

It is of vital importance, before attempting to operate your engine, to read this 'SAFETY INSTRUCTIONS AND WARNINGS' leaflet and to strictly adhere to the advice contained herein. Also, please read through the instruction leaflet or manual supplied with the engine, so as to familiarize yourself with the controls and other features of the engine.

Keep this leaflet and the engine 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.

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

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



NOTES

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 naked 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.



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.
- Fit an effective silencer (muffler). Frequent close exposure to a noisy exhaust (especially in the case of the most powerful high-speed engines) may eventually impair your hearing and such noise is also likely to cause annoyance to others over a wide area.
- Fit 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.
- If you fit 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. Do not 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. The wearing of safety glasses is also strongly recommended.
- 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 carburettor.
- 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 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. 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!

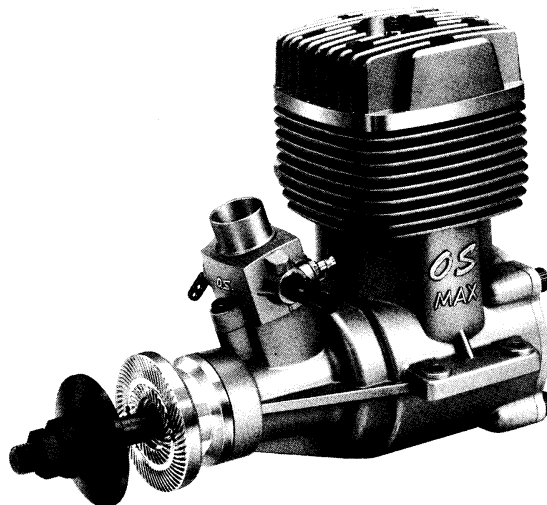
INSTRUCTIONS FOR O.S. MAX-BGX-1 RING ENGINE

IMPORTANT: Before attempting to operate this engine, please read through these instructions so as to familiarize yourself with the controls and other features of the engine. Also, pay careful attention to the recommendations contained in the "Safety Instructions and Warnings" leaflet enclosed.

The O.S. MAX-BGX-1 RING is the largest engine in the high-quality, high-performance O.S. Schnuerle scavenged two-stroke range. It has been designed as a more compact, lighter, more powerful and smoother-running alternative to converted chainsaw-type gasoline engines for large, radio-controlled quarter-scale aircraft.

The engine is supplied with an effective low-loss silencer and an optional backplate (radial) mount for easy firewall type engine installation.

A special tuned silencer and header pipe are available as an optional extra assembly, for use where maximum power, at further reduced noise levels, is required.



SPECIFICATIONS

Displacement	34.97cc (2.13 cu.in.)
Bore	37.3mm (1.469 in.)
Stroke	32.0mm (1.260 in.)
Practical r.p.m.	1,500-10,000 r.p.m.
Power Output	4.1 BHP/10,000 r.p.m.
Weight	1,340g (47.3 oz.) (With cover plate)

INSTALLATION

There are two methods of installing the engine in the aircraft: (a) standard beam mounting, using the engine's integral crankcase mounting lugs, and (b) radial mounting, using the backplate mount supplied, to bolt the engine to the front bulkhead or firewall.

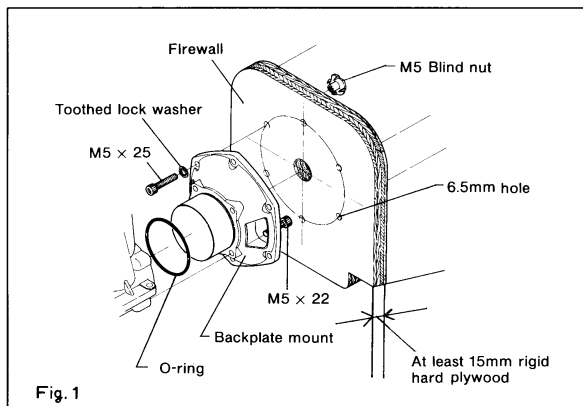
Whichever method is chosen, make sure that the structure to which the engine is attached (i.e. horizontal bearers or vertical bulkhead), is of sturdy proportions and very firmly integrated with the airframe. This is necessary both for safety and for the realisation of maximum performance.

