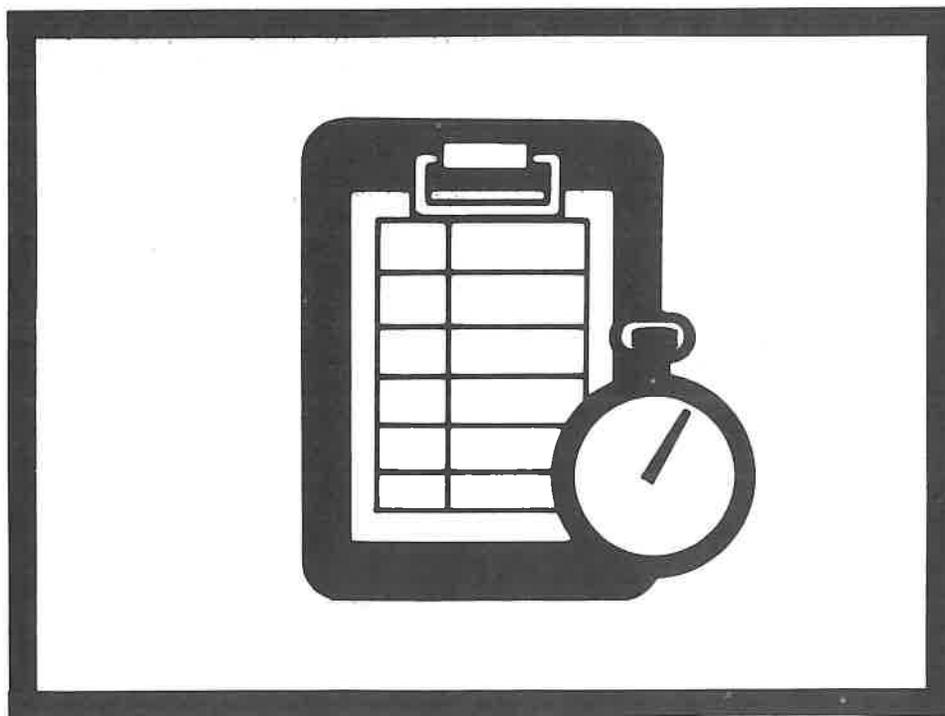




# CHAPTER 7 TUNING



**CARBURETOR TUNING**

**Symptoms of improper settings**

If your machine exhibits one or more of the symptoms listed below, it may need carb tuning changes. Before attempting any changes, however, make sure that everything else is in good shape and tuned properly. Check the condition of the spark plug, make sure the ignition timing is correct. If your machine has run properly at a certain track in the past and then starts running poorly with the same carb settings, the problem is almost certain to be elsewhere; changing the carb settings in such a case would be a waste of time.

<p>If your machine is <b>too rich</b>, it will:</p> <ul style="list-style-type: none"> <li>• Accelerate poorly;</li> <li>• Misfire;</li> <li>• Smoke excessively;</li> <li>• Foul spark plugs;</li> <li>• Have a "deep" exhaust note.</li> </ul>
<p>If your machine is <b>too lean</b>, it will:</p> <ul style="list-style-type: none"> <li>• Ping or rattle;</li> <li>• Accelerate erratically;</li> <li>• Act like it's running out of fuel;</li> <li>• Run extremely hot.</li> </ul>

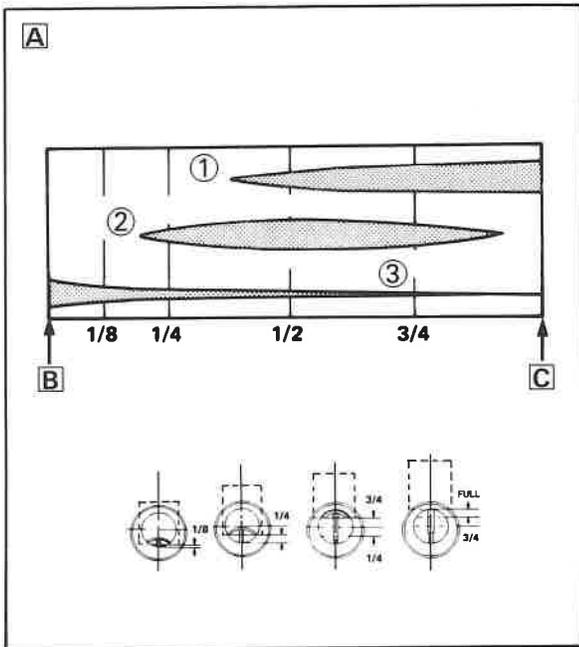
- If your machine pings or rattles, make sure the gasoline you are using is fresh and of a sufficient octane rating. You might also try different brands of high-octane gas.



