THROTTLE VALVE

The throttle valve regulates the engine's power output by controlling the volume of air-fuel mixture delivered to the engine cylinder. Reducing the charge in the cylinder reduces the power it can generate and vice versa.

Throttle valves used in motorcycle carburetors are commonly either disc (butterfly) type or cylindrical slide type. Other throttle valve shapes (e.g. flat slide) have been utilized but are not commonly encountered.

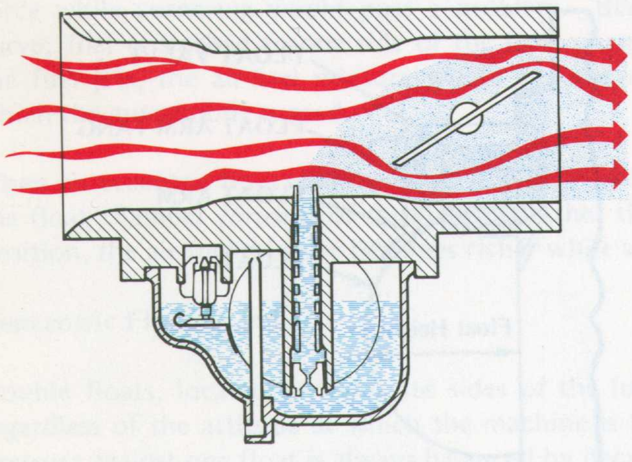

FIG. 11 Disc Throttle Valve

Disc Throttle Valve:

Because the disc throttle valve rotates on a central axis, it is balanced against pressure. This type of throttle valve opens and closes freely regardless of induction pressure fluctuations or pressure differences on either side of the valve. Disc throttle valves are used in automobile carburetors and in some motorcycle carburetors.

Slide Throttle Valve:

Slide type throttle valves require fluctuating induction pressures in order to work freely and easily without unusually strong closing springs. Steady induction pressures press the throttle slide against one side of its guide, which increases closing friction.

For this reason, slide type throttle valves are not suitable for the multi-cylinder manifolds used in automobile engines but work very well in motorcycle applications where each carburetor feeds only one or two cylinders. Manifold vacuum fluctuates greatly where there is no overlap between intake strokes in the engine.

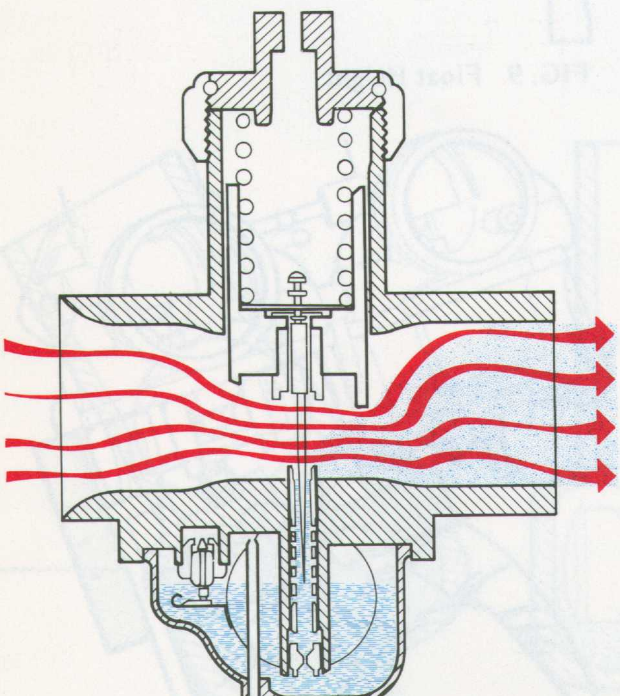

FIG. 12 Slide Throttle Valve

Maintaining Correct Air-Fuel Mixture Ratios:

The air-fuel mixture ratio is affected by changes in venturi air speed. When the throttle valve opening is increased and engine rpm also increases, air will rush through the carburetor bore at a greater rate. Unfortunately, the rate of fuel flow through a fixed jet does not increase proportionately with an increase in air speed through a fixed venturi. At high speeds, the air-fuel mixture ratio tends to become richer. It is therefore desirable to provide some means of varying the venturi size and metering fuel flow in order to maintain correct air-fuel mixture ratios over a wide range of operating speeds. Alternatively, this objective can also be achieved solely by the use of compensating jets and air-bleeds, as is done in many automobile carburetors.

The use of a slide type throttle valve helps to simplify carburetor design because it also acts as a variable venturi. As the slide is lowered, it constricts the carburetor bore at the fuel jet. The slide is also a very convenient mount for holding a metering needle to control fuel flow at the jet.

A disc throttle valve is located beyond the venturi area and obviously creates no constriction at that point. If a carburetor using a disc throttle valve had only one fixed jet and one fixed venturi, as in Fig. 11, it could deliver the correct air-fuel mixture ratio at only one air speed. Therefore, when a disc throttle valve is used, the carburetor must also be equipped with compensating systems, or a vacuum piston to vary venturi size and hold a fuel metering needle (Fig. 13) in the manner of a slide throttle. The vacuum piston possesses some special advantages, however, which will be explained in later sections of this manual.

