



# **GMEB**

# **Fuel Pump Troubleshooting GUIDE**

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**A Complete Guide To Fuel Pump  
Diagnostics, Prevention & Installation  
For Gasoline-Powered Engines**

# Table of Contents

|                                                      |    |
|------------------------------------------------------|----|
| History And Function Of The Fuel Pump .....          | 2  |
| How Does An Electric Fuel Pump Work? .....           | 4  |
| How To Figure Out The Type Of Pump A Car Has .....   | 4  |
| Diagnosing A Failing Electric Fuel Pump .....        | 5  |
| How To Test .....                                    | 6  |
| Pressure Test An Electric Fuel Pump .....            | 6  |
| Will The Vehicle Start? .....                        | 6  |
| Is The Engine Sputtering? .....                      | 7  |
| Unusual Noises In New Fuel Pumps .....               | 7  |
| Loose Fuel Pump .....                                | 7  |
| Contaminated Fuel Filter .....                       | 8  |
| Low Fuel Tank Level .....                            | 8  |
| Contaminated Fuel .....                              | 8  |
| Fuel Pump Installation Procedure .....               | 10 |
| Precautions To Take When Replacing A Fuel Pump ..... | 11 |
| Wire The Fuel Pump Correctly .....                   | 11 |
| Replace The Fuel Filter .....                        | 12 |
| Inspect The Fuel Tank Too .....                      | 12 |
| Use The Right Fuel Tank Gasket Size .....            | 13 |
| Keep Debris Out Of Fuel Tank .....                   | 13 |
| Maximizing Fuel Pump Lifespan .....                  | 14 |
| Preventative Maintenance And Care .....              | 14 |
| Choose A Quality Fuel Pump .....                     | 15 |
| Fuel Pump Components .....                           | 15 |
| Motors .....                                         | 15 |
| High-Grade Aluminum Casing .....                     | 15 |
| High-Grade Vacuum Formed Plastics (POM) .....        | 16 |
| 150 Micron Pre-Pump Fuel Filters (Strainer) .....    | 16 |
| High-Pressure Gasoline Direct Injection (GDI) .....  | 16 |
| Conclusion .....                                     | 17 |

# History And Function Of The Fuel Pump

The fuel pump didn't come into the picture until a couple of decades after cars were invented. Vehicles have relied on fuel pumps for about a century and have evolved quite a bit over the years. Let's take a quick look at the evolution of the fuel pump for gasoline-powered engines.

## 1900-1919:

In the beginning, fuel was supplied to the engine via gravity. The fuel tank sat above the engine so fuel could trickle down to the carburetor via a feed pipe. It was practical but not safe. It's dangerous to keep the fuel tank so close to the engine.

