

O.S. ENGINE

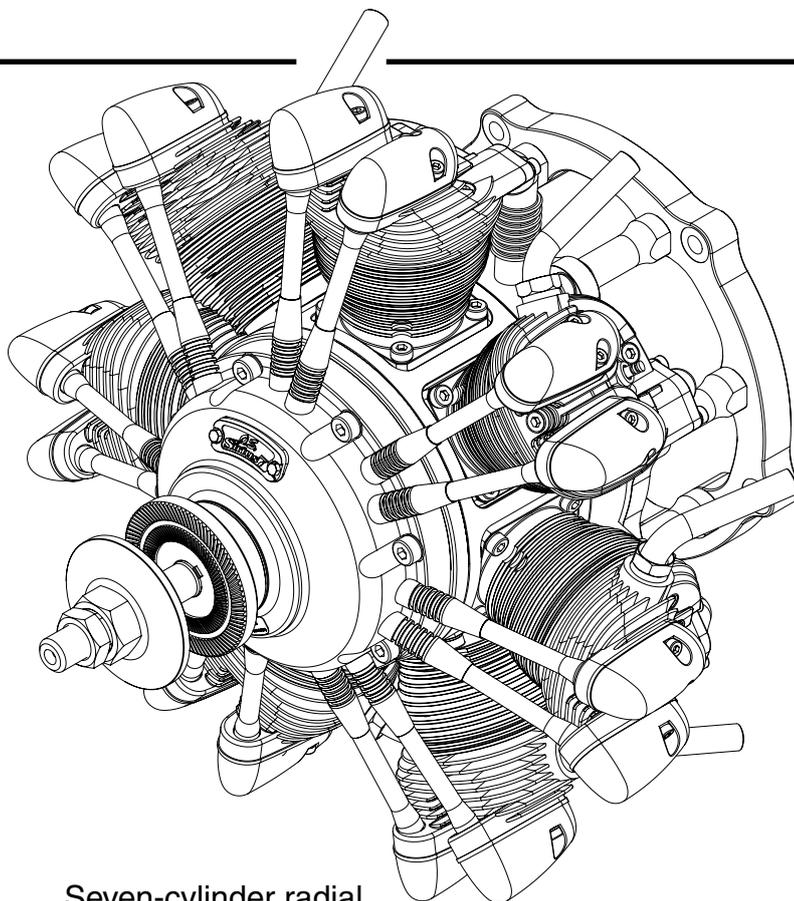
Sirius7

FR7-420
SEVEN-CYLINDER RADIAL ENGINE

OWNER'S INSTRUCTION MANUAL

It is of vital importance, before attempting to operate your engine, to read the general 'SAFETY INSTRUCTIONS AND WARNINGS' section on pages 2-4 of this booklet 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.
- Keep these instructions in a safe place so that you may readily refer to them whenever necessary.
- It is suggested that any instructions supplied with the aircraft, radio control equipment, etc., are accessible for checking at the same time.



Seven-cylinder radial overhead-valve four-stroke engine

O.S. ENGINE

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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 or abused. 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 propeller and do not crouch over the engine when it is running. 

- A weakened or loose propeller may disintegrate or be thrown off and, since propeller tip speeds with powerful engines may exceed 600 feet (180 metres) per second, it will be understood that such a failure could result in serious injury, (see 'NOTES' section relating to propeller safety).

- 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 an 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. 

- 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.

- 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. 

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NOTES

- This engine was designed for model aircraft. 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.
- If you remove the glowplug from the engine and check its condition by connecting the battery leads to it, do not hold the plug with bare fingers. Use an appropriate tool or a folded piece of cloth.
- Install a top-quality propeller of the diameter and pitch specified for the engine and aircraft. Locate the propeller on the shaft so that the curved face of the blades faces forward-i.e. in the direction of flight. Firmly tighten the propeller nut, using the correct size wrench.
- Always check the tightness of the propeller nut and retighten it, if necessary, before restarting the engine, particularly in the case of four-stroke-cycle engines. If a safety locknut assembly is provided with your engine, always use it. This will prevent the propeller from flying off in the event of a "backfire", even if it loosens. Also, check the tightness of all the screws and nuts before restarting the engine.
- If you install a spinner, make sure that it is a precision made product and that the slots for the propeller blades do not cut into the blade roots and weaken them.
- Discard any propeller which has become split, cracked, nicked or otherwise rendered unsafe. Never attempt to repair such a propeller: destroy it. Do not modify a propeller in any way, unless you are highly experienced in tuning propellers for specialized competition work such as pylon-racing.
- Use an electric starter for this engine. The wearing of safety glasses is also strongly recommended.

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! NOTES

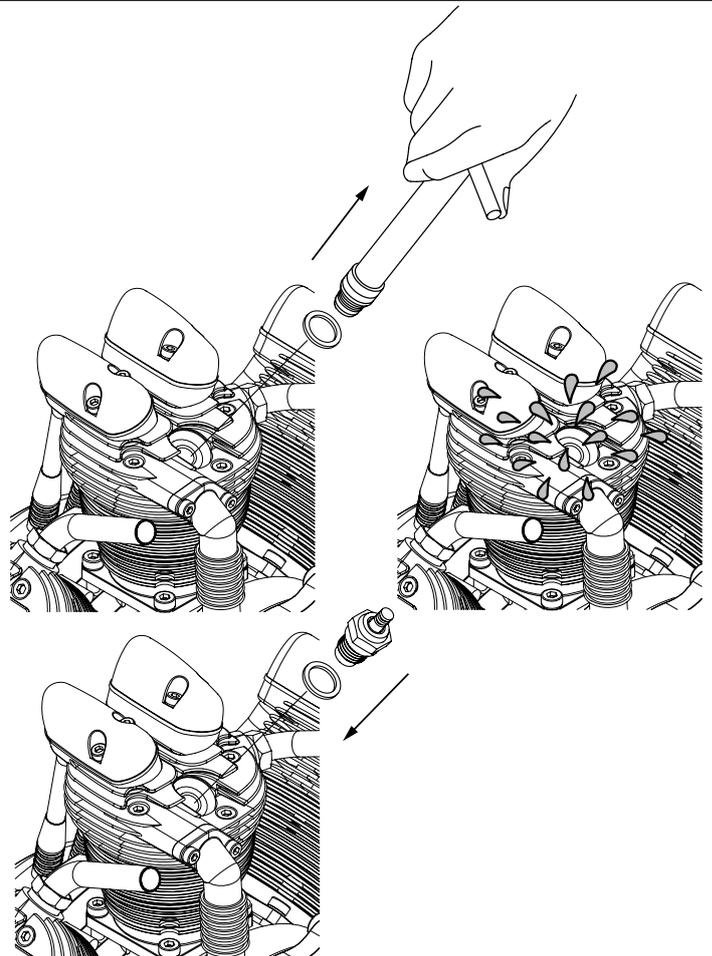
- Take care that the glow plug clip or battery leads do not come into contact with the propeller. Also check the linkage to the throttle arm. A disconnected linkage could also foul the propeller.
- After starting the engine, carry out any needle-valve readjustments from a safe position behind the rotating propeller. Stop the engine before attempting to make other adjustments to the carburetor.
- 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.
- Take care that loose clothing (ties, shirt sleeves, scarves, etc.) do not come into contact with the propeller. Do not carry loose objects (such as pencils, screwdrivers, etc.) in a shirt pocket from where they could fall through the propeller arc.
- Do not start your engine in an area containing loose gravel or sand. The propeller may throw such material in your face and eyes and cause injury.
- For their safety, keep all onlookers (especially small children) well back (at least 20 feet or 6 meters) 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. Keep the propeller pointed away from you and walk well clear of spectators.
- Warning! Immediately after a glowplug-ignition engine has been run and is still warm, conditions sometimes exist whereby it is just possible for the engine to abruptly restart if the propeller is casually flipped over compression WITHOUT the glowplug battery being reconnected. Remember this if you wish to avoid the risk of a painfully rapped knuckle!

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NOTES WHEN APPLYING AN ELECTRIC 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 glowplug, 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.



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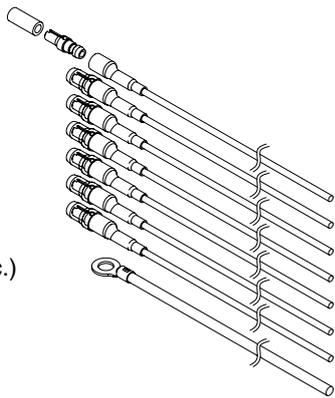
The FR7-420 (Sirius7) is a seven-cylinder radial overhead-valve four-stroke-cycle engine of 70cc displacement. The engine maintains the same features of stress free starting, super smooth idling and high torque power which is always the hallmark of O.S. large size multi-cylinder engines. With its finely detailed design and outstanding scale appearance and sound, the engine's quality is second to none.

STANDARD ACCESSORIES

- Glow Plug Type F (installed on the engine)



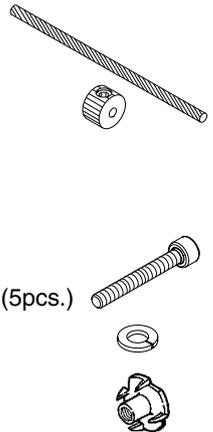
- Plug Cable Set
 - Plug Cable (7pcs.)
 - Plug Terminal (7pcs.) (w/silicone tube)



- Lead for ground $\varnothing 5$ (1pc.)

