

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

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.

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).

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.

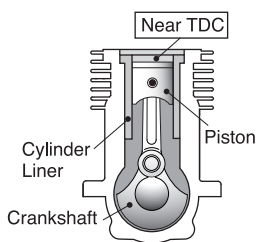
NOTES

- This engine was designed for model 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.
- Be sure to use the silencer (muffler) supplied with the engine. Frequent exposure to an open exhaust may eventually impair your hearing. Such noise is also likely to cause annoyance to others over a wide area.
- 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. 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.

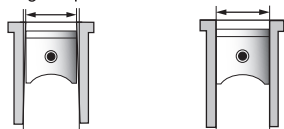
- Preferably, use an electric starter. The wearing of safety glasses is also strongly recommended.
- Discard any propeller which has become split, cracked, nicked or otherwise rendered unsafe. Never attempt to repair such a propeller: destroy it. Do not modify a propeller in any way, unless you are highly experienced in tuning propellers for specialized competition work such as pylon-racing.
- 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!

ENGINE CONSTRUCTION

With this engine, the piston will feel tight at the top of its stroke (TDC) when the engine is cold. This is normal. The cylinder bore has a slight taper. The piston and cylinder are designed to achieve a perfect running clearance when they reach operating temperature.



Slight taper



When the engine is cold. When the engine is hot.

ABOUT THE ENGINE

- This engine is ideally suited to a variety of R/C aircraft, including trainer, sports, aerobatic and scale types.

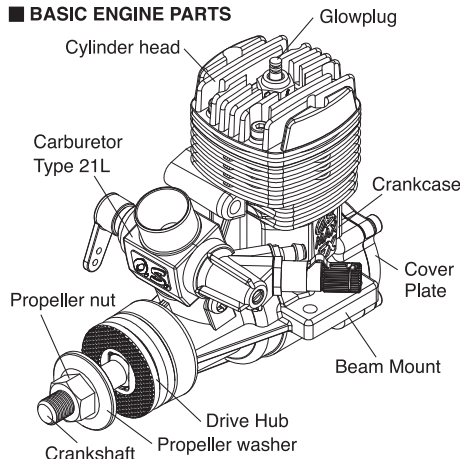
Standard Accessories

- Glow Plug No.8
- 892 Silencer Assembly

INSTALLING GLOW PLUG

Carefully insert plug, with washer, fingertight only, before final tightening with the correct size plug wrench.

BASIC ENGINE PARTS



INSTALLATION

It is suggested to use as heavy and rigid as possible engine mounting for highest performance and safe running. Install the engine on a plastic mount using at least 3mm steel screws, such as Allen type, with locknuts, for bolting the engine to the bearers.

- Make sure that these mounting beams are accurately aligned and firmly integrated with the airframe, reinforcing the adjacent structure to absorb vibration. Use 3mm or larger steel screws, preferably Allen type hexagon socket head cap screws, with washers and locknuts, for bolting the engine to the bearers.

O.S. Radial Motor Mount

A special O.S. radial motor mount (Code No.71908410) is available, as an optional extra, for use where firewall type mounting is required.

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.

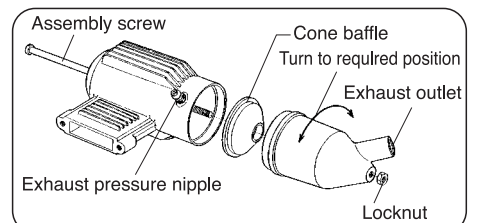
INSTALLING SILENCER

Secure the silencer to the engine by means of two retaining screws supplied after the engine is securely mounted to a test bench or a model.

The exhaust outlet of the silencer can be rotated to any desired position in the following manner:

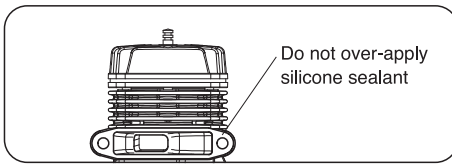
- Loosen the locknut and assembly screw.
- Set the exhaust outlet at the required position by rotating the rear part of the silencer.
- Re-tighten the assembly screw, followed by the locknut.

It is recommended to seal the fitting faces of engine exhaust and silencer with silicone sealant.



Note on silicone sealant

When applying silicone sealant to the engine's exhaust, do not over apply as the excess sealant may get into the engine's internal parts and possibly foul the glowplug causing the engine to quit or experience abnormal engine operation. If this happens, remove the head, clean out the sealant, and replace the glowplug.



