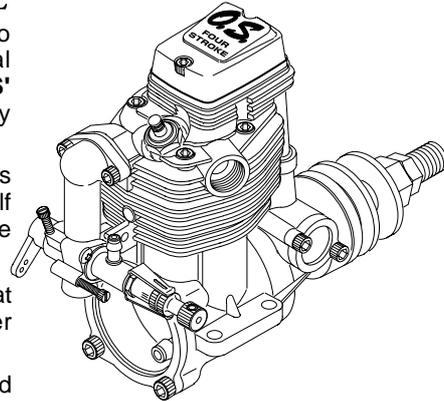

O.S. ENGINE**FS-30S & FS-40S**

**FOUR CYCLE ENGINE
OWNER'S INSTRUCTION MANUAL**

It is of vital importance, before attempting to operate your engine, to read the general **'SAFETY INSTRUCTIONS AND WARNINGS'** section on pages 2-6 of this booklet and to strictly adhere to the advice contained therein.

- Also, please study the entire contents of this instruction manual, so as to familiarize yourself with the controls and other features of the engine.
- Keep these instructions in a safe place so that you may readily refer to them whenever necessary.
- It is suggested that any instructions supplied with the aircraft, radio control equipment, etc., are accessible for checking at the same time.



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SAFETY INSTRUCTIONS AND WARNINGS ABOUT YOUR O.S. ENGINE

Remember that your engine is not a "toy", but a highly efficient internal-combustion machine whose power is capable of harming you, or others, if it is misused.

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.

2



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 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.



3



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 lock-nuts.
- 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.



NOTES

- 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 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.



NOTES

- 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!

This manual handles the following two versions.

FS-30S, FS-40S

The FS Series engines are up-to-date overhead-valve four-stroke-cycle engines for model aircraft use and are the outcome of a long period of technical development.

The FS Series engines are produced by the world's oldest and largest model engine manufacturing company; a company which also pioneered the quantity production of model four-cycle engines.

Accessories

FS-30S

- F-2010 Silencer Assembly

FS-40S

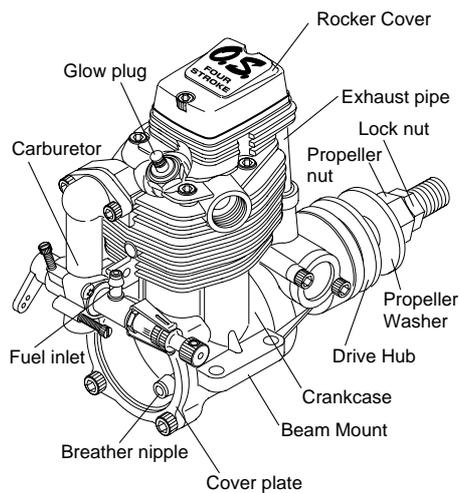
- Silencer Body
- Choke rod

INSTALLING THE GLOWPLUG

Install washer on glowplug and insert carefully into cylinder-head, making sure that it is not cross-threaded before tightening firmly.



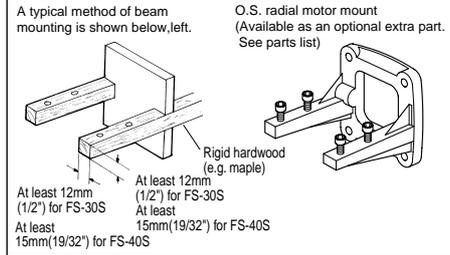
BASIC ENGINE PARTS



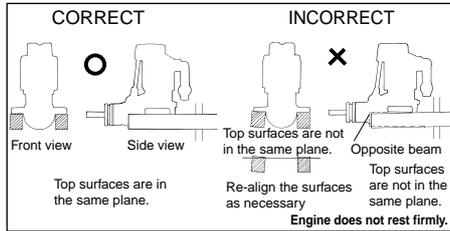
FS-30S

INSTALLATION

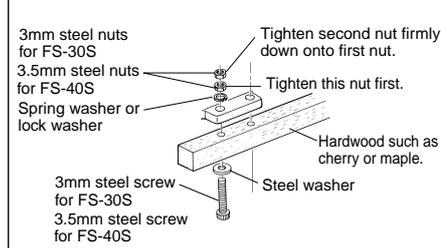
Installation in the model



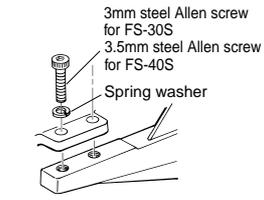
Make sure that the mounting beams are parallel and that their top surfaces are in the same plane.