STANDARD ACCESSORIES

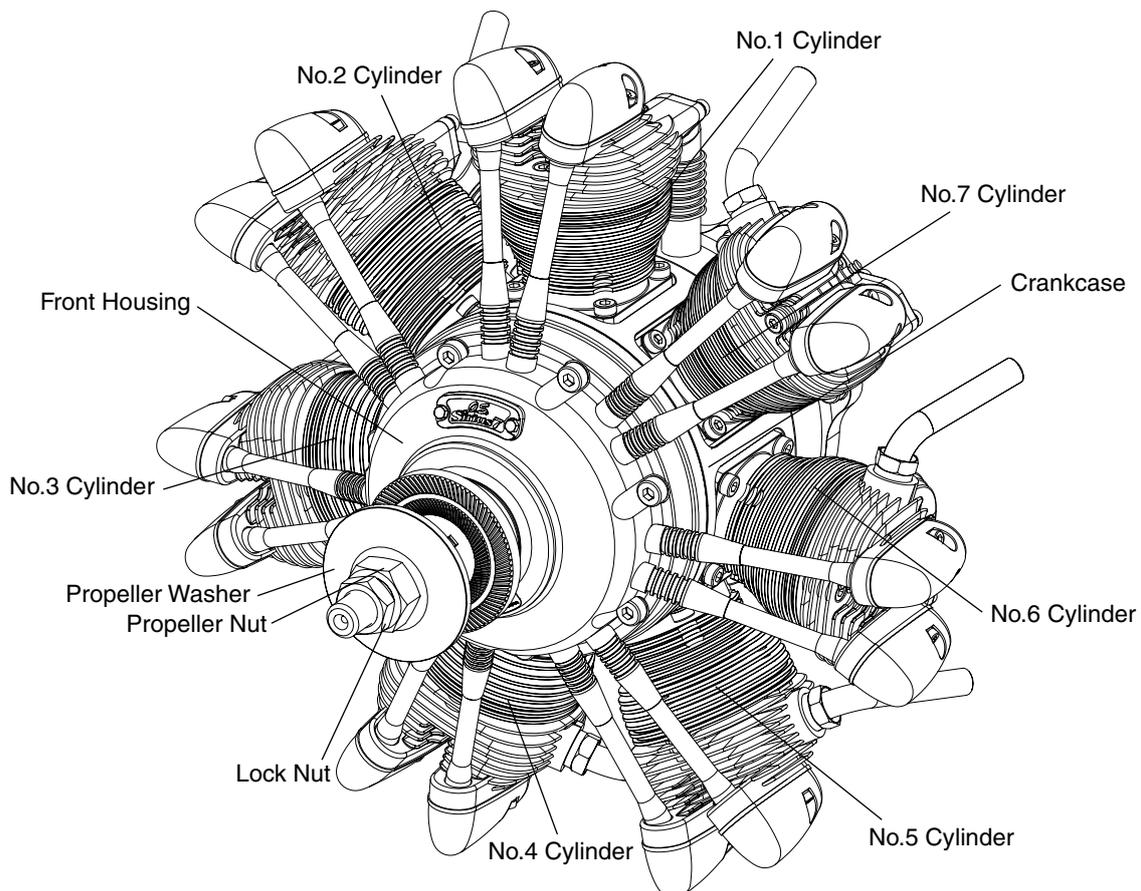
- Needle-Valve Extension Cable Set
- Drain Plug
- Carburetor Insert
- Radial Mount Retaining Screw Set
 - Engine mounting screws (M5X25) (5pcs.)
 - Lock washers ($\varnothing 5$) (5pcs.)
 - Blind nuts (M5) (5pcs.)

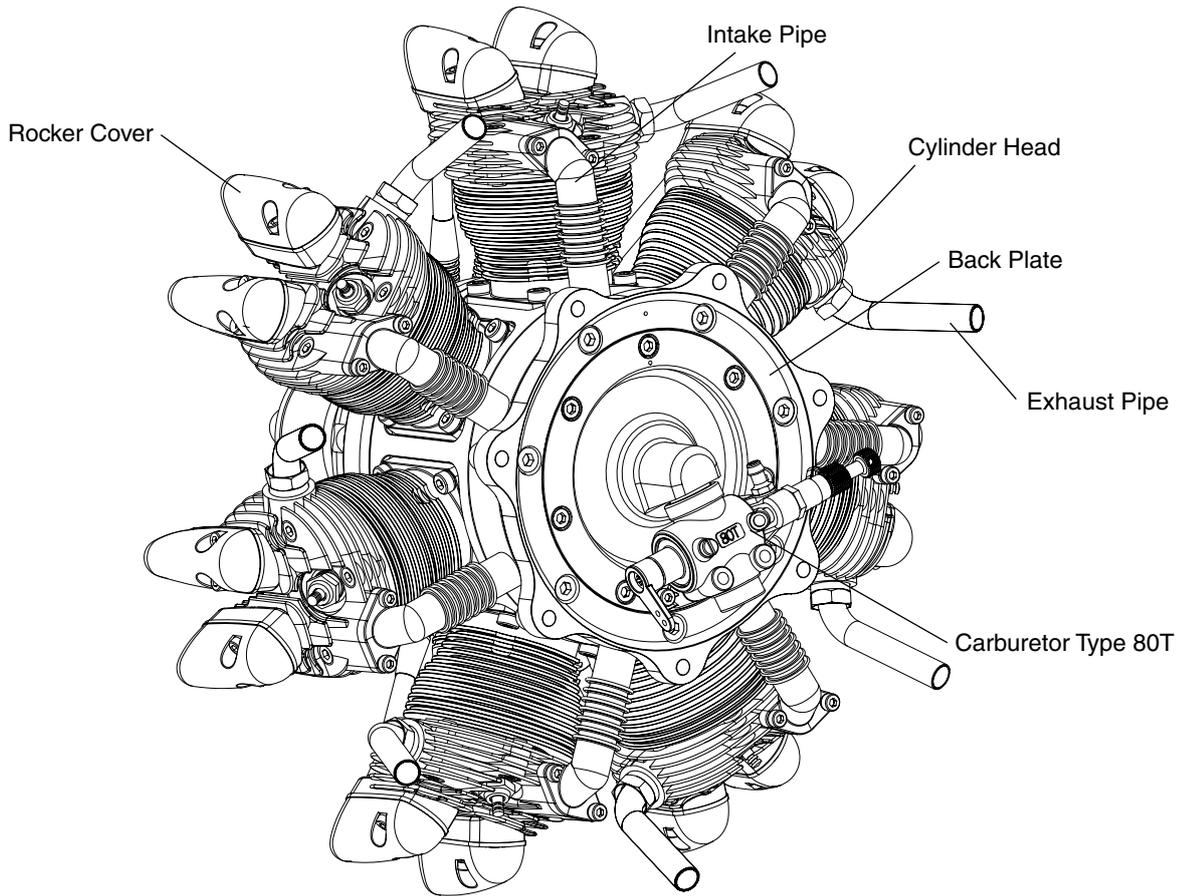


- Valve adjusting tool kit
 - Feeler gauge 0.04mm
 - Feeler gauge 0.1mm
 - Hex. key 1.5mm
 - Wrench 5mm



- Decal
- Instruction Manual
- Aluminum Case





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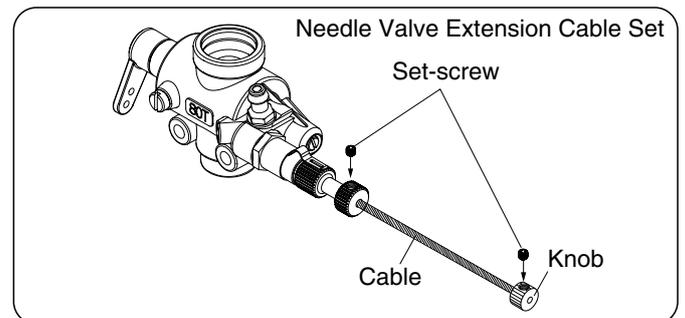
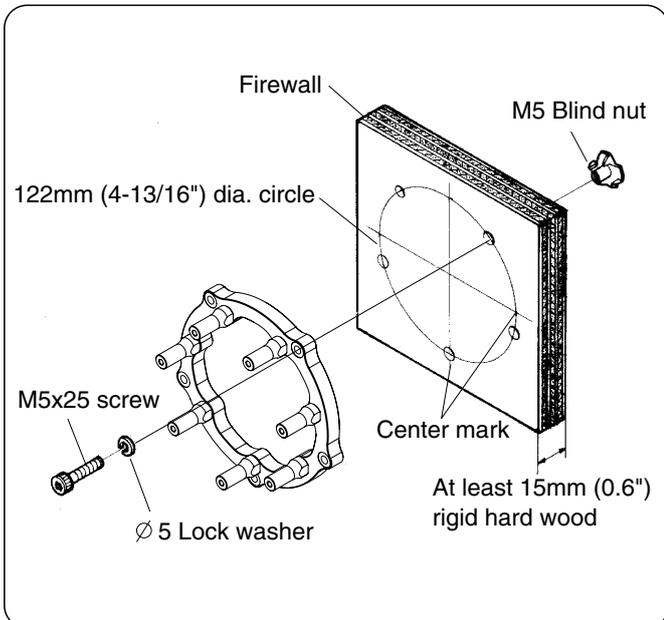
INSTALLATION

- It is essential that the firewall is strong and rigid (e.g. at least 15mm thick) and firmly integrated with the structure of the aircraft.
- It is suggested to install the engine upright.
- It is suggested to use Lock Washers (available as an optional extra) with engine installing screws or apply LOCTITE to the screws to prevent them from loosening.

