

It is of vital importance, before attempting to operate your engine, to read the general 'SAFETY INSTRUCTIONS AND WARNINGS' in the following section and to strictly adhere to the advice contained therein.

• Also, please study the entire contents of this instruction manual, so as to familiarize yourself with the controls and other features of the engine.

SAFETY INSTRUCTIONS AND WARNINGS ABOUT YOUR O.S. ENGINE

Remember that your engine is not a "toy", but a highly efficient internal-combustion machine whose power is capable of harming you, or others, if it is misused. As owner, you, alone, are responsible for the safe operation of your engine, so act with discretion and care at all times. If at some future date, your O.S. engine is acquired by another person, we would respectfully request that these instructions are also passed on to its new owner.

■ The advice which follows is grouped under two headings according to the degree of damage or danger which might arise through misuse or neglect.

⚠ WARNINGS

These cover events which might involve serious (in extreme circumstances, even fatal) injury.

⚠ NOTES

These cover the many other possibilities, generally less obvious sources of danger, but which, under certain circumstances, may also cause damage or injury.

⚠ WARNINGS

Never touch, or allow any object to come into contact with, the rotating parts.

■ INTRODUCTION

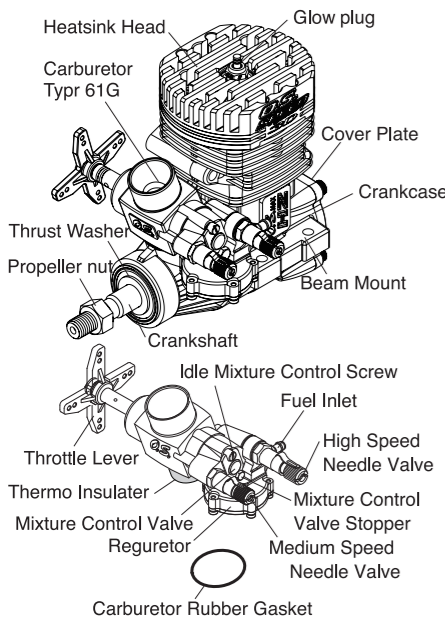
This is the O.S. SPEED version of the 91HZ-R developed exclusively for the 3D flights.

It is equipped with DRS (Demand Regulator System) ensuring an always steady fuel supply which demands repeated vigorous attitude changes for 3D flights.

The 61G carburetor is equipped with twin needles which enable adjustment of the idling/hovering and high speed mixture independently.

Additionally, when using the governor function using a Futaba gyro, the cover plate mounting sensor BPS-1 can be installed. By Equipping the governor function, it makes the flight even more stable.

■ ENGINE PARTS NAME



Model engine fuel is poisonous. Do not allow it to come into contact with the eyes or mouth. Always store it in a clearly marked container and out of the reach of children.



Model engine fuel is also highly flammable. Keep it away from open flame, excessive heat, sources of sparks, or anything else which might ignite it. Do not smoke or allow anyone else to smoke, near to it.



Model engines generate considerable heat. Do not touch any part of your engine until it has cooled. Contact with the muffler (silencer), cylinder head or exhaust header pipe, in particular, may result in a serious burn.

• Never operate your engine in an enclosed space. Model engines, like automobile engines, exhaust deadly carbon-monoxide. Run your engine only in an open area.

⚠ NOTES

- This engine was designed for model helicopters. Do not attempt to use it for any other purpose.
- Mount the engine in your model securely, following the manufacturers' recommendations, using appropriate screws and locknuts.
- Install an effective silencer (muffler). Frequent close exposure to a noisy exhaust (especially in the case of the more powerful high-speed engines) may eventually impair your hearing and such noise is also likely to cause annoyance to others over a wide area.
- Check the linkage to the throttle arm before each flight.

Standard accessories

- O.S. No.8 glow plug is supplied with the engine
- Check Valve
- Head Gasket (0.2mm)

NOTE
As delivered, the engine has the carburetor lightly fit into the intake. Secure it changing the angle according to the model.

Notes on installing cooling fan and clutch

Do not use a tool which locks piston when installing a cooling-fan and clutch, or top of the piston may be damaged. Also, do not insert a screw driver or the similar into the exhaust port.

