy Dodge P7100 Shut Off Solenoid](#)
6. Check for exhaust manifold leaks, exhaust leaks won't let the turbo spool up and create full boost. [Buy 12 Valve Cummins Exhaust Manifold Gasket Set](#)
7. Check the intercooler hose connections; these can often slip off the intercooler piping especially in high boost situations. [Buy 94-98 Dodge Intercooler Hose Kit](#)
8. Loose or cracked boost line leading to AFC (aneroid) hosing in injection pump.
9. Damage AFC diaphragm, check to see if it will hold a vacuum.

### Miss, Blue-White Smoke

1. Low fuel galley pressure (see Overflow valve and Fuel Supply Pump) [Buy Cummins Fuel Lift Pump](#)
2. Air in fuel system to injection pump.
3. Pump to engine timing is retarded. If you have checked the fuel galley pressure and it is good, then you can try the following; after the vehicle sits overnight start the engine and as soon as the oil pressure gauge starts to move increase the to 1800 rpm. If the white smoke and miss are cleared up in less than 7 seconds, then the pump to engine timing is usually good. If it takes longer than 7 seconds to clear up the smoke and rough run you may need to check the pump to engine timing.
4. Bad injector or pump problem.
5. If you have changed the injection pump, and it ran fine for a shot time then starts missing, smoking or dies with no restart then the pump camshaft nut was not torqued correctly.
6. Low compression in one or more cylinders
7. Air heater not working properly [Buy Intake Air Heater Relays](#)

### Stalling or dies on deceleration

1. Idle speed too low, idle speed should be 800-850 rpm.
2. If you have a start and die or a long crank time after the vehicle sits overnight then you may need to replace the return line off of the injection pump. The 5/16" rubber hose connects to the steel line on the back of the injection pump and is located behind the fuel filter housing. If the line is cracked or "checked" on the outside it will allow fuel to drain back overnight. Make sure to put a slight "camel hump" in the line to prevent fuel drain back (cutting the line too long will make it "hump" upward).



## Air Intake Heater [Buy Dodge Cummins Air Heater Relays](#)

1. The engine will start cold down to about 35 degrees without the intake heater working. The PCM gets a signal from the intake air temperature sensor and activates the heater via the air intake heater relays, if the air intake temperature is below 60 degrees. The heater will continue to cycle after the starting for a short time.
2. The colder it is and the higher in elevation you are the more you need the intake heater for faster cold starting and reduced smoke.
3. You can watch the volt gauge to see if the intake heater is cycling; it will drop to about 10 volts while the engine is running.

## Injectors [Buy Dodge Cummins 12 Valve Injectors](#)

1. Loosen each injector line one at a time and note which line does not make a difference on how it runs.
2. When diagnosing a miss you can move the possible bad injector to a different hole and see if the miss follows it. If not then you are looking at a possible pump or engine problem on that cylinder.
3. We do not see many injector problems on the 94-98 12 valve engine; they are usually good for 200k miles or more.

## Injection Pump [Buy Dodge Cummins 12 Valve P7100 Pumps](#)

1. Pump to engine timing is critical to performance. If the timing is retarded then you will have a low power and often a blue/white smoke complaint (worse cold).
2. If you have white smoke and a miss when cold check the fuel galley pressure first. If the galley pressure is good (see overflow valve and supply pump) try the following on a cold start. A. Start the engine cold, as soon as oil pressure registers on the gauge increase rpm to 1800. The engine will smoke and miss, if the smoke and miss doesn't clear within 7 seconds the pump to engine timing may need to be reset.
3. Pump drive nut torque; clean gear and camshaft before installing, pre-torque to 10 ft. lbs, unlock the timing pins on the engine and injection pump. Final torque 165 ft. lbs (some manuals show 125 ft lbs...this is WRONG). Incorrect torque will allow the drive gear to slip resulting in white smoke or dies with no restart shortly after installation.

## Overflow Valve and Supply pump [Buy Overflow Valve for P7100](#) and [Buy Dodge Cummins Fuel Supply Pump](#)

1. Fuel galley pressure (check at inlet to injection pump) should be 20psi at idle and a minimum of 25psi at 2500rpm. If it is low, the most common problem is the overflow valve, but a weak fuel supply pump can also cause the same problem, as well as restricted fuel supply.
2. Change the fuel filter.



3. Use pliers with a soft jaw and temporarily pinch the return hose off of the injection pump. The supply pressure should spike very quickly to 50 psi. If the pressure goes to 50 psi or above the overflow valve will need to be replaced. If not then you have a bad supply pump, restricted fuel supply (fuel heater screen or tank sock) or the fuel heater is sucking air.

### Shut off solenoid [Buy Ram Cummins 12v P7100 Shutoff Solenoid Kit](#)

1. The shut down solenoid is controlled by two relays one for pull-in during cranking (70 amps) and one for hold-in during running. If the shut off solenoid doesn't pull up be sure to check the relay and replace if needed prior to replacing the shut off solenoid.
2. Look in your service manual for the wiring diagram.

### Turbo [Buy Dodge Cummins 12 Valve Turbos](#)

1. The turbo is "powered" by exhaust gas velocity (expanding exhaust gases). Revving the engine up while in neutral will produce low boost. To accurately measure boost pressure you must be under load, such as full throttle acceleration while driving.
2. If you are lacking fuel (galley pressure) at the right time (timing) or have an exhaust leak (loss of exhaust gas velocity) the turbo will not produce the correct boost. Solve these problems first, before replacing the turbocharger.
3. The turbo should spin freely while pushing the turbine shaft left, right, up and down while gently rotating the compressor wheel. The compressor wheel should turn freely by hand, if it doesn't replace the turbocharger.
4. Visually inspect the compressor wheel. The blades should not contact the compressor housing and the blades should not be chipped, bent or damaged in any way.
5. Check the wastegate actuator for free movement while applying regulated air pressure, the wastegate should start moving open with about 20 psi applied to it (check the specifications for the turbo you are checking).



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