FUEL

Select, by practical tests, the most suitable fuel from among the best quality fuels available in your country for model use. For the best performance, a fuel containing 5% to 20% 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. Once a satisfactory fuel has been selected and used for a while, it may be unwise to needlessly change the brand or type. In any engine, a change of fuel may cause carbon deposits in the combustion chamber or on the piston head to become detached and lodged elsewhere, with the risk of this causing unreliable operation for a while. If, however, the adoption of a different fuel is unavoidable, check the engine for the first few flights on the new fuel, by temporarily reverting to the running-in procedure.

PROPELLERS

The choice of propeller depends on the design and weight of the aircraft and 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 the propeller noise will increase, due to higher rpm or if a larger-diameter/lower-pitched prop is used.

	Sport	Aerobatic
SIZE(DxP)	9x5-6, 9.5x5, 10x5	9x6, 9.5x5

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-controlled system.

SPINNER

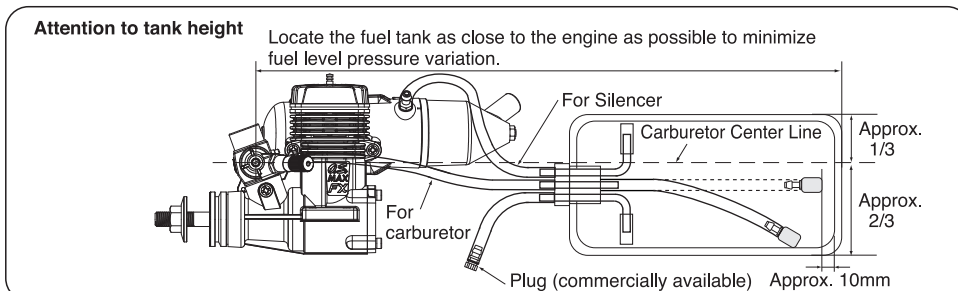
Since the engine is intended to be started with an electric starter, the addition of a spinner assembly for centering the starter sleeve is desirable. Use a heavy-duty, well balanced spinner either of metal or plastic.

Fuel Tank

A fuel tank of approximately 200cc capacity is suggested. This allows around 10-12 minutes flying time, dependent upon the type of fuel used, the size of propeller and on the amount of full-throttle to part-throttle operation throughout the flight.

FUEL TANK LOCATION

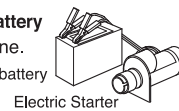
● Make sure that the tank is well rinsed out with methanol or glow fuel before installation and that the pickup weight is well clear of the bottom of the tank when held vertically.



Electric Starter and Starter Battery

Required when starting the engine.

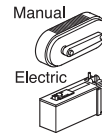
12-Volt lead-acid battery



BEFORE STARTING

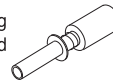
Fuel Pump

Alternatively, one of the purpose-made manual or electric fuel pumps may be used to transfer fuel directly from your fuel container to the fuel tank.



GlowPlug Igniter

Commercially available handy glowplug heater in which the glowplug battery and battery leads are integrated.



O.S. Super Filter (Fuel Can Filter)

Install a filter on 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.



O.S. Non-Bubble Weight

To prevent the pickup from adhering to the tank wall under suction and restricting fuel flow, slots may be filed at the end of the weight. Alternatively, O.S. Non-Bubble Weight is available as an optional extra.



Fuel Filter

It is recommended to install a good in-line filter between the fuel tank and carburetor to prevent entry of foreign matter into the carburetor.

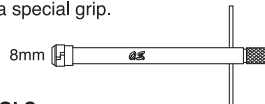


O.S. SPEED Silicone Fuel Line (optional extra)

The connection between the fuel tank and the engine. ID. 2.5mm Length 1000mm

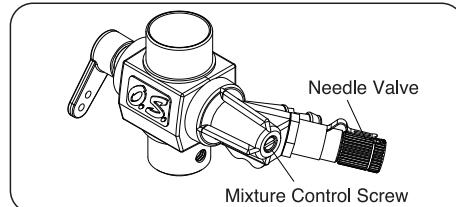
Long Socket Wrench With Plug Grip

Recommended for easy removal and replacement of the angled and recessed glowplug, the O.S. Long Socket Wrench incorporates a special grip.



MIXTURE CONTROLS

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 Screw

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

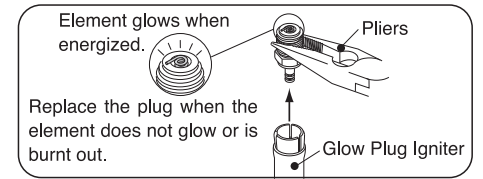
● Be sure to use a pressurized fuel system by connecting the muffler pressure nipple to the vent-pipe of the fuel tank.