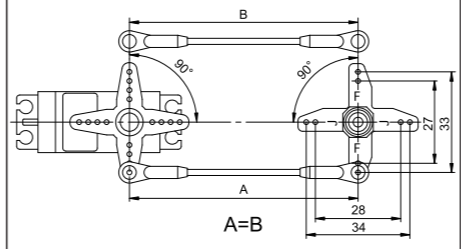
It is recommended to use Crankshaft Clamp 91/105/GT15 (Code No.71530530) available as an optional tool.

With this engine, the cover plate cannot be removed when the piston is at BDC due to engine construction. When it is required to remove the cover plate, be sure to position the piston at TDC.

Do not grip the engine mounting beams with a vise, or the crankcase will be distorted which will result in engine breaking.

- Avoid sudden high r.p.m. immediately after the engine is started, as the clutch will engage and you may be struck by the rotor.
- After starting the engine, carry out any needle-valve readjustments after stopping the rotor by closing the throttle to the lowest r.p.m.. Stop the engine before attempting to make other adjustments to the carburetor.
- Use an electric starter. The wearing of safety glasses is also strongly recommended. Press the rotor head down securely.
- Check for glow plug clip and battery leads, do not come into contact with rotating parts.
- Adjust the throttle linkage so that the engine stops when the throttle stick and trim lever on the transmitter are fully retarded. Alternatively, the engine may be stopped by cutting off the fuel supply. Never try to stop the engine physically.
- Check for loose clothing (ties, shirt sleeves, scarves etc.) do not come into contact with the rotor. Do not carry loose objects (such as pencils, screwdrivers, etc.) in a shirt pocket from where they could fall through the rotor disc.
- For their safety, keep all onlookers (especially small children) well back (at least 20 feet or 6 metres) when preparing your model for flight. If you have to carry the model to the take-off point with the engine running, be especially cautious. Hold the rotor securely and keep well clear of spectators.
- Warning! Immediately after a glow plug-ignition engine has been run and is still warm, conditions sometimes exist whereby it is just possible for the engine to restart when turned over WITHOUT the glowplug battery being reconnected. Remember this to avoid the risk of accidents.

Linking the throttle servo to the carburetor
Link the throttle servo to the carburetor using the throttle lever supplied. Throttle control rod A and B should be equal length. Set the linkage so that the servo output lever and throttle lever are parallel when the throttle stick on the transmitter is at middle position. Installing hole intervals on the F lever and on the J lever are different. Decide the lever to use according to the servo used. Be sure to cut off another lever to avoid any interference.



NOTES WHEN APPLYING AN ELECTRIC STARTER
Because of this initial tightness, a standard electric starter may have difficulty in rotating the engine when cold, before it has been adequately run-in. In this case, use a high-torque type starter. Do not over-prime. This could cause a hydraulic lock and damage the engine on application of the electric starter. If over-primed, remove glow plug, close needle-valve and apply starter to pump out surplus fuel. Cover the head with a rag to prevent pumped out fuel from getting into your eyes.

Note on heating the glow plug
The heatsink head on the engine is treated with an anodized finish which does not conduct current. Therefore, when heating a glow plug, connect one lead to the glow plug and the other to the head or cover plate retaining screw.

Example

■ BEFORE STARTING

Tools, accessories, etc. The following items are necessary for operating the engine.

Items necessary for starting

Fuel

Select, by practical tests, the most suitable fuel from among the best quality fuels available in your country for helicopter use. For the best throttle response, a fuel containing 10% to 30% nitromethane is preferable. Lubricants may be either castor-oil or a suitable synthetic oil (or. a blend of both) provided that they are always of top quality. For consistent performance and long engine life, it is essential to use fuel containing AT LEAST 18% lubricant by volume. Some fuels containing coloring additives tend to deteriorate and may adversely affect running qualities. If in doubt compare to a fuel known to be good.

O.S. Super Filter (Fuel Can Filter)

Install a filter to the outlet tube of your refueling container to prevent entry of foreign matter into fuel tank. O.S. 'Super Filters' (large and small) are available as optional extras.

Battery leads Glowplug battery

Hexagon starting shaft

Electric starter and starter battery

Fuel Pump Fuel Filter Silicone Fuel Line

■ TOOLS

Hex Drivers Phillips Screwdriver

Screwdriver Socket Drivers

O.S. SPEED Plug Wrench (optional extra)

End Wrenches Needle Nose Pliers

■ INSTALLING THE GLOWPLUG

Install washer on glow plug and insert carefully into Heatsink-head, making sure that it is not cross-threaded before tightening firmly.

