FUEL SUPPLY SYSTEM IN AUTOMOBILE

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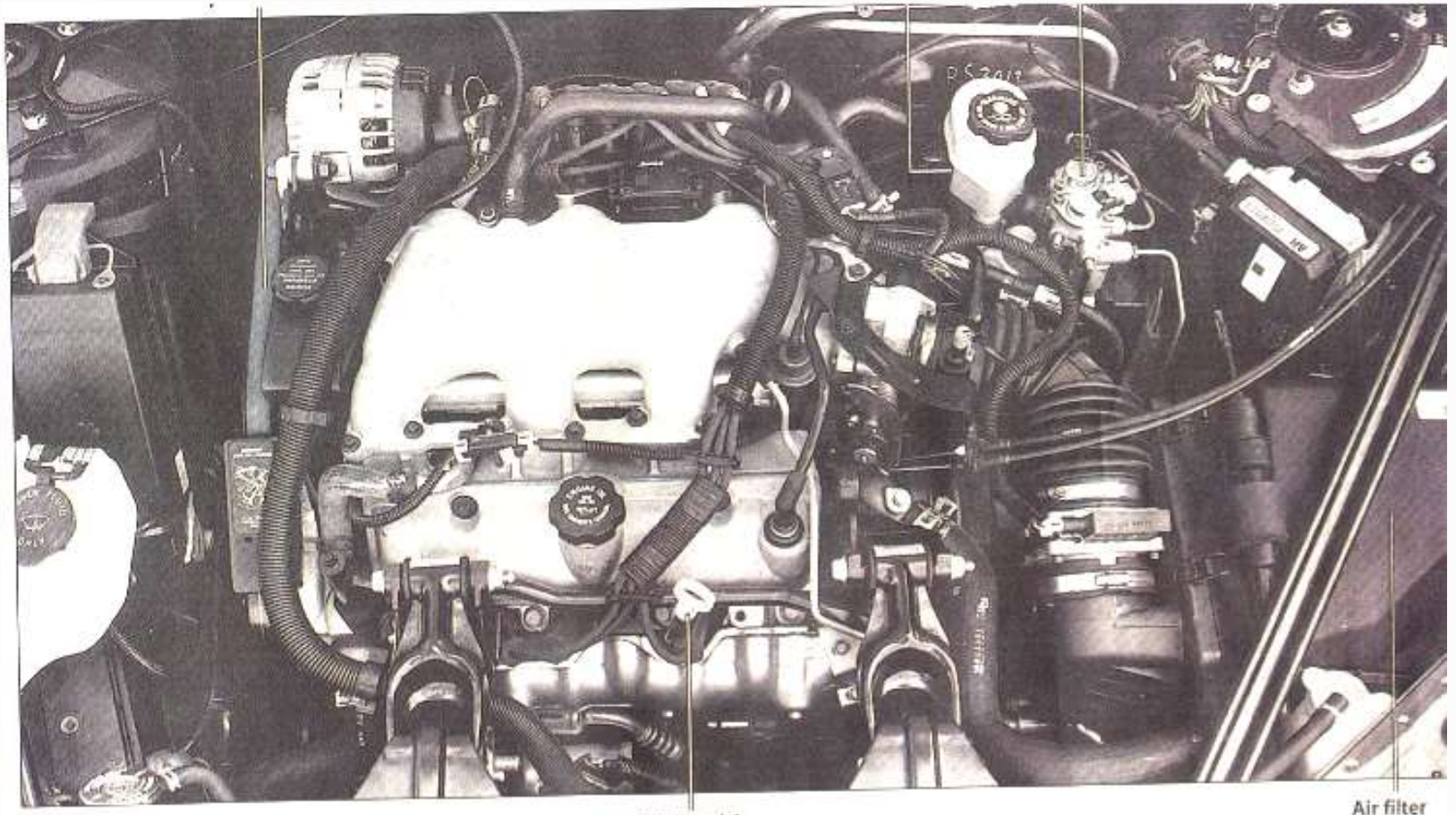


Oh, carburetor, where art thou?

Purposes of Fuel Supply System

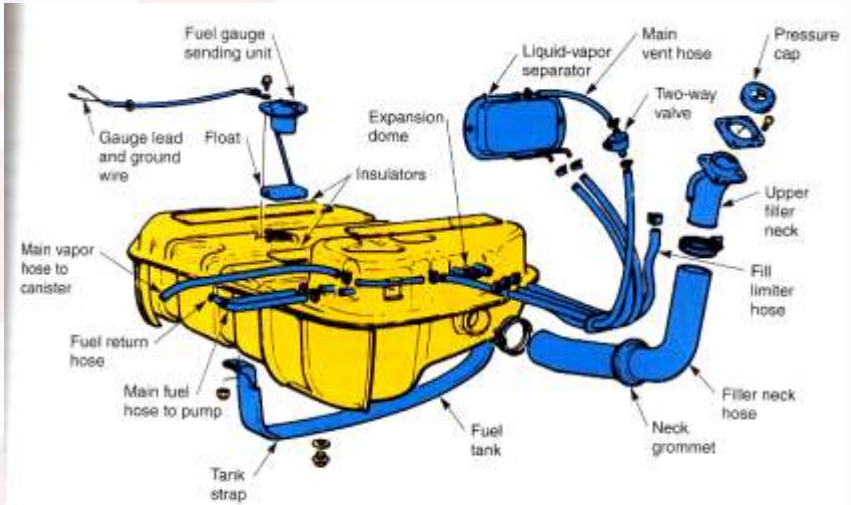
- Store sufficient amount of fuel for a reasonable cruising range for the vehicle.
- Filter the fuel and the air.
- Deliver the fuel to the engines carburetor, throttle body or fuel injectors.
- Do not allow the fuel to vaporize in the fuel lines. (vapor lock)
- Do not allow fuel vapors into the atmosphere.

Fuel Supply System Parts

- Fuel tank assembly.
- Fuel vapor recovery system.
- Fuel pump.
- Fuel lines.
- Pressure regulation system.
- Fuel filter.
- Air Filter.

Fuel Tank

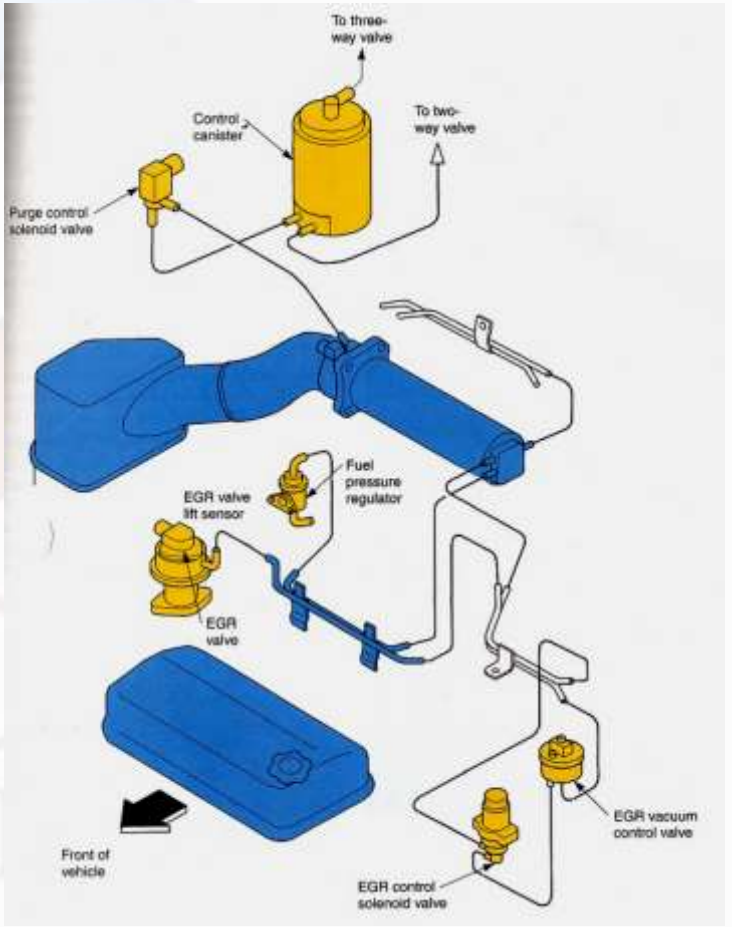
- Made of plastic or Metal
- Hoses
- Electric Pump
- Insulation
- Straps
- Fill



e 21-2. Basic parts of a fuel tank assembly. (Chrysler)

Fuel Vapor Recovery

- Fuel vapors cannot be vented to the atmosphere.
- Vapor is captured and stored in a charcoal canister.
- The vapor is sent to the engines intake manifold and burned in the combustion chamber.