Beam mounting

- 1) Use heavy, rigid, hardwood bearers or a metal mount and keep unsupported length as short as possible to reduce frontal overhang.
- 2) Make sure that the bearers are parallel and that their mounting surfaces are in the same plane.
- 3) Use 5mm or 10-24 steel cap-head screws, such as Allen hexagon socket type, with locknuts, for bolting the engine to the bearers.

Radial mounting

- 1) Draw vertical and horizontal centre lines on the firewall to correspond with the required thrust-line. Use these to find the centre of the 100mm (3.93 in.) diameter bolt-circle required to correctly locate the backplate mount. (See Fig. 1)



- 2) Depending on whether the engine is to be installed with the cylinder upright, inverted, angled or horizontal, position the backplate mount so that the access hole in the side of the mount is conveniently located to receive the fuel line and muffler-pressure line from tank to engine. Place the mount against the firewall so that its six mounting holes are accurately aligned on the

bolt circle. Mark off the bolt-hole centers and drill six 6.5mm holes through the firewall.

- 3) Remove the crankcase cover plate from the engine. Carefully slide the O-ring seal from the cover plate and fit it to the retaining groove on the backplate mount.
- 4) Fit the backplate mount to the engine in the required position and secure it firmly with the four M5 x 22 Allen screws provided.
- 5) Bolt the complete engine and backplate mount assembly to the firewall, using the six M5 x 25 Allen screws, toothed lock washers and blind nuts supplied.

GLOWPLUG

An O.S. No.8 glowplug is installed in the engine. However, performance may vary, to some extent, depending on local weather conditions, fuels, etc., and the user may care to select the most suitable alternative R/C type glowplug after tests.

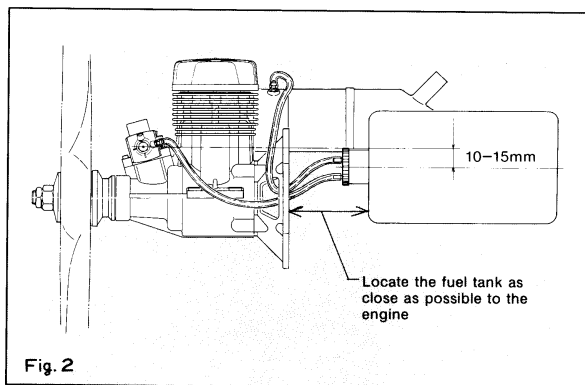
FUEL

Use a good quality commercial fuel containing 5 to 10 percent nitromethane. Lubricants may be either castor oil or synthetics, provided that they are always of the best quality. For consistent performance and long life of the engine, it is advisable to use fuel containing NOT LESS THAN 18% lubricant. Once the type of fuel has been chosen after practical tests, it is inadvisable to change the brand or type needlessly. This is because, in any engine, a change of fuel may cause deposits in the combustion chamber, on the piston crown, or in the ring groove, to become loosened and re-deposited elsewhere in the engine, with the risk of causing unreliability for a while. This tends to occur most frequently when, after an engine has been run for a period on a fuel containing only castor-oil lubricant, a change is made to one based on synthetic oil. When a change of fuel is unavoidable, it is advisable to recheck the engine by repeating the latter stages of the running-in procedure.

FUEL TANK

A 700cc or 24 oz. fuel tank gives approximately 10 minutes running time, with variations according to throttle setting, propeller size and fuel used. Use muffler pressurization and locate the tank so that its centre line is 10-15mm below the level of the needle-valve. Also, position the tank

as close to the engine as possible, i.e. immediately behind the firewall. (See Fig. 2)



Note: If the model is left unattended with the fuel tank filled, fuel may flow into the carburettor, causing it to "flood" the engine and making it difficult to start. Take appropriate action to prevent this, e.g. shut off the needle-valve or pinch the fuel delivery tube with a suitable clip.

