

13.1 The Carburetor

- The carburetor's job is to mix fuel and air in the correct ratio for combustion under all operating conditions³⁹. The most common type on light aircraft is the float-chamber carburetor, which is simple but prone to icing⁴⁰.
- ☐ Venturi Principle: The carburetor uses a venturi—a narrow throat in the air intake passage. As air flows through the venturi, its velocity increases and its static pressure drops (Bernoulli's Principle)⁴¹. This low pressure is used to draw fuel from the float chamber into the airstream⁴².
- ☐ Mixture Correction: As engine speed increases, a simple carburetor tends to deliver an overly rich mixture. To correct this, a diffuser well or an air bleed diffuser is used to introduce air into the fuel discharge tube, preventing the mixture from becoming too rich as airflow increases⁴³.
- ☐ Accelerator Pump: When the throttle is opened quickly, there can be a temporary weakening of the mixture, causing the engine to hesitate (a 'flat spot')⁴⁴. An accelerator pump, linked to the throttle, injects a small amount of extra fuel into the venturi to prevent this⁴⁵.

13.2 Mixture Control

- As an aircraft climbs, air density decreases. A carburetor, being a volumetric device, will not automatically reduce the fuel flow to match, causing the mixture to become progressively richer with altitude⁴⁶. A manual mixture control is required to correct this.
- ☐ Practical Mixture Ratios: While the chemically correct (stoichiometric) ratio is about 15:1 (air to fuel), this does not give the best results in an engine⁴⁷. Piston engines are often run slightly richer than this for stable operation⁴⁸.
- ☐ Leaning the Mixture: The pilot uses the mixture control to lean the fuel/air ratio. For economy cruise, a lean mixture (e.g., 17.4:1) can be used, which reduces Specific Fuel Consumption (SFC)⁴⁹. However, excessively lean mixtures burn slower and hotter, which can

- lead to overheating and 'popping back' into the induction manifold⁵⁰.
- ☐ Full Rich for Takeoff: For takeoff, a very rich mixture (e.g., 10:1) is used. The excess, unburnt fuel has a cooling effect inside the cylinder, which helps prevent detonation at high power settings⁵¹.

© Ghost Aviator · Technical General for Aviators · Ghost Aviator

GHOST AVIATOR

GHOST AVIATOR