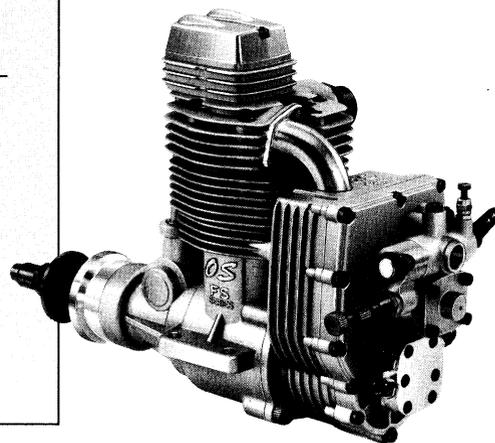


***O.S.***  
**FS-120S-SP**

**SUPERCHARGED  
FOUR STROKE CYCLE ENGINE**

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**OWNER'S  
INSTRUCTION MANUAL**



***O.S. ENGINES* MFG. CO., LTD.**

# 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 meters) 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 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.





# 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.
- 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. A safety locknut assembly is provided. Always use it. This will prevent the propeller from flying off in the event of a "backfire", even if it loosens.
- 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.



# 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 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 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!

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

The O.S. FS-120S-SP is a high-quality, high-performance, four-stroke-cycle engine equipped with an O.S.-designed Roots type supercharger. This is the very first time that a genuine supercharger has been fitted to a production model aircraft engine and the power output of the FS-120S-SP, compared with that of the already powerful standard model FS-120SII, has been increased by 30–40 percent. Most importantly, torque has been markedly improved, enabling the engine to be operated efficiently under heavier loads: that is to say, on larger propellers at lower revolutions, corresponding to ground r.p.m. of 8,000–9,000. This is of considerable value for FAI Class F3A contest flying (enabling competitors to qualify for noise-reduction bonus points).

The FS-120S-SP is equipped with an O.S. Type PG-02 gear-type fuel-pump. This feeds a constant, uninterrupted supply of fuel to an O.S. Type C14 carburettor, a new design that incorporates a special built-in pressure regulator. The complete system has been developed specifically for the FS-120S-SP and ensures that the engine is provided with the correct fuel/air mixture for optimum performance and throttle response, at all times, irrespective of fuel tank location and aircraft attitude.

Each FS-120S-SP is stamped with a serial number. Please quote this number if you have occasion to make any inquiry.

## **INSTALLATION**

Generally, it is best to bolt any single-cylinder engine directly to an engine mount that forms an integral part of the aircraft's fuselage, so that engine vibration is absorbed by the airframe. However, depending on the type of construction, this may cause the fuselage, wings, etc., to emit a resonant sound, which, when added to engine and propeller noise, may increase overall noise to unacceptable levels. To overcome this problem in F3A contest flying, many competitors now use a special resilient engine mounting, a so-called "soft mount", in which engine vibration is isolated from the airframe by rubber bushes or grommets between the engine mount and airframe.

However, this will allow the engine, itself, to vibrate with increased amplitude and the energy so used will reduce the power available at the crankshaft. This means that, with "soft mounts", full-throttle performance, on typical propeller sizes, is commonly reduced by between 300 and 600 r.p.m. In other words, the more resilient the engine mounting, the lower the noise level generated by the airframe, but at the expense of increased power loss. Therefore, when selecting or adjusting the resilience of a "soft mount", it is desirable to adopt a degree of flexibility that will provide the best balance between noise suppression and power delivery.

- **Throttle linkage**

When the engine is throttled down to idling speed, vibration amplitude, with a soft mount, is further increased and this can result in fluctuation in the throttle opening and, consequently, erratic running if the idle position of the throttle depends solely on the linkage to the servo. Therefore, it may be advisable to use the throttle stop screw on the carburettor, to positively fix the idling position. Remember to allow for some light spring compression in the linkage travel, to avoid stalling the servo at the end of the throttle movement.

**Note:** Fixing the idling speed with the throttle stop screw will mean, of course, that the engine cannot be stopped by retarding the throttle trim lever on the transmitter.