PROPELLER

The choice of propeller depends on the design and weight of the model and on the type of flying in which you will be engaged. If necessary, determine the best size and type of prop after practical experimentation. As a starting point, refer to the propellers listed below.

Type of Model	Propeller size (dia. × pitch)
Sports	18×8, 18×10, 18×12, 20×8
Scale	18×10, 18×12, 20×8, 20×10

Note: Slightly smaller or larger propellers than those listed may be used. However, it should be noted that propeller noise will increase if propeller blade tip velocity is increased (i.e. due to higher engine r.p.m. or larger prop diameter).

For safety, keep your face and other parts of the body well away from the propeller when starting the engine or adjusting the needle-valve while the engine is running. Remember that the propeller operates through a much wider arc with large diameter propellers. Refer again to the "Safety Instructions and Warnings" leaflet enclosed.

IMPORTANT:

Use well balanced propellers and spinners only. An unbalanced prop or spinner causes vibration and loss of power.

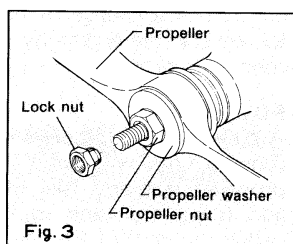
WARNING! There is a risk, particularly with large capacity engines, of the propeller flying off if the propeller nut loosens due to detonation or "knocking" should the engine be operated too lean or under too heavy a load. Obviously, this can be very hazardous. To deal with such risks, we have developed the special propeller locknut assembly supplied with the MAX-BGX-1 RING. This prevents the propeller from flying off, even if the propeller itself should slip or loosen. (See Fig. 3.)

Fit the BGX-1 RING safety locknut assembly as follows:

- 1) Ream the propeller boss to 9.6mm bore, then check that the propeller is accurately balanced.
- 2) Fit the propeller to the engine shaft, followed by the retaining washer and prop nut. Tighten the nut with the 17mm wrench supplied.
- 3) Finally, fit the locknut and tighten firmly, making sure that it locks into the propeller retaining nut.

IMPORTANT:

With any engine, regardless of the type of propeller attachment used, make a habit of checking prop tightness before starting the engine. Remember that, especially with wooden props, there is a tendency for the material to shrink, or for it to be reduced by the serrated face of the drive hub.



INSTALLATION OF SILENCER (MUFFLER)

To fit the standard silencer (See Fig. 4):

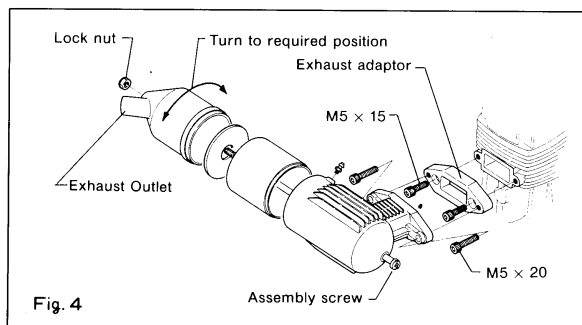
- 1) Fix the exhaust adaptor plate to the engine with the two M5 x 15 Allen screws supplied.
- 2) Now fit the silencer to the exhaust adaptor with M5 x 20 Allen screws, also provided.

Note: In order to prevent the leakage of exhaust oil from between the engine and adaptor, and between the adaptor and silencer, apply a suitable silicone sealant to the joint faces during assembly.

The angled exhaust outlet is adjustable and can be rotated to any desired position in the following manner (refer again to Fig. 4):

- 1) Loosen locknut and assembly screw.
- 2) Set the exhaust outlet at the required angle by rotating the rear part of the silencer.
- 3) Re-tighten the assembly screw, followed by the locknut.