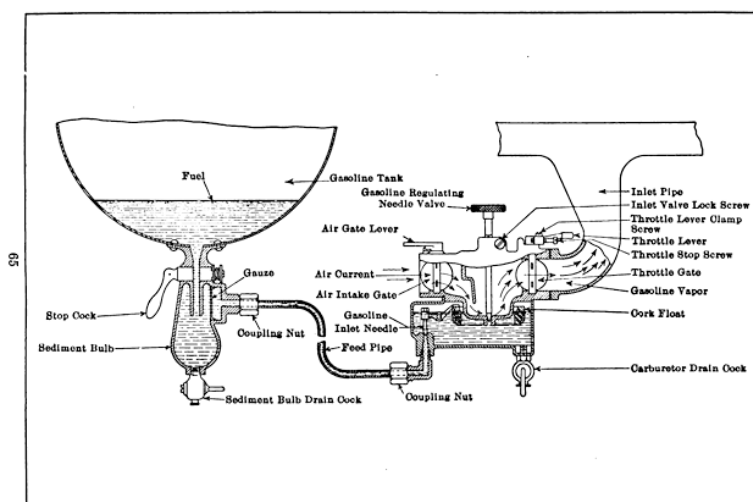


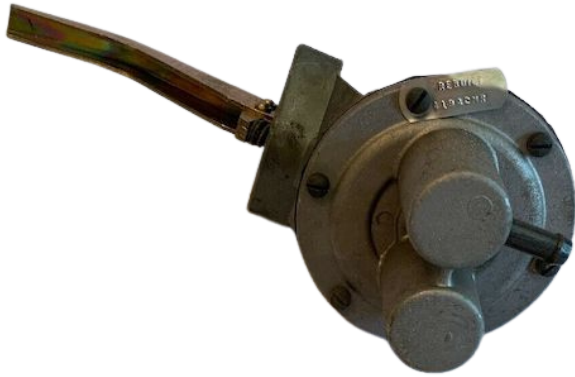
Fig. 14.—The Ford Model T Fuel Supply and Gas Making System.

Image Credit: Victor Wilfred Page  
via [Wikimedia Commons](#)

## 1920s:

To minimize the risk of fire, automakers finally moved the fuel tank to the back of the vehicle. There was a problem, though. The design didn't enable gravity to supply fuel to the carburetor. The solution? A mechanical fuel pump. A mechanical fuel pump is bolted to the engine and either the camshaft or the crankshaft powers it. A pivoted lever sits on the camshaft or crankshaft, and as the shaft turns, the lever rises and falls, creating suction. This draws fuel from the tank to the carburetor. You can read more about how mechanical fuel pumps work in [this blog post on GMB.net](#).





*Image: Mechanical fuel pump*

### **Late 1960s:**

Manufacturers adopted fuel injection technology to address the changing automotive market. Electric fuel pumps better met the needs of fuel injection systems and created much more pressure than traditional mechanical fuel pumps.

Electric fuel pumps usually operate at about 60 psi. That's enough pressure to atomize the fuel when it's injected into the cylinders.

### **Mid-1990s:**

By the 1990s, almost all vehicles had fuel injection systems. That meant virtually all vehicles had an electric fuel pump, and mechanical fuel pumps were obsolete on production automobiles.



*Image: Electric fuel pump*



## How Does An Electric Fuel Pump Work?

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A vehicle's electrical system powers the fuel pump with 12 volts of direct current. A solenoid actuates a diaphragm to draw fuel into the pump, which then sends the fuel down the fuel line to the fuel injectors.

Some electric fuel pumps remain switched on whenever the ignition is on. Electric fuel pumps in more modern vehicles are switched on by the ECU precisely when the engine needs fuel.

It's absolutely safe for electric fuel pumps to be submerged in gasoline. Liquid gasoline is a hydrocarbon, and hydrocarbons do not conduct electricity. In fact, gasoline helps keep the fuel pump cooler.

## How To Figure Out Which Type Of Fuel Pump A Car Has?

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If you aren't sure what type of fuel pump a particular car has, consider this:

- Carbureted vehicles have mechanical fuel pumps, with very few exceptions. So, if your vehicle has a carb, you probably have a mechanical fuel pump.
- On most vehicles made after 1990 (and quite a few made after 1986), the fuel pump is likely electric and located inside the fuel tank. This is because vehicles from this era use electronic fuel injection, which usually requires an electric fuel pump.

If your vehicle has a large air cleaner (filter) on top of the engine, you likely have a carbureted engine. Though, that's not always the case.

The fuel system itself is a better indicator of whether or not a mechanical or electrical fuel pump. If the fuel is drawn from the bottom of the tank by a mechanical pump attached to the engine, you're probably looking at carburation. No fuel pump in the engine bay? Fuel lines running to the side or top of the tank? Mostly likely fuel injection.

## Diagnosing A Failing Electric Fuel Pump

Because of the way mechanical fuel pumps are designed, they tend to either work just fine, or fail entirely. In other words, if you have a mechanical fuel pump with a problem, your engine won't get any fuel at all, and won't run. There's no such thing as an intermittent mechanical fuel pump failure. Any power loss or engine "choke" problems are likely being caused by something else. In a fuel injected engine, electric fuel pumps can fail intermittently.

