Sprinter Diesel Diagnostics

2007– 2009 Sprinter OM642 Diagnostics

In order to do proper diagnostics you will need a scan tool and some special tools available from Mopar Special Tools. Mopar Wi-Tech subscription may be necessary. If you don't have service information you can buy a subscription online at

- eAutorepair.net.
- alldatadiy.com
- https://mopar.snapon.com
- https://www.freedomracing.com
- https://www.fcawitech.com/

Note. Smoke may not be visible on DPF equipped vans. The exhaust may need to be disconnected or a test pipe temporarily installed to diagnose smoking issues. Black smoke related problems will often cause frequent regenerations and premature DPF loading.

Note. Down Pipe flex pipes replacements are available for 3.0 y pipe. Call for availability.

CAUTION
The fuel system contains high pressure fuel up to 24,000 PSI. Do NOT use your fingers to find leaks! High pressure fuel entering your bloodstream may result in amputation or loss of life.

Piezo High Pressure Common Rail Basic Information

The high pressure pump builds rail pressure and delivers it to the fuel rail manifold where it flows through the injector lines to the injectors. The fuel pressure regulator in the high pressure pump and the pressure regulating valve in the rail control rail pressure. The injectors have a piezo stack instead of an electromagnetic solenoid. When energized, the piezo crystals expand, lifting the control valve off of its seat via a hydraulic coupler (connecting plunger below) to begin injection. If the valve seat in the injector is leaking or the pressure regulating valve leaks then it will not build enough rail pressure to start the engine.

Preliminary checks

1. Record and repair any active DTC, they may be related to complaint
2. Ensure that you have a good clean fuel supply.
3. Verify that battery voltage is above 12.0 volts.
4. Verify that cranking speed is above 200 rpm

No Start or Hard Start

1. First, verify rail pressure while cranking. If rail pressure matches desired and the engine will not start, there is another problem causing the no start. If the rail pressure does not reach desired, continue with fuel system diagnosis.
2. No or low fuel supply pressure to the high pressure injection pump (CP). See “Fuel Supply” below.
3. Injectors; monitor rail pressure and see if you have over 3600 PSI, or 1.0 volt, during cranking. If not, one or more internally leaking injectors can cause a hard start. See injector section for further diagnostics. No smoke from the tailpipe after about 10 seconds of cranking means no fuel is getting into the cylinders.
4. Leaking fuel pressure solenoid (in fuel rail). There should be no fuel coming out of the solenoid while cranking. Perform the fuel rail pressure solenoid leak quantity test to determine if it is faulty. If the injectors check good, the fuel pressure solenoid should hold 870-1450 psi when unplugged during cranking. See “Fuel Pressure Solenoid, or Flow Control Valve” below for more information.
5. If the above tests pass and rail pressure is still below spec, try unplugging the Fuel Quantity Control Valve (FCA) in the CP pump and see if the pressure goes up. If not, the pump may be bad.

Black Smoke

Smoke may not be visible on DPF equipped vans. The exhaust may need disconnected or a test pipe temporarily installed to diagnose smoking issues. Black smoke related problems will often cause frequent regenerations and premature DPF loading /cloging.

1. Dirty air filter
2. Exhaust leaks or Boost leaks, you can usually hear a boost leak as a high-pitched squeal under load.

3. VGT turbo sticking and/or not operating properly.
4. EGR system fault. Usually this will set a code.
5. Dirty or damaged Mass Air Flow sensor
6. Plugged intake manifolds and/or defective swirl valves

Miss, Rough Run, Knock

1. A bad or incorrect torque on an injector, missing or damaged chamber gasket, low compression, excessive valve lash, flat lobes on camshafts could all cause a miss.
2. Injector hold down bolts must be replaced if they are removed, they are a torque to yield bolt. If not, they could stretch and allow combustion gasses to blow past the injector, which can overheat the injector and cause it to fail.
3. There is a relative compression test available using the wiTECH scan tool. Acceptable values between two cylinders must be equal to or less than 15 rpm.