Note: The standard silencer is quite effective, but reduces power to some degree. As previously stated, a tuned silencer and exhaust header pipe, specially developed for the MAX-BGX-1 RING, are available as optional extra parts, if the owner wishes to extract more power from the engine.



CARBURETTOR

The special O.S. automatic mixture control carburettor (Type 8AA), fitted to the MAX-BGX-1 RING, is dealt with in the separate instruction sheet enclosed. Please refer to these instructions when installing the engine and adjusting the carburettor controls.

STARTING

WARNING! This is a powerful engine and develops considerable thrust when running. Therefore:

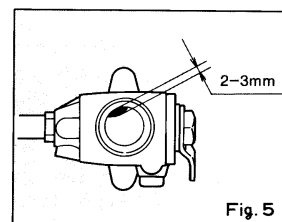
- When the engine is being started, an assistant should hold the model very securely.
- DO NOT start the engine with the throttle open: the model could suddenly move forward and slip from your assistant's grasp, which could have dangerous consequences.
- Take great care when adjusting the needle-valve while the engine is running. DO NOT attempt to adjust the mixture control screw while the engine is running.

Although it is possible to hand-start the BGX-1 RING, electric starting is preferable. A heavy-duty starter is recommended, to overcome the engine's high compression and because large glowplug engines have a tendency to "kick-back" under certain conditions (temperature, fuel type, etc.).

Note: Fit a strongly made spinner to facilitate the use of the electric starter and, as previously advised, employ a muffler-pressurized fuel system.

Starting procedure

- 1) Check the rotation of the electric starter (counter-clockwise when looking at the front of the engine). Reverse polarity of starter battery leads if incorrect.
- 2) Have the carburettor instructions at hand for cross reference.
- 3) Open the needle-valve 1 to 1-1/2 turns (when the standard E-5010 silencer is used) or 1-1/2 to 2 turns (when a tuned silencer is used), from the fully closed position.



- 4) Set the throttle rotor slightly open (2-3mm) from the closed position. (See Fig. 5)
- 5) Grasp the propeller and rotate the engine once or twice by hand to make sure that the piston passes freely over compression.
- 6) Heat the glowplug by connecting the glowplug battery leads.
- 7) Bring the starter cone into contact with the spinner, making sure that it is accurately aligned and that the model is being held firmly.
- 8) Depress the starter switch for one or two seconds.
- 9) If your starter has insufficient power to rotate the engine completely through the compression stroke, withdraw the starter, temporarily disconnect the glowplug battery and rotate the prop in the reverse direction until compression is felt. Holding this position, re-energize the glowplug and re-apply the starter. In this way the kinetic energy of the propeller — even though it rotates less than one revolution — can be used to help the starter take the engine over maximum compression.
- 10) When the engine starts, withdraw the starter immediately and open the throttle slightly before disconnecting the glowplug battery.

Now refer to the carburettor instruction sheet.

Hand starting

WARNING! When you attempt to hand-start a glow engine of this size, you may, under certain circumstances, experience a painful “kick-back”. DO NOT TRY TO START THE ENGINE WITH A BARE HAND. Always use a “chicken-stick” or a VERY heavily padded glove.

The best way to hand-start the BGX-1 RING is to adopt the “bounced-start” process, a practice that is familiar to users of large single-cylinder four-stroke-cycle glow engines. The procedure is as follows:

