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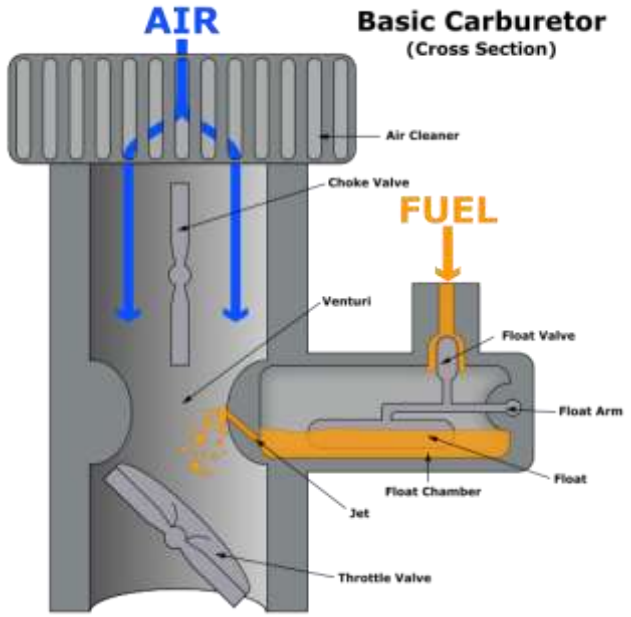
Carburetors:

- A carburetor is a device that blends air and fuel before it is supplied to the intake manifold.
- It is a mechanical device which used to depend on the speed and pressure of the air passing through it.
- This device had its limitations which led to fuel injection becoming the preferred method of automotive fuel delivery.



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Limitations of Carburetors:

- In a carburetor the ratio of air & fuel in the injected mixture has to be preset. So the mixture is either fixed as *lean* or *rich*.
- This causes the cars to be either under powered or overcharged.

So it was primarily due to the stricter emission norms and the ever increasing quest for engine power a better solution for this problem was required.

Engine Management System

- To ensure that a correct proportion of air and fuel is supplied to the engine in all conditions.
- Earlier, performed by the carburettor
- Now computerized system calculates the required air-fuel ratios.
- Resulted in improved performance, fuel efficiency & lower emissions.
- Controlled by a computer called Engine Control Module (ECM)

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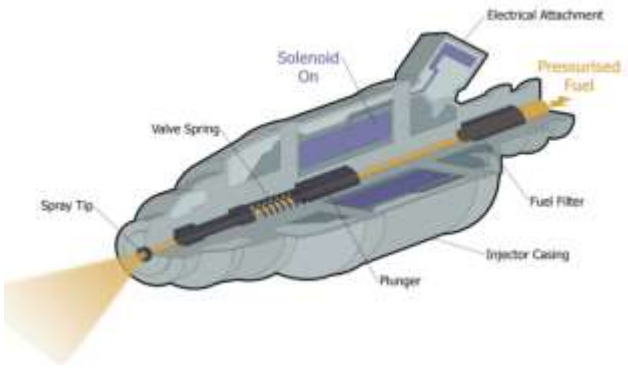
- The new device that replaced the carburetors was the fuel injection system that primarily comprised of :
- An Electronic Control Module (ECM)
- A fuel injector
- A fuel pump



This kind of a fuel injection setup is called

Single Point Fuel Injection (SPFI) OR

Throttle Body Injection (TBI)

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Disadvantages of SPFI:

Since the injection setup was feeding fuel to all the cylinders on every cycle hence they were not economical and caused a lot of pollution.

So, with the increasing need for refined engines and even stricter emission norms coming in, the injection technology moved a step up.

Latest in the injection technology is the:

Multi Point Fuel Injection (MPFI)

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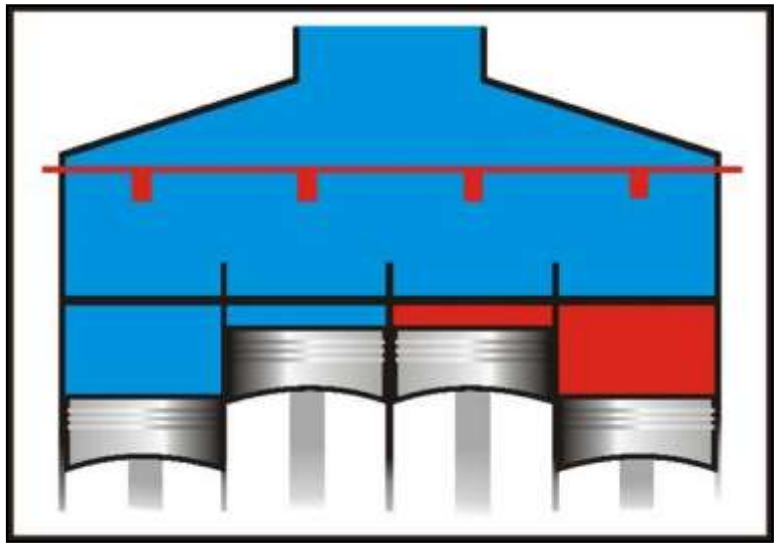
Multi Point Fuel Injection

In **MPFi (Multi Port Fuel Injection)** system, there is an electronic fuel injector for each cylinder.

These injectors spray fuel into the cylinders.



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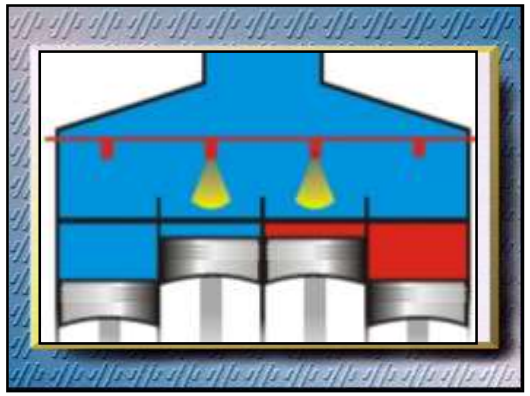
With the advanced microprocessor technology coming in, the ECMs became more powerful and a more precise fuel injection timing was attained.

There are different injection timings that are used in different driving conditions:

Simultaneous Injection

Group Sequential Injection



Sequential Injection

Multi-Port Fuel Injection

Advantage:

Efficient distribution and combustion of fuel.

Benefit:

- Cleaner Emissions
- Better Fuel Economy