Surge at idle

1. Restricted or aerated fuel supply to the high pressure pump.
2. Actual versus desired too far apart, map the fuel pressure graph, if you have a fluctuation over 500 psi this may cause a surge. It may be a bad fuel quantity solenoid valve (FCA) in the CP pump. Verify fuel pressure solenoid (in the rail, see below) operation before replacing the fuel quantity solenoid in the high pressure pump.

Blue-White smoke at idle when cold

*Smoke may not be visible on DPF equipped vans. The exhaust may need disconnected or a test pipe temporarily installed to diagnose smoking issues.
If the smoke clears in less than 1 minute, this could be normal depending on temperature and altitude. Blue white smoke that burns your eyes is UN-burnt fuel. Cold temperatures, high altitude and excessive idle time all mean incomplete combustion.

1. Possible bad injector, leaking at the nozzle tip.
2. The intake air temperature, coolant temperature, inlet air temperature and battery temperature should all display normal ambient temperatures when cold. If not, repair as necessary.
3. Check glow plug system operation when cold.

4. Check rail pressure when engine is off, it should be 0 PSI (+/- 500 PSI).
5. Aerated or restricted fuel supply.
6. Excessive idle time can cause white smoke when cold due to carbon build up on injector tips. More than 20% idle time is excessive.

Fuel Supply

2007-2009 model years use an electric supply pump in the tank to feed the CP pump at 59 +-2 PSI. Measure before and after the fuel filter to verify any possible filter restrictions. The fuel pressure relief valve (cascade overflow valve), in the CP pump, limits the fuel supply pressure to the fuel quantity control valve (FPR, FCA, MPROP). The fuel supply system also provides pressure to the return, or back leakage, side of the injectors. See “Injectors” for more information.
Fuel Pressure Solenoid, In Fuel Rail
• The fuel pressure solenoid is attached to the rear of the fuel rail. The tip of the fuel pressure solenoid uses a knife edge, for metal to metal sealing. The knife edge actually deforms the metal in the fuel rail in order to seal the surfaces. The solenoid must be replaced if it is removed from the rail. The solenoid controls and maintains the rail pressure as commanded by the ECM.
• In a DE-energized state, the fuel pressure solenoid is held closed by spring force, like a relief valve. During starting the fuel pressure solenoid is held closed by magnetic force to allow enough pressure for starting. When plugged in, the fuel pressure solenoid should not leak any fuel out of the return during cranking.
• When unplugged, it should hold 870-1450 PSI during cranking and should return some fuel. If it doesn’t hold pressure, and the injectors are OK, then the fuel pressure solenoid is bad.
• When driving, the fuel pressure solenoid is constantly somewhat open, the pressure of the fluid counteracts the magnetic force of the coil and the slight spring force to help maintain desired rail pressure.
• If the actual fuel pressure, vs the fuel pressure set point, gradually drops, and then spikes well above the set point, then the fuel pressure solenoid is sticking and usually needs to be replaced.

*To perform the fuel rail pressure solenoid leak quantity test, follow these steps:

1. There are two types of lines going to the solenoid. One rubber line and one braided steel line. Disconnect the rubber return fuel line from the fuel rail. Plug the rubber fuel return to prevent leakage. Use a short section of hose to route the fuel from the rail into a suitable container.
2. For the braided line disconnect the large fuel rail return hose at the banjo fitting and clamp it off. Attach hose to the banjo fitting and direct the hose into a suitable container.

3. Crank the engine for 10 seconds. There should be no leakage out of the solenoid.
4. If there is, check the pulse width modulated signal from the ECM. It is normally 18% to 24% when cranking or idling.
5. If it is and there is leakage, replace the fuel pressure solenoid.

High Pressure Injection Pump (CP Pump)

The high pressure pump is driven by the camshaft, and requires no timing. Fuel that enters the high pressure pump is pressurized between 200-1600 bar (2,900 – 23,205 psi). The pressurized fuel is then supplied to the fuel rail. The high pressure pump and flange located behind the pump are supplied as an assembly. Fuel passages and control elements in the flange regulate the flow of fuel to the high pressure pumping chambers, and control the lubrication of the pump.