- **Installation of cowling, etc.**

If a soft mount is used, make sure that vibration does not cause the engine and/or spinner to touch the fuselage or cowling. In addition to damaging these parts, such contact may result in extra noise, overheating and unreliable idling.

- **Securing the engine**

Irrespective of the type of mount employed, be sure to bolt the engine to it firmly, using 5 mm steel screws, such as Allen type socket-head cap screws, with washers and locknuts.

- **Silencer assembly**

Observe the following assembly sequence:

- 1) Locate the exhaust header-pipe on the cylinder-head by screwing the union nut over the exhaust-stub. Adjust the header-pipe to the required angle, then tighten the union nut firmly with the 17 mm wrench supplied.

- 2) Screw the silencer onto the header pipe and tighten the locknut securely.

**Note:** We advise the application of a heatproof silicone sealant to the threads of the exhaust system. Examine the joints periodically to make sure that the nuts have not loosened.

### **O.S. EX-502-SP SILENCER**

The EX-502-SP silencer has been designed and developed expressly for O.S. FS-120S-SP and FS-120SII engines for FAI F3A competition use. The silencer and the matched exhaust pipes are available as optional extras. (See Parts List.)

### **GLOWPLUG**

An O.S. Type "F" glowplug is fitted to the engine. This well-proven plug was developed specifically for four-stroke engines. When the plug needs replacing, it is advisable to choose the O.S. Type "F" as the engine may not perform so well on other plugs.

### **PROPELLERS**

Determine the best size and type after practical experimentation. Suggested sizes for typical FAI F3A competition models are 13½x13½ to 14 and 14x12 to 14.

#### **Propeller material**

Because of the much above average performance of the supercharged FS-120S-SP, special attention needs to be paid to the choice of propeller material. In order to absorb the engine's very strong torque impulses without slipping, the propeller must be very firmly secured to the crankshaft. This means that the propeller, itself, must be made of a strong, hard material, so that when the propeller nut is

fully tightened, the propeller boss will not become crushed, or its rear surface broken up under the pressure of the serrated face of the propeller driver.

Some ordinary wooden propellers (including certain types made from maple or beech) may not be strong enough for this engine. Preferable is a high quality resin bonded laminated propeller, or one made of glassfibre, or carbon fibre, reinforced epoxy resin. If a glassfibre-reinforced propeller is used, make quite certain that it is one of the special high-grade, high-tensile types approved for high-performance engines.

**Caution:** Take extra care to avoid injury when using hard, sharp-bladed propellers.

**Attention:** Keep your face and other parts of the body well away from the propeller when starting the engine or when adjusting the needle-valve while the engine is running. Remember that the propeller operates through a wider arc with the large diameter propellers that this engine is capable of turning. Refer again to the "Safety Instructions and Warnings" leaflet enclosed.

**Important:** Use well balanced propellers and spinners only. An out-of-balance propeller or spinner causes vibration and loss of power.

**WARNING:** When operating a powerful engine at high speed, there is always a danger, especially with nylon propellers (even some of the latest, most strongly reinforced types) of the propeller fracturing and a blade being thrown off. Obviously, this is very dangerous and could cause serious injury. Therefore, never crouch over the engine when it is running and keep all onlookers well back and behind the model. If a spinner is fitted, make sure that the spinner notches are large enough to clear the propeller blades. The spinner must not cut into the blades when it is tightened.

There is also a risk, particularly with four-stroke engines, of the complete propeller flying off if the propeller retaining nut loosens, due to the onset of detonation or "knocking" through operating the engine too lean, or under too heavy a load. This, too, can be very hazardous, but, to eliminate this danger, we have developed special propeller locknut assemblies for the O.S. four-stroke engines, including the latest type now fitted to the FS-120S-SP. These prevent the propeller detaching itself from the engine, even if it should slip or loosen.