How to fasten the mounting screws.



Hardwood mounting beams



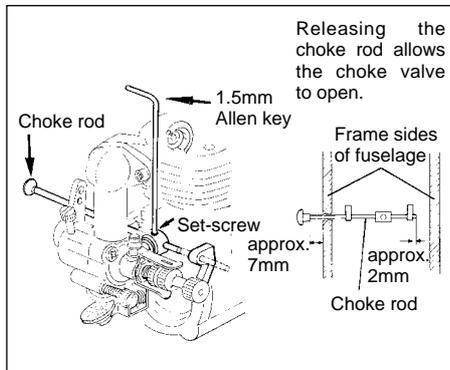
O.S. radial motor mount (cast aluminum)

8

INSTALLATION OF CHOKE ROD (FS-40S)

The FS Series engines are equipped with self-reopening choke valves.

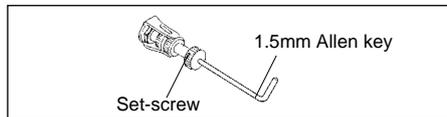
Cut the choke rod (supplied) to the length indicated, then secure the rod by tightening the set screw, using 1.5mm Allen wrench, after installing the engine.



NEEDLE VALVE EXTENSION

The needle-valve supplied with these engines 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.

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



9

SILENCER

Installation for FS-30S and FS-40S

Screw the exhaust header pipe into the exhaust port until it "bottoms", then unscrew it just sufficiently to achieve the required exhaust outlet angle. Secure the pipe in this position by tightening the locknut firmly against the cylinder head with the wrench supplied. Then, screw the silencer onto the end of the header pipe and tighten locknut firmly. Re-check tightness of locknuts when engine is hot.

LINKAGE OF THROTTLE LEVER

First, ensure that the throttle rotor is fully closed when the throttle-lever is in the closed position. Adjust rotor stop screw if necessary. Then couple the lever to the throttle-servo so that the rotor is fully closed when the transmitter throttle stick and trim lever are in the fully retarded position.

BEFORE STARTING

Tools, accessories, etc.

The following items are necessary for operating the engine.

1 Fuel

Model glowplug engine fuel of good quality, preferably containing a small percentage of nitromethane. (See "Advice on selection of fuel, glowplug and propeller")

2 Glowplug

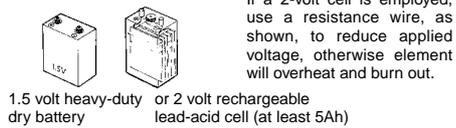
O.S. Type F glowplug is installed in the engine.

3 Propeller

Suggested propellers are shown in the ADVICE ON SELECTION OF FUEL & PROPELLER section.

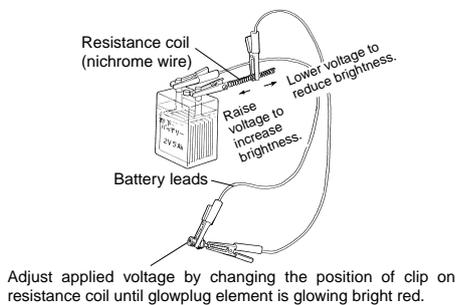
4 Glowplug battery

The power source for heating the glowplug may be a 1.2volt Ni-cd battery a large heavy-duty 1.5volt dry cell, or a 2-volt rechargeable lead-acid cell (accumulator).



Warning (Very hot)

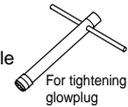
Never touch the nichrome wire while the battery is connected.



5 Plug wrench

Used for tightening glowplug.

The O.S. long plug wrench is available as an optional accessory.