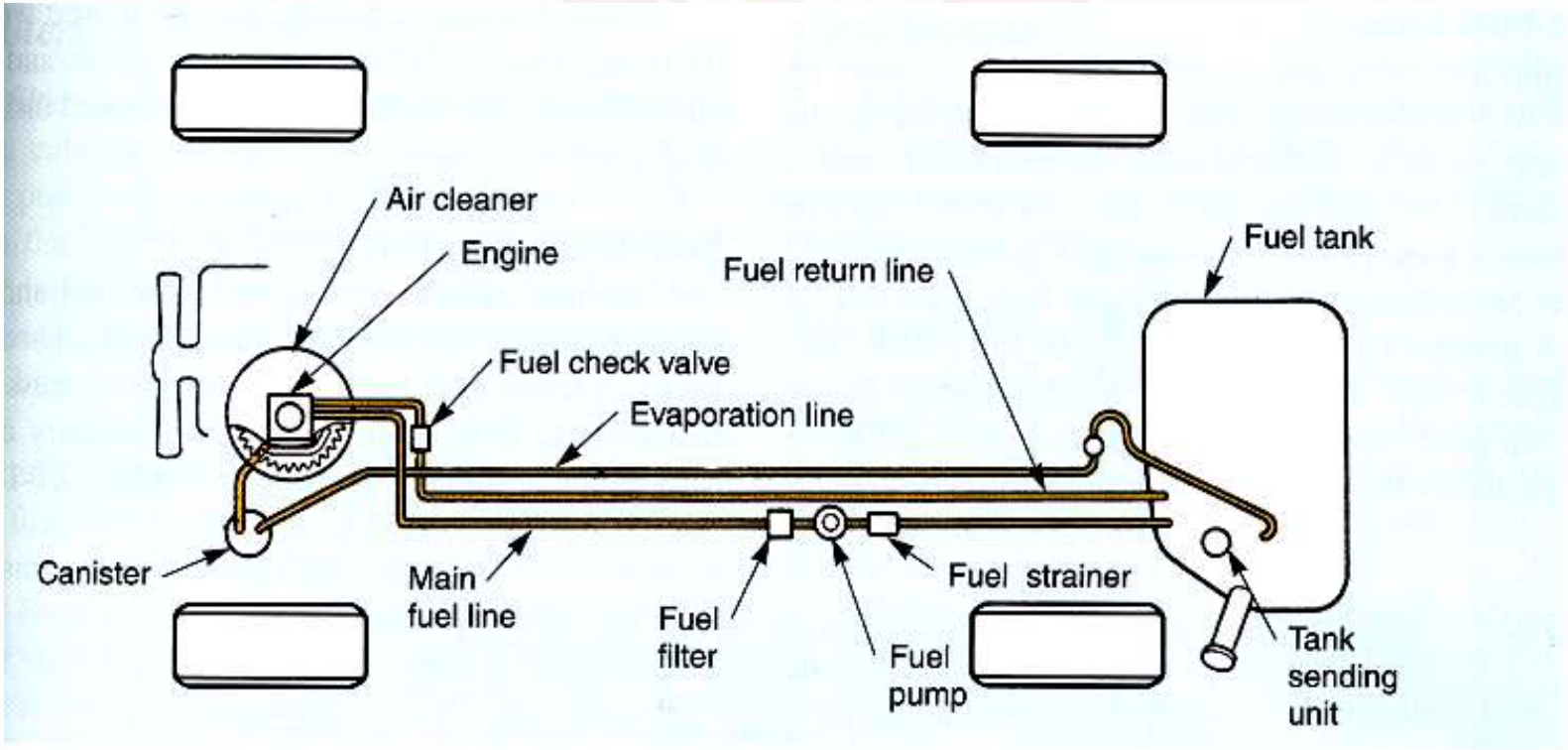


Fuel Pump

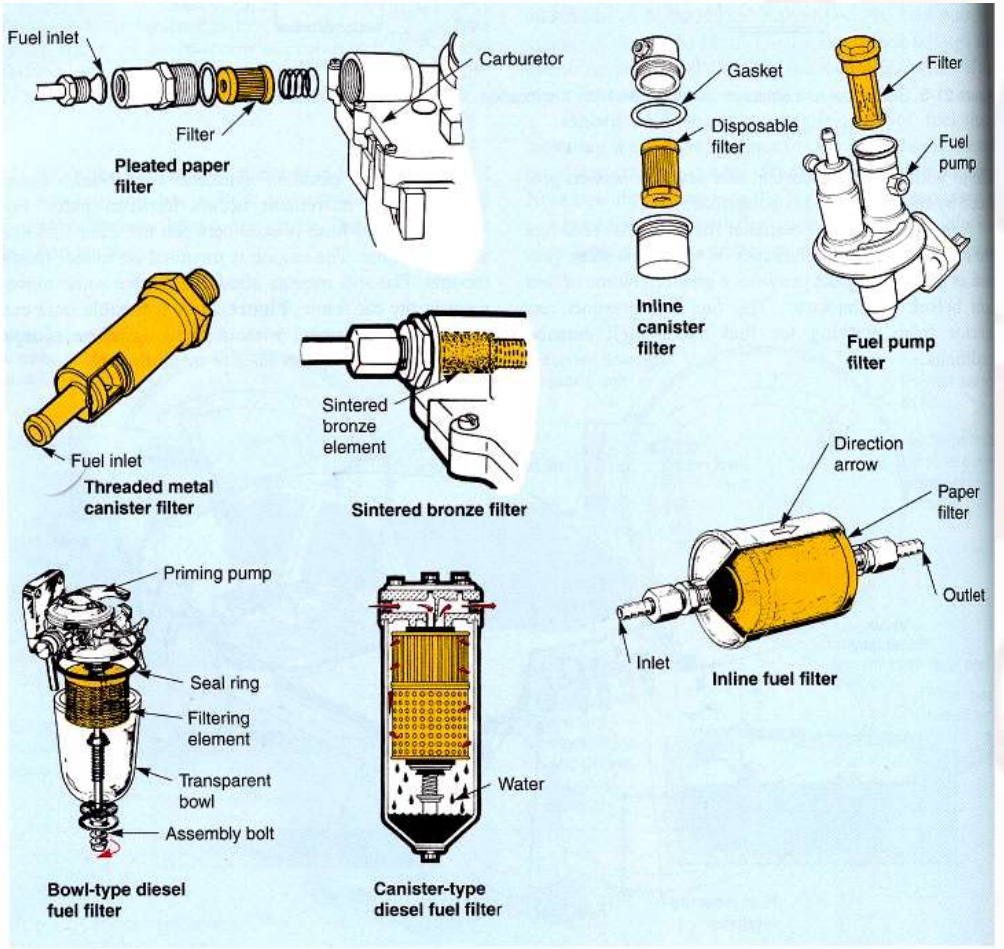
- Most pumps are electric pumps mounted inside the gas tank.
- The computer controls power to pump through a device called a relay.
- When the engine is running the computer turns the pump on.
- When the engine is off the computer turns the pump off.

Fuel Lines

- Can be made of steel or many types of flexible material such as neopreme rubber and different types of plastic.



Fuel Filter



- Screen out any particles in the gasoline.
- Most use a cartridge with micro-porous paper inside.
- Other types of filtering systems are used but not common.

Air Induction

- Consist of the air inlet, air cleaner, hoses, mass air flow sensor (MAF), throttle body, idle air control (IAC), and inlet air temperature sensor (IAT).