■ INSTALLATION OF THE STANDARD ACCESSORIES

● Installation of Velocity Stack

Install the velocity stack supplied on the carburetor with M3x3 set-screw supplied.

Cut out the cooling fan duct so that velocity stack man not interfere the duct.

The velocity stack develops its performance when it is completely located inside the duct.

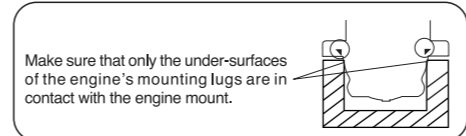
● About The Head Gasket

The engine is installed with a 0.1mm thick head gasket from the factory. When a 15% nitro fuel is used, run the engine as it is. But when a 30% nitro fuel is used, replace the 0.1mm gasket with a 0.2mm thick gasket supplied or just add the 0.2mm thick gasket for easier tuning.

■ INSTALLATION OF THE ENGINE

The under-surfaces of all O.S. engine beam mounting lugs are precision machined flat and exactly parallel to the engine's horizontal axis. It is essential that the engine mounts in the model are also accurately made and aligned. If they are not, they will cause stress and distortion within the engine itself, probably resulting in loss of performance and internal damage.

The recommended screws for securing the engine to the engine mounts in the model are 4mm or 4-40 steel Allen type. It is also advisable to use lock washers or LOCTITE to prevent nuts from loosening.



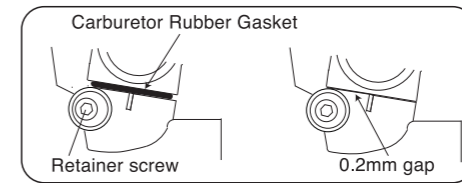
■ INSTALLATION OF THE CARBURETOR

As delivered, the engine has its carburetor lightly fitted into its intake boss. Secure it as follows.

1. Loosen carburetor retainer screw slightly.
2. Insert the carburetor rubber gasket on the carburetor body securely. Then, insert the carburetor in the crankcase.

Note: In case it is hard to insert the carburetor in the crankcase, apply oil on the Thermo Insulator. Do not force it, or damage to the Thermo Insulator and/or crankcase can occur.

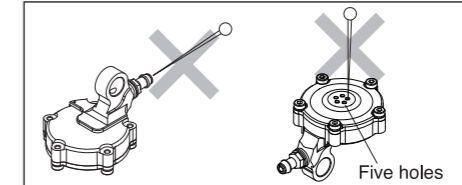
3. Rotate the retainer screw gently until it stops, then tighten a further 90-120 degrees. Do not over-tighten the screw as this will damage the Thermo Insulator.



■ ABOUT THE REGURETOR

CARE OF REGURETOR

- NEVER disassemble the pressure regulator. Their original performance may not be restored after reassembly.
- NEVER insert anything into the inlet nipple in an attempt to clear a suspected obstruction.
- DO NOT block the five holes on the top of the regulator, or the regulator may not work properly. Do not insert a needle or anything into these holes.
- DO NOT allow foreign matter to enter the fuel system. Dirt inside the regulator, no matter how small, may obstruct the flow of fuel and prevent a from working properly.



- ALWAYS use fuel filters. Keep the fuel tank scrupulously clean and filter all fuel as it enters the tank (e.g. via an O.S. 'Super-Filter' Code No.72403050) and use a good quality in-line filter between the tank and regulator. Remember to inspect filter screens at regular intervals and rinse clean as necessary.
- DO NOT clean the regulator with organic solvent such as kerosene, light machine oil, gasoline, thinner or crc as the silicone rubber parts inside will deteriorate. Be sure to use methanol or fuel.
- DO NOT allow fuel to remain in the regulator. After finishing the day's flight session, be sure to run out the fuel in the regulator. Stop the fuel flow to the regulator with a stopper and run the engine at idle to use up the fuel in the regulator. After stopping the engine, rotate the engine by electric starter to eliminate fuel inside the engine.

■ ABOUT THE SILENCER AND PLUMBING

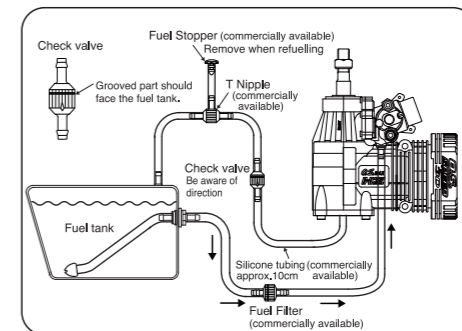
It is suggested to use the O.S. PowerBoost 105 silencer which is developed to best Match the 105HZ-R. Also, the conventional silencers designed for 90 size engines can be used too.

