mixed with the fast-moving stream of air before it enters the engine. The velocity of the air in the bore (and thus the amount of fuel being forced through the carburetor into the airstream at any given time) is regulated by the throttle valve.

This is a more complicated process than it may sound, however. For instance, when the engine is idling, the air velocity through the venturi is not great enough to draw fuel into the air stream. And with sudden changes in engine operation such as rapid acceleration, the venturi effect is temporarily lost. So other systems are designed into the carburetor to cope with these situations.

A more detailed presentation of carburetor function is available in the Engine module of Understanding Automotive Systems.

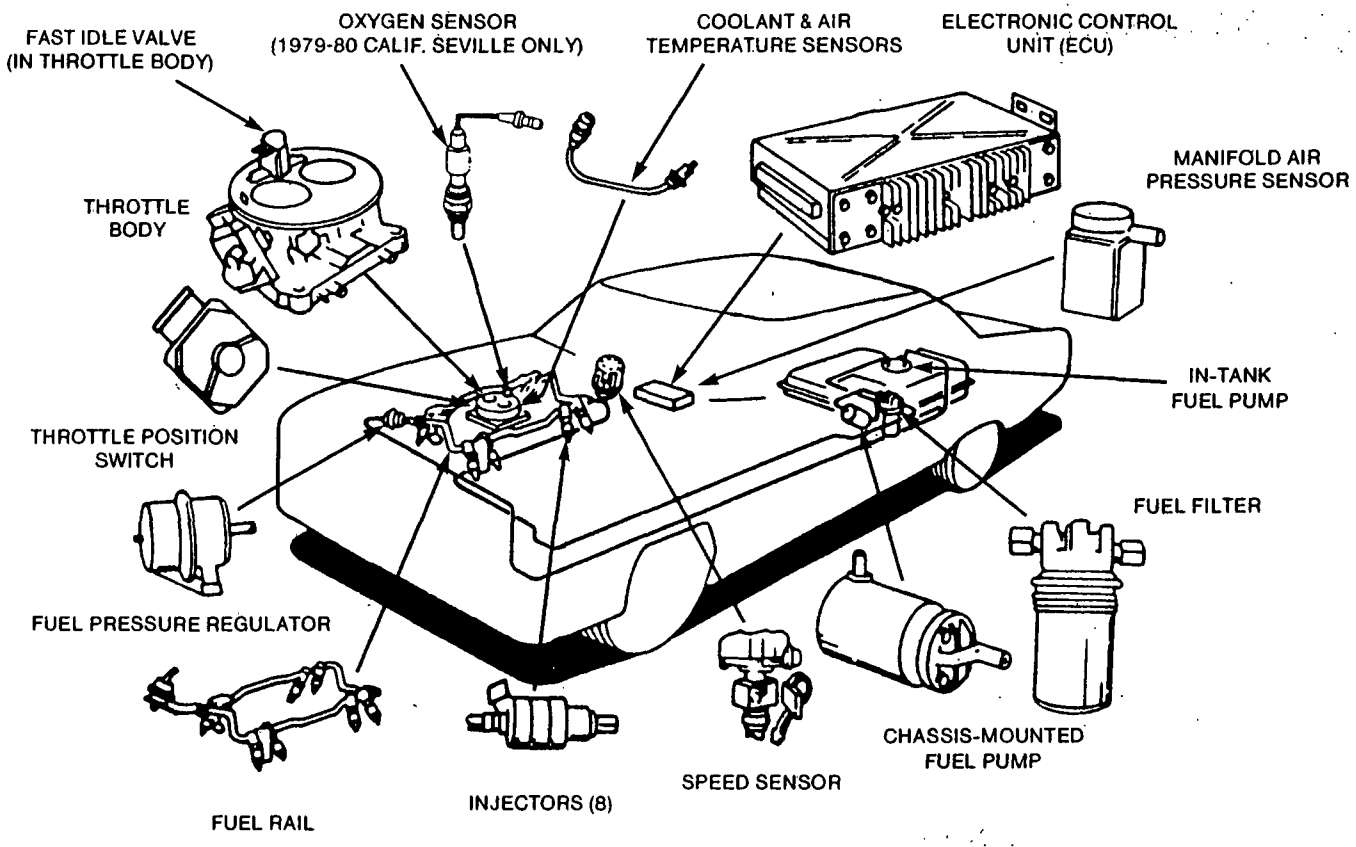
FUEL INJECTION

In fuel injection systems, fuel is forced under pressure through a small opening into the air. Unlike a carburetor, the pressure forcing the fuel into the air is not atmospheric pressure but produced by a pump in the injection system itself.

Most injection systems deliver gasoline at an intake port in the cylinder head. In this case, only air passes through the intake manifold. Another type of gasoline fuel injection system delivers fuel at the throttle body. When this is done at one central point the system is called a throttle body injection (TBI) or central fuel injection (CFI) system.

Fuel injection provides more precise control of the air/fuel ratio, improved emission control, fuel efficiency, and driveability. Fuel injection systems, however, are more expensive, require clean fuel, and are usually considered difficult to service.

The most widely-used systems are electronic fuel injection (EFI). These systems provide a pulse of fuel, with the electronic system controlling how long the injector is held open (pulse width).



(Figure 35) Electronic Fuel Injection System.