# THE CARBURETOR

The carburetor has three important functions:

1. measures the correct quantity of fuel and vaporizes this fuel,
2. mixes it with air in the proper proportion, and
3. delivers the mixture to the cylinders.

**COMPONENTS OF A CARBURETOR**

**Venturi:**

Air is drawn into the Venturi and because of its shape, the air is accelerated while the air is cooled and the pressure is reduced.

**Nozzle:**

Provides a passage for fuel from the float chamber to the Venturi.

The reduced pressure draws fuel into the Venturi where it is vaporized.

**Throttle Valve:**

Regulates the volume of fuel/air mixture.

**Intake manifold:**

Distributes the fuel/air mixture from the carburetor to the cylinders.

**Float Chamber:**

Contains a consistent level of fuel in order to keep the fuel supply steady.

**Needle Valve:**

Opens and closes the fuel line and is controlled by the float.

**Vent:**

Allows the pressure to be equalized with that of the changing outside air pressure.

**Idle Jet:**

Used to keep the engine going when there is insufficient airflow to draw in fuel from the nozzle.

# FUEL/AIR MIXTURE

* The ratio of fuel to air is regulated by the pilot with the mixture control.
* The valve that provides throttling is a “butterfly” type, center hinged. “Choke” occurs when the valve is almost fully closed.
* The proportion of fuel is governed by weight and not by volume.
* The chemically correct mixture is about 1:15, where it is one part fuel to fifteen parts air.
* An engine will run hotter with a lean mixture because the lean mixture is slower burning, exposing the cylinder walls to high temperatures for a longer period of time.
* An engine will run cooler with a richer mixture because the rich mixture burns more quickly.

# MIXTURE CONTROL

* As altitude increases, the density of air decreases.
* Carburetors are calibrated for sea level operation. Therefore, with altitude, the mixture would become over-rich, causing a waste of fuel and a loss of power.
* Mixture control is fitted to adjust the amount of fuel being drawn from the nozzle.
* The mixture control can be used to produce a rich or lean fuel/air mixture.

##### RICH MIXTURE

* Besides lowering the combustion temperature, too rich a mixture will result in unburned wasted fuel.
* It contributes to fouled spark plugs and combustion chamber deposits.
* Can also cause rough engine operation, appreciable loss of power or engine failure.
* Used for high power settings.

##### LEAN MIXTURE

* May cause rough engine operation, sudden “cutting out”, “popping back” or backfiring, detonation, overheating or appreciable loss of power.
* Less fuel is available to absorb the heat of combustion, causing higher cylinder temps. The speed of combustion and exposure-time are not relevant since the fuel/air mixture is under compression.
* Continual operation at too lean a mixture has also been responsible for engine failure.
* Used for cruise power settings.

**WHEN TO LEAN ENGINE**

1. At cruise power, below approximately 75% of the rated RPM of the engine.

2. At any altitude above 3000 feet.

3. For take-off at high altitude airports.

1. After climbing to a higher altitude.

**WHY LEAN THE ENGINE**

Proper leaning of engine is both practical and economical. It results in:

economy of fuel,

* a smoother running engine,
* a more efficient engine,
* extended range,
* less spark plug fouling,
* more desirable engine temperatures, and
* cleaner combustion chambers.

#### CARBURETOR ICING

* Forms under moist atmospheric conditions with air temperatures anywhere from approximately
* -5°C to 30°C.
* Indicated by a loss of power (RPM drop).
* Can cause complete engine failure.

##### FORMS OF CARBURETOR ICE

There are three forms of carburetor ice*:*

1. Fuel vaporization ice,

2. impact ice, and

3. throttle ice.

**PREVENTION OF CARB ICING:**

* Carb icing does not occur in engines that have fuel injectors rather than a carburetor.
* Carb heat uses air heated by the exhaust system which is pumped into the carburetor
* Results in initial drop in RPM.
* If ice is present, its melting will give a short period of engine roughness.

**EXHAUST SYSTEM**

* Collects and disposes of the high temperature, noxious gases discharged by the engine.
* Main function is to prevent the escape of these potentially destructive gases into the airframe and cabin.

**TWO TYPES:**

1. short stack system, and

2. collector system.

###### **SHORT STACK SYSTEM**

Used on non-turbocharged engines and on low powered engines

Relatively simple:

* a downstack from each cylinder,
* an exhaust collector tube on each side of the engine, and
* an exhaust ejector on each side of the cowling.

###### **COLLECTOR EXHAUST SYSTEM**

* Used on most large engines and on all turbocharged engines.
* Individual exhaust headers empty into a collector ring that collects the exhaust from the cylinders.
* One outlet from this ring routes the hot exhaust gas to the turbocharger.
* An exhaust tailpipe carries the gases away.