**Fit the locknut assembly as follows.**

- 1) Ream the propeller boss to 8.1 mm diameter, making sure that the bore is at 90 degrees to the plane of rotation. Check that the propeller is accurately balanced.
- 2) Fit the propeller to the engine shaft, followed by the retaining washer and nut. Tighten the nut with the 14 mm wrench supplied.
- 3) Finally, fit the locknut and tighten firmly, making sure that it locks into the propeller retaining nut.

**Note:** Some 6–8 in. pitch propellers have insufficient boss thickness. Select a propeller of at least 18 mm boss thickness to insure that the locknut fully engages the prop retaining nut.

**IMPORTANT:** With any engine, regardless of the type of propeller security system utilized, make a habit of checking prop tightness 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.

## FUEL

The FS-120S-SP runs on standard model glowplug engine fuels, but, for the best combination of performance and reliability, mixtures containing between 15% and 25% nitromethane are recommended. For consistent performance and long engine life, it is essential to use fuels of the highest quality, containing NOT LESS THAN 18% lubricating oil. Lubricants may be castor-oil and/or an equivalent grade of synthetic oil. When the engine leaves the factory, the carburettor is adjusted for a fuel containing 20% nitromethane and 20% lubricant.

## FUEL TANK

A 400 cc (14 oz) fuel tank will provide approximately 10 minutes running time. The actual time varies, of course, according to the proportion of full-throttle to part-throttle operation and also depends on the fuel and/or propeller used.

Make sure that the fuel tank "clunk" type pickup weight is properly installed and cannot stick to the tank wall and cause an irregular fuel flow. Without a freely moving pickup, fuel delivery could be cut off during aerobatic manoeuvres. As a safety measure, it is advisable to make slots in the end of the weight with a file or fine hacksaw blade, as shown in Fig. 1. Remember to thoroughly wash out the weight, to remove any particles of metal, prior to re-inserting it into the fuel tank.

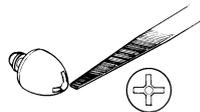


Fig. 1

Especially with large single-cylinder engines, air bubbles tend to be generated in the fuel tank due to vibration. This will cause the engine to run erratically or stop. Standard procedure to prevent this is to isolate the tank from the surrounding structure by wrapping it in foam rubber.

## FUEL LINE

Use heavy-duty silicone fuel tubing of approximately 2.5 mm bore and 5 mm outer diameter. It is advisable to secure all connections with commercially available tubing clips. Incidentally, this engine does not have an external crankcase breather.

## FUEL PUMP AND PRESSURE REGULATOR

The gear type mechanical fuel pump fitted to the FS-120S-SP is built onto the rear of the supercharger and is driven from it. Do not attempt to disassemble either of these components.

Never attempt to "clean out" the fuel inlet and outlet nipples with a sharp instrument, such as a pin or thin wire. This is likely to damage the system and render it inoperative. The nipples will not become obstructed unless unused fuel is allowed to remain in the system and then left to coagulate through a long period of storage. Such coagulation can be contained, or prevented, by keeping uncovered nipples sealed with the small plastic caps provided.

If foreign matter is allowed to enter the fuel system, it may interfere with its functioning and cause damage to the working parts. Therefore, make sure that all fuel is thoroughly filtered. See recommendations in 'MAINTENANCE' section.

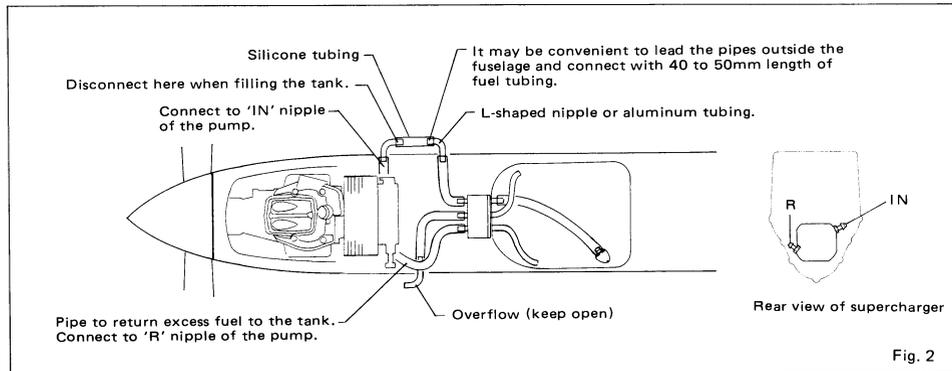
Do not bring your face near to the fuel-tank overflow (ventilation) pipe. If, when being started, the engine rotates in the reverse direction, fuel will spurt strongly from the overflow.

