



Feeding Fuel Forward

Technicians are reporting an increase in intermittent engine operation problems recently. Could these problems be the result of high fuel prices?

It seems to be happening more often lately. A customer complains of engine problems...

“The engine keeps stalling and sputtering. It’s hard to start and it won’t stay running.”

Intermittent engine problems are nothing new; you’ve dealt with them for years. What *is* new may be the source of many of these problems. Two major problems are plaguing vehicles lately for the same reason: high gas prices.

Many drivers are running on low tank levels lately. Because gas prices have been so high, many people have been letting the fuel level in their vehicle get very low, waiting to find “the best price in town” before they fill up. This, of course, leads to a higher concentration of any sediment in the smaller amount of fuel in the gas tank and increases the possibility of plugging up the fuel pump filter. Basically, we’re speaking of older cars that have been on the road for several years, but even brand new vehicles can be affected by just one tank of contaminated fuel. Also, most electric in-tank fuel pumps, including those on

Subaru models, use the fuel as a coolant for the motor, another really good reason to avoid letting the fuel level get too low. A burned out or damaged motor calls for pump replacement.

Compounding that problem is the fact that drivers are “shopping around” for fuel. Low gas prices at smaller, independent gas stations have lured customers to their pumps, because the fuel is cheaper. All loyalty to the major brand gas stations goes out the window when prices skyrocket. It makes one wonder if the gasoline at those stations is as clean and sediment free as the fuel from the major brands. Also at question is the in-ground storage tanks and if they are routinely inspected and cleaned, like those at the major brand stations.

Chasing Down the Problem

Where do you start? After you throw a scan tool on the car and are satisfied that there are no stored trouble codes in the system, you can opt for inspecting either the ignition system or the fuel system. Once you’ve eliminated the ignition system, give a closer look at the fuel supply system. The fuel system troubleshooting chart on opposite page offers a systematic way to diagnose and correct any problems.

Trouble and Possible Cause (see NOTE on page 14)		Corrective Action (see NOTE on page 14)
1. Insufficient fuel supply to the injector		
1)	Fuel pump will not operate	
	• Defective terminal contact	Inspect connections, especially ground, and tighten securely
	• Trouble in electromagnetic or electronic circuit parts	Replace fuel pump
2)	Lowering of fuel pump function	Replace fuel pump
3)	Clogged dust or water in the fuel filter	Replace fuel filter, clean or replace fuel tank
4)	Clogged or bent fuel pipe or hose	Clean, correct or replace fuel pipe or hose
5)	Air is mixed in the fuel system	Inspect or retighten each connection part
6)	Clogged or bent breather tube or pipe	Clean, correct or replace air breather tube or pipe
7)	Damaged diaphragm of pressure regulator	Replace
2. Leakage or blow out fuel		
1)	Loosened joint of the fuel pipe	Retightening
2)	Cracked fuel pipe, hose and fuel tank	Replace
3)	Defective welding part of the fuel tank	Replace
4)	Defective drain packing of the fuel tank	Replace
5)	Clogged or bent air breather tube or air vent tube	Clean, correct or replace air breather tube or air vent tube
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube and fuel filter pipe	Retightening
2)	Defective packing air tightness on the fuel saucer	Correct or replace packing
3)	Cracked fuel separator	Replace separator
4)	Inoperable fuel pump modulator or circuit	Replace
4. Defective fuel meter indicator		
1)	Defective operation of fuel meter unit	Replace
2)	Defective operation of fuel meter	Replace
5. Noise		
1)	Large operation noise or vibration of fuel pump	Replace

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Note:

When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank.

1) To prevent water condensation:

- Top off the fuel tank or drain the fuel completely.
- Drain water condensation from the fuel filter.