## Making setting changes

Carb setting changes are made by changing or adjusting following five carburetor components.

- Pilot air screw
- Main jet
- Pilot jet
- Jet needle



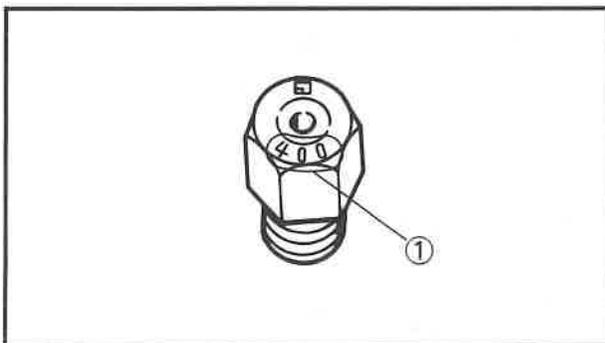
Four of the components, the jet needle, needle jet, main jet, and pilot jet, regulate the flow of fuel; the throttle valve and pilot air screw regulate the flow of air. The following chart indicates the working range of each component. Note how the working ranges overlap each other as the throttle valve moves from closed to fully open.

If you note a particular symptom of rich or lean running in a specific range, use the chart to determine which component needs changing. Use the following information to decide what changes to make.

**A** SLIDE VALVE CARBURETOR WORKING RANGE OF EACH CARBURETOR COMPONENT

- B** CLOSED  
**C** FULL OPEN

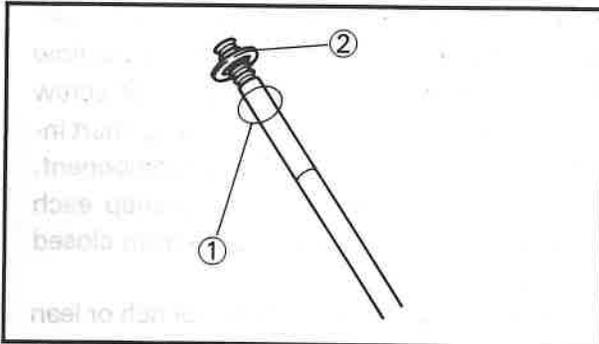
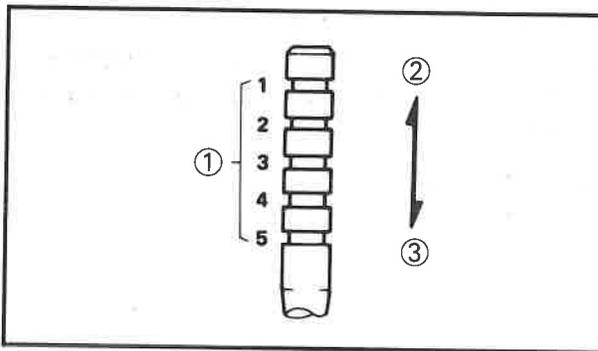
- ① Main jet  
 ② Jet needle  
 ③ Pilot air screw & jet



## Main jet

The main jet has its greatest effect in the 3/4-to-full-throttle range. The number of the main jet, stamped on the bottom or side of the jet, indicates the relative size of the hole in the jet which meters fuel. The larger the number on the main jet is, the bigger the hole and the more fuel it will pass; hence, larger numbers mean richer jetting. Smaller numbers, of course, mean leaner jetting. Make main-jet changes one step (#10) at a time.

- ① Jet number



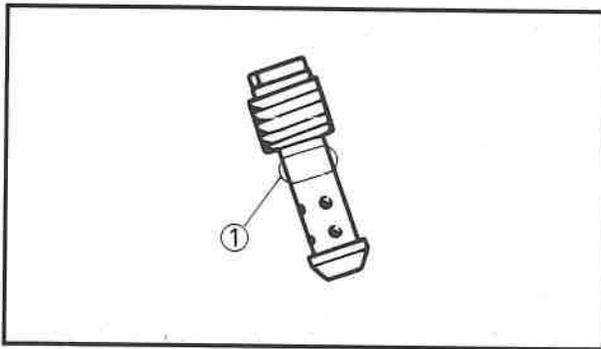
### Jet needle

The jet needle has its greatest effect in the 1/4-to-3/4-throttle range. The needle moves in and out of the needle jet; since the needle is tapered, its position in the jet determines the amount of fuel allowed through. There are five grooves in the top of the needle in which a circlip fits. This clip locates the needle in the slide and, therefore, determines its position relative to the needle jet. Moving the clip down has the effect of pulling the needle further out of the jet; the mixture is thereby richened. Moving the clip up leans the mixture. Change the clip position one step at a time.