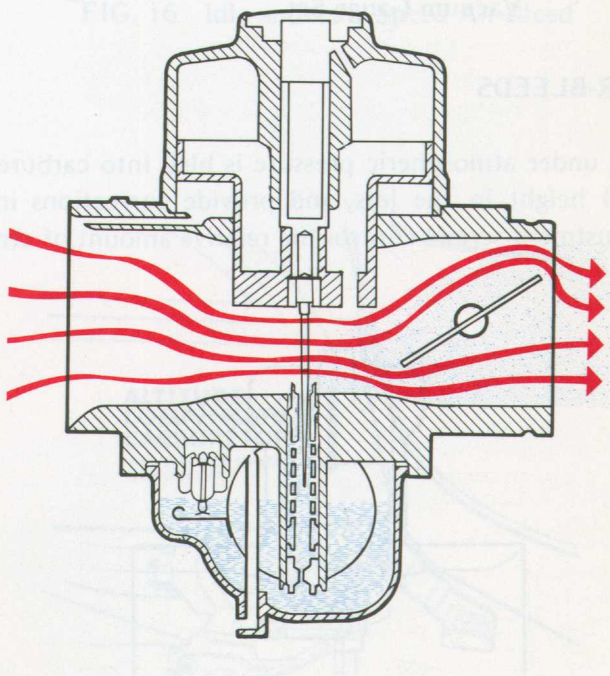

FIG. 13 Disc Throttle Valve and Vacuum Piston

Throttle Valve Synchronization:

On multi-cylinder and twin cylinder engines using more than one carburetor, the movement of the throttle valves must be accurately synchronized to ensure that each cylinder receives an identical amount of fuel mixture.

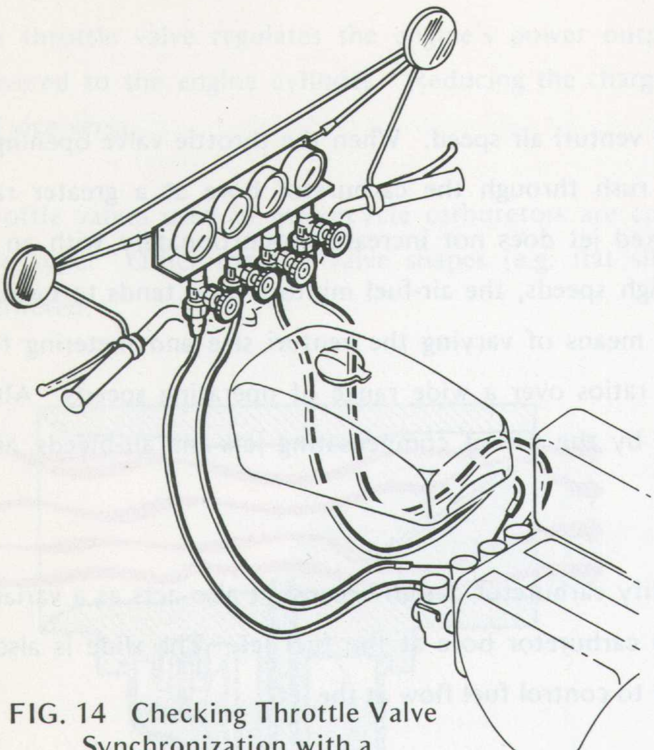

FIG. 14 Checking Throttle Valve Synchronization with a Vacuum Gauge Set

Throttle valve synchronization in twin cylinder engines can be judged by placing one's hands at the tips of the mufflers. If the exhaust pressure feels equal in both pipes, the throttle valves are synchronized within acceptable limits. A more accurate measure of synchronization can be made with a vacuum gauge set if the engine is tapped to receive vacuum gauge attachments, or with an air flow meter if a vacuum gauge set cannot be attached.

Throttle valve synchronization in Honda four cylinder engines requires the use of a vacuum gauge set. Four throttle valves cannot be accurately synchronized by feel, and it is inconvenient to use an air flow meter on these models.

Specific instructions for throttle valve synchronization adjustment are given in the applicable shop manuals.

AIR-BLEEDS

Air under atmospheric pressure is bled into carburetor fuel passages to improve fuel atomization, stabilize fuel height in the jets, and provide corrections in the air-fuel mixture ratio. Air jets and/or air-bleed adjustment screws control the relative amount of atmospheric air drawn into the fuel systems.

