

**!!DO NOT start the engine before you finish reading the Safety Restrictions!!**

Thank you for your favor of buying our product! We guarantee you this is the best gasoline engine with highest performance one can ever find on the current market. The engine is specially designed for use on model airplane with powerful torque output while weighs a very little weight. It is quite simple for getting familiar with it as well as its operation and adjustment. Moreover it is durable powering up your path as a model fan with over hundreds of hours of stable and high performance.

The best service life of the engine is 300 hours. We recommend you making a time trace every time when use the engine..

Please make sure all the guidance's in the User's Guide are fully read and understood before the first time you start the engine, especially the sections about safety and ignition system wiring.

**Trail Operation** The trail operation is recommended to be performed in the practice flight by installing the engine on the model plane. This way the engine will be able to operation in both loaded and unloaded intervals; while the lower temperature in the atmosphere on the air facilitates cooling the engines as well.

**Lubricant and Fuel for Trail Operation** It is recommended during this period to mix non-synthetic (petroleum base) lubricant into fuel in the ratio of 1:30.

**Attention!! Since the piston ring in the new engine is not perfectly has not been associated with the cylinder chamber inner wall yet when just bought, adoption of synthetic lubricants in the trail phase will result in permanent damage to these parts and finally the engine will not be able to acquire the designed power output as the consequence.**

The fuel used in the engine is recommended to be the standard lead-free gasoline whose octane level at 90. Gasoline with octane level higher than 90 however would not acquire higher power for this engine.

**Installation** In fold the engine (especially the carburetor part) as much as possible in the engine shell, so to acquire the best performance for the engine. Since if the carburetor pops out of the engine shell, the unstable air flow may cause unsmooth engine operation or even cuts of the engine in the air.

**Engine Seat** Processed screw holes are prepared on both side and the back of the engine for fixing application. Please fix the engine with strengthen bolts, spacing's and nuts on the airplane. The fire proof wall should be made of aero composite plane (or other suitable materials) and fixed firmly on the airplane. The thickness of the fire proof wall is recommended to be 6mm for large engines.

**Fuel Supply Line and Fuel Tank** Please choose both the fuel tank and supply line designed for gasoline engine, and the outlet of the fuel tube and the fuel tank should be tie up tightly with thin iron wire as well as the connection the fuel tube with the movement weight; also it has to be noticed that the weight should oscillating freely in the fuel tank when the tank placed vertically without contacting with its bottom. The inner size of the fuel tube should at least equal to the inner size of the fuel inlet port (or larger than).

**Fuel** It is recommended to use standard lead-free gasoline whose octane level at 90. Adoption of gasoline with octane level higher than 90 do not acquire higher power for this engine but may lower the rotating speed. So please use the recommended fuel. **Lubricant** After the wear-in phase it is recommended to use SHELL two stroke race lubricant by adding it into the fuel by 1:30 ratio. This way your engine will be kept clean during operation while the lubricant providing excellent protection for the mechanic parts. High quality synthetic or mineral lubricant from other producer can also be adopted on the engine only when they are designed for two stroke air cooling gasoline engine. In this case the ratio the lubricant be added should refer to respective manufacturer's advices.

**Fuel Filter** One or more high quality filter should be applied to prevent any impurity matters from entering the fuel tank. Special filter can be purchased from the model shop. Remember washing a new fuel tank with fuel several times before installing it on the plane for use, because any particles or impurity matters which is hard to detect with naked eyes would possibly block the precise tunnels inside the carburetor cutting off the self-stable operation process of the engine.

**Ignition System** Please follow the wiring instructions of the ignition system carefully, and NEVER load the battery unless you are quite sure that the system is correctly connected. Risky start on the engine under incorrect system wiring will lead to ignition system damage. Damage due to such action will obtain no warranty from our company.

**Carburetor/Mixing Proportion Base Principles:** The engine requires correct fuel mixing proportion with the air to operate regularly. The air in taking volume is controlled by the butterfly changeover in the air throttle.

If the engine do not supply proper power after started, you can adjust the proportion screw on the carburetor to maximize the power output.

Low speed and High speed fuel injection needles

The engine gets fuel from the low speed fuel injection needle in any case, and start to receive fuel from the high speed fuel injection needle when the rotating speed rises to the medium speed (2000—3000 rounds per minute). When the engine operates in high speed almost all the fuel the engine receives is from the high speed injection needle (in proportion). The engine adjusting technique is just the configuration of the two injection needles which acquires correct air-fuel proportion for the engine under any rotating speed.

**Lean Fuel** means the fuel supplied by the carburetor is insufficient under certain butterfly changeover state. Engine operates in the insufficient fuel state (not over too insufficient to operate) will have a higher rotating speed and a smoother rotation as well. However the engine will be the same hotter (as the fuel proportion for taking away the heat is less).

**Rich Fuel** means the fuel supplied by the carburetor exceeds the actual need the engine operation demands under certain butterfly changeover state. The consequence is lead to the opposite way compared with that of Lean Fuel meanwhile the spark plug will not be able to work normally due to overwhelmed fuel (shut off).

Generally speaking the low speed injection needle should be configured little Lean Fuel as possible without interfering the normal operation when the engine shifts from idle speed to medium speed. The engine will be unstable or even shut off when boosted from idle speed to medium speed at the over-lean fuel state while oppositely at the over-rich fuel state the engine may in some case cough with expectoration when suddenly speeded up from idle speed to high speed.