**A good quality electric fuel pump lasts about 100,000 miles or more, but like all parts, some can fail early. The most common signs of fuel pump failure are:**

- ✓ Reduced engine power when "under load" (at highway speeds or laden with people/cargo)
- ✓ Difficulty starting the engine
- ✓ The engine "choking out" or dying after running for a while or when up to temperature
- ✓ A check engine light that returns a lean code (not enough fuel) from the engine's computer (ECU)
- ✓ A whining noise from the fuel tank area (usually under the rear seat or at the rear of the vehicle)

With the exception of a whining noise from the fuel tank, these are also symptoms that could indicate problems with a half dozen other systems. Determining if a fuel pump is failing is often about ruling out other possible issues.

Here's how you go about diagnosing fuel system problems, so that you can determine if you need a new fuel pump or not.

## How To Test

### Pressure Test An Electric Fuel Pump

The most effective option for testing fuel pump failure is to attach a fuel pressure gauge to the common fuel rail on a fuel injected engine. A shop manual or vehicle repair manual will have fuel pressure specs at various RPM rates, with tolerance ranges. If measured fuel pressure is not within those parameters, the pump may be faulty. Testing pressure in the lines between the fuel pump and the fuel pressure regulator will confirm either a pump failure or point towards a faulty regulator.



Image: courtesy of [CarNewsCafe](#)

#### NOTE:

A fuel system pressure test is only as good as the testing tool. If an inexpensive fuel pressure test gauge is used, false readings are possible. If you don't have a good quality testing tool, we recommend investing in a professional tool or working with a shop to get your fuel system pressure tested. A fuel pressure gauge that's "off" by as little as 3% can mask or falsely indicate a fuel pump problem.

### Will The Vehicle Start?

If the vehicle will not start at all but the engine will crank (turn over without starting) when the key is turned, the problem could be fuel delivery. Again, testing for fuel pressure can determine whether this is the case. Another simple test is to turn the key to the "on" position without starting the vehicle and listen for the fuel pump. An electric fuel pump makes a quiet whine during initial activation, and this can be heard from outside the vehicle.



## Is The Engine Sputtering?

If your vehicle engine is sputtering or dying out after running for a while without any problems, diagnosis can be tricky. This usually happens when the engine spends some time at cruising speeds and is then slowed down at a stoplight or stop sign. In this scenario, the engine can sputter for more reasons than we can list.

However, if you have a sputtering engine and a “lean mixture” check engine code, that may indicate a fuel pump problem. The diagnosis process here is to bring the engine up to temperature and then do a fuel pressure check.

## Unusual Noises In New Fuel Pumps

A low humming sound is nothing to worry about. A fuel pump should make that noise. Most people never notice it, because they’re not trying to listen to it. The pump is driven by an electric motor, so of course it will always hum softly when in use.

But if a newly installed fuel pump is making other strange noises, there are a few possible causes:

- ✓ Loose fuel pump
- ✓ Contaminated fuel filter
- ✓ Low fuel tank level
- ✓ Contaminated fuel



*Image: a new GMB fuel pump*

### 1 Loose Fuel Pump

**Most common noises:** whining, droning, wet sputtering

Was the pump properly installed and tightened? A fuel pump that’s a little loose can make a lot of noise. If you suspect that this is the reason your fuel pump is making noise, you can see if it’s loose. If it is, tightening it (or reinstalling it) should get rid of the noise. Renewing the gasket that seals the fuel pump to the tank can also address this problem.

## 2 Contaminated Fuel Filter

**Most common noises:** buzzing, loud humming

Did you replace the fuel filter while installing the fuel pump? If not, you may be dealing with a clogged filter that's blocking the fuel flow. This causes the fuel pump to work harder than normal, which creates a loud buzzing or humming noise. Other signs of a clogged fuel filter include:

- Engine starts hard
- Engine running rough
- Sluggish acceleration

The only way to find out if a contaminated fuel filter is the root of the issue is to check the filter. If you find that it's clogged, replace it. The fuel pump noise should go away.