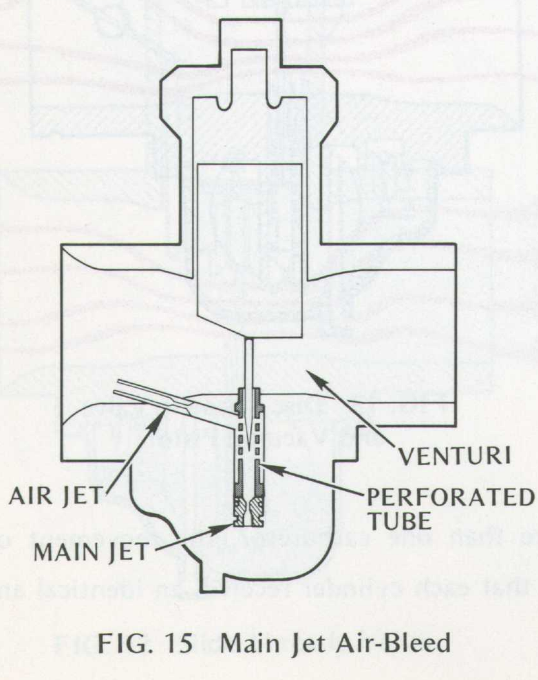

FIG. 15 Main Jet Air-Bleed

Main Jet Air-Bleed:

Fig. 15 illustrates a typical main jet air-bleed. Low venturi pressure, which causes fuel to rise through the main fuel jet, also causes atmospheric air to flow through the air jet. Air and fuel meet and mix together in a perforated tube above the main fuel jet. The aerated fuel released into the venturi is more easily atomized than a dense unaerated stream of fuel.

Aerated fuel also has less tendency to fall back down the jet tube between intake strokes, thus stabilizing fuel height in the jet tube. The same effect can be observed when drinking beverages through a straw. When you remove your mouth from the straw, a frothy beverage tends to remain in the straw, but an unaerated beverage will fall back down the straw into the cup.

AIR-BLEEDS (continued)

Idle and Low Speed Air-Bleed:

Fig. 16 illustrates an idle and low speed air-bleed provided with an adjustment screw for controlling the flow of air delivered to the perforated tube above the low speed fuel jet. The screw can be turned to constrict the air-bleed passage, producing a richer pre-mixture, and vice versa.

The majority of motorcycle carburetors are provided with this type of air-bleed screw for adjusting idle mixture. However, some models have a fixed idle and low speed air-bleed and use an adjustment screw to meter the flow of aerated fuel instead.

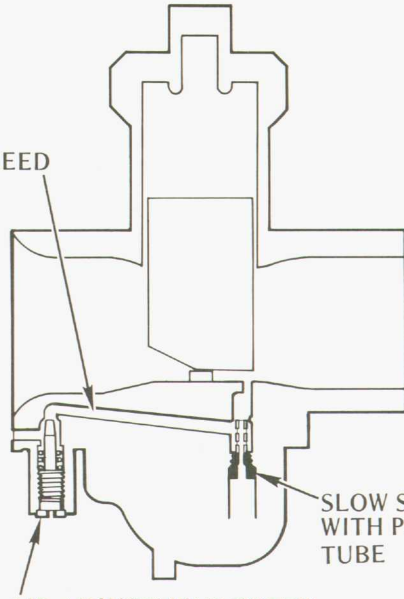

FIG. 16 Idle and Low Speed Air-Bleed

Altitude Compensator:

The atmosphere is less dense at high altitudes than at sea level. The weight of air in the air-fuel mixture at high altitudes is therefore reduced, causing the mixture to become excessively rich.

When a vehicle is operated at high altitudes, the air-fuel mixture ratio can be corrected by installing smaller diameter fuel jets to reduce fuel flow in proportion to the reduced weight of air. Alternatively, air-bleeds can be provided to correct the air-fuel mixture ratio without necessitating fuel jet replacement.

The carburetor on Honda CT-90, ST-90, and ATC-90 models is equipped with an *altitude compensator* for use at 6000 ft. above sea level or higher. When the compensator knob is pulled outward, an auxiliary air-bleed comes into operation and supplies additional air to both main and low speed fuel systems.

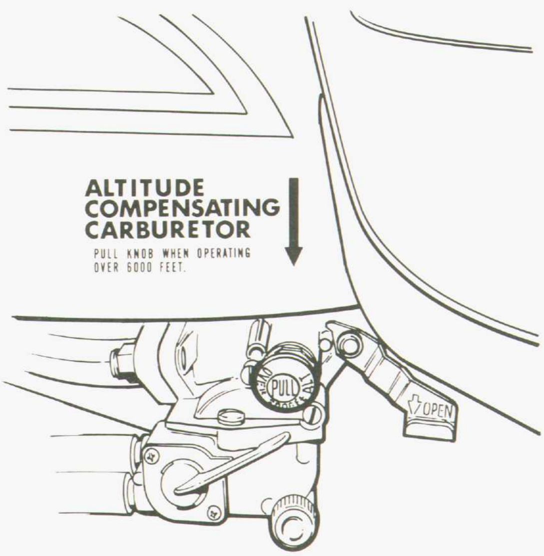

FIG. 17 Altitude Compensator