STARTING

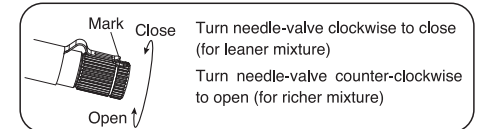
Be sure to use an electric starter to start the engine.

Starting procedure is as follows:

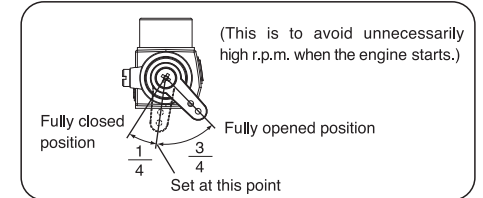
1. Fill the fuel tank with fuel. When filled, prevent fuel flowing into the carburetor with a commercially available fuel stopper, etc. Release the stopper before starting the engine.
2. Make sure that plug element glows red, and install the plug in the cylinder head.



3. Check that the needle-valve is closed. (Do not overtighten.) Now open the needle-valve counter-clockwise 2 to 2.5 turns to the starting setting.



4. Open the throttle approx. one-quarter.



5. Apply the starter and press the starter switch for 5-6 seconds to prime the engine.
6. Connect battery leads to glowplug.
7. Bring electric starter into contact with spinner-nut or spinner and depress starter switch for one or two seconds. Repeat if necessary. When the engine starts, withdraw the starter immediately.

Attention :

Do not choke the carburetor air intake when applying the starter. This could cause an excessive amount of fuel to be drawn into the cylinder which may initiate a hydraulic lock and damage the engine. If the engine does not start within 10 repeat applications of the starter, remove the glow-plug, check that it glows brightly and that the cylinder is not flooded with fuel. (To eject excess fuel, close needle-valve and apply starter with glowplug removed.) Then try again.

VERY IMPORTANT!

Before being operated at full power (i.e. at full-throttle and with the needle-valve closed to its optimum setting) the engine must be adequately run-in, otherwise there is a danger of it becoming overheated and damaged.

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 set so that the throttle is fully closed when the throttle lever as well as trim lever on the transmitter are fully pulled down.

RUNNING-IN ("Breaking-in")

All internal-combustion engines benefit from extra care when they are run for the first few times known as running-in or breaking-in.

This allows the working parts to mate together under load at operating temperature. Therefore, it is vitally important to complete the break-in before allowing the engine to run continuously at high speed and before finalizing carburetor adjustments.

However, because O.S. engines are produced with the aid of the finest modern precision machinery and from the best and most suitable materials, only a short and simple running-in procedure is called for and can be carried out with the engine installed in the model.

The process is as follows.

1. Install the engine with the propeller intended for your model. Open the needle-valve to the advised starting setting and start the engine. If the engine stops when the glow plug battery is disconnected, open the needle-valve to the point where the engine does not stop. Run the engine for one minute with the throttle fully open, but with the needle-valve adjusted for rich, slow "four-cycle" operation.

2. Now close the needle-valve until the engine speeds up to "two-cycle" operation and allow it to run for about 10 seconds, then reopen the needle-valve to bring the engine back to "four-cycle" operation and run it for another 10 seconds. Repeat this procedure until the fuel tank is empty.

Optimum needle setting (1)

Slowly advance the throttle to its fully open position, then gradually close the needle-valve until the exhaust note begins to change. (4-cycle to 2-cycle)

3. Re-start and adjust the needle-valve so that the engine just breaks into "two-cycle" from "four-cycle" operation, then make three or four flights, avoiding successive "nose-up" flights.

4. During subsequent flights, the needle-valve can be gradually closed to give more power. However, if the engine shows signs of running too lean, the next flight should be set richer. After a total of ten flights, the engine should run continuously, on its optimum needle-valve setting, without loss of power as it warms up.

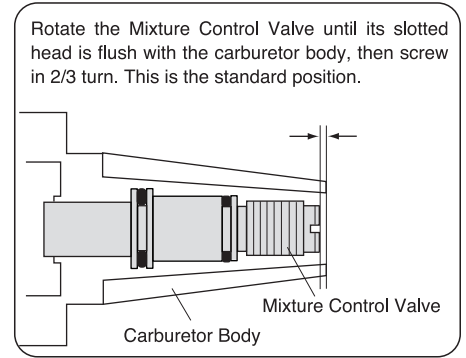
5. After the completion of the running-in adjust the carburetor at optimum setting referring to MIXTURE CONTROL SCREW ADJUSTMENT section and SUBSEQUENT READJUSTMENT section.