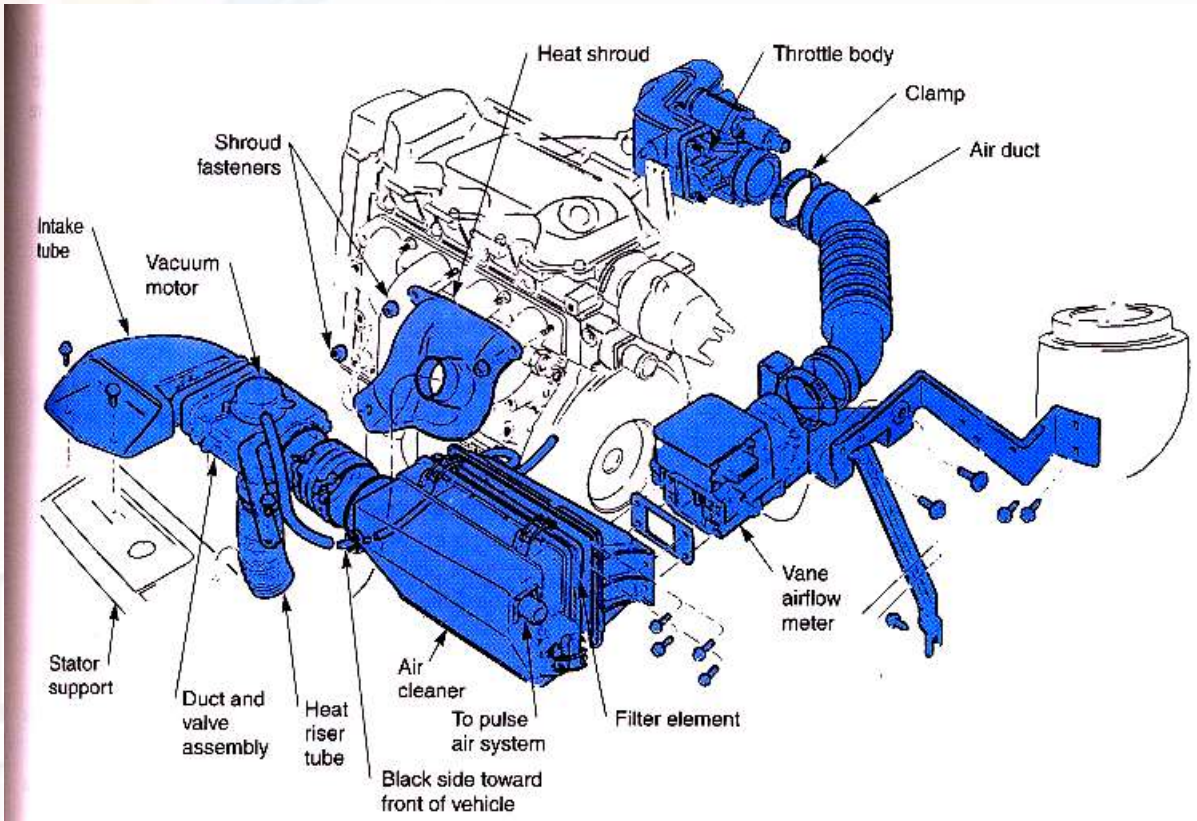


Figure 21-32. Parts of modern air filter assembly. (Toyota)

Air Filter

- Paper type filter most popular.
- Change either when dirty or every 30,000 miles or 3 years.
- Hold a light behind the element to check it for dirtiness.

Pressure Regulator

- Vacuum controlled
- On Fuel rail

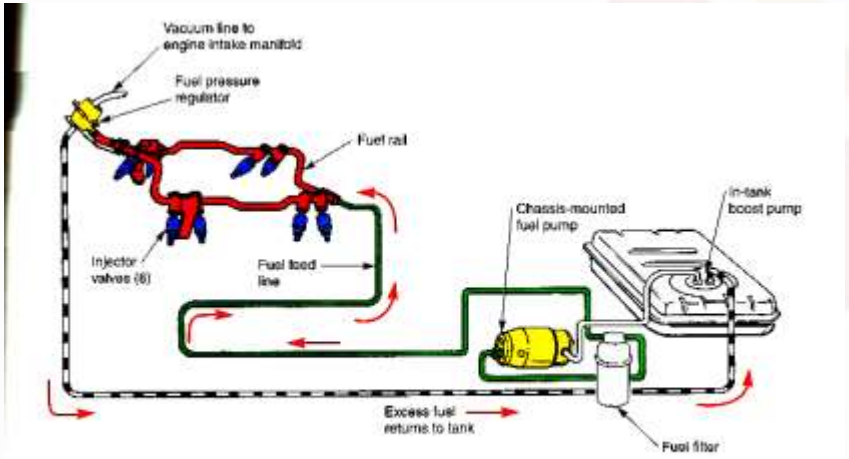
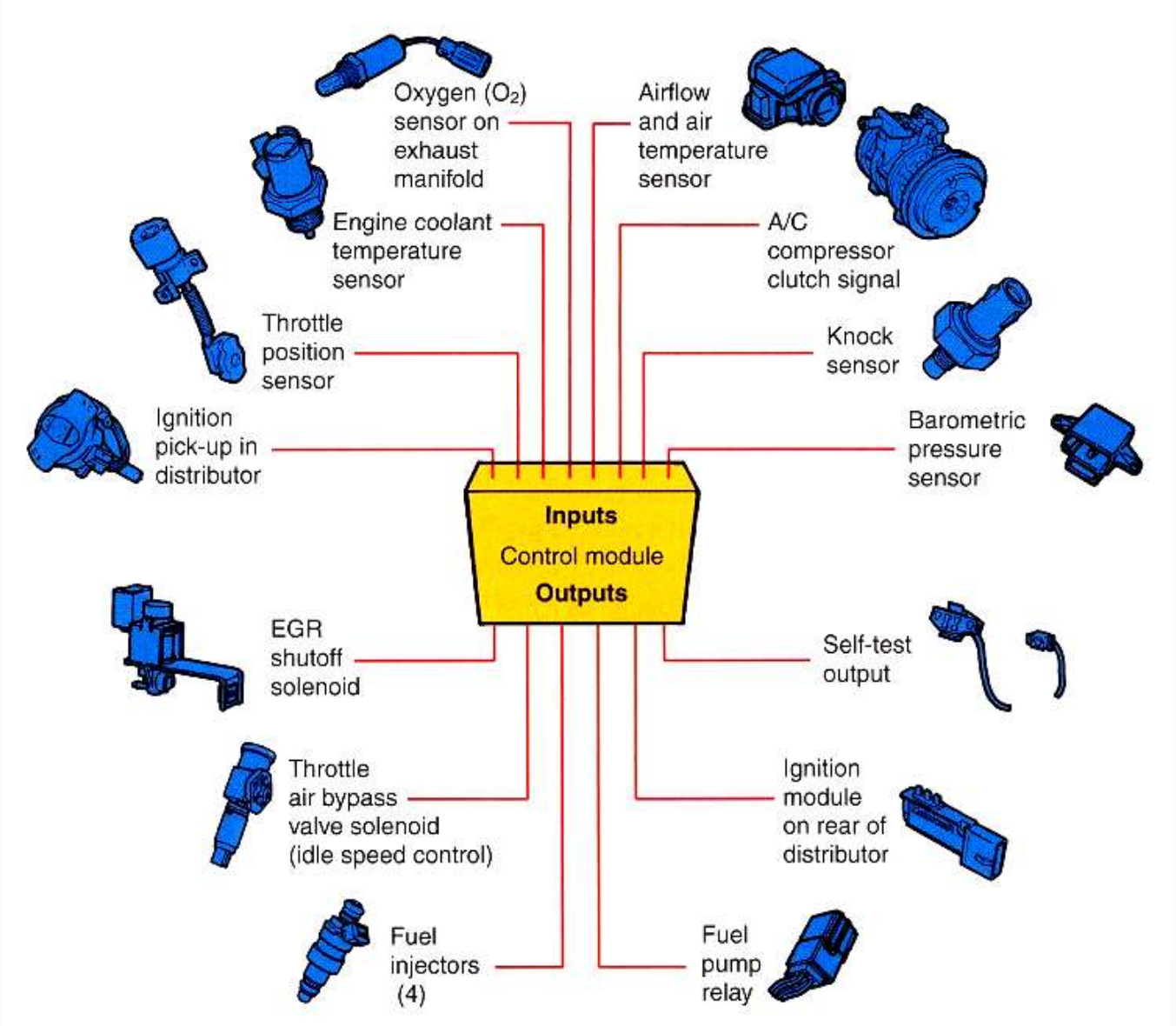
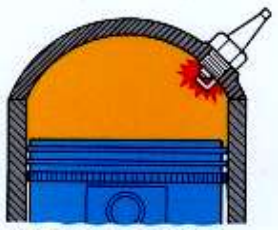


Figure 22-35. Pressure regulator action. The fuel pump forces fuel into the fuel rail, injectors, and regulator. The regulator allows excess fuel to flow back to the fuel tank. The vacuum supplied to the regulator causes fuel pressure to increase and decrease with changes in engine vacuum and load. (Cadillac)

Sensors & Relays



Abnormal Combustion



Spark occurs, combustion is slow but normal.