■ **Needle-valve extension**

The needle-valve supplied with this engine is designed to incorporate an extension so that, when the engine is enclosed within the fuselage, the needle-valve may be adjusted from the outside. For this purpose, a Needle Valve Extension Cable Set is supplied with the engine.

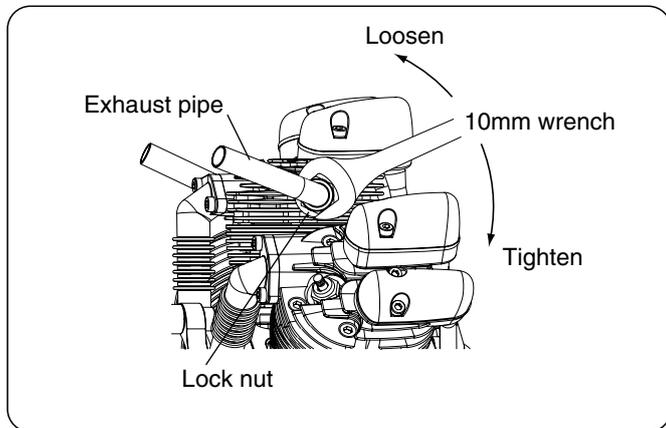
If a longer extension is required, cut a commercially available rod to the required length, bend one end to an L shape, insert it into needle's center hole and secure it by tightening the set-screw in the needle-valve knob with 1.5mm Allen key.



Note:
Carburetor installing direction cannot be changed and the needle direction cannot be changed. Avoid the place near the exhaust pipe when fixing the extension cable.

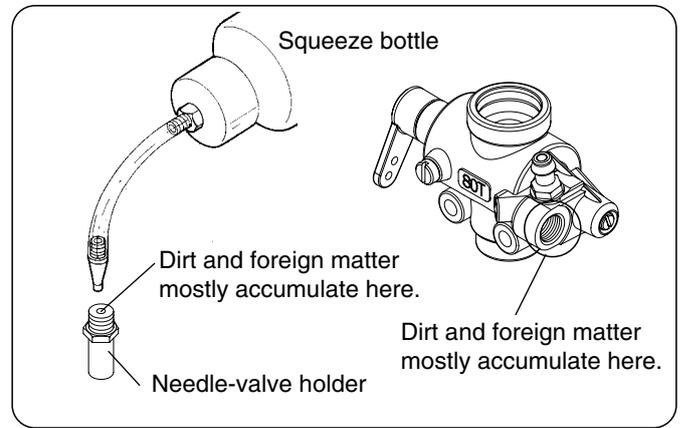
■ **Exhaust pipe**

- Exhaust pipe becomes very hot while running and right after running, make sure it does not touch the model and never allow hand and body to touch it.
- Check the tightness of locknuts while the engine is warm after the first flight.



■ **Carburetor cleanliness**

- It is recommended that the fuel is passed through a filter when the tank is filled and that a good in-line filter is installed between the fuel tank and carburetor.
- Occasionally remove the needle-valve holder from the carburetor and rinse out the locations shown below with methanol or fuel. Be careful not to lose the gasket when removing the needle-valve holder from the carburetor.

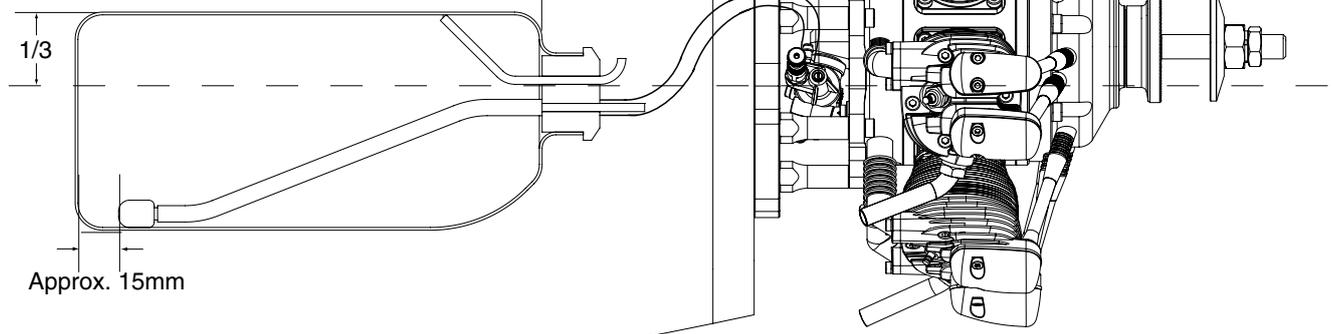


FUEL TANK & LINES

- Make sure that the tank is well rinsed out with methanol or glow fuel before installation and that the pickup weight is well clear of the bottom of the tank when held vertically. A 700cc tank will allow approx. 10 minutes medium speed flight.
- Be sure to follow the instructions concerning the relationship between fuel tank and carburetor position, or the expected stable idle running will not be obtained even with adequate carburetor adjustment.
- For plumbing, use heavy duty silicone tube of 2.5mm inner dia and 5mm outer dia.

Locate the fuel tank as close as possible to the carburetor, or the fuel level difference will affect the engine running when the model is upright or inverted.

Set the fuel tank position so that the carburetor center line is 1/3 lower than from the tank top when the model is placed horizontal.





Since the compatibility of the glowplug and fuel may have a marked effect on performance and reliability, it is suggested to use the O.S. Type F plug when it is necessary to replace. Carefully install plug finger-tight, before final tightening with the correct size plug wrench.

The engine is installed with the O.S. Type F plugs.

The role of the glowplug

With a glowplug engine, ignition is initiated by the application of a 1.5-volt power source. When the battery is disconnected, the heat retained within the combustion chamber remains sufficient to keep the plug filament glowing, thereby continuing to keep the engine running. Ignition timing is 'automatic': under reduced load, allowing higher rpm, the plug becomes hotter and, appropriately, fires the fuel/air charge earlier; conversely, at reduced rpm, the plug become cooler and ignition is retarded.

Glowplug life

Particularly in the case of very high performance engines, glowplugs must be regarded as expendable items. However, plug life can be extended and engine performance maintained by careful use, i.e.:

- Install a plug suitable for the engine.
- Use fuel containing a moderate percentage of nitromethane.
- Do not run the engine too lean and do not leave the battery connected while adjusting the needle.

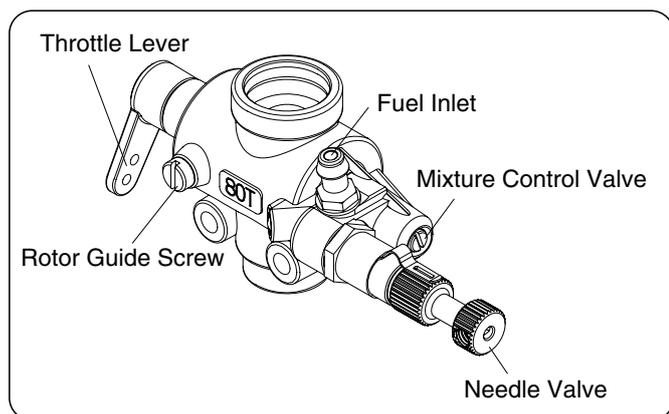
When to replace the glowplug

Apart from when actually burned out, a plug may need to be replaced because it no longer delivers its best performance, such as when:

- Filament surface has roughened and turned white.
- Filament coil has become distorted.
- Foreign matter has adhered to filament or plug body has corroded.
- Engine tends to cut out when idling.
- Starting qualities deteriorate.

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■ CARBURETOR 80T PARTS NAMES



Two mixture controls are provided on this Carburetor.

•The Needle Valve

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

•The Mixture Control Valve

This meters fuel flow at part-throttle and idling speeds to ensure reliable operation as the throttle is opened and closed. The Mixture Control Valve is factory set for the approximate best result. First run the engine as received and readjust the Mixture Control Screw only if necessary.

The carburetor Mixture Control Valve is set at basic position (a little on the rich side) at the factory. However, minor readjustment will be required for a fuel used, atmospheric conditions and a model. When a good result is not obtained with the factory setting, readjust it according to the MIXTURE CONTROL VALVE ADJUSTMENT section. Please note during a running-in period flights should be made with a slightly rich needle setting. Therefore, during a running-in period proper carburetor responses will not be obtained. Adjust it for optimum position after the running-in is completed.

■ THROTTLE LINKAGE

Before connecting the throttle to its servo, make sure that the throttle arm and linkage safely clear any adjacent part of the airframe structure, etc., as the throttle is opened and closed. Connect the linkage so that the throttle is fully closed when the transmitter throttle stick and its trim lever are at their lowest settings and fully open when the throttle stick is in its fully-open position. Carefully align the appropriate holes in the throttle arm and servo horn so that they move symmetrically and smoothly through their full travel.