Optimum needle setting (2)

As the needle-valve is closed slowly and gradually, the engine r.p.m. will increase and a continuous high-pitched exhaust note, only, will be heard. Close the needle-valve 10-15 degrees and wait for the change of r.p.m. After the engine r.p.m. increases turn the needle-valve another 10-15 degrees and wait for the next change of r.p.m. 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.

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. The basic position can be found in the sketch shown below.



SUBSEQUENT STARTING PROCEDURE

Once the optimum needle-valve setting has been established the procedure for starting may be simplified as follows.

1. Open the needle-valve one half-turn (180 degrees) from the optimum setting.
2. Set the throttle one-quarter open from the fully closed position, energize the glowplug and apply the electric starter. When the engine starts, re-open the throttle and re-adjust the needle-valve to the optimum setting.

Note:

When re-starting the engine on the same day, provided that atmospheric conditions have not changed significantly, it may be practicable to re-start the engine on its optimum (running) setting.

SUBSEQUENT READJUSTMENT

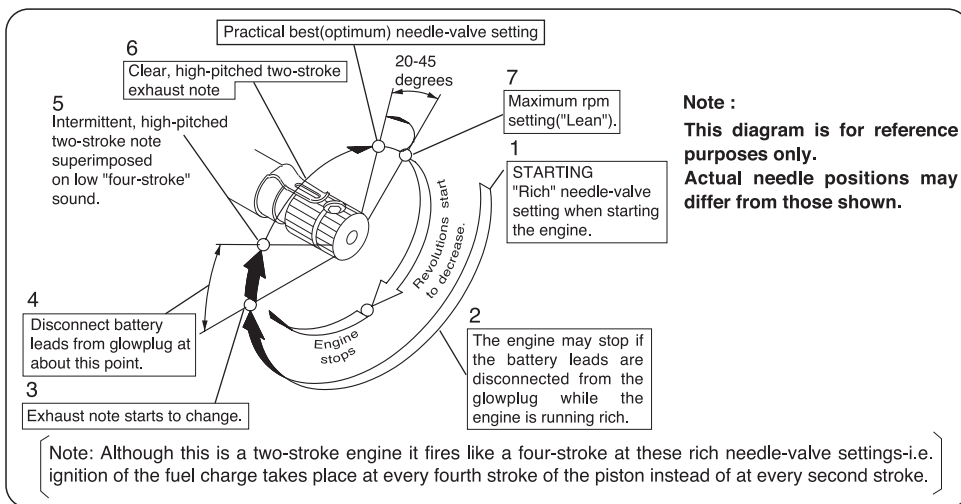
Once the engine has been run-in and the controls properly set up, it should be unnecessary to alter the mixture settings; except to make minor adjustments to the Needle-Valve occasionally, to take account of variations in climatic conditions. The use of a different fuel, however, particularly one containing more, or less, nitromethane and/or a different type or proportion of lubricating oil, is likely to call for some readjustment of the Needle-Valve. Remember that, as a safety measure, it is advisable to increase the Needle-Valve opening by an extra half-turn counter-clockwise, prior to establishing a new setting. The same applies if the silencer type is changed. A different silencer may alter the exhaust pressure applied to the fuel feed and call for a revised Needle-Valve setting. The use of a different glowplug may also require compensating carburetor readjustments.

CARE AND MAINTENANCE

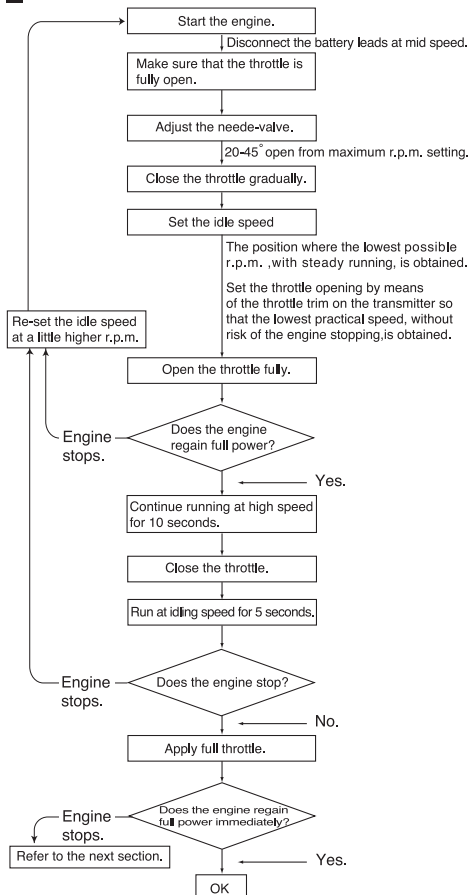
Please pay attention to the matters described below to ensure that your engine serves you well in regard to performance, reliability and long life.