If changing the clip position doesn't provide the proper setting, the jet needle may be changed.

- ① Clip position
- ② Leaner
- ③ Richer

- ① Jet needle number
- ② Circlip



### Pilot jet and pilot air screw

The pilot jet and pilot screw control the mixture in the closed-to-1/8-throttle range. To adjust the mixture in this range, the pilot air screw can be turned to change the airflow through the circuit, or the pilot jet can be changed to provide more or less fuel. Start by turning the pilot air screw. Screwing it in richens the mixture, and turning it out leans the mixture. Pilot air screw specs indicate the turns out from a lightly seated position. Make changes in 1/4-turn increments. If turning the screw between one and two-and-a-half turns doesn't provide the desired results, change the pilot jet. This jet has a number stamped on it which indicates its size; the larger the number is, the richer the jet. Make one-step (#2.5) changes in the pilot jet, and fine-tune with the pilot screw.

- ① Pilot jet number



## TEST RUNS

Warm up the engine with the carburetor at the standard settings, and run two or three laps of the course while examining the operating condition of the spark plug.

Test-ride the machine by varying the throttle opening.

Condition of spark plug	
Correct	Insulator is dry and light tan color.
Too hot	Insulator is whitish.
Too cold	Insulator is wet and sooty.

If spark plug is whitish, the fuel-air mixture is lean.

- Replace the main jet with a one step large type.

If spark plug is wet, the fuel-air mixture is rich.

- Replace the main jet with a one step smaller type.

Set the carburetor so that the engine delivers satisfactory power at any throttle opening.

**If the air-fuel mixture is too lean, the engine tends to overheat and seize up, and on the contrary, if too rich, the spark plug easily gets wet, thus causing misfires.**

The proper setting of the mixture varies depending on atmospheric conditions (pressure, humidity, and temperature).

Taking these conditions into consideration, adjust the carburetor settings properly.

- Take a note of carburetor settings as well as weather conditions, course conditions, and lap times so they can be utilized as reference data for future races.



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## SPARK PLUG

### Spark plug reading

Proper spark plug reading is essential to achieve optimum performance and engine reliability. In order to achieve a proper plug reading, it will be necessary to perform the following: Install a new standard spark plug, warm up the engine, and run two or three laps of a course at maximum power output (on main jet circuit), then run at wide open throttle for approximately 15 seconds, stop the engine before closing the throttle and simultaneously disengage the clutch while braking to a stop. Also, establish a consistency in the gas and oil premix used, making sure it's within the manufacturer's specifications. The insulator tip color and deposits will vary depending on the different brands of gas and oil you use.

Do not allow the engine to run at idle speeds, or it may erase the true plug reading.

When removing the spark plug, make note of its torque (loose, correct or over tightened). The color and type of deposits on the spark plug insulator tip will give you a good indication of how this particular engine is operating.

**Don't forget that a darker-than-normal color is quite common during the break-in period.**

**Even at part-throttle operation, the spark plug may get oily indicating that fuel is rich.**





The following are some of the more common spark plug symptoms and how they relate to engine operating to operate.



**Normal:**

Dark-brown-to-light-tan color with slight deposits and slight electrode wear. This indicates the engine has been running the way it has been designed to operate.



**Rich:**

Dry, sooty black, carbon deposits. Possible cause: Rich air-fuel mixture, dirty air filter, excessive low-speed operation, weak ignition or incorrect heat range.



**Oil fouled:**

Wet, black and oily deposits. Possible cause: Excessive low-speed operation, using an oil that is not recommended and/or an incorrect premix ratio, transmission oil entering the crankcase, rich air-fuel mixture, dirty air filter, low compression, weak ignition, incorrect heat range and/or spark gap or excessive exhaust carbon buildup.

**Overheating:**

Light gray or white color. Insulator nose blistered, glazed, cracked or shows signs of aluminum speckles, and the electrodes are burned. May be accompanied by an audible "pinging/rattling." Possible cause: Lean air-fuel mixture or air leak, incorrect timing, insufficient cooling, incorrect spark plug heat range or improper spark plug installation (the tightening torque is too loose or the threads are dirty). Tiny aluminum speckles on the insulator nose indicate an extremely high operating temperature due to preignition/detonation and melting of the piston crown. If this condition exists, it is vital the piston be inspected and the cause corrected before any future operation.