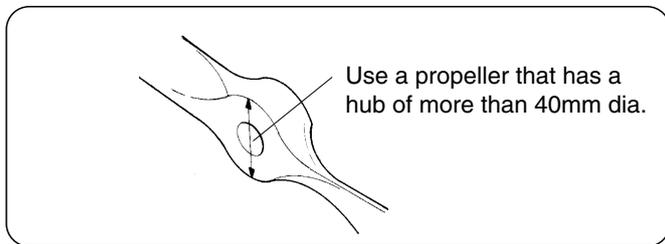
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The choice of propeller depends on the design and weight of the aircraft and on the type of flying in which you will be engaged. Determine the best size and type after practical experimentation. As a starting point, refer to the props listed in the accompanying table. Slightly larger, or even slightly smaller, props than those shown in the table may be used, but remember that propeller noise will increase if blade tip velocity is raised, due to higher rpm or if a larger-diameter / lower-pitch prop is used.

Warning:

Make sure that the propeller is well balanced. An unbalanced propeller and / or spinner can cause serious vibration which may weaken parts of the airframe or affect the safety of the radio-control system. DO NOT forget the WARNINGS and NOTES on propeller and spinner safety given on pages 2,3 and 4.

Type	Size (DxP)
Sport / Scale	22x10-12, 23x8-12, 24x8-12, 26x8

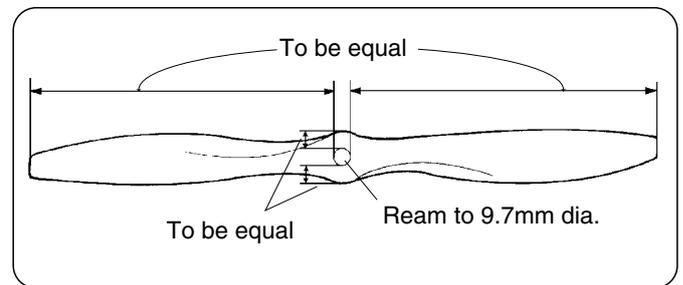


PROPELLER & SPINNER ATTACHMENT

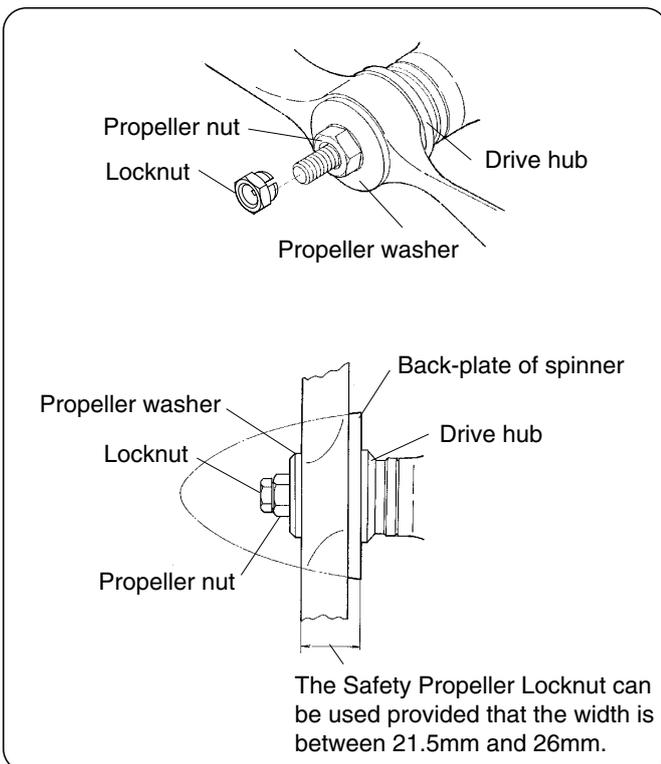
There is a risk, particularly with powerful four-stroke engines, of the propeller flying off if the prop nut loosens due to detonation ("knocking") in the combustion chamber when the engine is operated too lean, or under an excessively heavy load.

Obviously, this can be very hazardous. To eliminate such dangers, the O.S. Safety Locknut Assembly was devised. Install this as follows:

1. Ream the propeller shaft hole to 9.7mm bore with an appropriate reamer, checking that the hole is exactly centered.
2. Install the prop to the engine shaft, followed by the retaining washer and prop nut and tighten firmly with a 17mm wrench. (not supplied).



3. Add the special tapered and slotted locknut and secure with a 14mm wrench while holding the prop nut with the 17mm wrench. (not supplied).



NOTE:

Make a habit of always checking the tightness of the propeller before starting the engine. Remember that, especially with wooden propellers, there is a tendency for the material to shrink, or for it to be reduced by the serrated face of the drive hub. Retighten the propeller nut if necessary after loosening the Locknut. The locknut should be tightened firmly after retightening the propeller nut.

SPINNER

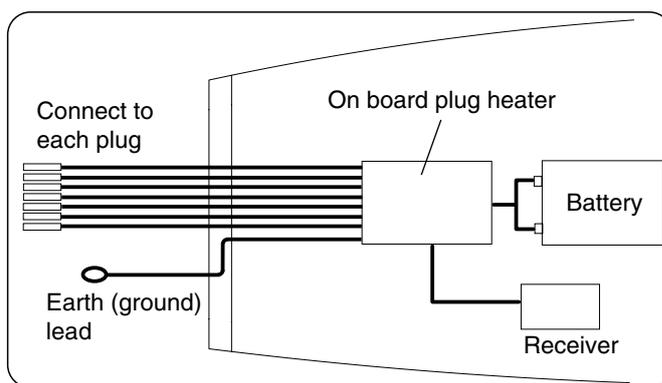
The engine is intended to be started with an electric starter, the addition of a spinner assembly for centering the starter sleeve is desirable. Special propeller locknut sets are available for use with spinners. Use a good quality well balanced spinner, enclosing the propeller boss. Make sure that it is of precision-made and sturdy construction so that the spinner shell cannot loosen when the starter is used. Make sure the spinner notches do not interfere with the propeller. If they do, cut the notches to clear the blades.

■ Glowplug battery

- The engine uses seven plugs (O.S. Type F). It is suggested to use a commercially available glowplug heater intended for multi-cylinder engines. This enables the glowplug heat to be turned ON and OFF at the transmitter and also apply heat at idle. A pulse type that heats the plugs with lower current drain is suggested.
- Since the required consumption current is 7 times more than that for a single cylinder, a 1.2V, 20A capacity battery is required.

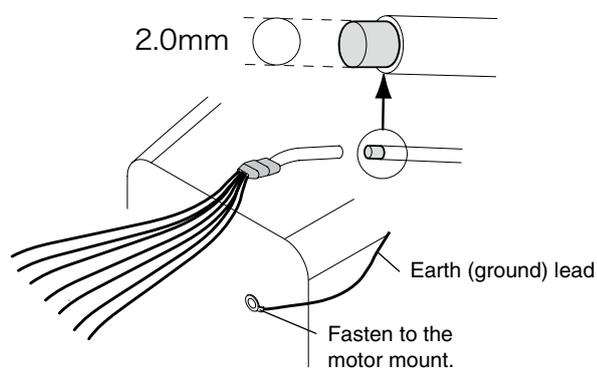
■ Glowplug leads

- Make sure that no part of the wiring touches any part of the engine, or the wire covering may be melted which causes short-circuit and fire.
- Insert each plug terminal on the plug until you feel two "clicks".
- Make sure that the plug terminals do not come off before heating the plugs.
- When the plug terminals come off while running or you feel contact is loose, it is suggested to replace the plug terminals.
- Be sure to install insulating covering (5 O.D., 3 I.D., 12 long silicone tubing) when replacing the plug terminals.



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If glowplug leads are extended together as a single cable, use heavier wire, e.g. cross-section area of 2.0mm multi-strand copper core as supplied for earth lead.



■ Fuel

Suitable fuel for this engine is a methanol based fuel containing 5~8% nitromethane and 8~10% lubricant.

It is suggested to dilute commercially available 15% nitromethane and 18% lubricant fuel with methanol half-and-half to make a 7.5% nitromethane and 9% lubricant fuel.

When you blend a fuel by yourself, use only good quality methanol, nitromethane and lubricant.

When it is difficult to judge the needle adjustment due to propeller size and the fuel used, it is suggested to install a collector ring (optional extra) and apply a muffler pressurized fuel feed system. Also, installation of the carburetor insert supplied with the engine (refer to Page 23) makes it easier to judge the needle adjustment reaction, while power drops a little.

When a commercially available 15% nitromethane and 18% lubricant fuel is used, it is suggested to install the carburetor insert and preferably apply muffler pressurized fuel feed system.

Note:

Never use a fuel containing more than 15% nitromethane, or stable performance will not be obtained and the tendency for rust will be increased.

Reminder!



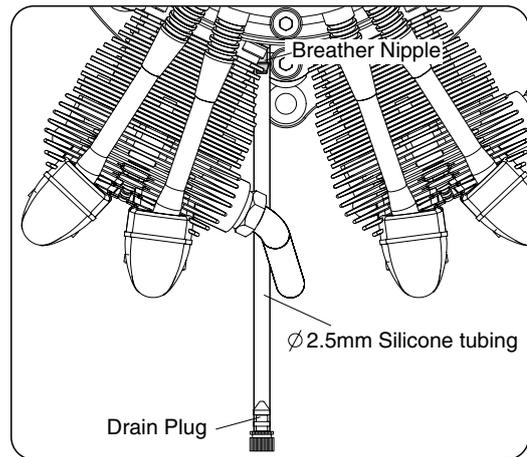
Model engine fuel is poisonous. Do not allow it to come into contact with the eyes or mouth. Always store it in a clearly marked container and out of the reach of children.