In this case, install the silencer screwing in the M4x15 bolts from the silencer side since the crankcase has been tapped to accept the bolts is done on the crankcase.

Carry out plumbing referring to the instructions supplied with the silencer.

- Carry out plumbing referring to a sketch.
- Connect silicone tubing cut into approx. 10cm to the nipple on the cover plate.
- Then, connect the check valve supplied with the engine as sketched (Be aware of the direction.) It is suggested to install a stopper as shown in the sketch.
- When refueling, remove this stopper to release pressure in the fuel tank.
- Connect the fuel line to the nipple on the regulator.
- Be sure to equip a commercially available in-line filter to avoid dust entering the regulator.

Note:
Since the muffler pressurized fuel feed is not used with this engine, plug the nipple on the muffler or replace it with a bolt.



■ CARBURETOR CONTROLS

With a fixed-wing model, power failure is rarely a serious threat to the safety of the aircraft since it can usually glide down to a safe landing. In a helicopter, on the other hand, it is vitally important that the engine keeps running and that there is a quick and reliable response to the throttle in order to ensure safe ascent and descent of the model.

Three adjustable mixture controls are incorporated in the Type 61G. They are as follows.

A The High-Speed (Main) Needle Valve

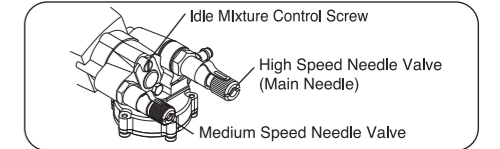
When set to produce maximum power at full throttle, this establishes the basic fuel/air mixture strength. This is then maintained by the carburetor's automatic mixture control system to cover the engine's requirements at reduced throttle settings.

B The Idle Mixture Control Screw

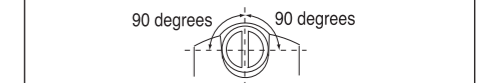
This provides the means of manually adjusting the mixture control valve. By setting the Mixture Control Screw for the best idling performance, the mixture control valve automatically ensures that fuel is accurately metered to maintain the correct mixture strength as the throttle is opened.

C The Medium Speed Needle Valve

This is an extra control that can be brought into play, if necessary, after adjusting A and B above. It provides the means of fine-tuning mixture strength over that all-important part of a helicopter's throttle range where the model is flying in, or near, the hovering mode.

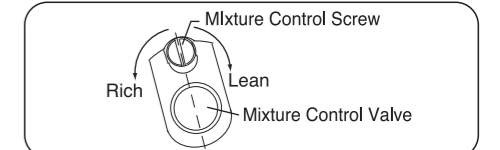


NOTE
As the idle mixture control screw is installed with LOCTITE, it may initially feel stiff, and it is suggested to use a slightly oversized screwdriver. The screw can be turned only 90 degrees either way. Do not force to turn further, or it may break or cause trouble.



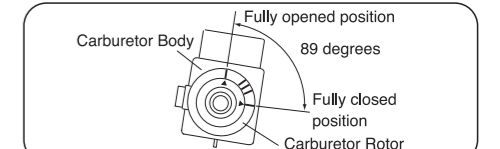
■ BASIC POSITION OF MIXTURE CONTROL SCREW (Mixture Control Valve)

As delivered, the Mixture Control Screw is positioned at approximately the center as shown in the sketch. Mixture gets lean when the Mixture Control Screw is turned right, while mixture gets rich when the Mixture Control Screw is turned left. With a model helicopter, adjustments vary with combined various factors such as climatic conditions, fuel, muffler, main rotor, weight of the model, gear ratio, etc. Therefore the Mixture Control Screw position varies with each model and set-up, and it is normal if the Mixture Control Screw position is off the center.



■ GRADUATIONS ON THE CARBURETOR BODY

As shown in the sketch, the carburetor has graduation marks.



When the triangle mark on the carburetor rotor meets the far right mark, the throttle is fully closed. When the triangle mark meets the top mark, the throttle is fully open. The range is 89 degrees. You may use the other three marks as the reference marking of throttle opening to your preference when hovering.

WARNING!
Never try to check the triangle mark position while the engine is running and rotor is rotating, or you may be hit by rotating rotor which results in serious injury. Stop the engine and rotor before checking the triangle mark position.