1. Most starting problems due to low rail pressure are caused by bad injectors or the fuel pressure solenoid in the fuel rail. If there is a leak in the injection system then the pump will not build enough pressure. If there has been a major contamination issue with dirt and or water then it is very likely that the high pressure pump will need to be replaced. The injectors are typically damaged first, but any contamination that got into the injectors also went through the CP pump.
2. You can unplug the fuel quantity control valve, in the CP3, and the pressure should default to maximum (23,200 PSI).
3. If the cascade overflow valve is bad this can send fuel out the return line instead of to the charging circuit of the CP pump.

Injectors

*The injector hold down bolts are torque to yield. They must be replaced when removed, they are one time use only! If they are not replaced it will most likely lead to the injectors coming loose while running, and possible damage to the cylinder head.
The injectors incorporate piezoelectric actuators required for high-speed activation. The higher switching speed allows the intervals between individual fuel injections to be reduced and controlled more precisely. This feature contributes to a quiet and more efficient engine.
The engine requires a high number of injections during normal operation. At an engine speed of 1000 rpm for example, the ECM may activate the injectors up to 250 times every second. Enough energy needs to be quickly stored to activate the injectors within these time constraints. The piezoelectric actuators also require high-voltage (150+ volts) for proper operation.
It takes about 3000 PSI rail pressure in order for the injectors to deliver fuel for starting. The injectors also require low fuel supply pressure on the return side to function.

Without back pressure the hydraulic coupler (connecting plunger) will have excessive clearance and the piezo actuator will not function correctly.

1. Excessive leakage in the injector usually results in a starting issue, which could occur hot or cold, but usually occurs hot because the fuel is thinner when hot. Excess leakage from the injector is returned to the tank, it is not an external fuel leak.

2. If the rail pressure is lower than specification and the fuel supply to the CP pump is good, check the injector return volume. Remove the engine covers. Disconnect the fuel return hoses at the top of the injectors. Install separate hoses and put in individual containers to measure the return volume. Pinch off the fuel return line to prevent pressurized fuel from the supply pump coming out of the return line while cranking. Each injector should have little to no return fuel while cranking, and must not exceed 2.5 ml in 10 seconds.

3. The injectors can be very difficult to remove at times due to carbon build up around the injector body in the cylinder head. Usually this is caused by leaking chamber gaskets. The hold down bolts are marginal at best, and if re-used after removal they will not hold torque. The bolts are torque to yield, they must be replaced any time they are removed.

Turbocharger

The turbochargers on these engines are a variable geometry type turbo. They use an electric actuator, controlled by a pulse width modulated signal from the ECM, to vary vane position depending on load and throttle position. Like any of the other VGT type turbos, these turbos are susceptible to carbon build up causing the vanes to stick resulting in several drivability problems. Most commonly these complaints would include poor response, low power, DPF loading, and poor fuel economy, among others. The turbocharger, charge air cooler and EGR system operate with one another and must be tested as a system.

1. Check the vane actuator for movement at key on and then when starting the engine. It should have full travel when the engine is started.

2. The actuator can be replaced separately from the turbo, but the condition of the vanes in the turbo can also affect actuator movement. Free and full travel must be verified if replacing the actuator.

Swirl Valves

The 3.0L engine in the Sprinter is equipped with a unique feature. Swirl valves help to improve low speed response and lower emissions. Per Chrysler:
“The intake manifolds feature swirl intake ports to reduce particulates at low engine speeds. Each cylinder incorporates one swirl port and one charge port. The swirl ports can be closed by the swirl valves. The valves are connected via a linkage which is

operated by the swirl valve actuator.
The swirl valves are normally open by spring tension. The spring is integral with the swirl valve actuator. In the lower engine speed and load range, the swirl valves are closed by the swirl valve actuator. The entire air mass flows through the charge ports only, which results in greater swirling. The increased swirling produces uniform combustion for better engine performance and reduction of particulates. As rotational speed and load increases, the swirl valves open, so that optimal swirling and the required air mass are provided for the current operating conditions."
These swirl valves are prone to sticking due to carbon build up in the intakes from the EGR system. The linkages are also prone to breaking or otherwise failing. When the swirl valves fail or stick, the engine will have very low power and codes related to the swirl valves. Some codes are not commonly found in service information. See the DTC list below for further information.