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.

■ Lubrication

- The crankcase breather hole is located at the back of the engine and is fitted with a brass nipple. Fit a length of silicone tubing of approx. 2.5mm I.D. to this nipple to conduct away the small amount of oil that escapes through the breather.
- Make a habit of draining out the excess oil in the crankcase at the end of each flying session. Leaving contaminated oil in the crankcase for a long time will cause rust. Also, residual castor oil will tend to solidify and lock the engine. Inject corrosion-inhibiting oil into the crankcase to neutralize the effects of any remaining contaminants.



STARTING

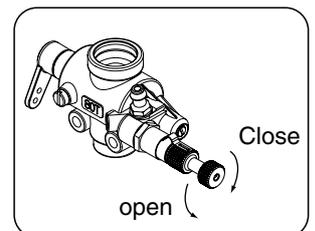
■ Precautions

For safety, please observe the following instructions before starting the engine.

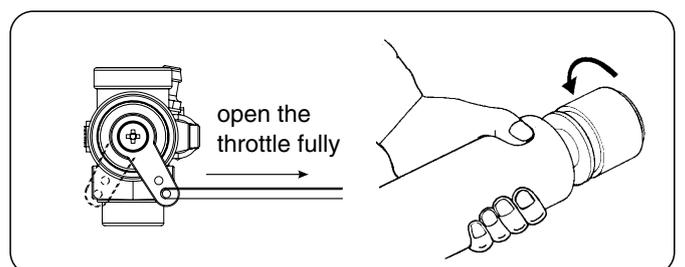
- Since this is a large engine of 70cc (total displacement), it generates huge thrust with full throttle. Be sure to hold the model with two adults and never allow any part of the body to be in front of the rotating propeller.
- Start the engine by turning the propeller counter-clockwise (i.e. normal running direction).
- Do not start the engine with the throttle fully opened, otherwise the model will tend to move forward suddenly due to the strong thrust of the propeller. Hold both wings of the model when starting the engine.
- Do not carry out carburetor adjustments (except needle-valve adjustment) while engine is running.
- Use a high-torque electric starter.

■ Starting procedure is as follows:

1. Open the needle-valve 2.5 turns from the fully closed position.



2. Make sure that glowplugs are not connected to the battery. Do not heat the glowplugs while priming.
3. Open the throttle fully and apply an electric starter for 5-6 seconds to prime the engine.



4. Set the throttle valve approximately 1/4 open from the fully closed position.

5. Starting with an electric starter.

- Make sure that the direction of rotation of the starter is correct.
- Connect the glowplug battery.
- Apply the electric starter.

6. When the engine starts, open the throttle valve fully and keep it running initially (approx. 10 seconds), with original needle-valve setting.

7. Make sure that all seven cylinders are firing

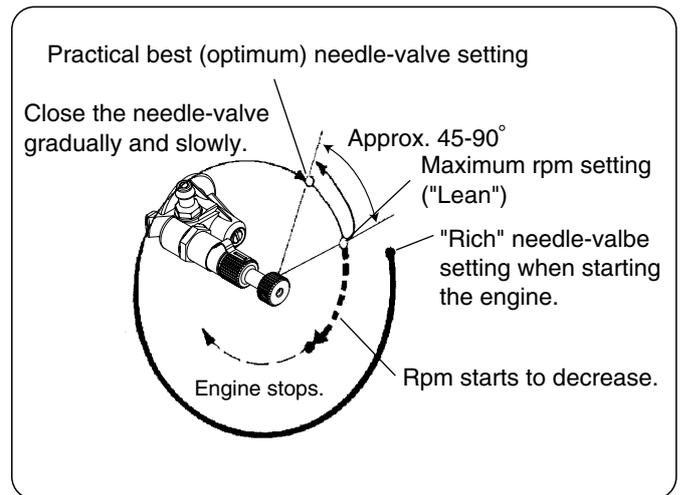
- The engine is running properly if white smoke is emitted through all seven exhaust pipes. A slight spray of fuel will be discharged through the exhaust pipe of any cylinder that is not firing.
- If a cylinder ceases firing, reduce the throttle setting to approximately 1/4 open from the fully closed position and re-connect the glowplug battery. The rpm will increase when all cylinders are firing steadily.
- With a propeller which the engine turns approx. 6,000rpm with full throttle, one misfiring cylinder will drop approx. 500rpm and two misfiring cylinders will drop approx. 1,000rpm.

8. Now disconnect the glowplug battery.

9. Adjust the needle-valve

With fully throttle, close the needle-valve gradually to increase the engine rpm. It is suggested to use a tachometer.

- Abrupt adjustment of the needle-valve may cause the engine to stop, especially when it is new and insufficiently run-in.
- As the speed of the engine does not instantly change with needle-valve readjustment, small movements, with pauses between, are necessary to arrive at the optimum setting.



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■ How to stop the engine

Pull down the throttle lever and trim lever on the transmitter fully.

Note:

Make sure that the throttle linkage is made so that the throttle is fully closed when the throttle lever as well as trim lever on the transmitter are fully pulled down.

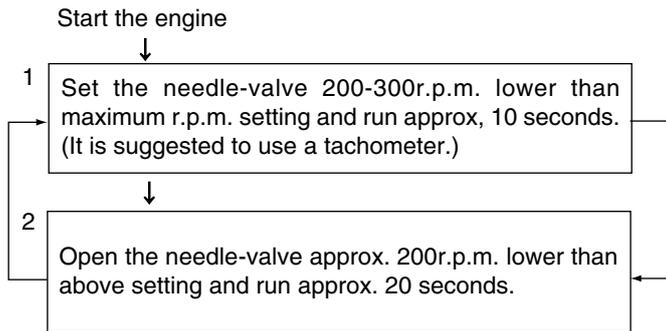
■ Re-starting the engine when warm

To re-start the engine when warm, simply re-energise the plugs and reapply the starter with the throttle in the idling position. If the engine does not start, disconnect the battery from the glowplugs and re-prime. Initially, the high temperature inside the combustion chambers may turn the liquid fuel into gas and emit it through the exhaust pipes.

Allow the engine to cool and then repeat the priming procedure once or twice.

Obtain an 22x10 or 23x8 propeller for running-in.

1. Running-in on the ground

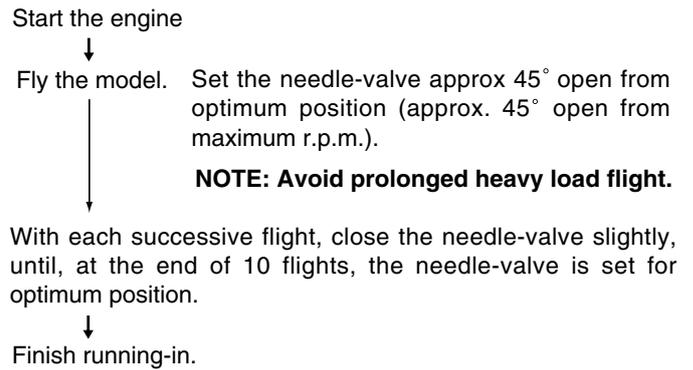


Repeat above procedure, i.e., richening and leaning the mixture until the engine has approx. 10 minutes of running time.

NOTE:

Keep the throttle fully open, using only the needle-valve to change r.p.m. Prolonged running-in on the ground is not suggested because the purpose is just initial running-in to increase engine temperature gradually close to that of maximum r.p.m.

2. Running-in in the air



The carburetor can now be adjusted for optimum throttle performance following the instructions given in the next section.

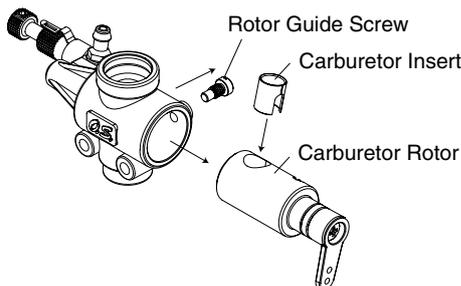
■ Needle-valve adjustment

Adjust the needle-valve following the instructions given in STARTING section.

■ Mixture control valve adjustment

The carburetor of your engine has been factory set for the approximate best result with the fuel tank located in the normal position (i.e. close to the back of the engine and where the level of the needle-valve is at 1/3 height of the tank, refer to Page11), but the setting may, in some cases, vary slightly in accordance with fuel and climatic conditions.