- 1) Fit the propeller to the shaft so that it is horizontal when brought up to compression.
- 2) Open the needle-valve 1 to 1/2 turns (when the standard E-5010 silencer is used) or 1-1/2 to 2 turns (when a tuned silencer is used), from the fully closed position.
- 3) Open the throttle fully and prime the engine. Do this by placing a finger over the carburettor air intake, while rotating the propeller in the normal direction (counter-clockwise) until fuel is seen to reach the carburettor, then turn the prop an extra 1-2 revolutions to draw fuel into the engine. Do not exceed 1-2 turns, or the engine may suck in too much fuel and become flooded and difficult to start.
- 4) Uncover the air intake and rotate the propeller several times to draw fuel/air mixture into the cylinder.
- 5) Set the throttle at the starting position, as shown in Fig. 5. (This is essential: it is dangerous for the engine to instantly reach high revolutions after starting.)
- 6) Now turn the prop slowly counter-clockwise until compression is felt. The prop should be approximately horizontal.
- 7) Keep the propeller in this position, then energize the glowplug and swing the prop smartly, from the centre of the blade, in the CLOCKWISE direction. The piston will then be kicked back to the point where ignition and expansion of the charge will take place and start the engine running in the normal direction.
- 8) If the engine fires intermittently, but does not run, make sure that fuel is reaching the engine in sufficient quantity, then repeat procedures 3) to 6). Correct priming is the secret of easy starting.
- 9) When the engine starts, open the throttle slightly before disconnecting the glowplug battery.

Now refer to the carburettor instruction sheet.

RUNNING-IN (“Breaking-in”)

This engine has a special low-friction, ultra hard-wearing composite cylinder plating, a low-expansion aluminium-alloy, ringed piston, twin ball-bearings and high quality phosphor-bronze connecting rod bearings. All parts are precision fitted and preliminary bench-running is not

necessary. Therefore, the engine can be installed directly in the aircraft, but, for peak performance and long life, please observe the following.

CAUTION: When running the engine on the ground, take care to avoid dusty or dry sandy locations. The strong slipstream of a powerful engine like the MAX-BGX-1 RING can raise dust and grit which, drawn into the engine, will seriously damage its working parts in a matter of seconds.

The recommended running-in procedure is as follows:

- 1) Fit the propeller which you intend to use for actual flying. Start the engine, then open the throttle and run it for about 5 seconds near the maximum r.p.m. Now open the needle-valve one quarter-turn to produce a rich mixture for cooler, slower operation. Run the engine for about 10 seconds at this setting.
- 2) Keeping the throttle fully open and using only the needle-valve to reduce r.p.m., repeat this procedure, alternately running the engine fast and slow, but gradually extending the brief periods of maximum speed operation until the contents of at least one full tank of fuel (typically 700cc or 24-25 fluid ounces) have been consumed.
- 3) Following this initial session of running-in, the engine should be given a period of moderately rich running in the air. For the first flights, set the needle-valve on the rich side and, if necessary, temporarily readjust the throttle trim on the transmitter so that the engine does not stop when the throttle is reduced to the idle setting for landing.
- 4) With each successive flight, close the needle-valve very slightly, until, at the end of ten flights, the needle-valve has reached its optimum setting — i.e. where the engine is delivering high power without being “over-lean”.
- 5) Refer to the carburettor instruction sheet, regarding optimum control adjustments, including adjustment for the best throttle response.

Note: Remember that, during the early stages of running-in, when the needle-valve is set quite rich, the carburettor cannot be expected to give its best response. Therefore, avoid abrupt throttle operation during this time and always be prepared for an emergency landing if the engine stops.

CARE OF YOUR MAX-BGX-1 RING

Do not run the engine too lean. As explained in the carburettor instructions, closing the needle-valve too far will cause overheating and the risk of damage. It also carries a greater risk of internal corrosion. The acidic products of combustion are increased at high temperatures with some fuels and, since a proportion of these by-products enter the crankcase with the blow-by gases from the combustion chamber, this increases the probability of corrosion of the steel parts of the engine, i.e. the formation of rust.

Equally important, however, is the prevention of cold corrosion which can occur if the engine is left “wet” with fuel. This can happen if the engine is stopped after a period of excessively rich running or prolonged idling.

At the conclusion of each flying session, let the engine run for a few moments at full throttle, with the correct needle setting, to bring it up to normal running temperature, then cut off the fuel supply — preferably by removing the fuel delivery line from the carburettor.

Extra protection against corrosion should also be given by injecting some corrosion inhibiting oil into the crankcase, via the carburettor intake, rotating the crankshaft for several revolutions to distribute the oil through the working parts of the engine.

Finally, do not disassemble the engine needlessly.