Diesel Particulate Filter

The diesel particulate filter traps soot from the exhaust to lower particulate emissions. During certain driving conditions the engine will perform a regeneration cycle, which will use additional fuel injections and the catalyst to heat up the exhaust temps to the point where the soot will be burnt out and form ash. Over time the DPF will become "ash loaded" and need replaced or cleaned.
Any engine drive-ability issues or fuel system failures will cause premature plugging or failure of the DPF. If the DPF is plugging repeatedly or requiring excessive regeneration cycles there is probably another problem with the engine, fuel system, or EGR system.

1. DO NOT reset the DPF timer unless the DPF has been replaced or cleaned (removed and cleaned, not regenerated in the vehicle). The ECM keeps track of fuel used, soot, and ash load. Excess soot and ash load will result if the timer is reset without replacing or cleaning the DPF.

2. A plugged DPF can cause a turbo failure by forcing exhaust under excess pressure around the turbine shaft seals. Low boost/low power complaints must be diagnosed properly and completely prior to repairs!

3. Excessive idle time will also cause DPF restriction due to particulate build up at idle. This will cause poor mileage (zero MPG when idling) due to more frequent regeneration events. Excess idle time could be defined as leaving the vehicle running while hooking up a trailer or loading/unloading.

4. Using a fuel additive, which improves cetane, will reduce regeneration events and improve mileage around town. This is due to a better burn when cold and fewer particulates getting to the DPF. Use the following information regarding diagnostic trouble codes in addition to the normal diagnostic procedures outlined in the service manual or technical service bulletins.

*Sprinter OEM codes do not start with a “P”, just four digits like “2626”. However, most service information sites use a P due to the standard OBD protocol. When searching for codes try both configurations, for example “P2626” and “2626”. Also, many of the Sprinter codes will have a standardized OBD alternate, such as “P0299” for “2359”. Not all codes have the OBD counterpart, which tends to create some confusion as to which codes need to be addressed. OEM service information and scan tools are suggested for these reasons.

DTC P0087 Fuel rail pressure malfunction- pressure too low
*This code is not listed in Chrysler service literature for Sprinter but may set or show with some scan tools.

1. Restricted or aerated fuel supply to CP3 pump
2. Excessive leakage from fuel injectors
3. Fuel pressure solenoid in fuel rail not operating correctly

DTC P0201 – P0206 Injector control circuit short to ground/voltage or “general error”

1. Damaged injector wiring
2. Check injector resistance. It should be 185k ohms +/- 10%.

DTC P0299 Turbo under boost condition
This code is not listed in the Chrysler service information for Sprinter, but it is an OBD2/Global code that can be stored in the Sprinter ECM and will show with some scan tools, often in conjunction with P2359 or in place of.

1. Cracked and/or leaking plastic turbocharger resonator
2. Leaking charge air cooler tubes, hoses, or seals from turbo, intercooler or intake
3. Dirty or Damaged MAF sensor
4. Other boost leaks and or exhaust leaks (before the turbocharger)
5. Turbo and or VGT system failure- VGT actuator stuck open
6. EGR valve sticking or other EGR system failure
7. Plugged air filter
8. Plugged DPF

DTC P0300 Misfire detected

1. Restricted or aerated fuel supply

2. Defective injector(s)
3. Fuel injector hold down lost torque, chamber gasket leaking
4. Use scan tool to isolate each cylinder
5. Perform Fuel Correction Test with scan tool to isolate cylinders
6. Damaged cams and/or lifters

DTC P2025 Intake pressure sensor plausibility

1. Basically a barometric pressure/intake restriction sensor. Mounted on air box and is often damaged during service or other repairs

DTC P02043 Camshaft position sensor circuit- open circuit

1. Usually defective cam sensor, however occasionally a bad crank sensor may set this code.
2. Often sets in conjunction with P2045 crankshaft position sensor circuit lost signal

DTC P02045 Crankshaft position sensor circuit lost signal

1. Usually defective cam sensor, however occasionally a bad crank sensor may set this code.
2. Often sets in conjunction with P2043 camshaft position sensor circuit- open circuit

DTC's P2133 Cylinder 1, P2134 Cylinder 2, P2135 Cylinder 3, P2136 Cylinder 4, P2137 Cylinder 5, P2138 Cylinder 6 Glow Plug Open, Short Circuit, or Excess Temperature
(May also show as P0671, P0672, P0673, P0674, P0675, P0676)
• Check glow plug system as outlined in service information. Almost always caused by bad glow plugs and/or module.