- Installation of the carburetor insert

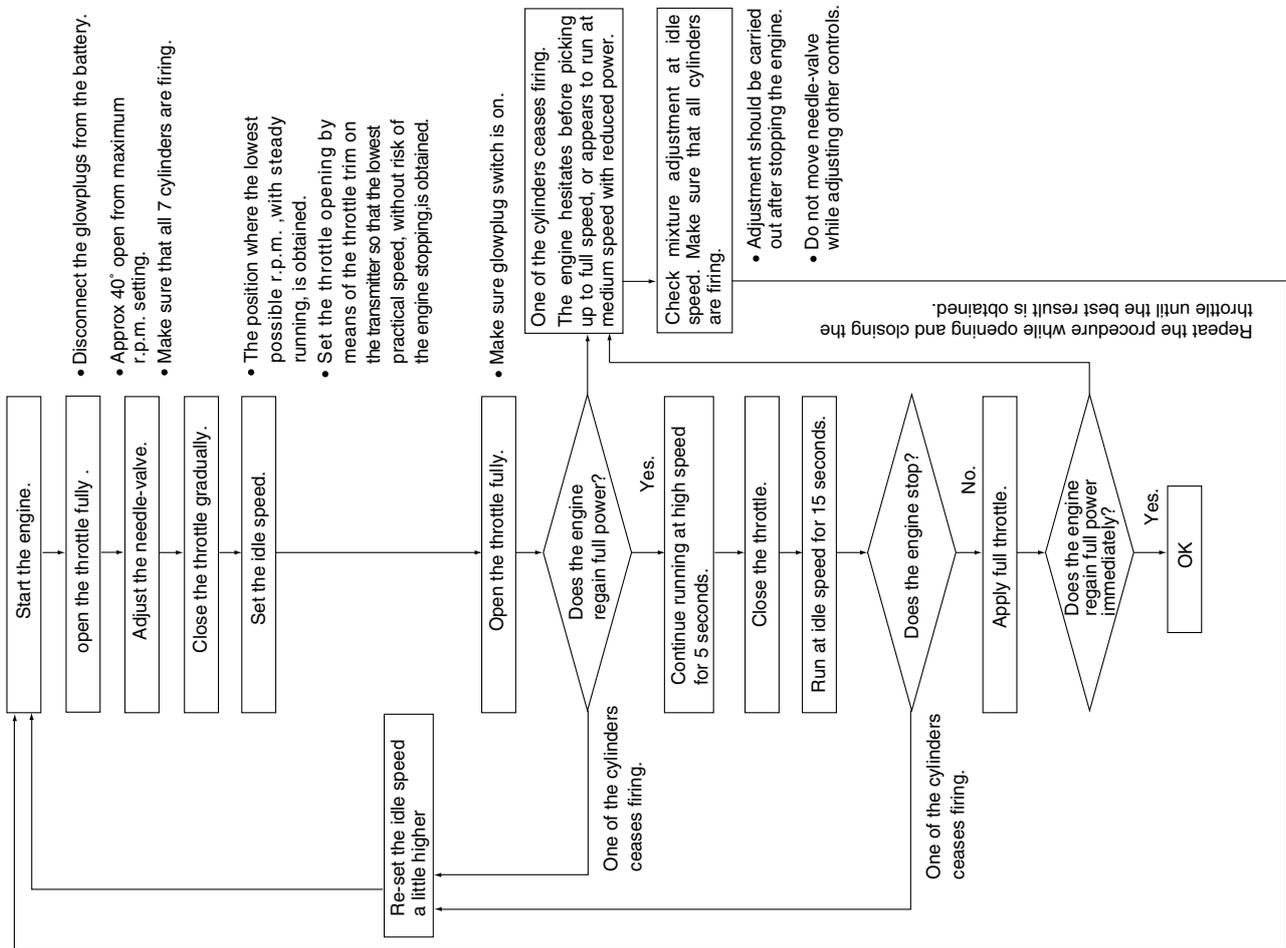


1. Remove the Rotor Guide Screw.
2. Pull out the Carburetor Rotor.
3. Insert the Carburetor Insert (Be aware of direction.)
4. Reinstall them in the reverse order.

- Note that a fuel containing higher nitromethane and lubricant makes it difficult to judge reactions when opening and closing the needle, and shortens stable idle running time.
- Never use a fuel containing more than 15% nitromethane, or correct carburetor adjustments cannot be done and the tendency for rust will increase.

After running-in is completed and the needle-valve is set at optimum position (approx 45° open from maximum r.p.m. position), check the idle speed and adjust only when necessary.

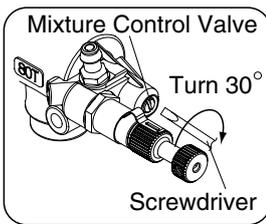
An approximate 1,500rpm idle speed is possible. However, it is suggested to set the speed higher than 1,800rpm for more idle reliability.



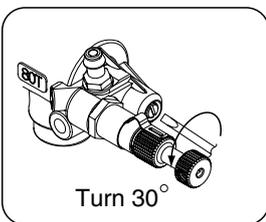
Attention: Do not leave the battery connected while adjusting the carburetor.

■ Adjusting the mixture control valve

1. If the engine hesitates, puffing out a good deal of smoke, before picking up to full speed, it is probable that the idle mixture is too rich. In this case, it will be necessary to turn the Mixture Control Valve clockwise to lean the mixture. About 1/12 turn (30°) should be sufficient.



2. Alternatively, if the engine stops or is slow to pick up speed, without smoking or a strong exhaust note, it is probable that the idle mixture is too lean. In this case, it will be necessary to turn the Mixture Control Valve counter-clockwise approximately 1/12 turn (30°).



3. Thirdly, if the rpm increase but the engine appears to run with reduced power, it is probable that one of the cylinders has ceased firing. You may detect this by the difference in exhaust note and rpm compared with previous full-throttle running. The cutting out of the cylinder may be caused by the idle speed being set too low or the idle mixture being too rich. In the case of the idle speed being too low, re-set the idle position a little higher by means of the throttle trim on the transmitter. In the case of the idle mixture being too rich, turn the Mixture Control Valve clockwise about 1/12 turn (30°). Normal safe idle speeds are in the region of 1,800 r.p.m..

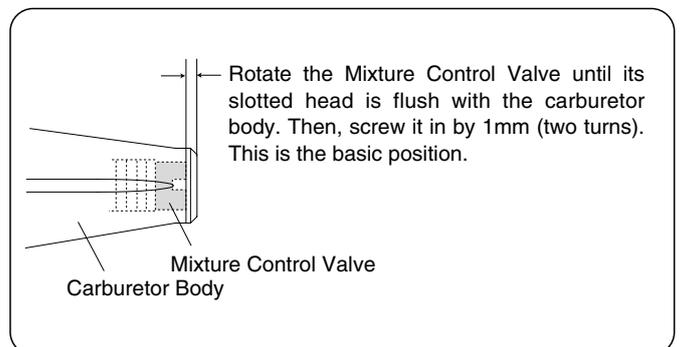
NOTE:

As this is a seven-cylinder four-stroke-cycle engine, seven firings take place every two complete revolutions. Therefore, at first you may have an impression that the engine is idling at higher r.p.m. than actual running r.p.m. It is recommended to check the engine r.p.m. with a tachometer.

Changing the make of glowplug or fuel may sometimes require re-adjustment of carburetor throttle.

■ REALIGNMENT OF MIXTURE CONTROL VALVE

In the course of making carburetor adjustments, it is just possible that the Mixture Control Valve may be inadvertently screwed in or out too far and thereby moved beyond its effective adjustment range.



■ Checking before flight

- Make sure that all seven cylinders are firing.
Sound at full throttle changes when one or two cylinders are not firing. With a propeller which the engine runs approx. 6,000rpm with full throttle, one misfiring cylinder will drop approx. 500rpm and two misfiring cylinders will drop approx. 1,000rpm.
- Make sure that engine runs steadily at idle speed.
- Make sure that engine is fully warmed up.
- It is necessary to warm up the engine as with a full-size aircraft or automobile. Do not attempt to take-off immediately after the engine has been started. Allow the engine to run at full throttle for at least 10 seconds before releasing the model.

■ Care and Maintenance

Please pay attention to the matters described below to ensure that your engine serves you well in regard to performance, reliability and long life.

- As previously mentioned, it is vitally important to avoid operating the engine in conditions where dust, disturbed by the propeller, may be deposited on the engine and enter its working parts.
- Remember to keep your fuel container closed to prevent foreign matter from contaminating the fuel.

- Install a fuel filter to prevent dirt and dust in the fuel container from entering the fuel tank. O.S. Super Filters (L) is available as an optional extra.
- Install an in-line fuel filter between the tank and carburetor to prevent foreign matter in the tank from entering the carburetor.
- Clean these filters periodically.
- If these precautions are neglected, restriction of fuel flow may cause the engine to cut out, or the fuel/air mixture to become too lean causing the engine to overheat.
- The use of modern high-performance alcohol based model engine fuels, while promoting cooler running, improved anti-detonation combustion and increased power, have the disadvantage of causing corrosion due to the acid by-products of combustion. The use of nitromethane in the fuel can also contribute to the problem.

- Do not close the needle-valve and mixture control valve too far as this will cause a lean setting and over heating of the engine. This can, in turn, create nitromethane oxide leading to internal rusting of the engine. Always adjust the needlevalve slightly on the rich side of peak rpm.
- Do not leave unused fuel in the engine at the conclusion of a day's flying. Accepted practice is to cut off the fuel supply while the engine is still running at full throttle, then expel as much fuel residue as possible by turning the engine over 20-30 seconds with the electric starter. Finally, inject some after-run oil through the glowplug hole and turn the engine over several times with the electric starter.
- When the engine is not to be used for some months (for example, as between flying seasons), a worthwhile precaution is to remove it from the airframe and, after washing off the exterior with alcohol (not gasoline nor kerosene), remove carefully the carburetor with intake pipe, glow plug and all silicone tubing and put them safely aside. Then, immerse the engine in a container of alcohol. Rotate the crankshaft while the engine is immersed. If foreign matter is visible in the alcohol, rinse the engine again in clean alcohol. Finally, shake off and dry the alcohol, and inject some after-run oil in the glowplug hole and rotate the crankshaft several times by hand. Reinstall the carburetor with intake pipe and glowplug on the engine and keep it in a dry place after putting in a vinyl bag.