The high speed injection needle should be configured correctly namely the engine will operate at the highest speed without encountering any damage due to the heat from the operation under lean fuel state. While oppositely over-rich fuel state also cause the irregular engine operation and the engine will not acquire designed rotating speed (power output)

There are two needles on the carburetor respectively marked "L" and "H". the L one represent the idle speed (low speed) injection needle while the H one stands for the high speed injection needle. By turning these two needles clockwise the fuel injected into the engine will be reduced which moves close to the lean fuel state, while the rich fuel state side can be approached counterclockwise.

In case the injection needles have to be re-configured due to any reasons (such as disassembled for maintenance), it is recommended to turn the low speed injection needle counter clock wise by two and a half rounds and one round for the high speed needle (while pay attention not to over tight the needle which may result in needle or carburetor damage), so to set a excellent start for both needles above which the precise adjustment will be performed.

**Warning: DO NOT adjust the admission acceleration ring without guidance since its structure design is special. Any improper adjustment may cause unstable engine operation or even permanent damage.**

**Warning: Please read carefully and remember thoroughly all the safety restrictions before any attempt of starting the engine.**

**DO NOT start the engine without an assistant for holding the plane.**

Please check carefully the ignition system wiring again following the wiring instructions before starting the engines.

**Make the assumption always in mind that the engine will be started in any time, and keep highly cautious**

**Preparations before starting the engine: For first time starting the engine, please turn the low speed needle counterclockwise by one and a half round, and one round counterclockwise for the high speed needle, so to set a configuration start at which the engine will be able to operation in idle speed and under rich fuel state under any valve state.**

Fill the fuel tank full with fuel (attention: the fuel and lubricant proportion should be correctly adjusted), make sure the ignition switch is at OFF position while find a reliable assistant for holding the plane firmly.

Full open the air valve

Block the valve with thumb or forefinger and slowly rotate the propeller counterclockwise till fuel passing through the pipeline into the carburetor is confirmed. Then toggle the propeller several times to make sure the fuel has entered the engines

Close the air valve changeover by 2-3mm and prepare for start.

Make sure the ignition switch is at "ON" position.

Toggle the propeller several times till it starts and repeat above procedures if not.

## **Start the Engine**

**Adjust the carburetor Adjust the idle or medium speed.**

**Warning: Do not adjust the engine during operations. All adjustment should be performed after the engine is shut off and the ignition switch is at OFF position.**

Please check the idle and acceleration performance after starting and warming up. The idle speed should be stabled between 1800~2000 rounds . If the idle speed can not stay stably at 1800~2000 round due to rich fuel, please turn the low speed fuel injection needle by one eighth round each time till the operation is smooth and once it goes smooth, please try opening the throttling by 1/3 (about 2500~3500 rounds). If the engine delays or shut off, the idle speed may be over lean fuel which requires adjusting the idle speed needle by 1/16 round. If the engine approaches to the medium speed after it delays, please turn the idle speed needle by 1/16 round clockwise. Repeat above procedures till the idle speed is stable and clearly responding to medium or low speed acceleration.

## Carburetor Configurations High Speed Section

**Warning: Do not adjust the engine during operations. All adjustment should be performed after the engine is shut off and the ignition switch is at OFF position.**

Once the low speed configuration is done, the high speed injection needle should be adjusted. The configuration in principle is that slowly approach to correct mixing proportion from the full throttle and rich fuel state. Full open the throttle and turn the high speed injection needle till the engine operation is rough and unsmooth so to make sure the engine is running under rich fuel state

Turn the high speed injection needle by 1/8 round each time and maintain 5~10 secs after each adjustment. Make sure the working temperature is responding to the fuel needle adjustment. If during the 1/8 adjustment the rotating speed decreases, then the adjustment is approve to be over the limit. Please turn the high speed needle by 1/4 round, make sure the rotating speed reaches the highest value. In this way, the engine initial speed can be acquired and then turn back the needle just for a little to make sure the safety.

Check the idle speed and medium speed acceleration performance. In case re-adjustment is needed, please adjust the high speed settings after the adjustment. Repeat above procedure till the engine operates smoothly.

Details of eletric ignition coil:

Red cable is the positive pole (+)

The electric igniter timing has already been set when produced.

Correct electric ignition time is required for the new electric igniter normal operation.

**Battery : 4.8-6V**

## Troubleshooting

**Case 1: The engine operates normally on the ground however severe rich fuel situation appears when taking off or in the air.**

Possible Causes: the positive pressure in the cowling or the carburetor port is impacted by the propeller slip flow.

Resolves:

1. install additional cowling in front of the carburetor
2. install admission acceleration pipe

## **Case 2: Sometimes rich fuel while sometimes lean fuel while on the air**

Possible Causes: If the engine operates normally on the ground but turns out to be unstable in the air especially when the altitude changes, this is the most frequent situation when the carburetor pops out the cowling.

Resolves : 1. Install additional cowling in front of the carburetor

2. install admission acceleration pipe

## **Case 3: The engine operated normally but gradually turns out to be unsmooth recently**

Possible Causes: The engine operated normally but gradually turns out to be unsmooth recently, please check by following procedures

Check the ignition battery: make sure the voltage and current is still within the normal range.

Check whether the ignition system wiring is complete or not: including the ignition cap and the grounding.

Check the spark plug: replace with a new one if it is already dysfunctional.

Check the inner filter of the carburetor: Impurities accumulated in long term services will gradually block this structure which is extremely fine and precise.

## **Maintenance**

It is recommended to dry off the fuel tank after each flight and always make sure the most fresh 90# lead free gasoline is used.

If the engine will rest for a long period, please dry off the fuel tank and rotate the engine to further dry off the fuel left in the carburetor.

Check the spark plug regularly which should be mild brown. The milder the color is, the more is it close to lean fuel while the darker the more to rich fuel.

Check the propeller, make sure it is locked tightly especially the wooden propeller.