DTC P2359 Boost pressure too high/too low
• Many scan tools will show a P0299 code in place of this code. 2359 is the code listed in Chrysler literature.

1. Most commonly sets due to a cracked and/or leaking turbocharger resonator assembly.
2. Other boost leaks at intercooler, intercooler piping/hoses, etc.
3. Sticking VGT actuator
4. Plugged air filter

5. Restricted DPF
6. Defective turbocharger

DTC P2510 Boost Pressure Regulator Circuit Performance, P0046 Turbo Boost Control Circuit Performance (Jeep)
• This code indicates that the VGT actuator is operating outside a normal position range and is usually associated with a severe lack of power. Boost or turbo intake leaks are often the culprit, however defective turbos and actuators are not uncommon.

1. Check for boost leaks at intercooler, intercooler piping/hoses, seals, ETC.
2. Inspect turbo inlet ducting for loose clamps and/or connections.
3. Verify VGT actuator function with a scan tool
4. Defective turbocharger

DTC P2513 Swirl Valve Motor Position Error, P1270 Intake Manifold Runner Performance (Jeep)
• It is not uncommon for scan tools to not have a description or correct description for this code. (Sprinter)

1. Check the swirl valve linkage for range of movement. It can be actuated using some scan tools and should move key on engine off. The valves commonly stick and do not allow movement.
2. Inspect the swirl valve linkage and sensors. If the linkage is loose or broken, or the sensors are loose/out of position, this code may set.
3. Replacement of the swirl valve assemblies is recommended if the valves are sticky/stuck, the linkage is worn/broken, or if the motor is bad. Cleaning the intakes and valves usually is only a temporary fix.

DTC P2621 Diesel Particulate filter, Ash Accumulation High
• May also show as “**P242F**”, which is the OBD2 code alternate
• This code is usually just what the description states- a restricted DPF. The DPF can be restricted by a number of things, including: driving habits, fuel system/engine failures, sensor failures.
• The vehicle may just need to be driven at steady highway speeds for 45 to 90 minutes to clean the DPF.

1. Check for any other engine related codes and repair as needed first.
2. Inspect the entire exhaust system to be sure there is no damage, leaks, or modifications.

3. If the exhaust system checks ok, attempt a manual regeneration. It may take multiple attempts to get the DPF to burn out completely. In some cases the DPF may need to be removed for cleaning at a service facility or replacement.

4. If the regeneration was successful, test drive the vehicle to see if the fault returns. If it does, check the DPF differential pressure sensor for skewed readings and replace as needed, then re-test.

DTC P2626 Diesel Particulate Filter- Soot Content Too High
• This code is usually just what the description states- a restricted DPF. The DPF can be restricted by a number of things, including driving habits, fuel system/engine failures, sensor failures.
• The vehicle may just need to be driven at steady highway speeds for 45 to 90 minutes to clean the DPF.

1. Check for any other engine related codes and repair as needed first.

2. Inspect the entire exhaust system to be sure there is no damage, leaks, or modifications.

3. If the exhaust system checks ok, attempt a manual regeneration. It may take multiple attempts to get the DPF to burn out completely. In some cases the DPF may need to be removed for cleaning at a service facility or replacement.

4. If the regeneration was successful, test drive the vehicle to see if the fault returns. If it does, check the DPF differential pressure sensor for skewed readings and replace as needed, then re-test.

DTC P2952 Left Swirl Valve Position Sensor Fault, P2953 Right Swirl Valve Position Sensor Fault
• It is not uncommon for scan tools to not have a description or correct description for these codes.