Here is an example of a typical installation. DO NOT use muffler pressurized fuel feed.

### STARTING

It is advisable to use a heavy-duty electric starter for this engine, due to the fact that large, single-cylinder glow engines have a tendency to "kickback", under certain conditions, when being hand started. Make sure that the starter-motor leads are correctly connected to rotate the engine counter-clockwise when viewed from the front. Starting procedure is as follows.

- 1) Set the throttle slightly more than half-open and the needle-valve two and half turns open from the fully closed position.
- 2) This engine is not fitted with a choke valve, therefore rotate the engine for at least 5 seconds, using the electric starter, to pump fuel from tank to carburettor. (It may be necessary to rotate the engine for 10 seconds, or more, in the case of a brand-new engine or one that has been out of use for a long time.) DO NOT energize the glow plug at this stage.
- 3) Now re-set the throttle very slightly open from the idling position (See Fig. 3) and turn the propeller slowly clockwise, by hand, until compression is felt.
- 4) With the propeller still in this position, energize the glowplug and apply the electric starter.



- 5) When the engine starts, open the throttle slowly to the half-speed position, leaving the needle-valve at its starting setting. Let the engine run like this for approximately 20 seconds. If it slows down because the mixture is excessively rich, close the needle-valve gradually until the engine runs evenly.
- 6) Finally, disconnect the battery from the glowplug, slowly move the throttle to its fully open position and close the needle-valve slowly to increase engine speed. Adjust the needle-valve gradually, taking care not to turn it too far. Remember that response to each readjustment, in terms of increased revolutions, will be slightly more delayed than in the case of a conventional unsupercharged engine.

#### **RUNNING-IN ("Breaking-in")**

All internal-combustion engines benefit, to some degree, from extra care when they are run for the first few times — known as running-in or breaking-in. However, as O.S. engines are made with the finest modern precision machinery and from the best and most suitable materials, only a very brief break-in period is required and this can be completed with the engine installed in the model.

**CAUTION:** When running the engine on the ground, take care to avoid dusty or dry sandy locations. Dust and grit drawn into the engine will seriously damage its working parts. A powerful engine like the supercharged FS-120S-SP, can be ruined in a matter of seconds, in this way.

The recommended running-in procedure is as follows.

- 1) Start the engine with the throttle open just above the idle setting (see Fig. 3), then open the throttle fully and run the engine for about 3 seconds, only, at near maximum r.p.m. Now open the needle-valve one half

turn to produce a rich mixture for cooler, slower operation. Operate the engine for about 10 seconds at this setting.

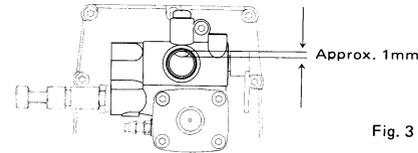


Fig. 3

- 2) After 10 seconds, close the needle-valve again for a fast 5-second run, followed by another 10 seconds of rich running. Repeat this procedure, running the engine alternately fast and slow with the needle-valve, but then gradually extending the short periods of high-speed operation until two full tanks of fuel have been consumed.
- 3) Following this initial break-in period, the engine should be given a period of moderately rich running in flight, setting the needle-valve  $\frac{1}{4}$  to  $\frac{1}{2}$  open from the peak r.p.m. position. For the first few flights, it may be necessary to readjust the idling speed, temporarily, so that the engine does not stop when the throttle is closed.
- 4) Before each flight, allow the engine to warm up, then run it at full throttle for 2 to 3 seconds just before taking off.
- 5) With each successive flight, close the needle-valve slightly, until, at the end of 15 flights, the needle is at the optimum setting. Remember that the optimum needle-valve setting is always very slightly on the rich side of

the setting at which maximum full-throttle power is reached. Do not "over-lean" the mixture. This will cause overheating and seriously shorten the engine's life.