## 3 Low Fuel Tank Level

**Most common noises:** whining, buzzing

Do you have a habit of driving on empty? If you rarely fill your gas tank to the top, the pump may overheat. That is why the fuel pump is inside the gas tank. The fuel helps keep the fuel pump cool. When your gas tank is chronically empty (below 1/4), the fuel pump will wear out faster from excessive heat.

Do you suspect that your fuel pump is making noise because it's overheated? Keep your gas tank full and see if the noise goes away over time.

## 4 Contaminated Fuel

**Most common noises:** whining, buzzing

Fuel that contains impurities such as dirt, metal shavings, or rust will have a negative effect on not only the fuel pump, but the fuel system as a whole. The fuel pump can only handle liquid, not dirt or any debris. Have you noticed any of the following signs besides high-pitched whining or buzzing noises? You may have contaminated fuel in your tank.

- Engine running rough
- Poor fuel economy
- Difficulty starting the engine
- Misfiring

If this is the case, then it's possible that your fuel pump has already gone bad (especially if it's a cheaply built one). Regardless of the age of a fuel pump, contaminated fuel can cause problems and so can water. Water in the fuel can easily corrode fuel pump components, causing the pump to fail.

The fuel pump strainer is the first line of defense against fuel system contamination. That's why it's an important part of the fuel pump design. See page 15 for more on fuel pump strainers.

You'll find a number of articles on the GMB blog that discuss various engine noises and the possible related problems, like this one on [Serpentine Belt Tensioners](#) and [Wheel Bearings](#).





# Fuel Pump Installation Procedure

Electric fuel pumps can be difficult to replace. To replace a failed electric fuel pump, you may have to drain and remove the fuel tank (dropping the fuel tank), replace the fuel pump assembly, and then test all the work. A fuel pump replacement should also be accompanied by a fuel filter replacement and a check of the pump's connectors (on both sides of the plugs) to ensure they are not burnt or overworked.

Replacing a fuel pump generally is not a job for a beginner auto DIYer. You'll need some mechanical know-how to do it, which makes fuel pump replacement an ideal service offering for a shop.

Before you get started, disconnect the battery and look for an access panel in the trunk, under the rear seat cushion, or in the cargo area. If you find one, you're in luck. This is designed for accessing and replacing the fuel pump, but not all vehicles have one. If you do, you can skip removing the fuel tank altogether. If not, you can follow these steps:

- ✓ Using a jack, lift the vehicle.
- ✓ Decrease fuel system pressure according to the steps in your service manual.
- ✓ Disconnect filler neck from tank according to the steps in your service manual.
- ✓ Using a second jack and large block of wood or other object, support the fuel tank.
- ✓ Remove the fuel tank.
  - Start with bolts and straps then move on to wiring, fuel lines and vent hoses
  - Lower the tank
  - Remove the fuel pump assembly from the pump according to the steps in
  - your service manual.
- ✓ Reverse the same process to install the new pump.

## Precautions To Take When Replacing A Fuel Pump

It's not always easy to replace a fuel pump, but avoiding the most common mistakes will help the job go much more smoothly.

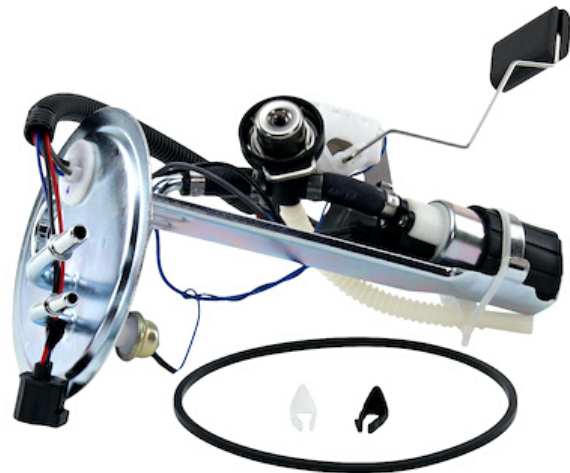
If a fuel pump isn't installed correctly, it either won't work at all or won't supply enough fuel to the engine. When the fuel pump isn't working right, your engine isn't getting the amount of fuel it needs to run well.