**Gap bridging:**

Carbon deposits lodged between the side and center electrode. Possible cause: An excessive amount of carbon buildup, using an oil that is not recommended and/or an incorrect premix ratio, high-speed operation after excessive low-speed operation or dirt bypassing the air filter.

**NOTE:**

If a darker-or-lighter-than-normal plug color still exists after tuning, it may be necessary to make an adjustment to the main jet. If the plug shows symptoms of being rich (darker-than-normal), change to the next smaller main jet. If the plug shows symptoms of being lean (lighter-than-normal), change to a larger main jet. Make a test run after each change.

**Additional information on spark plug is available from spark plug manufacturers.**

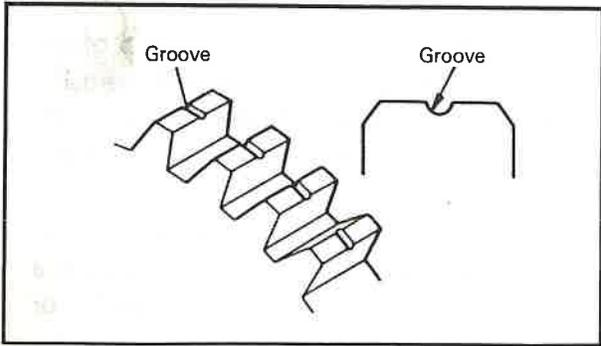


**Heat range:**

Heat range refers to the classification of the spark plug's ability to transfer heat from the firing tip of the insulator to the cylinder head. The machine manufacturer has already determined through extensive testing the correct heat range for your machine. However, if an engine has been modified, it may require a change of heat range (one step) colder or hotter.

**CAUTION:**

Select a spark plug with a colder or hotter heat range carefully and cautiously. A spark plug with too hot of a heat range may lead to preignition and possible engine damage. A spark plug with too cold a heat range may foul as the result of too much carbon buildup.



**GEARING**

**Selection of transmission gear ratio**

The following gear sets are contained in the packing (or optional) to allow the rider to change the gear ratios according to the circuit condition or rider's preference.

**CAUTION:**

Select the transmission gears so that the number of grooves in the wheel gear match that of the pinion gear as shown below. Trouble may be occurred if the selection is different than that listed below.

**1st gear**

	Gear ratio	Part number	Number of groove
Factory installed	28/14 (2.000)	5F7-17211-10/3YL-17411-10	1
Packing part	34/18 (1.889)	5F7-17211-20/3YL-17411-20	2

**2nd gear**

	Gear ratio	Part number	Number of groove
Factory installed	31/21 (1.476)	4DP-17221-10/4DP-17121-10	1
Packing part	27/19 (1.421)	5F7-17221-21/5F7-17121-21	2

**3rd gear**

	Gear ratio	Part number	Number of groove
Factory installed	26/21 (1.238)	5F7-17231-10/5F7-17131-10	1
Packing part	25/21 (1.190)	5F7-17231-20/5F7-17131-20	2



SETTING RECORD TABLE

The data shown here is an example of entry. For your actual use, copy the necessary data.

Event name				
Date				
Weather				
Place				

Setting specs.

Ignition timing				
Spark plug				
Carburetor Main jet Power jet Jet needle Needle jet Pilot jet Air screw Float height				
Gearing 1st 2nd 3rd Secondary				
Front fork Spring pre-load Rebound damping Compression damping Tube height Oil quantity Level Weight				
Rear shock Spring fitting length Rebound damping Compression damping Seat height				
Front tire (pressure)				
Rear tire (pressure)				
Fuel consumption				

# SETTING RECORD TABLE

**TUN**



Event name				
Date				
Weather				
Place				

**Setting specs.**

Ignition timing				
Spark plug				
Carburetor				
Main jet				
Power jet				
Jet needle				
Needle jet				
Pilot jet				
Air screw				
Float height				
Gearing				
1st				
2nd				
3rd				
Secondary				
Front fork				
Spring pre-load				
Rebound damping				
Compression damping				
Tube height				
Oil quantity				
Level				
Weight				
Rear shock				
Spring fitting length				
Rebound damping				
Compression damping				
Seat height				
Front tire (pressure)				
Rear tire (pressure)				
Fuel consumption				

**NOTE:** \_\_\_\_\_

1. Make setting changes in small increments.
2. When the proper settings have been determined for a particular track, they should be written down for reference upon returning to that track.
3. Always make adjustment in cold state.