1. Check the swirl valve linkage for range of movement. It can be actuated using some scan tools and should move key on engine off. The valves commonly stick and do not allow movement.

2. Inspect the swirl valve linkage and sensors. If the linkage is loose or broken, or the sensors are loose/out of position, this code may set.

3. Replacement of the swirl valve assemblies is recommended if the valves are sticky/stuck, the linkage is worn/broken, or if the motor is bad. Cleaning the intakes and valves usually is only a temporary fix.

2001–2006 Dodge-Mercedes: Freightliner Sprinter Diagnostics

High Pressure Common Rail Basic Information

The high pressure pump builds the high pressure and delivers it to the fuel rail manifold, which buffers out pressure fluctuations and distributes fuel to the individual injectors. The fuel quantity valve (fuel control actuator, M-Prop) in the high pressure pump controls pressure output from the pump. The fuel pressure solenoid (pressure control valve) in the fuel rail has final control of rail pressure and prevents over pressurizing of the system. The injectors have a hollow check ball that holds rail pressure until the fuel solenoid is actuated by the ECM, this allows the check ball to rise off its' seat and an injection to take place. If the check ball in the injector is leaking or the fuel pressure solenoid is defective then it will not build enough rail pressure to start the engine.

Preliminary checks

1. Record and repair any active DTC, they may be related to complaint
2. Ensure that you have a good clean fuel supply.
3. Verify that battery voltage is above 12.0 volts.
4. Verify that cranking speed is above 200 rpm

No Start or Hard Start

1. No or low fuel supply pressure to the high pressure injection pump (CP).
2. Injectors; monitor rail pressure and see if you have over 3600 PSI during cranking, if not, one or more injectors can cause a hard start, see injector section for further diagnostics. No smoke from the tailpipe after about 10 seconds of cranking means no fuel is getting into the cylinders. Plugged fuel filter
3. Leaking fuel pressure solenoid (in fuel rail). There should be no fuel coming out of the solenoid while cranking. Perform the fuel rail pressure solenoid leak quantity test to determine if it is faulty. If the injectors check good, the fuel pressure solenoid should hold 870-1450 psi when unplugged during cranking.
4. CMP and CKP Sensors must be in sync.

Black Smoke

1. Dirty air filter

2. Exhaust leaks or Boost leaks, you can usually hear a boost leak as a high pitched squeal under load.
3. VGT turbo sticking and/or not operating properly.
4. EGR system fault. Usually this will set a code.
5. Dirty or damaged Mass Air Flow sensor

Miss, Rough Run, Knock

1. A bad or incorrect torque on an injector, missing or damaged chamber gasket, low compression, excessive valve lash, flat lobes on camshafts could all cause a miss.
2. Injector hold down bolts must be replaced if they are removed, they are a torque to yield bolt. If not they could stretch and cause compression to blow past the injector, which can overheat the injector and cause it to fail.
3. There is a relative compression test available using the DRB3 or wiTECH scan tools. Acceptable values between two cylinders must be equal to or less than 15 rpm.
4. There has been some issues with the harmonic balancer which may cause rough running at different RPM, leaking crank seals, some sensor issues. 01-05 model years.

Surge at Idle

1. Restricted or aerated fuel supply to the high pressure pump.
2. Actual versus desired too far apart, map the fuel pressure graph, if you have a fluctuation over 500 psi this may cause a surge. It may be a bad fuel quantity solenoid valve (FCA) in the CP pump. Verify fuel pressure solenoid operation (in the rail) before replacing the fuel quantity solenoid in the high pressure

Slow Deceleration

1. If the engine hangs at higher rpm or is slow to decelerate, injector wear is what normally causes this problem due to excessive return. Injectors will need to be replaced

Blue-White Smoke at Idle When Cold

If the smoke clears in less than 1 minute, this could be normal depending on temperature and altitude. Blue white smoke that burns your eyes is UN-burnt fuel. Cold temperatures, high altitude and excessive idle time all mean incomplete combustion.

