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.

**ABOUT THE ENGINE**

- This is a high-performance two-stroke engine designed for sport and aerobatic models.
- The new 40K carburetor needle-valve assembly has been angled backward for safety.
- New E-3071 silencer (POWER BOX) develops very effective muffling. Also, the compact body enables it to fit within most cowls.

**STANDARD ACCESSORIES**

- Needle Valve
- Extension Cable Set
- E-3071 Silencer Assembly
- Silencer Retaining Screw (M3x35 2pcs.)

**BASIC ENGINE PARTS**

- Cylinder head
- Glowplug
- Carburetor
- Type 40K
- Propeller nut
- Cover Plate
- Beam Mount
- Crankcase
- Propeller washer
- Crankshaft

**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 frame, reinforcing the adjacent structure to absorb vibration. Use 4mm 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.71931300) is available, as an optional extra, for use where firewall type mounting is required.

**THROTTLE LINKAGE**

Before connecting the throttle to its servos, 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.

**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 manufacturer's 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.

**INSTALLATION**

The exhaust outlet of the silencer can be rotated to any desired position in the following manner:
- 1) Loosen the locknut and assembly screw.
- 2) Set the exhaust outlet at the required position by rotating the rear part of the silencer.
- 3) Re-tighten the assembly screw, followed by the locknut.

**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**

| Size  | 10.5x8 | 11x8-8 | 12x6-7 |

**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.

**Reminders**

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.

**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**

The 46AXE should be operated on a methanol based fuel containing not less than 18% (volumetric) castor oil, or a top quality synthetic lubricant (or a mixture of both), plus a small percentage (5-20%) of nitromethane for improved flexibility and power. (The carburetor is adjusted a little on the rich side at the factory for a fuel containing 20% lubricant and 15% nitromethane.) Some commercial fuels also contain coloring additives as an aid to fuel level visibility. In some cases, these additives have indicated slight negative effects on the performance. We would suggest that you use such fuels only if you are satisfied that they do not adversely affect running qualities when compared with familiar standard fuels. When changing to a fuel brand or formula that is different from the one to which you are accustomed, it is a wise precaution to temporarily revert to in-flight running-in procedures, until you are sure that the engine is running entirely satisfactorily.

**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 it.

**Fuel Tank**
A fuel tank of approximately 300cc 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.

**Glow Plug**
O.S. No.6 glowplug is supplied with the engine.

**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.
- **Glow Plug 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 fueling 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 I the end of the weight. Alternatively, O.S. Non-Bubble Weight is available as an optional extra.

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

**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.

**Silicone Fuel Line**
Heatproof silicone tubing of approx. 5mm o.d. and 2.5mm i.d. is required for the connection between the fuel tank and engine.

**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.

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

**Starting Procedure**
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 over-tighten.) Now open the needle-valve counter-clockwise 2-2.5 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.

**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.

**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 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.

**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.
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 excessive “take-off” 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 VALVE ADJUSTMENT section and SUBSEQUENT READJUSTMENT section.
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)

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 15-10 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.

Needle-valve adjustment diagram

Note: This diagram is for reference purposes only. Actual needle positions may differ from those shown.

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

**S.O. GENUINE PARTS & ACCESSORIES**
- **RADIAL MOTOR MOUNT**
  - No. 6 (71605000)
  - No. 7 (71607100)
  - No. 8 (71608001)
- **SPINNER NUT**
  - 1/4"-28 (L) (23024009)
- **PROPELLER NUT SETS**
  - FOR 2C SPINNER
  - 1/4"-28 M3 (71301020)
- **SILENCER EXTENSION ADAPTORS**
  - (5545600)
- **LONG PROPELLER NUT SETS**
  - 1/4"-28 (73101000)
- **SUPER FILTER**
  - (L) (72403050)
- **NON-BUBBLE WEIGHT**
  - (71531000)
- **NON-BUBBLE WEIGHT (S)**
  - (71531010)
- **FANG NUTS**
  - 6pcs./set M3 (79870031)
- **LOCK WASHER**
  - 10set M3 (5550002)
- **LONG SOCKET WRENCH WITH PLUG GRIP**
  - (71521000)

The specifications are subject to alteration for improvement without notice.

**MIXTURE CONTROL VALVE 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.

**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 carburettor to prevent dirt and dust in the tank from entering the carburettor.
- 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 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.

**REALIGNMENT OF MIXTURE CONTROL VALVE**
In the course of making carburettor 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.

**Note:** Although this is a two-stroke engine it fires like a four-stroke at these rich needle-valve settings i.e. ignition of the fuel charge takes place at every fourth stroke of the piston instead of every second stroke.
The specifications are subject to alteration for improvement without notice.

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**ENGINE PARTS LIST**

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<td>24603000</td>
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<td>Connecting Rod</td>
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<td>M3x15 Cap Screw (10pcs./sets)</td>
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**CARBURETOR PARTS LIST**

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<td>Carburator Retaining Screw</td>
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**ENGINE EXPLODED VIEW**

**CARBURETOR EXPLODED VIEW**

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**THREE VIEW DRAWING**

**SPECIFICATIONS**

- **Displacement:** 7.45cc / 0.455cu.in.
- **Bore:** 22.0mm / 0.866in.
- **Stroke:** 19.6mm / 0.772in.
- **Practical R.P.M.:** 2,000-17,000r.p.m.
- **Power output:** 12.5ps / 1.53hp / 16,000r.p.m.
- **Weight:** 758g / 13.32lbs.
- **Dimensions (mm):**
  - **Length:** 106.5
  - **Width:** 87.8
  - **Height:** 121.9

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