6 Battery leads

These are used to conduct current from the battery to the glowplug. Basically, two leads, with clips, are required, but, for greater convenience, twin leads with special glowplug connectors, as shown on the right, are commercially available.



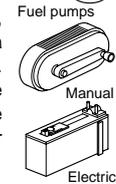
7 Fuel tank

For installation in the model, a 150cc(5oz.) for FS-30S and FS-40S tank is suggested. These will allow 10 minute flight.



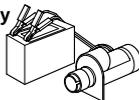
8 Fuel bottle or pump

For filling the fuel tank, a simple, polyethylene "squeeze" bottle, with a suitable spout, is all that is required. 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.



9 Electric starter and starter battery

An electric starter is recommended for starting.



10 Fuel can filter

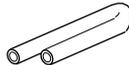
Install a filter in the outlet line of your refuelling container to prevent entry of foreign matter into the fuel tank. (Refer to ⑥ of STARTING THE ENGINE section.)



Fuel Can Filter

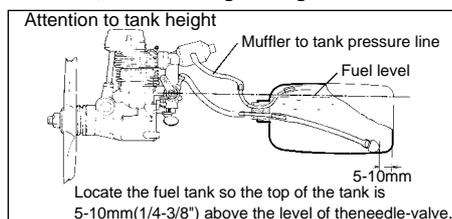
11 Silicone tubing

This is required for the connection between the fuel tank and engine.

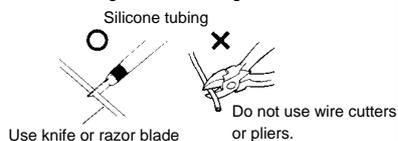


FUEL AND PRESSURE LINES

Connect suitable lengths of silicone tubing, as illustrated, after installing the engine.



Note: When cutting silicone tubing--



*If you should need to clean the silicone tubing, use methanol or glow-fuel, not gasoline or kerosene.

Silencer (muffler) pressurized fuel system

To reduce variation in fuel "head" and ensure steady fuel delivery at the carburetor, it is advisable to employ a silencer (muffler) pressurized fuel system, i.e. to use the silencer outlet nipple to pressurize the fuel tank as shown at left.

ADVICE ON SELECTION OF FUEL, GLOWPLUG & PROPELLER

Fuel

Use a good quality commercial fuel or one of the blends shown in the table. Fuel "A" is suitable for running-in and ordinary use. Fuel "B" is for use when more power is required and for improved flexibility. Note that even a small quantity of nitromethane (3-5%) will improve flexibility, making the needle-valve adjustment less critical and improving throttle response. Use only materials of the highest purity. Synthetic oils are permissible but are less tolerant of a "lean run" than castor-oil. If, therefore, a synthetic lubricant is used in the fuel, readjust the needle-valve to a slightly richer setting, as a safety measure, in case the fuel/air mixture becomes too lean through maneuvers in flight. If a higher nitro fuel is used, the engine should be checked out to make sure that it is sufficiently run-in to operate on that particular fuel without overheating. Do not use fuels containing less than 18% lubricant.

	A	B
Methanol	75%	65%
Castor Oil	20%	20%
Nitromethane	5%	15%

Reminder!

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

⚠ Model engine fuel is also highly flammable. Keep it away from open flame, excessive heat, sources of sparks, or anything else which might ignite it. Do not smoke, or allow anyone else to smoke, near to it.

PROPELLER

Suggested propeller sizes are given in the table. As the ideal propeller diameter, pitch and blade area vary according to the size, weight and type of model, final propeller selection will require in flight experimentation.

Reminder!

⚠ 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.

	Sport & Aerobatic	Trainer & Scale
FS-30S	9x6-7, 10x4	10x5-6
FS-40S	10x7-7.5, 11x6	10x7, 10.5x6, 11x7 12x5-6

GLOWPLUG

The FS-30S and FS-40S are supplied with an O.S. Type F glowplug, specially designed for O.S. four-stroke engines.

The role of the glowplug

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

Glowplug life

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

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

When to replace the glowplug

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

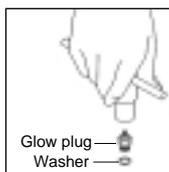
- Filament surface has roughened and turned white.
- Filament coil has become distorted.
- Foreign matter has adhered to filament or plug body has corroded.
- Engine tends to cut out when idling.
- Starting qualities deteriorate.