- 6) After approximately 15 flights, the carburettor can be adjusted for optimum throttle response, following the instructions given in the next section. Remember that, while the engine is being run-in and the needle valve is set rich, the carburettor cannot be expected to show its true capabilities. Therefore, avoid abrupt throttle changes (e.g. wide open to idle) during this time and always be prepared for an emergency landing if the engine stops.

#### O.S. TYPE C14 CARBURETTOR

Three adjustable controls are provided on the Type C14 carburettor fitted to the supercharged FS-120S-SP. They are as follows.

- **The Needle Valve:** For adjusting the mixture when the throttle is fully open.
- **The Mixture Control Screw:** For adjusting the mixture at part-throttle and idling speeds, to obtain steady idling and smooth transition through medium speeds.
- **The Throttle Stop Screw:** For establishing the minimum idling speed.

#### ADJUSTING THE CARBURETTOR

The following adjustments should be carried out only after the engine has passed through the processes described in the 'RUNNING-IN' section. Advised procedures for setting the carburettor controls are as follows.

- 1) Open the needle-valve two turns (assuming the use of 20% nitromethane content fuel) from the fully closed position.
- 2) Set the throttle slightly open from the idling position (see Fig. 3) and start the engine in the normal way. It is preferable to have the throttle only slightly open, to avoid unnecessarily high revolutions when the engine starts.
- 3) Increase the throttle opening just sufficiently to allow the glowplug battery leads to be disconnected without causing the engine to stop, then slowly move the throttle to its fully open position. If the engine does not accelerate properly, due to an excessively rich mixture, close the needle-valve slightly and try again.
- 4) If the engine runs unsteadily, due to a continuing over-rich mixture, gradually reduce the needle setting until the engine smooths out, while remaining on the rich side. DO NOT close the needle-valve to its peak r.p.m. setting at this point.
- 5) After running the engine very briefly on this setting, close the throttle and allow it to idle for a similarly short period. Then restore the throttle to its fully open position to make sure that the engine continues to run evenly and slightly rich.

**WARNING!** If, at full throttle, the engine begins to 'detonate', close the throttle immediately to idle position and open the needle-valve 90 degrees. Then repeat steps 4) and 5).

- 6) Now, very carefully, one 'click' at a time, reduce the needle setting until the peak r.p.m. setting is reached, then, immediately, turn the needle precisely three 'clicks' counter-clockwise as a safety measure.
- 7) Once again, throttle the engine down to its idling speed, then slowly back to full power to make sure that it runs steadily at full throttle.
- 8) Next, check the response to the mixture control screw. Begin by fixing the idling speed at around 2,300–2,500 r.p.m. by means of the throttle trim lever on the transmitter.
- 9) Now raise r.p.m. to around 4,000. Operate the engine at this speed for about 10 seconds, then open the throttle fully. Engine speed should increase smoothly.
- 10) If it does not, turn the mixture control screw clockwise 30 degrees and repeat steps 8) and 9). If necessary, make another similar adjustment.
- 11) If mixture control screw adjustment does not have the desired effect — even when rotated clockwise through its full range of adjustment (i.e. approximately 90 degrees) this suggests that the needle-valve has not been adjusted correctly. Recheck the procedures outlined earlier.
- 12) On the other hand, if, on opening the throttle from 4,000 r.p.m., there is a quick response but the engine fails to reach full power and cuts out, turn the mixture control screw clockwise. Recheck steps 8) and 9).

**Notes:**

The O.S. FS-120S-SP supercharged four-stroke-cycle engine is a powerful and complex unit that was designed for experts. As such, it responds best to an expert touch. Concerning the carburettor, precise adjustment of the primary control, the Needle-valve, is still essential to the proper functioning of the engine at all times. Inaccurate setting of the needle-valve will not, for example, be compensated by readjustment of Mixture Control Screw.

