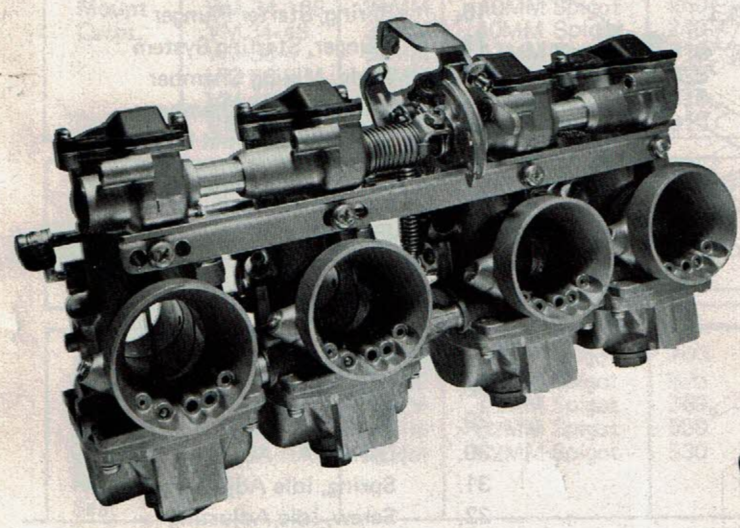
MIKUNI



CARBURETORS
ADAPTOR FLANGES
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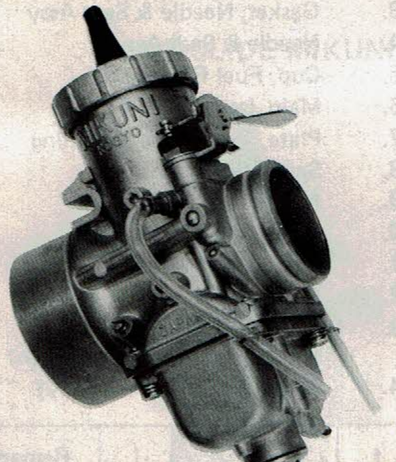

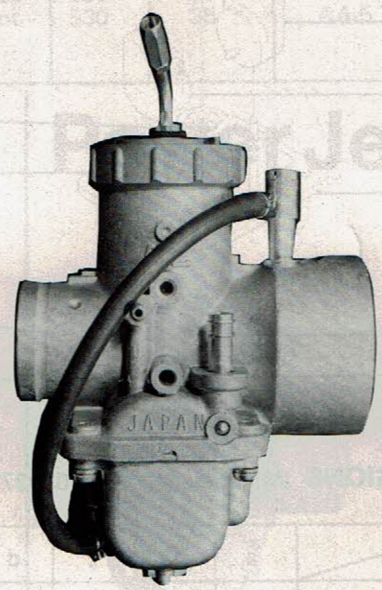

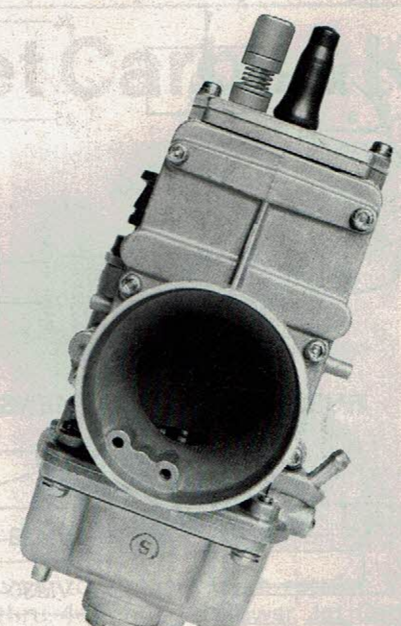

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TUNING MIKUNI CARBURETORS

(FOR STANDARD VM STYLE CARBS)

This section is a guide for users of Mikuni carbs to learn the basic methods of tuning and adjusting to obtain top performance and fuel economy. The arrows in the drawings in this section show the direction in which air, fuel, and air-fuel mixture flows.

Information herewith obtained from Mikuni engineering data and manuals.