Your engine loses power and fuel efficiency.

The most common issues that crop up after a poorly done fuel pump installation are:

- Engine running rough
- Engine failing to start up

Both of which are serious problems. Here are some installation tips to avoid them.



*Image: a new GMB fuel pump*

## Wire The Fuel Pump Correctly

In most fuel pump installations, the wiring is plug and play. Simply plug the new fuel pump connector into the original vehicle side connector. However, sometimes the vehicle side connector is damaged, corroded, or worn. There are two ways this can cause problems:

- Reusing an old connector can result in an intermittent or poor connection. An intermittent connection can cause stumbling when the connection is jarred. A poor connection can cause enough resistance to lower the amount of voltage reaching the pump. This causes the pump to turn more slowly than it should, and can shorten the life of the pump.
- Replacing the vehicle side connector should solve the issues with poor connections, but sometimes causes another problem. It's really easy to mis-wire a new connector, when all the wires leading to it are corroded and dirty. TIP: Clean the wires and take a picture of the connector before cutting it off.

## Replace The Fuel Filter

Always check the vehicle's fuel filter and replace it along with the fuel pump. It's cheap insurance against problems down the road. A clogged fuel filter makes the pump work harder, shortening its life. A partially clogged fuel filter can even kill the fuel pump entirely.



## Inspect The Fuel Tank Too

Inspect the fuel tank for damage. If it leaks or is otherwise faulty, you might as well replace the fuel tank at the same time as you replace the fuel pump. Any fuel leak you may find is extremely dangerous and should be addressed right away. (And if you have a leak you can't identify, [this chart might help.](#))



## Use The Right Fuel Tank Gasket Size

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When you drop the fuel tank, put a new gasket on it when you install the fuel pump and avoid universal sized gaskets.

Make sure you're using the correct size. If you use the wrong sized gasket – whether it's too big or too small – air will get into the fuel tank. This can trigger an emission systems code, and dropping the tank to put a new gasket in is an expensive fix. Quality replacement fuel pumps will include the correct gasket.

## Keep Debris Out Of Fuel Tank

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When you remove a fuel tank, it's easy for some of that debris to fall into the fuel tank and contaminate the fuel. When you have contaminated fuel, the strainer at the bottom of the fuel pump will clog up faster and will lead to premature fuel pump failure. The good news is it's very easy to prevent this. All you need to do is take the time to clean the debris off the fuel tank.

# Maximizing Fuel Pump Lifespan

## Preventative Maintenance And Care

Preventative maintenance is the key to maximizing the performance and durability of any fuel pump.

- ✓ Change your in-line fuel filter every 6-12 months.
- ✓ Do not let the vehicle sit unused for more than a few months without adding fuel stabilizer to the fuel tank.
- ✓ Whenever you buy gasoline, avoid off-brand gas stations, as they often sell low-grade gasoline. Try to buy fuel from a busy filling station, too. This reduces the odds of getting a “bad” tank of fuel.
- ✓ If you pull into the gas station and see that the underground tanks are being filled, come back later. If you fill the gas tank in your vehicle when the fuel station tanks are being filled, you may end up with contaminants in your fuel system.
- ✓ To ensure your fuel pump stays cool, try to keep your vehicle’s fuel tank at least a quarter full.

In regards to keeping your tank a quarter full: When the tank is low on fuel, the pump won’t be fully submerged, so it won’t be cooled by the fuel around it. When the engine is at less than full power, it doesn’t need all the fuel that the pump provides. The unused fuel is returned to the fuel tank. But, the trip to the engine compartment causes the fuel to get warmer. Heat from the above situations can [ruin the electric fuel pump](#) and force you to replace it.