1. Possible bad injector, leaking at the nozzle tip.
2. The intake air temperature, coolant temperature, inlet air temperature and battery temperature should all display normal ambient temperatures when cold. If not, repair as necessary.
3. Check glow plug system operation when cold.
4. Check rail pressure when engine is off, it should be 0 PSI (+/- 500 PSI).
5. Aerated or restricted fuel supply.
6. Excessive idle time can cause white smoke when cold due to carbon build up on injector tips. More than 20% idle time is excessive.

Fuel Supply

- 2001-2003, use a mechanical supply pump on the front of the head to supply fuel to the CP3 pump. Cranking fuel pressure 6-22 psi, Idle 29-36 psi, and maximum pressure 51 +/- 7 psi.
- 2004-2006 model years use an electric supply pump in the tank to feed the CP pump at 58 to 80 psi. Minimum pressure is 58 psi, measure before and after the fuel filter to verify any possible filter restrictions. The fuel pressure relief valve (cascade overflow valve), in the CP pump, limits the fuel supply pressure to the fuel quantity control valve. The pressure relief valve should open at 72.5 psi.

Fuel Pressure Solenoid, In Fuel Rail

1. The fuel pressure solenoid is attached to the rear of the fuel rail. The tip of the fuel pressure solenoid uses a knife edge, for metal to metal sealing. The knife edge actually deforms the metal in the fuel rail in order to seal the surfaces. The solenoid must be replaced if it is removed from the rail. The solenoid controls and maintains the rail pressure as commanded by the ECM.
2. In a DE-energized state, the fuel pressure solenoid is held closed by spring force, like a relief valve. During starting the fuel pressure solenoid is held closed by magnetic force to allow enough pressure for starting. When checking the fuel pressure solenoid there should be no fuel coming out the return during cranking, and it should hold 870-1450 psi when unplugged during cranking. If it doesn’t, and the injectors are OK, then the fuel pressure solenoid is bad.

3. When driving, the fuel pressure solenoid is constantly somewhat open, the pressure of the fluid counteracts the magnetic force of the coil and the slight spring force to help maintain desired rail pressure.

4. If the actual fuel pressure, vs the fuel pressure set point, gradually drops and then spikes well above the set point then the fuel pressure solenoid is sticking and usually needs replaced.

High Pressure Injection Pump (CP Pump)

1. Most starting problems due to low rail pressure are caused by bad (check ball seat) injectors or the fuel pressure solenoid in the fuel rail. You can unplug the fuel quantity control valve, in the CP3 and the pressure should default to maximum (23,500 PSI). However, if there is a leak in the injection system then the pump will not build enough pressure. If there has been a major contamination issue with dirt and or water then it is very likely that the high pressure pump will need to be replaced. The injectors are typically damaged first, but any contamination that got into the injectors also went through the CP pump.

2. If the cascade over flow valve is bad this can send fuel out the return line instead of to the charging circuit of the CP pump.

3. If the engine is running, there is a “Pump Pressure Generation Test” available using the DRB3. Rail pressure should increase from about 5800 psi to about 20,305 psi in about two seconds. If it does not, there is likely a high pressure fuel pump problem, provided that the injectors and fuel pressure solenoid have been tested and are good.

Injectors

***The injector hold down bolts are torque to yield. They must be replaced when removed, they are one time use only! If they are not replaced it will most likely lead to the the injectors coming loose while running, and possible damage to the cylinder head.**
It takes about 3600 PSI rail pressure in order for the injectors to deliver fuel for starting.

1. Excessive leakage in the injector usually results in a starting issue, which could occur hot or cold, but usually occurs hot because the fuel is thinner when hot. Excess leakage from the injector is returned to the tank, it is not an external fuel leak.

2. Per Chrysler, unplug the cam sensor and fuel rail pressure solenoid, and plumb the individual injector returns in to graduated vials. Run the cranking Fuel Quantity Test with a scan tool. In 10 seconds of cranking the return should be no more than 2.5 ml per injector. If more than 2.5 ml, replace the injector, clear the memory using the scan tool and retest. Multiple failures are possible, because hydraulic flow will take the path of least resistance.