Hot carbon deposit ignites fuel mixture.

Spark plug "fires" too soon.

Normal combustion spreads very slowly.

Spark plug "fires" and two flame fronts form.

Piston moves toward flame front.

End gas auto-ignites and two flame fronts spread rapidly.

Both flame fronts shoot toward each other at high speed.

Pressure builds as piston slams into combustion flame.

Flames collide with pressure "spike" and knock.

Detonation

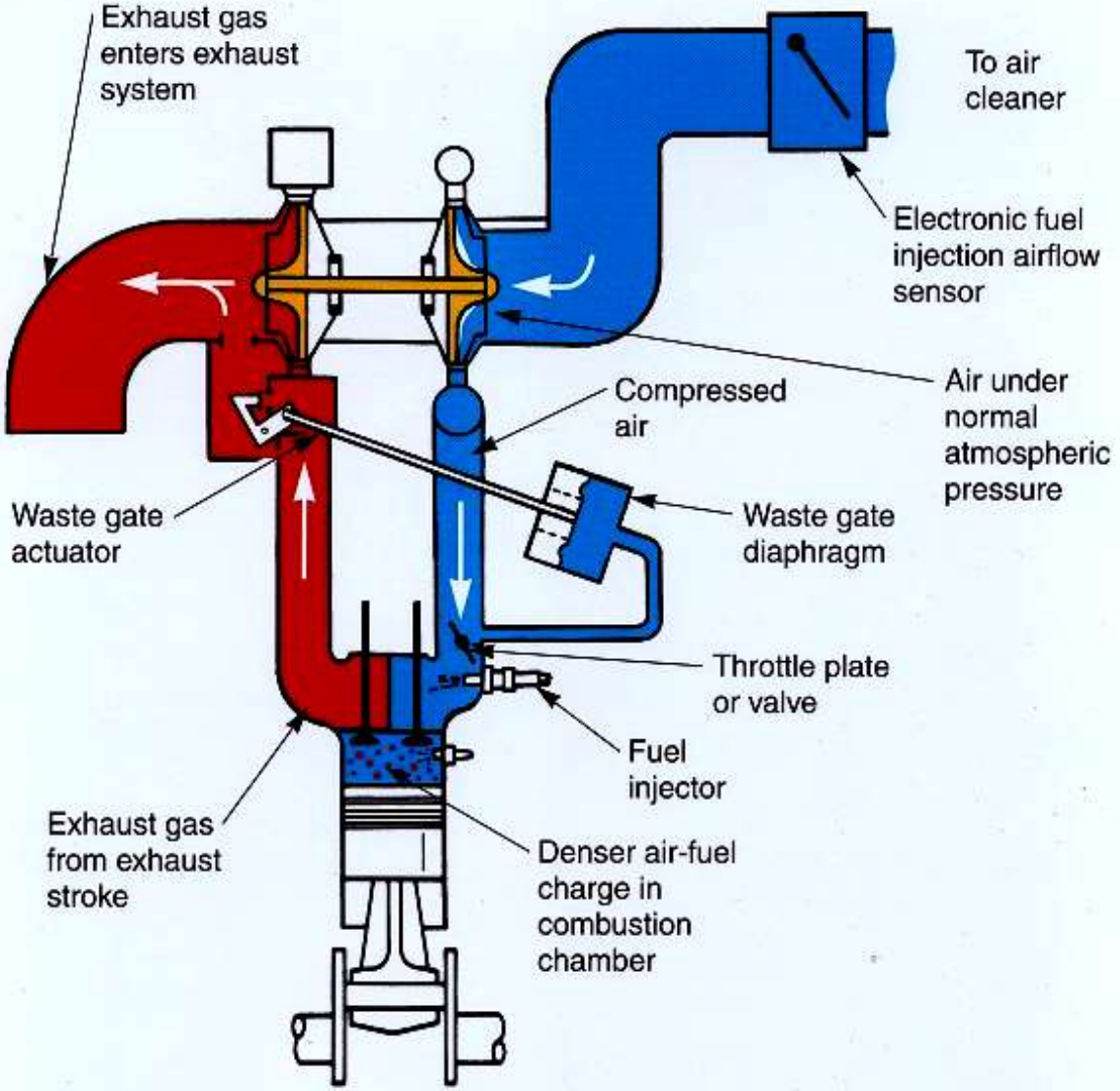
Two flames collide, causing pressure "spike" and knock.

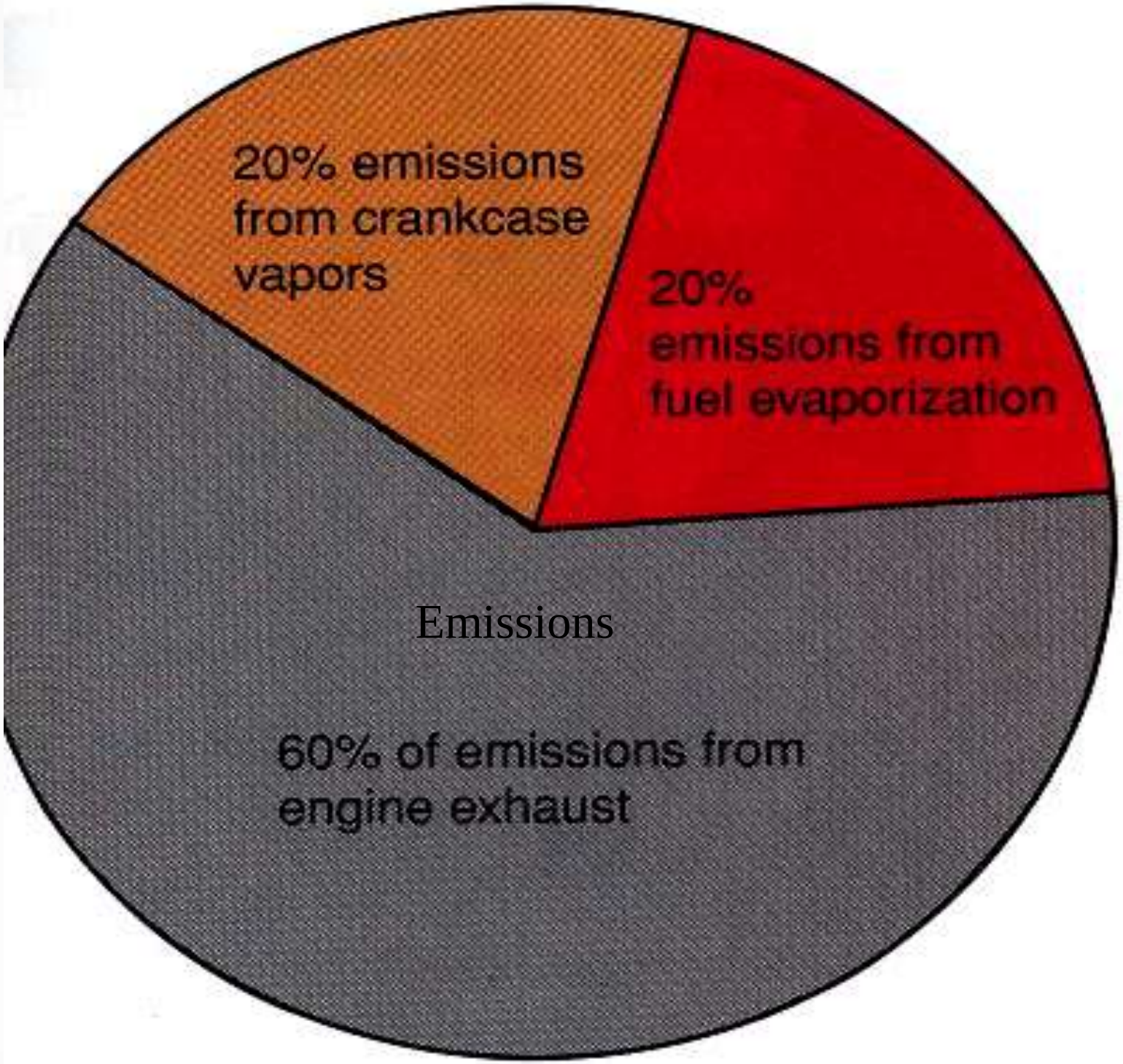
Preignition

Spark knock occurs because of excessive pressure in cylinder.