- 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) and (S) are available as optional extras.
- Install an in-line fuel filter between the tank and carburetor to prevent dirt and dust 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.

Needle-valve adjustment diagram



IDLING ADJUSTMENT CHART



MIXTURE CONTROL SCREW ADJUSTMENT

With the engine running, close the throttle and allow it to idle for about five seconds, then open the throttle fully. If, at this point, the engine is slow to pick up and produces an excess of exhaust smoke, the mixture is too rich. Correct this condition by turning the Mixture Control Screw clockwise 15-30 degrees. If the mixture is excessively rich, engine rpm will become unstable: opening the throttle will produce a great deal of smoke and rpm may drop suddenly or the engine may stop. This condition may also be initiated by excessively prolonged idling. If, on the other hand, the mixture is too lean, this will be indicated by a marked lack of exhaust smoke and a tendency for the engine to cut out when the throttle is opened. In this case, turn the Mixture Control Screw counter-clockwise 90 degrees to positively enrich the idle mixture, then turn the screw clockwise gradually until the engine regains full power cleanly when the throttle is reopened. Carry out adjustments patiently until the engine responds quickly and positively to the throttle control.

Note: Mixture Control Valve adjustments should be made in steps of 15-30° initially, carefully checking the effect, on throttle response, of each small adjustment.

- 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 needle valve 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 5-10 seconds with the electric starter. Finally, inject some after-run oil through the glowplug hole and turn the engine over several times by hand.

- 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, 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 and glowplug on the engine and keep it in a dry place after putting in a vinyl bag.

O.S. GENUINE PARTS & ACCESSORIES

O.S.GLOW PLUG

- **No.6 (Fomer A3)** (71605300)
- **No.7** (71607100)
- **No.8** (71608001)

RADIAL MOTOR MOUNT

(71908410)

SILENCER EXTENSION ADAPTORS

(22625103)

Width Screw hole pitch
12.5mm 35.0mm

SPINNER NUT

- **1/4"-28** (23024008)
- **1/4"-28(L)** (23024009)

LONG PROPELLER NUT SET

1/4"-28 (73101000)

NEEDLE VALVE EXTENSION CABLE SET

(72200080)

SUPER FILTER

(L) (72403050)

NON-BUBBLE WEIGHT

(71531000)

NON-BUBBLE WEIGHT (S)

(71531010)

FANG NUT (6pcs./sets)

M3 (79870031)

LOCK WASHER (10sets)

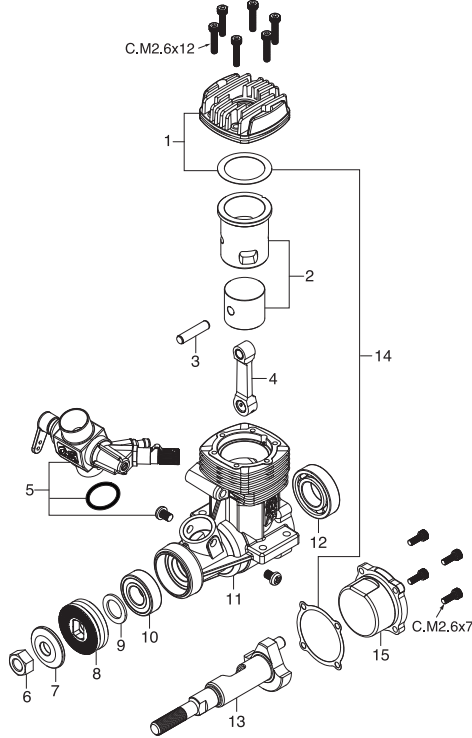
M3 (55500002)

LONG SOCKET WRENCH WITH PLUG GRIP

(71521000)

