ENCYCLOPEDIA ARTICLE

Fuel system

The system that stores fuel for present use and delivers it as needed to an engine; includes the fuel tank, fuel lines, pump, filter, vapor return lines, carburetor or injection components, and all fuel system vents and evaporative emission control systems or devices that provide fuel supply and fuel metering functions. Some early vehicles and other engines had a gravity-feed fuel system, in which fuel flowed to the engine from a tank located above it. Automotive and most other engines have a pressurized fuel system with a pump that draws or pushes fuel from the tank to the engine. See also: Carburetor; Fuel injection; Fuel pump

Automobile

The commonly used components for automobile and stationary gasoline engines are fuel tank, fuel gage, filter, electric or mechanical fuel pump, and carburetor or fuel-injection system (**Fig. 1**). In the past, fuel metering on automotive engines was usually performed by a carburetor. However, this device has been largely replaced by fuel injection into the intake manifold or ports, which increases fuel economy and efficiency while lowering exhaust gas emissions. Various types of fuel management systems are used on automotive engines, including electronically controlled feedback carburetors, mechanical continuous fuel injection, and sequential electronic fuel injection. See also: Automobile

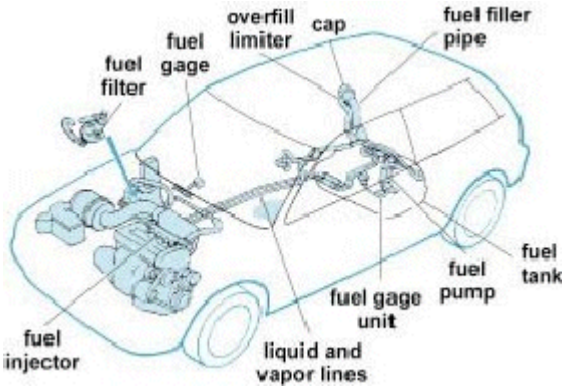

Fig. 1 Components of an automobile fuel system. (*Chrysler Corp*.)

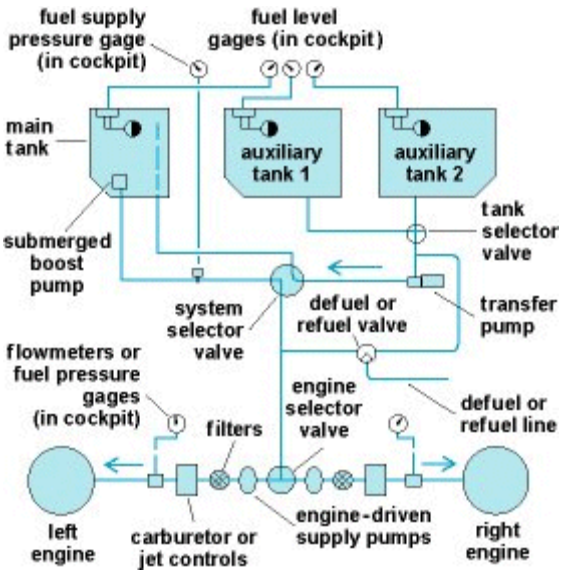

Fig. 2 Diagram of a typical aircraft fuel system.

Most carbureted engines use a diaphragm-type mechanical fuel pump that is operated by the rotation of an eccentric on the engine camshaft. Many gasoline fuel-injected engines use an impeller-type electric fuel pump located in the fuel tank (Fig. 1). This helps prevent problems with vapor lock, particularly during short engine stops on hot days, which results when the volatile fuel boils in the supply line and pumping chamber. See also: Vapor lock

Electric fuel pumps may have plunger-, diaphragm-, or impeller-type pumping elements, and are designed so that their speed of operation and current consumption depend upon the rate of fuel use. Safety devices prevent fuel delivery if the vehicle rolls over of if the engine stops running. See also: Automotive engine

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Aircraft

The presence of multiple engines and multiple tanks complicates the aircraft fuel system. Also, the reduction of pressure at altitude necessitates the regular use of boost pumps, submerged in the fuel tanks, which are usually of the centrifugal type and electrically driven. These supplement the engine-driven fuel supply pumps, which are usually of the gear or eccentric vane type.

Components of a typical aircraft fuel system include one main and two auxiliary tanks with their gages; booster, transfer, and engine-driven pumps; various selector valves; and a fuel jettisoning or defuel valve and connection, which is typical also of what would be needed for either single-point ground or flight refueling (**Fig. 2**). The arrangement is usually such that all the fuel supply will pass to the engines by way of the main tank, which is refilled as necessary from the auxiliary tanks. In case of emergency, the system selector valve may connect the auxilary tanks to the engines directly. Tank vents, not shown, are arranged so that overflow will go safely overboard.

Because of the large quantities of fuel used, aircraft fuel systems are often contaminated with dirt, metal chips, and lint; adequate filtration is therefore essential to reliable service. See also: Aircraft engine

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