3. You can also perform the engine running Fuel Quantity Test. After 10 seconds a maximum of 40 ml is allowed, if more replace the bad injector, clear the memory and rerun the test. See the service manual for more information.

4. The injectors can be very difficult to remove at times due to carbon build up around the injector body in the cylinder head. Usually this is caused by leaking chamber gaskets. The hold down bolts are marginal at best, and if re-used after removal they will not hold torque. The bolts are torque to yield, they must be replaced any time they are removed.

Turbocharger

The turbochargers on these engines are a variable geometry type turbo. They use an electric actuator, controlled by a pulse width modulated signal from the ECM, to vary vane position depending on load and throttle position. Like any of the other VGT type turbos, these turbos are susceptible to carbon build up causing the vanes to stick resulting in several drivability problems. Most commonly these complaints would include poor response, low power, black smoke, and poor fuel economy, among others. The turbocharger, charge air cooler and EGR system operate with one another and must be tested as a system.

1. Run the turbo actuator test with the DRB3. If the actuator rod does not move at all or does not move evenly inspect the pivot where the rod connects to the vane lever. They tend to corrode and limit movement. Clean up the pivot and rod, apply high temp grease and retry. If it still does not move correctly and the electrical power supply and ground check OK, then the turbo needs replaced. The actuator can not be replaced separately from the turbo.

2. Note: Do no try and move the actuator rod externally by pushing or pulling on it. The actuator rod has a worm rive gear attached to it which does not allow movement from the output side.

Use the following information regarding diagnostic trouble codes in addition to the normal diagnostic procedures outlined in the service manual or technical service bulletins.

DTC P0087 Fuel rail pressure malfunction- pressure too low
*This code is not listed in Chrysler service literature for Sprinter but may set or show with some scan tools.

1. Restricted or aerated fuel supply to CP3 pump

2. Excessive leakage from fuel injectors

3. Fuel pressure solenoid in fuel rail not operating correctly

DTC P0201 – P0205 Injector control circuit

1. Damaged injector wiring
2. Check injector resistance, should be less than 1 ohm and greater than zero ohms (zero ohm meter leads before test).

DTC P0299 Turbo under boost condition
This code is not listed in the Chrysler service information for Sprinter, but it is an OBD2/Global code that can be stored in the Sprinter ECM and will show with some scan tools, often in conjunction with P2359.

1. Cracked and/or leaking plastic turbocharger resonator
2. Cracked and/or leaking charge air cooler tube from intercooler to intake
3. Dirty or Damaged MAF sensor
4. Other boost leaks and or exhaust leaks (before the turbocharger)
5. Turbo and or VGT system failure- VGT actuator stuck open
6. EGR valve sticking or other EGR system failure
7. Plugged air filter, 2004-2006 air filters should not have a foam pad glued to them.
8. Plugged catalytic converter

DTC P0300 Misfire detected

Restricted or aerated fuel supply

1. Defective injector(s)
2. Fuel injector hold down lost torque, chamber gasket leaking
3. Use scan tool to isolate each cylinder
4. Perform Fuel Correction Test with scan tool to isolate cylinders
5. Damaged cams and/or lifters

DTC P2025 Intake pressure sensor plausibility

- Basically barometric pressure/intake restriction sensor. Mounted on air box and is often damaged during service or other repairs

DTC P02043 Camshaft position sensor circuit- open circuit

1. Usually defective cam sensor, however occasionally a bad crank sensor may set this code.
2. Often sets in conjunction with P2045 crankshaft position sensor circuit lost signal

DTC P02045 Crankshaft position sensor circuit lost signal

1. Usually defective cam sensor, however occasionally a bad crank sensor may set this code.
2. Often sets in conjunction with P2043 camshaft position sensor circuit- open circuit

DTC P2359 Boost pressure too high/too low

1. Most commonly set due to a cracked and/or leaking turbocharger resonator assembly.
2. Other boost leaks at intercooler, intercooler piping, etc.
3. Sticking VGT actuator
4. Plugged air filter, 2004-2006 air filters should not have a foam pad glued to them.
5. Restricted exhaust
6. Defective turbocharger