Spark knock

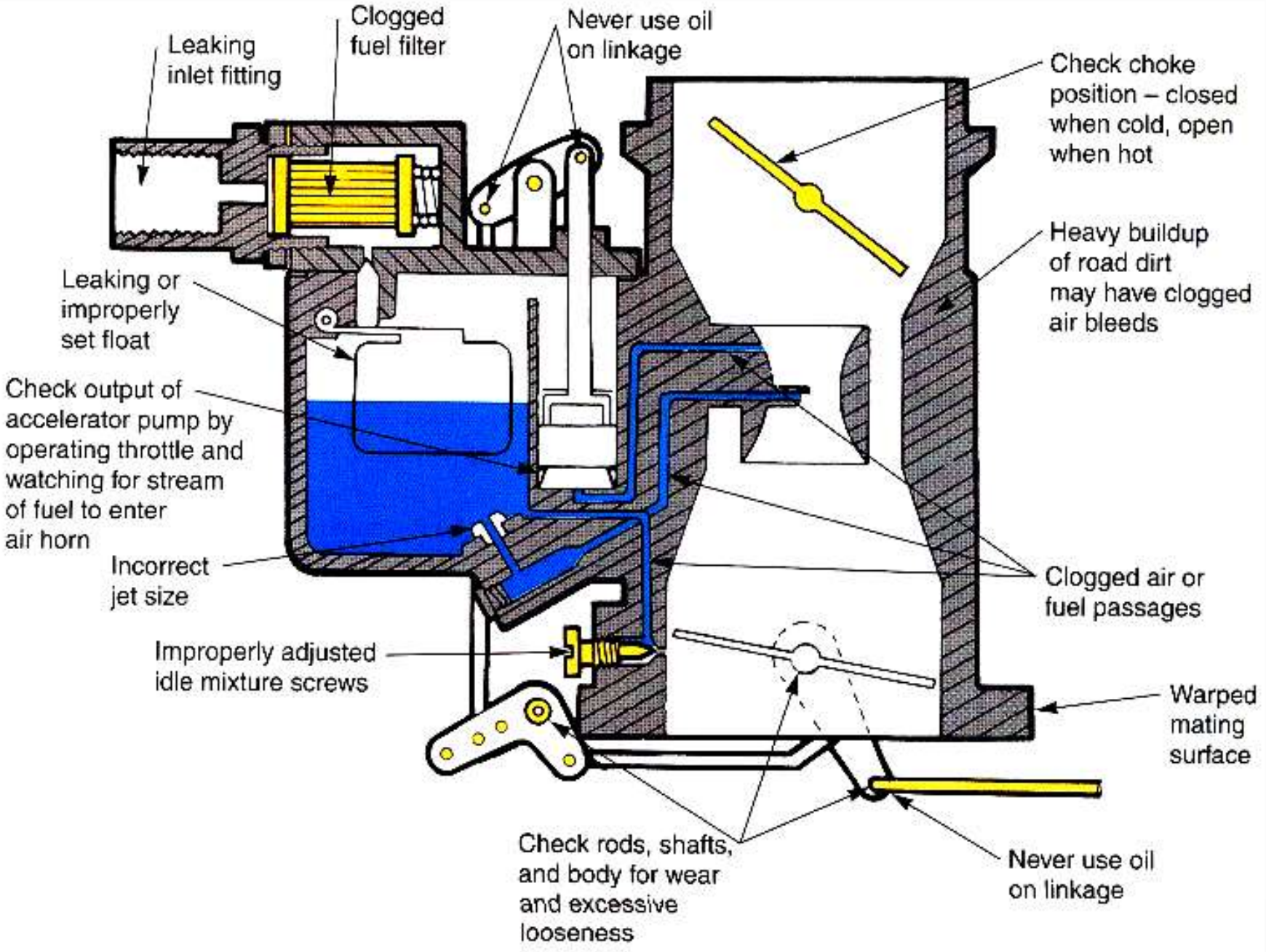
Turbocharger Operation



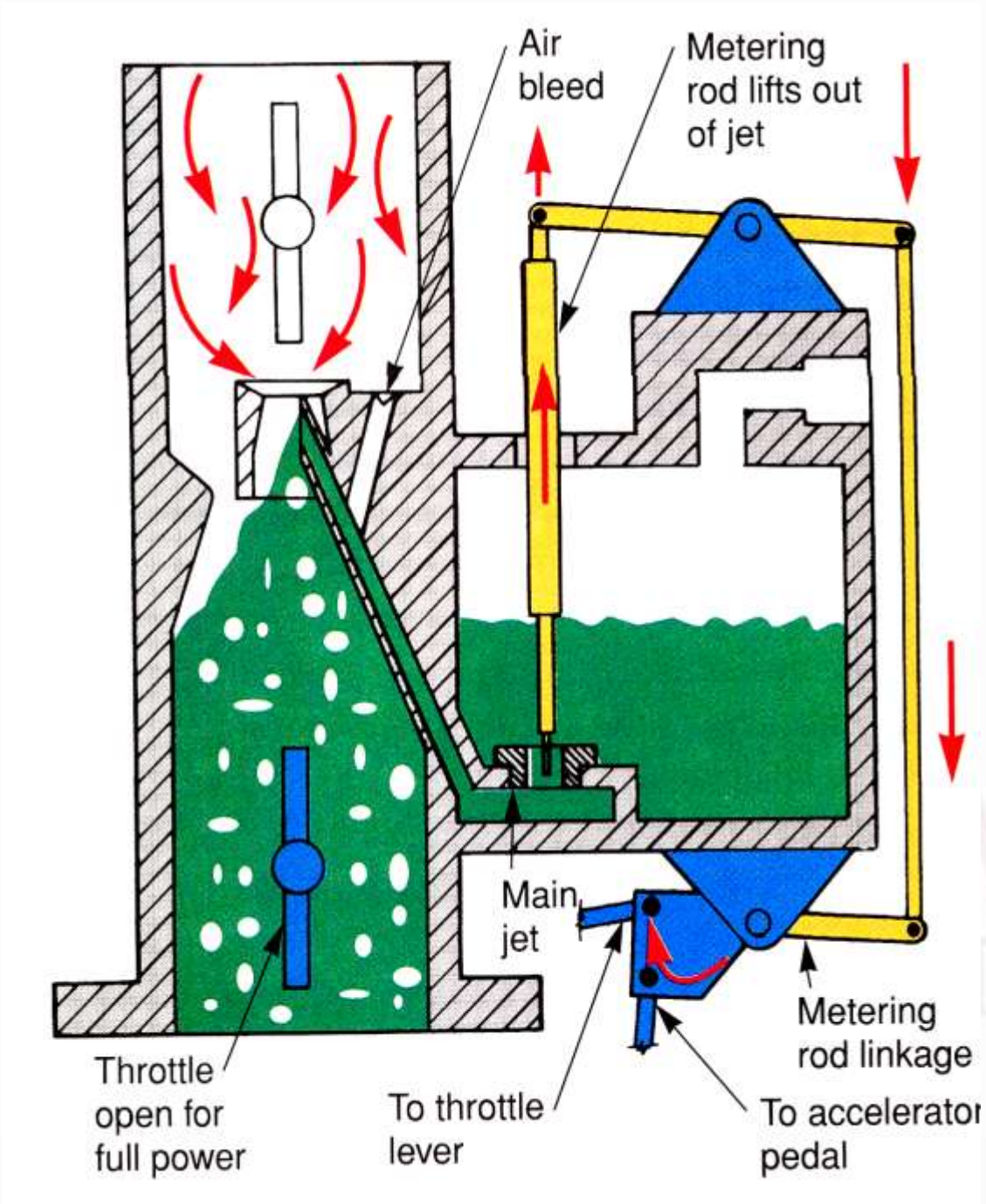

20% emissions from crankcase vapors
20% emissions from fuel evaporization
60% of emissions from engine exhaust