ALL O.S. four-stroke engines have their valve (tappet) clearances correctly set before they leave the factory. However, if, after many hours of running time have been logged, a loss of power is detected, or if the engine has to be disassembled or repaired as a result of an accident, valve clearances should be checked and readjusted, as necessary, with the aid of the O.S. Valve Adjusting Tool Kit.

Note:

Valve clearances of all O.S. four-stroke-cycle engines must be checked and reset **ONLY WHEN THE ENGINE IS COLD**. Procedure is as follows:

(I)

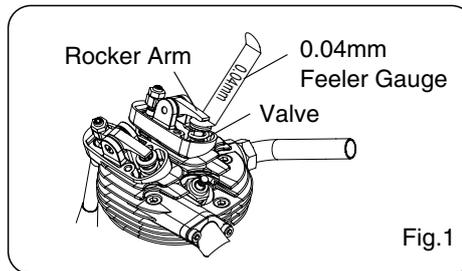
1. Remove all the glowplugs except the one installed in the cylinder that you want to check.

Note:

Each glowplug should be re-installed in to the original cylinder. You may start to check and adjust with any cylinder.

2. Turn the propeller counter-clockwise until compression is first felt, then turn it further a quarter turn. At this point, both valves should be closed.

3. The standard valve clearance, on both inlet and exhaust valves, is between 0.04mm and 0.1mm(0.0015-0.004 inch), measured between valve stem and rocker arm. Use the 0.04mm and 0.1mm feeler gauges to check clearances. (See Fig.1)



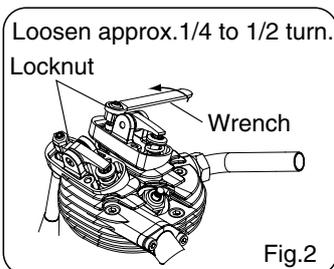
Note:

If the gap is found to be less than 0.04mm, it is not necessary to readjust the clearance if the engine has good compression and starts easily. Equally, if the gap exceeds 0.1mm but is not more than 0.14mm (i.e. the thickness of both feeler gauges inserted together), it is not necessary to readjust the clearance if the engine runs satisfactorily.

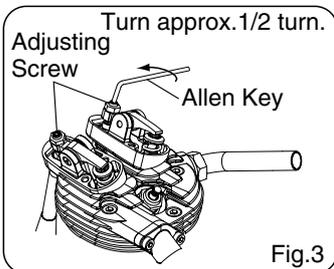
(II)

If a clearance is found to be outside either of these limits, it should be reset as follows.

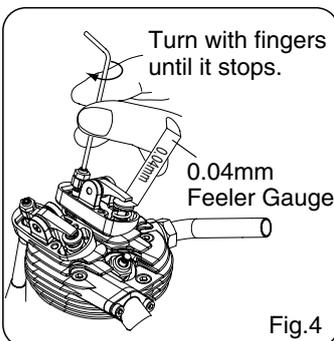
1. Carefully loosen the locknut on rocker-arm 1/4-1/2 turn with 5mm wrench. (Fig.2)



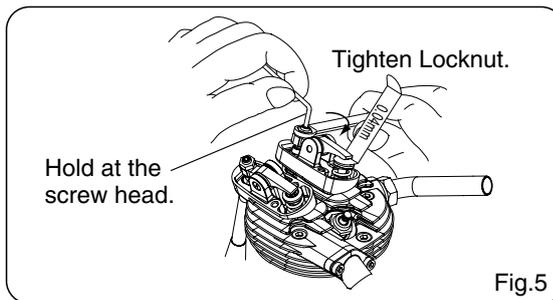
2. Turn adjusting-screw approx. 1/2 turn counter-clockwise to open gap, using appropriate tool-i.e. Allen hex key. (Fig.3)



3. Insert 0.04mm feeler gauge between valve stem and rocker-arm and gently turn adjusting screw clockwise until it stops. (Fig.4)



4. Re-tighten locknut while holding adjusting screw stationary. (Fig.5)



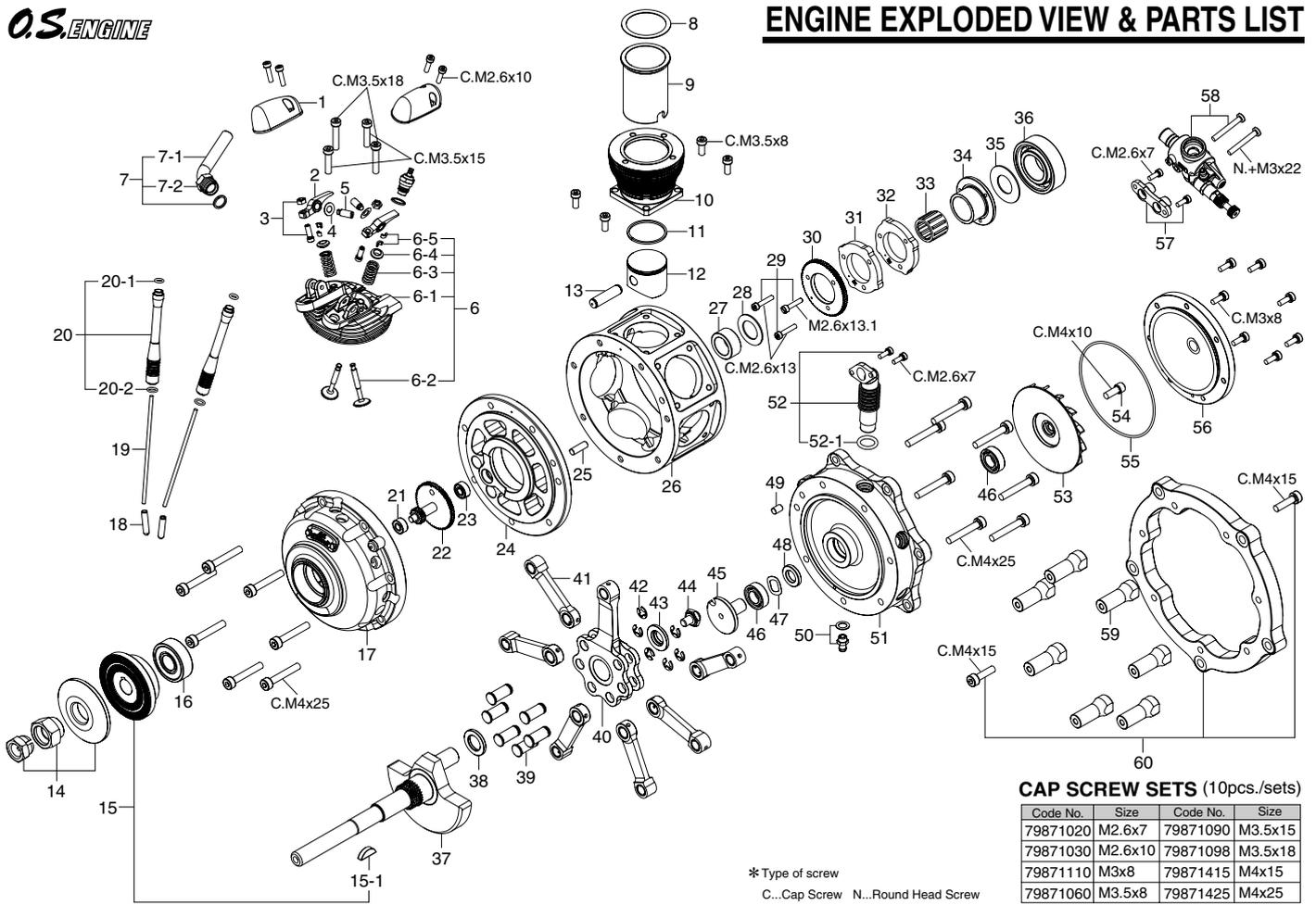
5. Remove 0.04mm feeler, recheck gap as explained in the previous page.
6. If clearance is correct, loosen the locknut on the other rocker-arm and repeat steps 1 to 5 above.

Remember:

Excessive valve clearance will cause loss of power, due to valve (s) not opening sufficiently. On the other hand, a total loss of clearance may cause difficult starting due to valves not closing properly, resulting in loss of compression.

Note:

The camshaft rotates one turn with every eight propeller turns and has four projections on the profile. After adjustment is completed, turn the propeller eight turns to make sure you feel 4 times normal compression.



