

## **INSTRUCTIONS**

A gas-powered engine require some basic knowledge and understanding, as well as important safety considerations.

### **SAFETY FIRST**

A gas-powered engine require a great deal of caution when working on them, and during their operation. Follow these safety precautions:

1. Fuel is highly toxic. Avoid skin and eye contact, and do not swallow it.
2. Fuel is highly flammable. Avoid exposing fuel to open flame or sparks.
3. Exhaust fumes are hazardous. Avoid inhalation, skin or eye contact.
4. The engine cooling head and exhaust pipe may reach temperatures over 100°C. Always wear gloves when working on a hot engine.
5. Avoid contact with the flywheel or the clutch while the engine is running.

### **INSTALLATION**

Before mounting the engine into the chassis, check that the bottom surfaces of the engine mounts blocks are flat. This is important to avoid any distortion of the crankcase, and to optimize heat dissipation through the chassis.

**Important** - To flatten the bottom part of the mounted engine mounts, attach the engine mounts to the engine, then rub the bottom of the mounts on a piece of sandpaper until there is full surface contact.

Mount the engine on the chassis and align the clutch pinions with the gears. Adjust the gear mesh.

### **RUNNING IN**

A gas-powered engine requires careful running-in to allow the internal parts to achieve proper operating clearances. This is especially true of the piston and liner, crankshaft and conrod.

Running-in the engine while running the car takes more time and requires more self-control. However, it allows the driveline components of the car to operate together for the first time under controlled conditions.

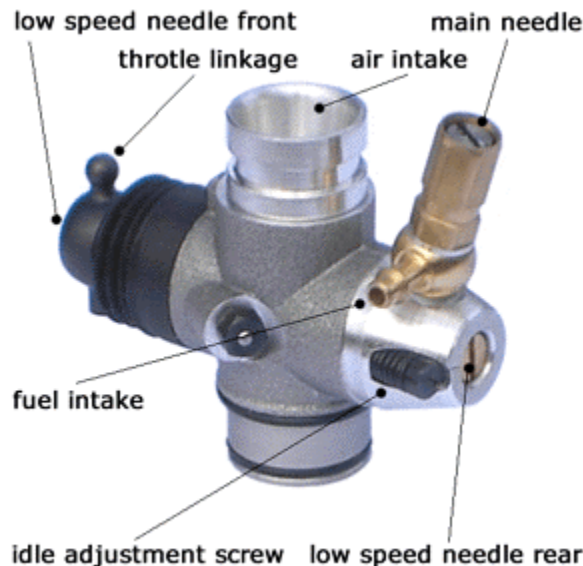
Richen the fuel-mixture from the factory position by turning the main needle 1/2 turn counter-clockwise. Run the car up to half-speed using moderate acceleration. Do this for 4-5 tanks of fuel.

On the next 3 tanks of fuel, slowly increase the speed and acceleration, and start leaning the main needle setting to achieve a good top-speed setting. Lean the main needle setting by turning the needle clockwise.

**Important** - When you adjust the carburetor settings, make adjustments in very small increments, since the engine is very responsive to small changes in mixture settings.

Your engine should be completely run-in after approximately 8 tanks of fuel (1 hour).

### **CARBURETOR ADJUSTMENT**



The carburetor on this engine is preset at the factory, meaning that the original settings are close to where they should be for normal operation.

**IMPORTANT: THE LOW SPEED NEEDLE FRONT NEED TO BE PAIRED TO THE ALUMINIUM CABURATOR BODY AND THE LOW SPEED NEEDLE REAR NEED TO BE PAIRED TO THE THROTTLE.**

The carburetor has 3 adjustments:

- 1 - Main needle: controls the amount of fuel at all RPM
- 2 - Low speed needles (front and rear): control the amount of fuel at idle and low RPM
- 3 - Idle adjustment screw: controls the idle RPM with the carburetor closed

The most difficult thing to adjust is the low speed adjustment. Keep the following principles in mind when doing this:

- Use the idle adjustment screw to adjust the idle RPM immediately after closing the carburetor

- Use the low speed needle to adjust the fuel mixture 2-5 seconds after closing the carburetor
- Use the front low speed needle (at the front end of the carburetor slide) for basic adjustment
- Use the rear low speed needle (at the rear of the carburetor body) for fine adjustment
- Use only a 1/2 turn each way.