ENGINE EXPLODED VIEW & PARTS LIST

* Type of screw
C...Cap Screw S...Set Screw



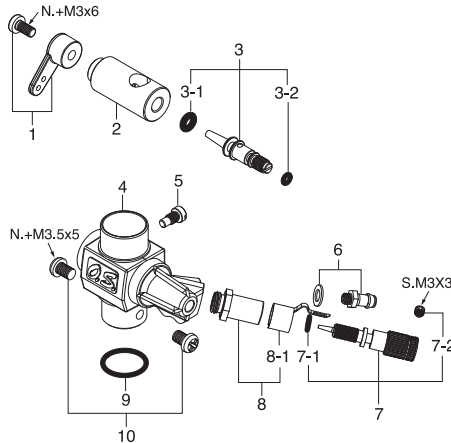
No.	Code No.	Description
1	22604020	Cylinder Head
2	22603040	Cylinder Piston Assembly
3	22606009	Piston Pin
4	22805010	Connecting Rod
5	22582000	Carburetor Complete (Type 21L)
6	23210007	Propeller Nut (1/4-28)
7	23009006	Propeller Washer
8	22808000	Drive Hub
9	22620003	Thrust Washer
10	22831000	Crankshaft Ball Bearing (F)
11	22601050	Crankcase
12	22630002	Crankshaft Ball Bearing (R)
13	22602030	Crankshaft
14	22614010	Gasket Set
15	22607020	Cover Plate
	71608001	Glow Plug No.8
	22628000	892 Silencer Assembly
	22681957	Pressure Fitting (No.7)
	23325300	Assembly Screw
	22625404	Retaining Screw (N.+M3x27 2pcs.)

CAP SCREW SETS (10pcs./sets)

Code No.	Size	Pcs. used in an engine
79871020	M2.6x7	Cover Plate Retaining Screw (4pcs.)
79871040	M2.6x12	Cylinder Head Retaining Screw (6pcs.)

CARBURETOR EXPLODED VIEW & PARTS LIST

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

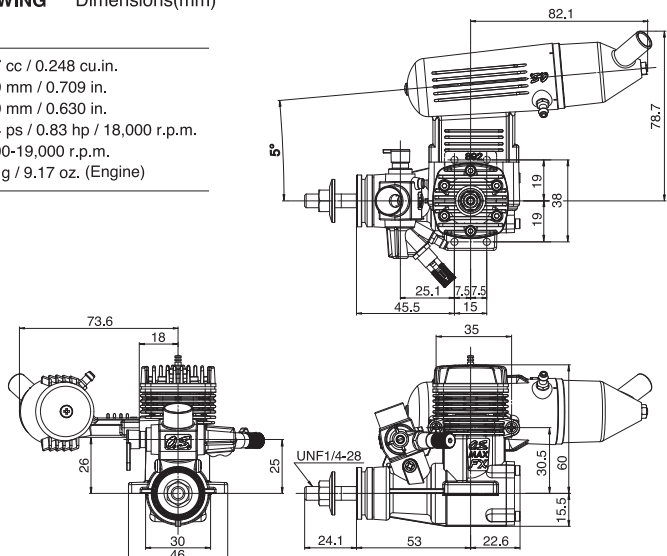


No.	Code No.	Description
1	22081408	Throttle Lever Assembly
2	22582200	Carburetor Rotor
3	29181620	Mixture Control Valve Assembly
3-1	46066319	"O" Ring (L) (2pcs.)
3-2	22781800	"O" Ring (S) (2pcs.)
4	22582100	Carburetor Body
5	45581820	Rotor Guide Screw
6	22681953	Fuel Inlet (No.1)
7	44281970	Needle Assembly
7-1	24981837	"O" Ring (2pcs.)
7-2	26381501	Set Screw
8	27381940	Needle-valve Holder Assembly
8-1	26711305	Ratchet Spring
9	22615000	Carburetor Rubber Gasket
10	23081706	Carburetor Retaining Screw

THREE VIEW DRAWING Dimensions(mm)

SPECIFICATIONS

■ Displacement	4.07 cc / 0.248 cu.in.
■ Bore	18.0 mm / 0.709 in.
■ Stroke	16.0 mm / 0.630 in.
■ Output	0.84 ps / 0.83 hp / 18,000 r.p.m.
■ Practical R.P.M.	2,500-19,000 r.p.m.
■ Weight	260 g / 9.17 oz. (Engine)



O.S. ENGINES MFG.CO.LTD.
http://www.os-engines.co.jp

6-15 3-Chome Imagawa Higashiumiyoshi-ku
Osaka 546-0003, Japan T.E.L. (06) 6702-0225
FAX. (06) 6704-2722