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 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 throttle valve regulates the flow of air/fuel mixture into the engine. It also creates turbulence to assist in the mixing of fuel and air.

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.

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.

4. 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

Basically a scavenging 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.