1. CARBURETOR FUNCTION

The function of a carburetor is to deliver a combustible air-fuel mixture to the engine. In order to do this, it must first break the fuel into tiny particles (in the form of vapor) and then mix the fuel with the proper ratio of air so it can burn without leaving excess fuel or air in the combustion chamber.

2. AIR-FUEL MIXTURE (Fig. 1)

The air-fuel ratio is generally expressed by its relative weight proportion. For example, the amount of air required for complete combustion of 1 gram of fuel under normal conditions is:

$$\text{Mixture ratio} = \frac{15 \text{ grams of air}}{1 \text{ gram of fuel}} \ldots \text{ theoretical mixture ratio}$$

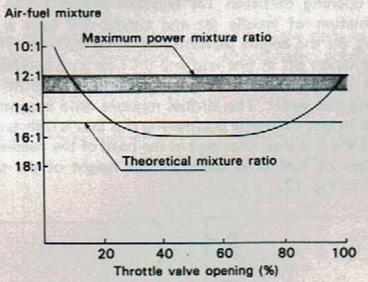

Fig. 1

Varying mixture ratios are required for the engine depending on operating conditions. Although the required mixture ratio varies more or less with the type of engine, its cooling efficiency, etc., the mixture ratio shown in Fig. 1 is required for ordinary engines. In the high speed range the ratio of about 12 to 13 grams of air for 1 gram of fuel produces the maximum output. However, in the case of an engine with low cooling efficiency, a somewhat richer mixture (10 to 12 grams of air against 1 gram of fuel) may be required to prevent seizure of the engine.

3. FUNCTIONS AND CONSTRUCTION

MIKUNI VM-TYPE CARBURETORS

Motorcycle and snowmobile engines are operated under a wide range of conditions, from idling with the throttle valve (Fig. 2 (1)) remaining almost closed, to the full load (the maximum output) with the throttle valve fully opened. To meet the requirements for proper mixture ratio under these varying conditions, a low-speed fuel system (the pilot system) and a main fuel system (the main system) are provided in Mikuni VM-type carburetors.

A – The Pilot System
Low-speed fuel system (Fig. 2 and Fig. 3)

Since the engine is operated with the throttle valve almost closed at idling or in the low speed range, the velocity of air flowing through the needle jet (2) is slow. Consequently, a vacuum strong enough to draw fuel from the needle jet in the main fuel system is not created. The fuel supply during this low speed operation is controlled by means of the pilot outlet (3) and the bypass (4) that are situated near the intake port. At idle, when the throttle valve is slightly opened, fuel metered by the pilot jet (5) is mixed with air adjusted in a proper amount by the air screw (6) and is broken into fine particles (vapor).

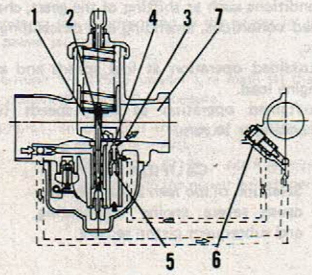

Fig. 2

The mixture is again mixed with air coming from the bypass and is drawn into the pilot outlet to mix with air flowing through the main bore (7). The fuel mixed with air at this stage then goes into the engine. When the throttle valve is opened slightly during low speed operation, the pilot outlet alone cannot supply the required fuel and the shortage has to be made up with fuel injected from the bypass. The adjustment of the mixture ratio during this stage is made by the pilot jet and the air screw, in the case of a two-hole type fuel system (Fig. 3). While at low speed operation if full throttle is initiated a similar shortage of fuel exists and during this transition from low to medium or low to high the fuel again has to be injected from the bypass until enough vacuum can be created to draw fuel from the main fuel system.

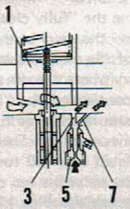

Fig. 3

B – Main Fuel System

On Mikuni VM-type carburetors, the pilot system and the main system are of independent construction.

The fuel flow in these two systems is shown in Fig. 4. Although there are two types of main systems, the *primary type* is the most widely used on 2-cycle engines, and on many 4-cycle engines. The *bleed type* system is normally used for rotary valve 2-cycle engines, and on some 4-cycle applications.