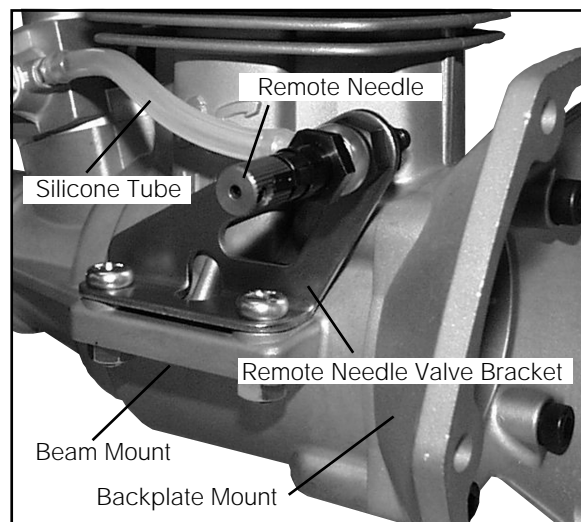
INSTRUCTIONS FOR MAX-BGX-1 RING NEEDLE VERSION ENGINES

It is of vital importance, before attempting to operate your engine, to read the general 'SAFETY INSTRUCTIONS AND WARNINGS' leaflet enclosed. Also, please study the entire contents of the instruction manual enclosed, so as to familiarize yourself with the controls and other features of the engine.

This 'RN' version of the MAX-BGX-1 RING is fitted, as standard, with a 'remote' needle-valve, mounted at the back of the engine, safely distanced from the propeller. This device was originated by OS several years before being adopted by a number of other manufacturers.

BEFORE INSTALLING THE ENGINE

- Fit the remote needle to the attachment bracket as shown in the photo.
- When beam-mounting the engine in the model, bolt the engine to the bearers along with the attachment bracket. Please refer to the INSTALLATION section of the engine instructions when installing the engine.
- Connect the needle-valve to carburettor jet nozzle with silicone tubing supplied. In the event of the tubing becoming damaged, it should be replaced with 78mm length of 5mm ODX2mm ID silicone tubing.



PARTS LIST

Description	Code No.	Description	Code No.
Crankcase	29301000	Thrust Washer	29320000
Crankshaft	29302000	Crankshaft Ball Bearing (Front)	46231000
Cylinder Liner	29303100	Crankshaft Ball Bearing (Rear)	29330000
Piston	29303200	Remote Needle Valve Bracket(BGX-1)	71704230
Piston Ring	29303400	Remote Needle Valve Assembly	28282000
Cylinder Head	29304000	Needle	28281970
Connecting Rod	29305000	"O" Ring	24981837
Piston Pin	29306000	Set-screw	26381501
Piston Pin Retainer(2pcs.)	29317000	Fuel Outlet	46181950
Cover Plate	29307000	Ratchet Spring	26711305
Drive Hub	29308000	Plug Screw	22881950
Woodruff Key	29208200	Carburettor Complete(Type 8AA-RN)	29383010
Propeller Lock Nut Set	29310100	Glow Plug No.8	71608001
Screw Set	29313000	E-5010 Silencer Assembly	29025000
Gasket Set	29314000	Backplate Mount	71919000

PARTS LIST(CARBURETTOR)

Description	Code No.	Description	Code No.
Carburettor Body	29381100	"O" Ring	27881820
Carburettor Rotor	28281200	Throttle Lever Assembly	28281400
Venturi Insert	28281210	Fuel Inlet	22681953
Rotor Spring	28281500	Carburettor Rubber Gasket	29315000
Rotor Guide Screw	28281600	Carburettor Fixing Screw	24925202
Mixture Control Screw Assembly	29381300		

The specifications are subject to alteration for improvement without notice.

O.S. ENGINES MFG.CO.,LTD.
 6-15 3-chome Imagawa Higashiumiyoshi-ku
 Osaka 546-0003, Japan. TEL. 06-6702-0225
 FAX. 06-6704-2722