Emissions

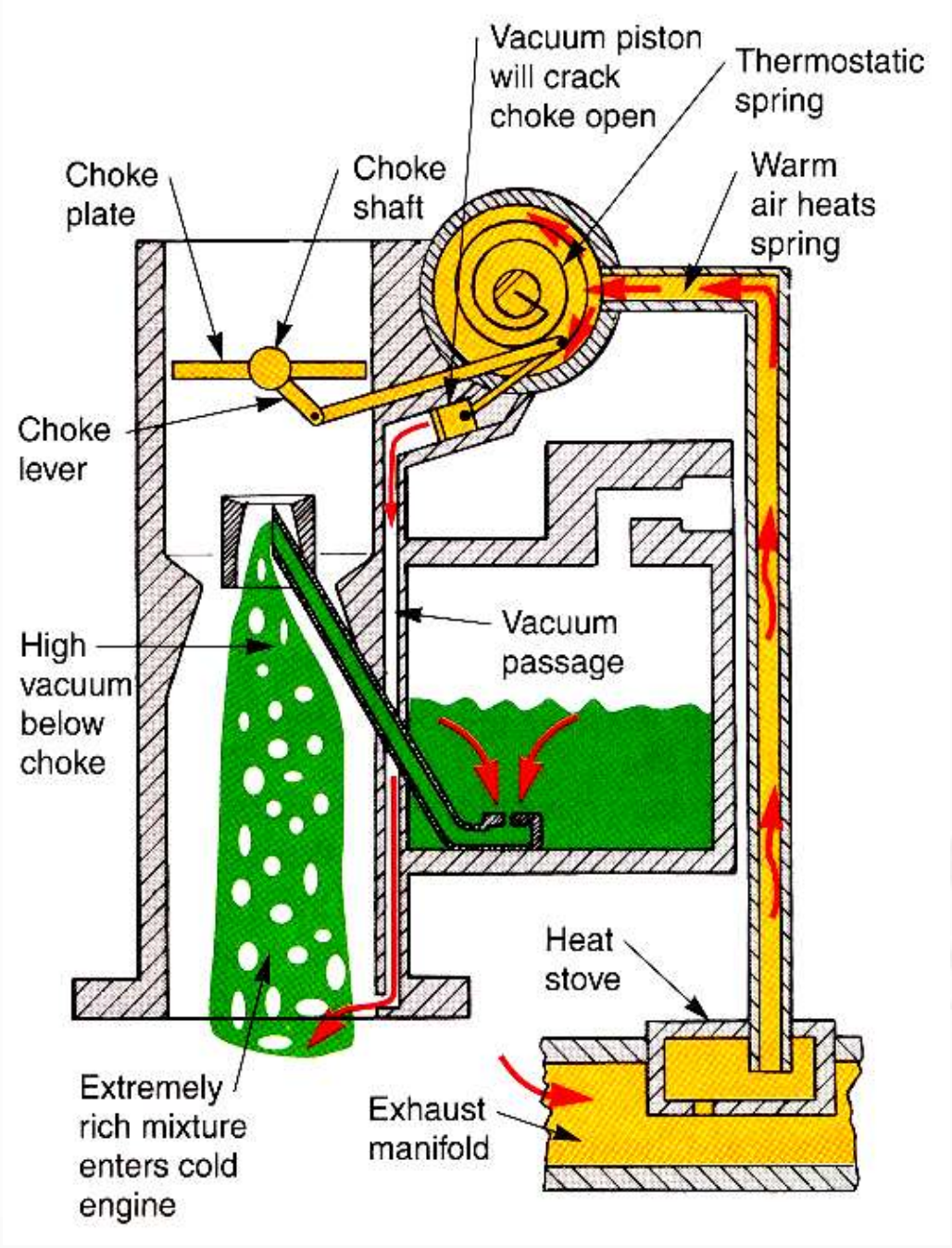
Carburetors



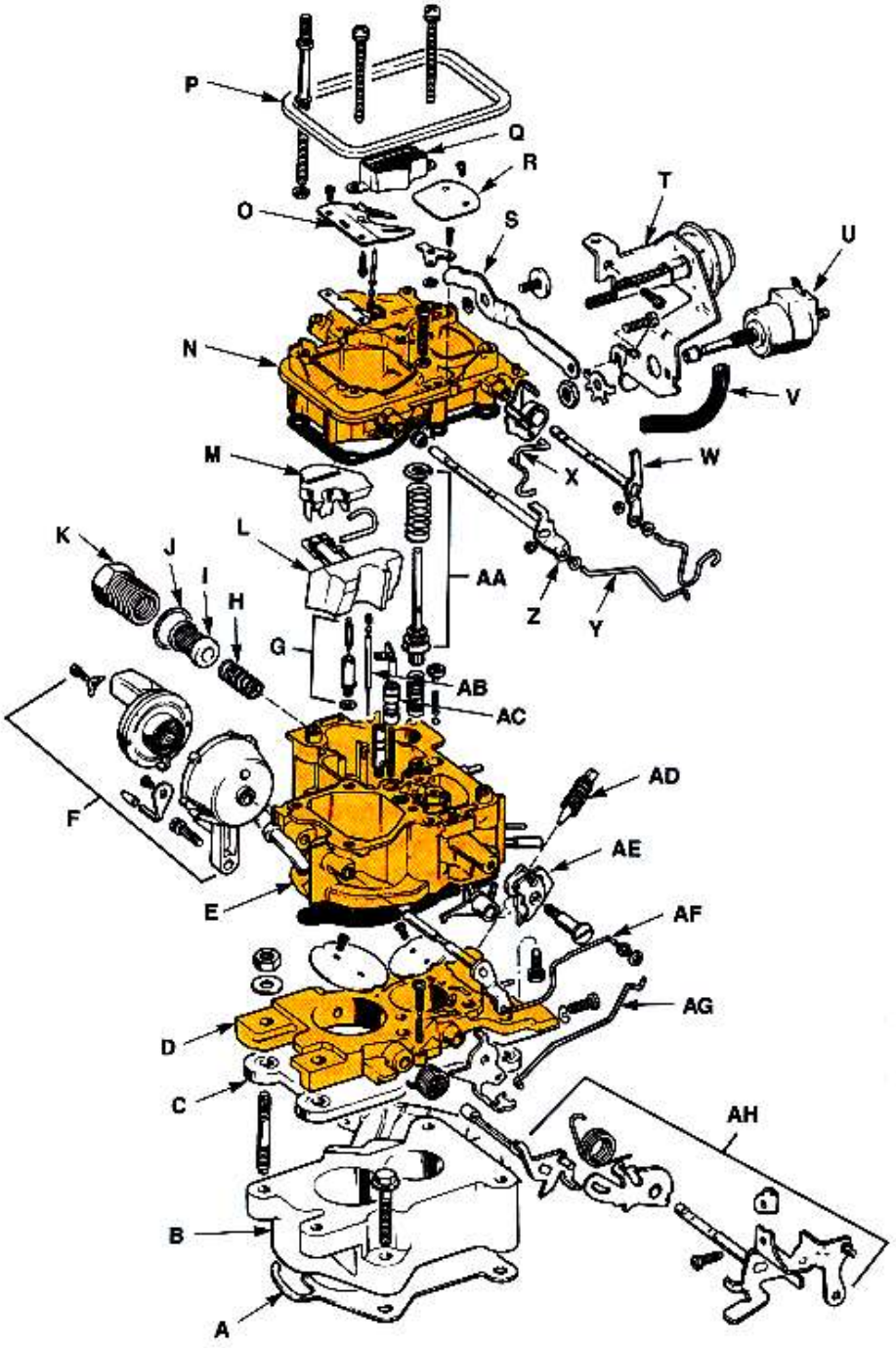
Carburetors



Carburetors

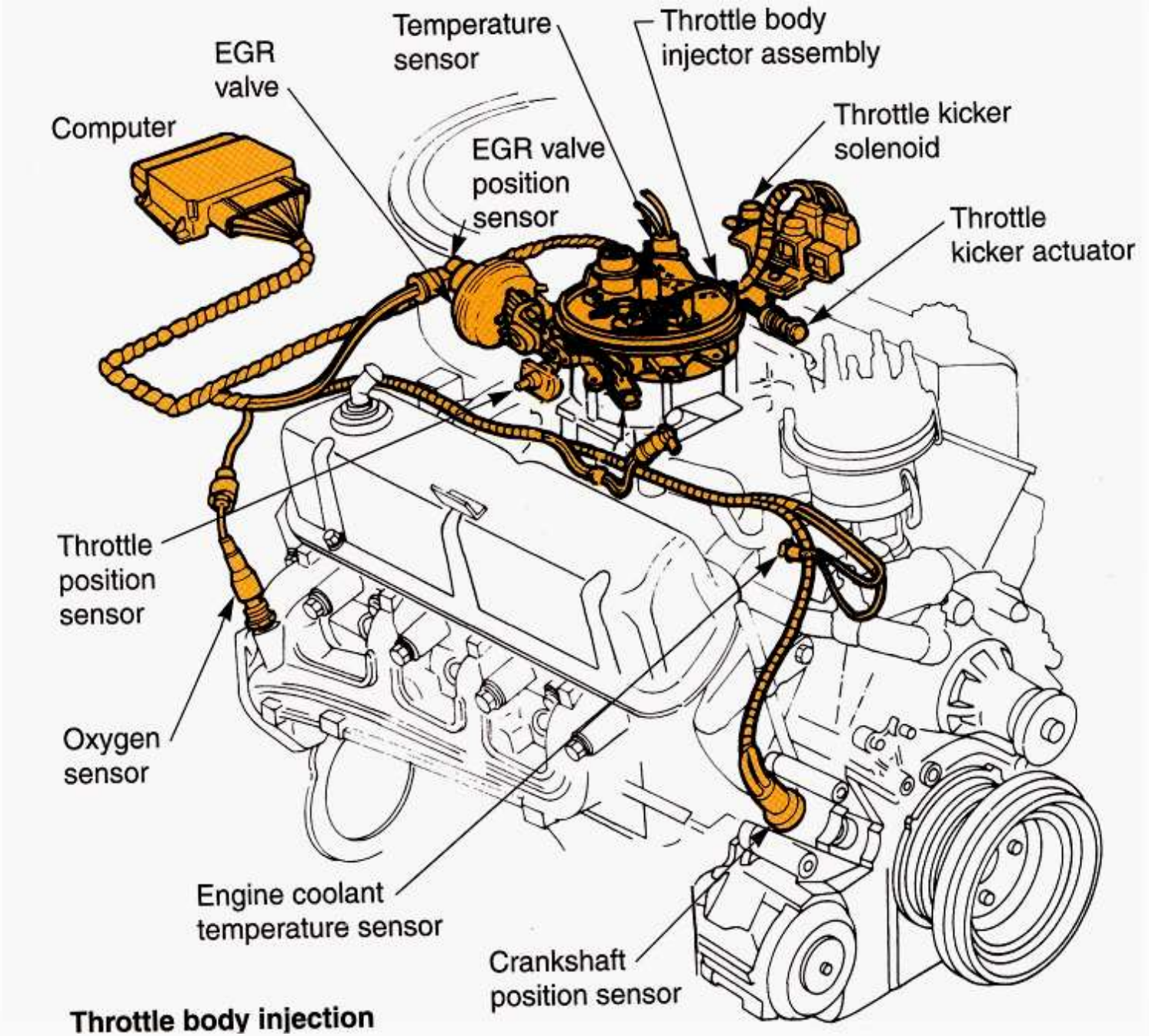


Carburetors

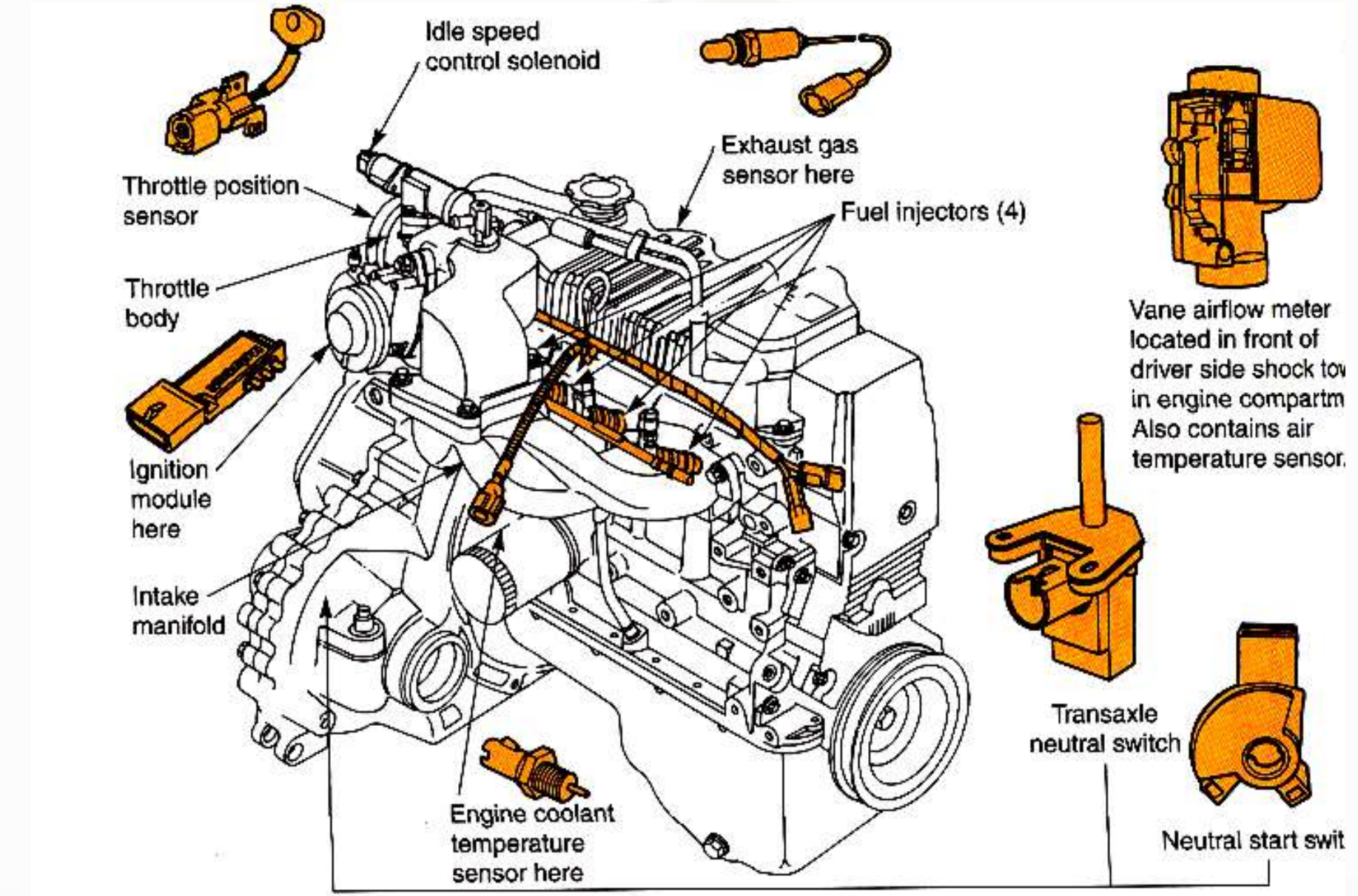


A. Base plate gasket
B. Intake adapter
C. Insulator
D. Throttle body
E. Main body
F. Electric choke assembly
G. Needle seat assembly
H. Spring
I. Fuel inlet filter
J. Fitting gasket
K. Fuel inlet fitting
L. Float assembly
M. Float baffle
N. Air horn
O. Secondary air valve
P. Air horn gasket
Q. Vent screen
R. Choke valve
S. Pump lever
T. Vacuum break and brac
U. Idle stop solenoid
V. Vacuum hose
W. Vacuum break lever
X. Choke link
Y. Air valve rod
Z. Air valve lever
AA. Accelerator pump
AB. Metering rod
AC. Power piston
AD. Idle needle and spring
AE. Fast idle cam
AF. Intermediate choke rod
AG. Pump rod
AH. Throttle lever assembly