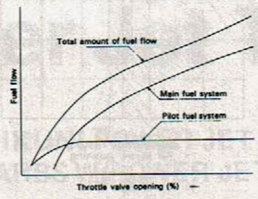

Fig. 4

Primary Type (Fig. 5)

When the throttle valve is opened about 1/4 or more, the velocity of air flowing through the needle jet (10), and the vacuum, increases to the point where fuel can be sucked in. When the opening of throttle valve (1) is between a quarter and three quarters, fuel passes through the main jet (9) and, after being metered in the clearance between the needle jet and the needle (11), it is mixed with air that is metered by the air jet (12) and atomization of the fuel is accelerated.

The mixture is then injected, after mixing with air flowing through the main bore (7), to the engine in the optimum air-fuel ratio. During this process of operation, the cutaway of the throttle valve serves to control the vacuum on the needle jet, thereby regulating the amount of fuel that is injected to the engine. When the throttle valve is opened more than three quarters for high speed operation, fuel is metered chiefly by the main jet (9).

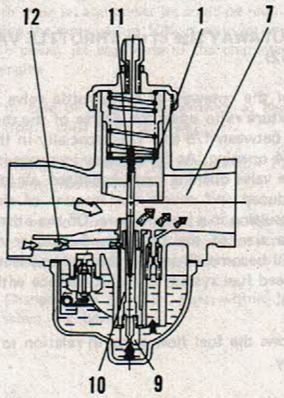

Fig. 5

C – Float System (Fig. 6)

The float system maintains a constant level of fuel in the bowl. Fuel flows through the needle valve (14) and enters the float chamber (15). As the fuel enters the float chamber, the float (16) moves upward to its pre-determined level because of buoyancy. When the fuel reaches the pre-determined level, the needle valve begins to close due to the lever action of the float arm rising, thus shutting off the supply of fuel.

The fuel level in the bowl controls the amount of fuel which is metered to create the optimum fuel mixture. For example, too high a level allows more fuel than necessary to leave the needle jet enriching the mixture. Too low a level results in a leaner mixture, as not enough fuel leaves the needle jet. Therefore, the pre-determined fuel level should not be changed.

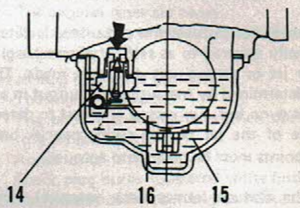

Fig. 6

D – Starter System (Fig. 7)

In place of a choke a starter system is employed for Mikuni carburetors. In a starter system, fuel and air for starting the engine are metered by entirely independent jets. The fuel metered by the starter jet (17) is mixed with air and is broken into tiny particles in the emulsion tube (18). The mixture then flows into the plunger area (19), mixes again with air coming from the air intake port and is delivered to the engine in the optimum air-fuel ratio through the fuel discharge passage (21). The starter is opened and closed by means of the starter plunger (22). Since the starter system is constructed to utilize the vacuum of the inlet passage (20), it is important that the throttle valve is closed, when starting the engine.

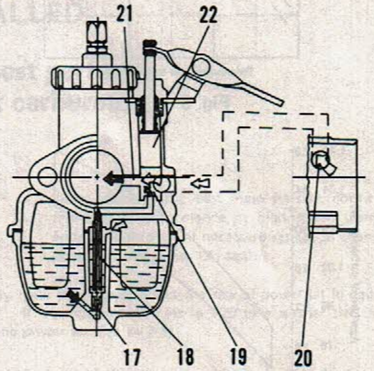

Fig. 7

4. TUNING & CARBURETOR SELECTION

Tuning normally means a process of accurate and careful calibration to obtain maximum engine performance, and an economical improvement in fuel consumption. Improvement of power output of the engine depends on the amount of air drawn into the cylinder per unit time. A practice generally followed for engine tuning includes:

(1) To improve suction efficiency and exhaust efficiency by remodeling the intake and exhaust system

(2) To improve combustion efficiency by raising the compression ratio

(3) To increase the number of revolutions by adjusting the ignition timing

Generally speaking carburetor tuning is done in four stages: idle, low speed, mid-range, and high speed. On the Mikuni each stage is controlled by a separate component simplifying the tuning process.

The function of the carburetor is to prepare and supply a mixture of fuel vapor and air to the engine cylinders in the proper ratio for efficient combustion.