Bear in mind these two observations regarding in-flight performance:

- 1) If engine speed 'surges' in full-throttle level flight, it is probable that the needle-valve is set slightly too rich. Try closing it two or three 'clicks' — preferably just one click at a time to avoid the risk of 'over-leaning' the mixture and causing detonation.
- 2) If the engine does not pick up cleanly to full power from below half-throttle operation, or runs unsteadily when the throttle is re-opened after a part-throttle manoeuvre, it is probable that the Mixture Control Screw is set too rich.

Other problems are most commonly the result of external factors, including unsuitable fuel, deficient installation and inadequate care and maintenance, such as poorly filtered fuel causing fuel metering problems. Please refer to the 'CARE & MAINTENANCE' section of this manual.

**Needle-valve sensitivity**

If the needle-valve is found to be too critical when using the needle fitted to the engine, this may be replaced with the more finely tapered needle (Code No. 27681970) supplied to de-sensitize adjustment.

**VALVE CLEARANCE ADJUSTMENT**

A valve adjusting kit is supplied as standard. Refer to the instructions sheet enclosed in the kit.

**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. Insert the extension (supplied) into the needle-valve's centre hole and secure it by tightening the set-screw in the knob with the small Allen key provided. If a longer extension is required, use one as light as possible and support its outer end to stop it from vibrating.

## CARE & MAINTENANCE OF YOUR FS-120S-SP

The importance of not allowing your engine to run too lean during running-in has already been stated. In fact, running the engine over-lean at any time must be avoided. In addition to the danger of inadequate lubrication through overheating, lean runs also carry a greater risk of causing internal corrosion. The acidic products of combustion are increased with some fuels at high temperatures. Since a proportion of these by-products enter the crankcase with the blowby gases from the combustion chamber, this means a greater risk of corroding the steel parts of the engine, i.e. the rusting of the crankshaft, camshaft, ball-bearings, etc. Equally important, however, is the prevention of cold corrosion through the engine being left "wet" with fuel. This can happen if the engine is stopped after a period of excessively rich running or prolonged idling. It is suggested that, at the conclusion of each flying session, the engine is allowed to run for a few moments at full throttle, with the correct needle setting. This will bring it up to its normal operating temperature. Then simply cut off the fuel supply 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. To do this, remove the plug screw sited below the camshaft housing and inject the oil while rotating the crankshaft, cam gears, etc.

Keep the engine in a clean, dry atmosphere when it is not in use. Do not dismantle the engine. Do not remove any screws other than the cylinder-head screws and the two screws securing the carburettor. Do not interfere with the supercharger or its performance may be impaired.

Minute particles of foreign matter are present in even the best quality fuels and these can build up to cause erratic and unreliable operation of the pump, regulator and car-

burettor. It is essential, therefore, that all fuel is properly filtered. Use a high-quality filter between your refuelling container and the aircraft fuel tank. O.S. Super-Filters are available as optional extras. One of these can be installed inside your refuelling container, to prevent foreign matter from reaching the fuel tank, and a second filter between tank and pump will provide added protection.

**WARNING:** Do not disassemble this engine. Once the engine has been disassembled, its original performance may not be restored when it is reassembled.

## Repairs and Replacements

In view of the complexity of the supercharged FS-120S-SP, owners are advised not to attempt to replace internal parts themselves. In fact, parts marked with a dot (●) in the PARTS LIST are not available through retail channels. If it becomes necessary to have the engine repaired or overhauled, it should be sent to the officially appointed O.S. distributor in your country. Unauthorized repairs will also invalidate the engine warranty.