Throttle Body Injection

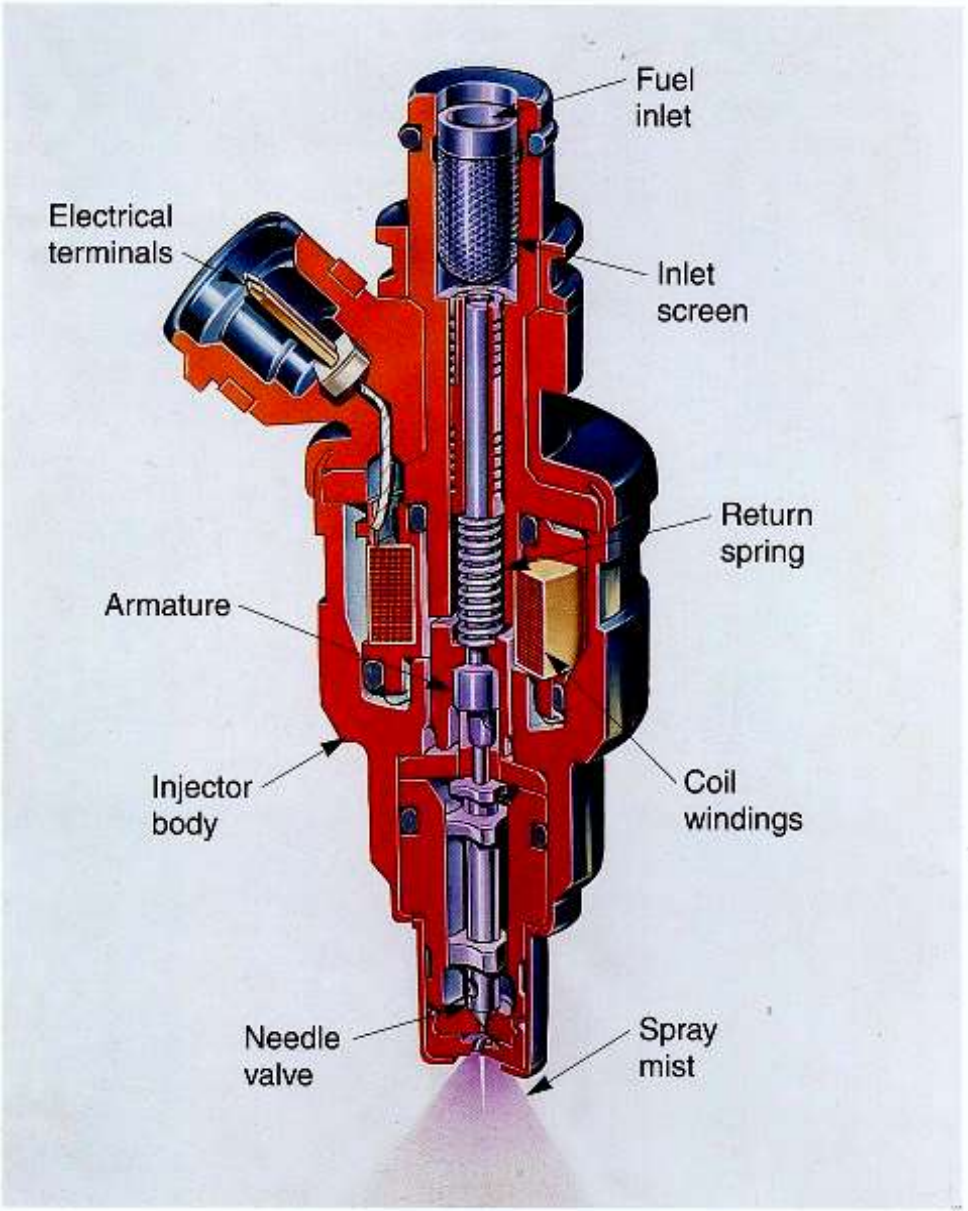


EFI
Electronic Fuel Injection

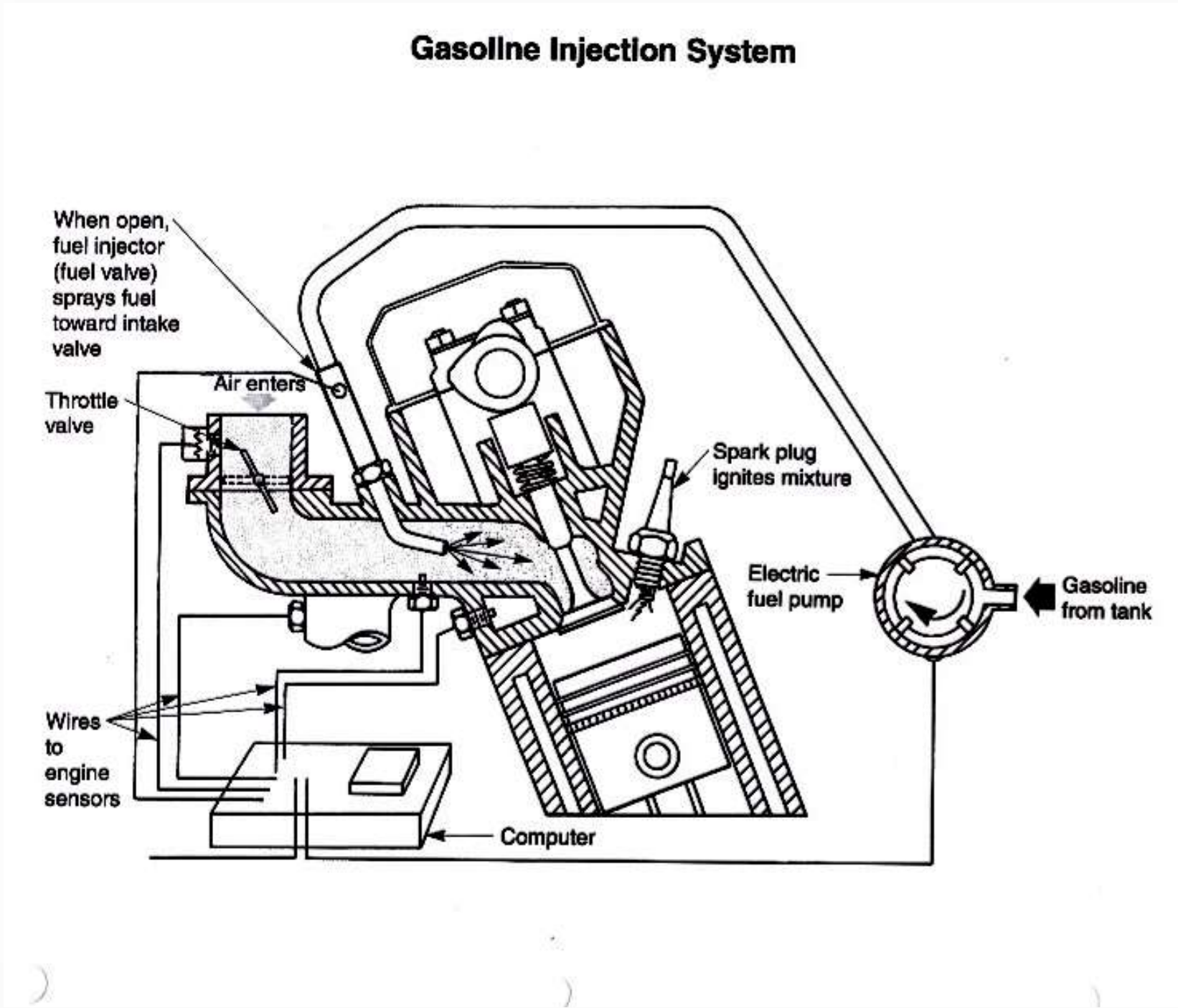


Multiport injection

Fuel Injector Cutaway



EFI


Gasoline Injection System
When open, fuel injector (fuel valve) sprays fuel toward intake valve
Air enters
Throttle valve
Spark plug ignites mixture
Electric fuel pump
Gasoline from tank
Wires to engine sensors
Computer

EFI Systems

- Group
  - All fire at one time
- Gang
  - Fire in pairs
- Sequential
  - Fire just before intake stroke

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Thank you