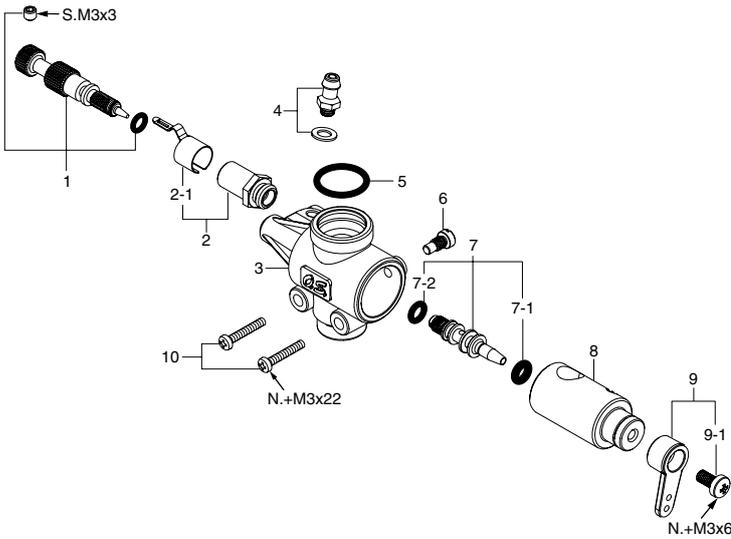
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No.	Code No.	Description
1	47104200	Rocker Cover
2	47161100	Rocker Arm
3	45061202	Tappet Adjusting Screw
4	47161120	Rocker Arm Thrust Washer (2pcs.)
5	47161500	Rocker Arm Shaft
6	47104000	Cylinder Head (W/Valve Assembly)
6-1	47104100	Cylinder Head
6-2	44851000	Valve (1pc.)
6-3	45960210	Valve Spring (1pc.)
6-4	45960310	Valve Spring Retainer (1pc.)
6-5	45960400	Cotter Pin (2pcs.)
7	45269000	Exhaust Pipe Assembly
7-1	45269100	Exhaust Pipe
7-2	45069200	Exhaust Pipe Lock Nut
8	47114010	Head Gasket
9	47003100	Cylinder Liner
10	47103300	Cylinder Jacket
11	44603400	Piston Ring
12	45603200	Piston
13	45606000	Piston Pin
14	29310100	Propeller Locnut Set
15	47108000	Drive Hub
15-1	29208200	Woodruff Key
16	29031009	Ball Bearing (Front)
17	47101600	Front Housing
18	47164000	Cam Follower (2pcs.)
19	47066000	Push Rod Set (S&L 1Piece Each)
20	47166100	Push Rod Cover Set (S&L 1Piece Each)
20-1	24881824	"O" Ring (2pcs.)
20-2	47166210	"O" Ring (2pcs.)
21	47031000	Reduction Gear Bearing (Front)
22	47162700	Reduction Gear
23	47131000	Reduction Gear Bearing (Rear)
24	47101610	Front Plate
25	47101100	Crankcase Locating Pin
26	47101000	Crankcase
27	47102100	Crankshaft Spacer
28	47062300	Cam Thrust Washer (B)
29	47162600	Cam Assembly Screw
30	47162500	Cam Gear
31	47162000	Intake Cam
32	47162100	Exhaust Cam

No.	Code No.	Description
33	47030000	Cam Holder Bearing
34	47162400	Cam Holder
35	47062200	Cam Thrust Washer (A)
36	47130000	Ball Bearing (Rear)
37	47102000	Crankshaft
38	47002300	Master Connecting rod Spacer
39	47105400	Link Pin
40	47105000	Master Connecting Rod Assembly
41	47005300	Link Rod
42	47105410	Link Pin E Ring
43	47002200	Crank Pin Washer
44	47102310	Crank Pin Stop Screw
45	47102400	Drive Shaft
46	47131100	Drive Shaft Bearing
47	47109500	Wave Washer (8mm)
48	47109400	Drive Shaft Spacer
49	47101810	Back Plate Parallel Pin
50	24025923	Nipple No.2 (5mm)
51	47101800	Back Plate
52	47168000	Intake Manifold Set
52-1	45515000	"O" Ring (2pcs.)
53	47107100	Impeller
54	44516110	Drive Shaft Retaining Screw
55	29714200	"O" Ring (1.2x54)
56	47101700	Rear Cover
57	47181140	Carburetor Spacer
58	47181000	Carburetor Complete (80T)
59	71912110	Radial Mount Stand Off
60	71912100	Radial Mount
	71615009	Glow Plug Type F
	46471000	Drain Plug
	72200060	Valve Adjusting Kit
	72200200	Boostre Cable Set For Single Cylinder
	72200170	Plug Cable Set
	72200171	Plug Cable
	72200190	Plug Terminal
	72200180	Earth Cable Ø 5
	47181210	Carburetor Insert
	72200080	Needle-Valve Extension Cable Set
	71912150	Radial Mount Retaining Screw Set
	79870050	Blind Nut M5 (10pcs.)
	79871525	Cap Screw M5x25 (10pcs.)

The specifications are subject to alteration for improvement without notice.

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No.	Code No.	Description
1	47181970	Needle Assembly
2	27381940	Needle Holder Assembly
2-1	26711305	Ratchet Spring
3	47181100	Carburetor Body
4	22681953	Fuel Inlet (Nipple No.1)
5	46115000	Carburetor Rubber Gasket
6	45581820	Rotor Guide Screw
7	47181600	Mixture Control Valve Assembly
7-1	46066319	"O" Ring (2pcs.)
7-2	24881824	"O" Ring (2pcs.)
8	47181200	Carburetor Rotor
9	22081408	Throttle Lever
9-1	22081313	Throttle Lever Retaining Screw
10	45581700	Carburetor Retaining Screw (2pcs.)

The specifications are subject to alteration for improvement without notice.

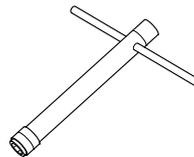
* Type of screw
N...Round Head Screw S...Set Screw

■ PROPELLER
LOCKNUT SET FOR 4C SPINNER
3/8"-M5 (L) (46210300)

■ SUPER FILTER (L)
(72403050)



■ LONG SOCKET WRENCH
WITH PLUG GRIP
(71521000)



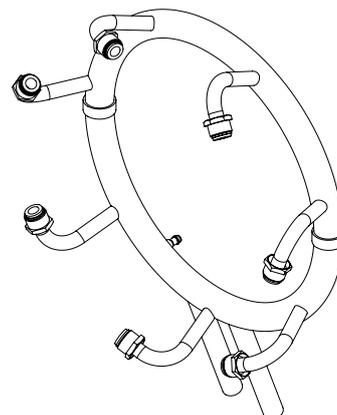
■ NON-BUBBLE WEIGHT
(71531000)



■ NON-BUBBLE WEIGHT
(71531010)



■ COLLECTOR EXHAUST PIPE
(47169000)



■ BLIND NUT (10pcs.)
M5
(79870050)



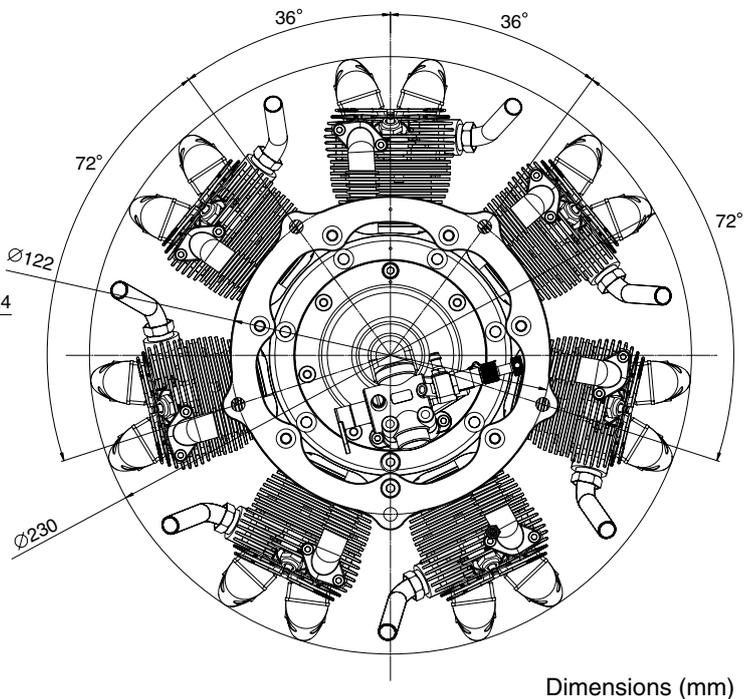
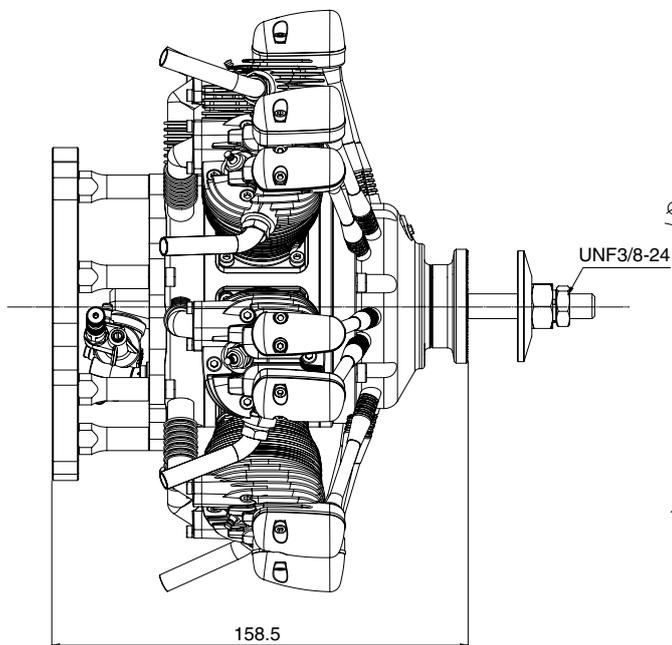
■ LOCK WASHER (10sets)
M5
(55500004)



The specifications are subject to alteration for improvement without notice.

Specifications

■ Displacement	9.95 cc x 7 / 0.607 cu.in. x 7
■ Bore	24.0 mm / 0.945 in.
■ Stroke	22.0 mm / 0.866 in.
■ Practical R.P.M.	1,500-7,000 r.p.m.
■ Output	
■ Weight	3,167 g / 111.71 oz.



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