**Very important** is to make only small adjustments at a time, maximum 1/8 of a turn, especially when fine-tuning. The engine is very responsive to small changes in mixture settings.

#### **Adjust needle settings before putting the car on the track**

Once the engine is running and has come up to operating temperature (within 15-20 seconds) proceed as follows:

**Main needle** - Take the car off the ground, and open the throttle fully. The engine should run cleanly until it reaches 80% of top RPM, after which it should start to run slightly rich (4-stroking):

- If the engine runs cleanly all the way up to top RPM, richen the main needle (counter-clockwise) until it starts to 4-stroke at approximately 80% of its top RPM
- If the engine runs too rich (4-stroking all the way) lean the main needle (clockwise) until it only starts to 4-stroke at approximately 80% of its top RPM

**Idle speed** - Take the car off the ground, and open the throttle fully for 2-3 seconds. Close the carburetor and check the idle speed that occurs immediately after.

- If the engine stops almost immediately, turn the idle adjustment screw clockwise to increase the idle RPM.
- If the idle RPM is too high, turn the idle adjustment screw counter-clockwise to reduce the idle RPM.

**Low speed needle** - Open the carburetor for 2-3 seconds and let the engine clean out. Close the carburetor and let the engine idle.

- If the engine idles for 2-5 seconds and then the idle RPM decreases, the engine is running too rich during idle. Lean the low speed needle (clockwise) to remedy this condition. Repeat this step until the engine idles reliably at a constant RPM for at least 20-30 seconds after the carburetor has been opened for 2-3 seconds.
- If the engine idles for 2-5 seconds and then the idle RPM increases, the engine is running too lean during idle. Richen the low speed needle (counter-clockwise) to remedy this situation.
- If the engine will not idle at all, rich the low speed needle (counter-clockwise), or turn the idle adjustment screw clockwise to increase the idle RPM.

**Important** - Because adjusting the low speed needle affects the idle RPM, use the idle adjustment screw to get the engine to idle at the right RPM. Once you are satisfied that you have achieved reliable carburetor settings, you are ready to put your car on the track.

#### **Adjusting needle settings at the track**

You can only fine-tune the main needle setting at the track. Initially, the main needle should still be set a little rich. Fill the fuel tank, run the car up to maximum speed for a few laps, and check if it reaches top RPM without running rich towards the end (4-stroking). Lean the main needle by small increments (1/12 of a turn, like 1 hour on a clock) and run the car again. Repeat these small adjustments until the engine accelerates well and reaches maximum speed without running rich. It is advised to then richen the main needle 1/8 of a turn (counter-clockwise).

Running the engine too lean will cause the engine to overheat, resulting in excessive engine wear and possibly breakdown. A fast, simple way to check the engine temperature is to apply a few drops of water to the cylinder head. The drops should evaporate only after 3-5 seconds. If they evaporate immediately the engine is too hot; richen the main needle 1/8 of a turn (counter-clockwise). Check engine temperature regularly and often.

The idle RPM and low speed needle settings may require a little fine tuning after the main needle has been set properly (see stages 2 and 3). Once properly adjusted, the engine should produce a strong, high-pitched sound at maximum speed, and a thin trail of smoke should be visible from the exhaust tailpipe.

**Important** - The carburetor settings may change with changes in weather conditions, fuel, glowplug or exhaust system. After changing any of these, always richen the main needle (counter-clockwise) 1/4 to 1/2 a turn and then re-adjust the main needle again on the track.

#### **MAINTENANCE**

This engine requires very little maintenance as long as the engine does not overheat and proper fuel and airfilter are used. To avoid internal corrosion, after each day of use add some fuel into the engine, or add a high grade "after run" oil.

After every 10-15 hours of use, it is advised that you ask an experienced gas racer to check the overall condition of your engine. It is also advised that you replace the engine conrod every (more or less) 15 hours of running to avoid fatigue. Failure to do so may cause severe and irreparable damage to your engine. This job is best done by an expert or with expert guidance.

Special attention should be paid to the airfilter. Make sure that it is always in place, well secured, well cleaned and oiled, and in good condition.

**Important** - Use a piece of paper between the pinion and the gear, tighten the engine mounting screws and remove the paper. This should give you approximately 0.1mm of play in the gear mesh.

After connecting the fuel and pressure lines and hooking up the throttle linkage to the carburetor, check that the carburetor opens and closes smoothly without binding. If there is any restriction of movement, adjust the throttle linkage or the position of the carburetor on the engine.