2) Refilling the fuel tank:

Refill the fuel tank while there is still some fuel left in the tank

3) Protecting the fuel system against freezing and water condensation:

• Cold areas: In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0 C (32 F) throughout the winter season, use an anti-freeze solution in the cooling system. Refueling will also complement the effect of anti-freeze solution each time the fuel level drops to about one-half. After the winter season, drain water which may have accumulated in the fuel filter and fuel tank in the same manner as described under Affected areas below.

• Affected areas: When water condensation accumulates in the fuel filter, drain water from both the fuel filter and fuel tank or use a water removing agent (or anti-freeze solution) in the fuel tank.

4) Observe the instructions, notes, etc., indicated on the label affixed to the anti-freeze solution (water removing agent) container before use.

Check the Fuel Pressure

The specific required fuel pressure on Subaru vehicles will vary by year, and engine. Always refer to the correct service information for the model you are servicing. If the fuel pressure isn't correct, the injection system will not function properly.

Lower than required pressure could be caused by a clogged pick-up screen or in-tank fuel filter, not to mention a failing or damaged fuel pump. It could also result from damaged or blocked fuel lines. Another possible cause is resistance in the fuel pump electrical circuit. Be sure to check the pump circuit control relay and ground.

Fuel Pumps

- First, Subaru recommends you relieve the fuel pressure before working on the fuel supply system:
- Remove the fuel pump fuse from the main fuse box.
- Start the engine and run it until it stalls.
- After the engine stalls, crank it for five more seconds.
- Turn the ignition switch to OFF.

Always remove the negative battery cable from the battery before removing the fuel pump from the gas tank — or anytime you are exposing gasoline to the open air. A good, safe practice is to cover the fuel tank opening while you are inspecting or working on the fuel pump to avoid the escape of fumes and lower the possibility of fire or explosion.

The pump will also be saturated with fuel, so allow it to drain and handle it carefully. If you find contamination on the pick up screen or in the in-tank cartridge on the fuel pump, the tank should be drained and cleaned. In fact, most experts agree that the tank should be removed, drained and cleaned thoroughly every time you remove the pump. Always replace the gasket and seals when reinstalling the pump. Again, fuel pumps will vary on Subaru vehicles by year and model, so you should refer to the proper service manual for specifics of the vehicle.

Fuel Filters

You don't need to be reminded of the importance of clean pure fuel at the injectors. Even the tiniest specks of dirt or rust can clog the injectors. The results can be disastrous to the engine.

Most Subaru models prior to 2004 had only the underhood fuel filter to supplement the pick up screen on the fuel pump. The 2004 and later WRX and STI models use an underhood filter and an additional filter built into the in-tank fuel pump, as do most 2005 and later turbo models. Starting in 2006, all Subaru models are equipped with both filters. Replacement of the in-tank filters are recommended every 60,000 miles. Refer to the maintenance schedule of the specific vehicle. Underhood fuel filters are replaced every 30,000 miles. Make sure you refer to the vehicle's Warranty and Maintenance Booklet for specific information.



The underhood fuel filter is the last line of defense against contaminated fuel before it can reach the injectors. It should be replaced at 30,000 mile intervals.



The underhood fuel filter, pictured on the left, has been used on many Subaru vehicles. In addition, the in-tank filter replacement cartridge on the right is located in the fuel pump assembly on recent models.

Inspect the Fuel Lines

For safety, always use only fluorescent shop lights around fuel lines. The fire risk of using an incandescent light bulb is just not worth it.

Check the fuel lines for leaks, crimps, blockages. Even a small restriction or induced air will cause problems for the injection system. Replace any lines that are damaged. Don't try to patch in a replacement piece for a damaged section. Always recheck all connections in the fuel system after completing any fuel supply system service.

After servicing a vehicle for fuel contamination problems, be sure to discuss your findings with the customer. Explain what they can do to avoid the same problem from occurring in the future.

The correct information for the model of Subaru vehicle you are servicing is available on the Subaru Technical Information System at <http://techinfo.subaru.com>. Don't forget to use Genuine Subaru Parts from your local N.E.W. Horizon Subaru Dealer. ■