## SPECIFICATIONS

|                        |                         |
|------------------------|-------------------------|
| Displacement           | 19.96 cc (1.218 cu.in.) |
| Bore                   | 30.4 mm (1.197 in.)     |
| Stroke                 | 27.5 mm (1.083 in.)     |
| Practical r.p.m.       | 2,000-11,000            |
| Power Output           | 2.5BHP/10,000r.p.m.     |
| Weight (with silencer) | 1,030g (36.36oz.)       |

## PARTS LIST

| Code No.   | Description                       | Code No.   | Description                               |
|------------|-----------------------------------|------------|---|
| ● 45501030 | Crankcase                         | 45560030   | Intake Valve Assembly                     |
| 45501110   | Cam Cover                         | 45560040   | Exhaust Valve Assembly                    |
| ● 45502020 | Crankshaft                        | 45561010   | Rocker Arm Assembly                       |
| ● 45503100 | Cylinder Liner                    | 45561401   | Rocker Support Assembly                   |
| ● 45503210 | Piston                            | 45562010   | Camshaft                                  |
| ● 45503400 | Piston Ring                       | 45564000   | Cam Follower                              |
| 45504020   | Cylinder Head (w/Valve Ass'y)     | 46166000   | Push Rod                                  |
| 45504110   | Cylinder Head                     | 45566101   | Push Rod Cover Assembly                   |
| 45504210   | Rocker Cover                      | 45569431   | Intake Pipe Assembly                      |
| ● 45505020 | Connecting Rod                    | ● 45587000 | Supercharger Unit                         |
| ● 45506010 | Piston Pin                        | 45586001   | Carburettor Complete (Type C14)           |
| ● 29017004 | Piston Pin Retainer               | 71615009   | Glow Plug Type "F"                        |
| 45508030   | Drive Washer (w/Key)              | 45525001   | Silencer Assembly                         |
| 45508200   | Woodruff Key                      | 72200060   | Valve Adjusting Kit                       |
| 45520000   | Thrust Washer                     | 27681970   | Needle                                    |
| 45910200   | Propeller Locknut Set for Spinner | * 71904300 | Radial Motor Mount Assembly For FS-120-SP |
| 45513020   | Screw Set                         | * 72141000 | EX-502-SP Silencer                        |
| 45514022   | Head Gasket                       | * 72140400 | EX-502 Exhaust Header Pipe (120IN)        |
| ● 29031009 | Crankshaft Ball Bearing (Front)   | * 72140500 | EX-502 Exhaust Header Pipe (120C)         |
| ● 45530000 | Crankshaft Ball Bearing (Rear)    | * 45910300 | 5/16-M5 Propeller Locknut Set             |
| ● 45231100 | Camshaft Bearing                  |            |   |

● Optional parts

● These parts will not be sold at retail shops.

The specifications are subject to alteration for improvement without notice.

## CARBURETTOR PARTS

| Code No. | Description                    |
|----------|--------------------------------|
| 45586100 | Carburettor Body               |
| 45586201 | Carburettor Rotor              |
| 27381900 | Needle Valve Assembly          |
| 29081952 | Needle                         |
| 24981837 | "O" Ring                       |
| 26381501 | Set Screw                      |
| 27381940 | Needle Valve Holder Assembly   |
| 26711305 | Ratchet Spring                 |
| 26781619 | Rotor Stop Set Screw Assembly  |
| 26681305 | Rotor Stop Set Screw           |
| 26681803 | Rotor Stopper Holder Assembly  |
| 45581820 | Rotor Guide Screw              |
| 45586300 | Mixture Control Valve Assembly |
| 27881800 | "O" Ring (S)                   |
| 27881810 | "O" Ring (L)                   |
| 27881820 | Metering Valve "O" Ring        |
| 27681340 | Mixture Control Valve Stopper  |
| 27881330 | Mixture Control Screw          |
| 27881400 | Throttle Lever Assembly        |
| 45515020 | Carburettor Rubber Gasket Set  |
| 45586700 | Carburettor Fixing Screw Set   |

**WARNING !!**

**Do not disassemble the engine.  
Once the engine has been disassembled,  
its original performance may not be  
restored when it is reassembled.**

***O.S. ENGINES*** MFG.CO.,LTD.

6-15 3-chome Imagawa Higashisumiyoshi-ku  
Osaka 546, Japan. TEL. (06) 702-0225  
FAX. (06) 704-2722