## Choose A Quality Fuel Pump

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A big part of maximizing the fuel pump lifespan is choosing quality parts from the start. So when it's time, thoroughly empty and clean the fuel tank at installation and choose a new electric fuel pump with a quality filter since electric fuel pumps can be sensitive to [sediment or rust](#) in the fuel. Here are some more attributes to look for when shopping for fuel pumps.

## Fuel Pump Components

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### Motors

You want durable, OE replacement electric motors. These motors are developed to match the manufacturer's specifications in terms of voltage, amperage, resistance, pressure, and volume to guarantee long lasting performance, consistent fuel pressure, and steady fuel delivery.

Inferior motors burn out and deliver inconsistent fuel pressure to your engine. Inconsistent fuel pressure can cause your engine to misfire, stutter, or even shut down completely.

**NOTE:** Inconsistent fuel pressure can also be caused by low-grade wiring. All GMB Fuel Pumps feature premium-grade electrical components (including wiring).

### High-Grade Aluminum Casing

An enclosed electric motor can generate high temperatures when running. GMB's high-grade protective aluminum heat dissipation sleeve allows the heat radiating from the electric motor to quickly dissipate and prevent an overheating condition. This added sleeve increases the motor life dramatically and helps prevent the motor from burning out.



## High-Grade Vacuum Formed Plastics (POM)

Using a high-grade vacuum formed plastic creates a component that won't lose its integrity when hot. Weak and/or poorly made plastic fuel pump assemblies can warp, which causes stress on the internal pump and components and affects the float levers.

## 150 Micron Pre-Pump Fuel Filters (Strainer)

If you look at a fuel pump that mounts in the fuel tank, you'll find an oblong filter attached to the bottom opening of the pump (over the fuel pick-up tube). That's the fuel pump strainer. The sender/hanger design is one of the greatest fuel pump innovations of our time. The fuel pump strainer is an integral part of this design.

The fuel pump strainer is not the same thing as the fuel filter. It's also not a moving part. It's a very, very fine mesh filter that covers the fuel pick-up tube. That's where the fuel pump sucks in fuel from the tank. With the presence of the fuel pump strainer, only clean fuel can enter the fuel pump.

It's common for low quality fuel pump strainers to clog up over time. A clogged fuel pump strainer restricts the flow of fuel into the pump. This forces the fuel pump to work harder and draw a much higher current. This leads to premature fuel pump failure. A clogged strainer is one of the top causes of fuel pump failure, which makes for a much more expensive problem.

The fuel pump strainer would never be changed by itself. This is because the fuel pump strainer is an [integral part of the fuel pump assembly](#). If the fuel pump fails, the new fuel pump will come with a new strainer.

## High-Pressure Gasoline Direct Injection (GDI)

These days, manufacturers are increasingly turning to gasoline direct injection (GDI) engines. These fuel systems are designed to inject highly-pressurized fuel directly into each cylinder's combustion chamber. This brings several benefits:

- Better emissions
- Improved fuel economy
- More power

GDI engine technology has been around since the 1990s. Yet it's only just starting to become popular because automakers see it as a good way to meet the increasingly strict emissions and fuel economy standards set by state governments.

The design of a high-pressure GDI fuel pump resembles a mechanical fuel pump, but it's more advanced. Its purpose is to pressurize the fuel that comes in from the fuel tank before sending it to the fuel rail. We talk about GDI fuel pumps extensively [on the GMB blog](#).



*Image: a new GMB GDI fuel pump*

## Conclusion

GMB is one of the largest global manufacturers of OE and Aftermarket automotive products, we have a lot to say about fuel pumps along with the other types of parts we manufacture and distribute across the globe. If you found value in this troubleshooting guide, we encourage you to share it with others and visit [www.GMB.net](http://www.GMB.net) for more resources like it. And, if you are looking for quality fuel pumps with extensive Asian, Domestic, and European coverage that meet or exceed OE standards, find out more about our parts on our website, too.