STARTING THE ENGINE

Preparations

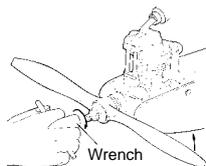
1 Installing the glowplug

Install the washer on the glowplug and screw carefully into cylinder-head, making sure that it is not cross-threaded before tightening firmly.



2 Installing the propeller

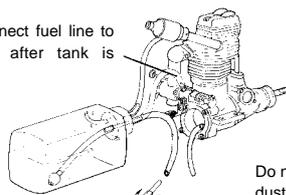
There is a risk, particularly with four-stroke engines, of the propeller flying off if the propeller nut loosens due to detonation or "knocking" when the engine is run too lean or under too heavy a load. To prevent this from happening, it is recommended to use the special Propeller Locknut Set (optional extra) with the FS-40S.



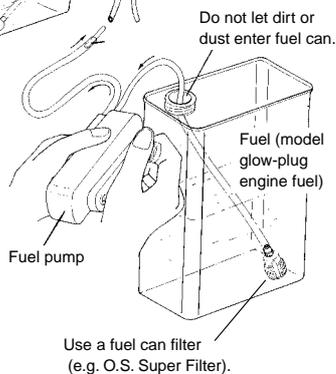
Tighten the propeller nut firmly so that compression is first felt around this position (i.e. with blades horizontal) when turning the propeller in the direction of arrow.

3 Filling the fuel tank

Re-connect fuel line to engine after tank is filled.



Disconnect fuel line from the fuel inlet, and connect it to the tubing from the fuel pump.

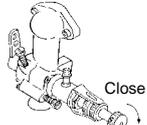


Starting

④ Opening and closing of the needle-valve

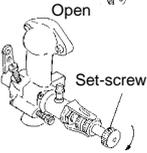
Turn needle-valve clockwise to close (for leaner mixture).

Turn needle-valve counter-clockwise to open (for richer mixture).



⑤ Setting the needle-valve

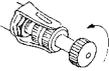
Turn the needle-valve in the direction of arrow slowly, without forcing, until it stops. The position where the needle-valve stops is the fully closed position. It may be convenient to remember the position of the mark or set-screw at this time.



Turn the needle-valve in the direction of arrow from the closed position.

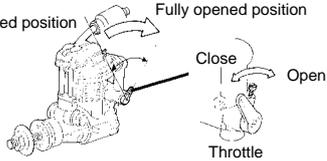
FS-30S (2 to 2-1/2 turns)

FS-40S (2-1/2 to 3 turns)

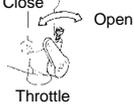


⑥ Open the throttle fully

Fully closed position



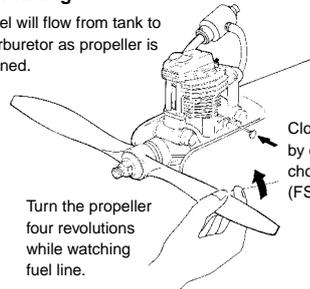
Fully opened position



Throttle

⑦ Priming

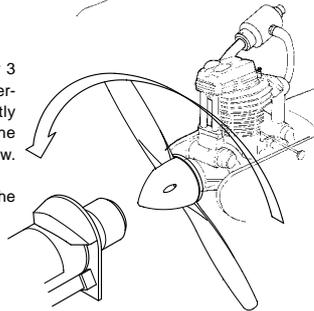
Fuel will flow from tank to carburetor as propeller is turned.



Close the air intake by operating the choke control. (FS-40S)

Turn the propeller four revolutions while watching fuel line.

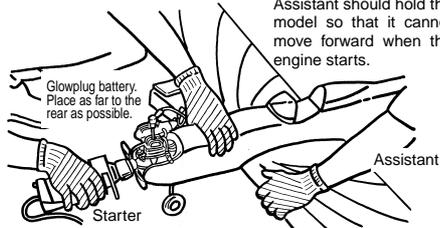
Turn the propeller 3 to 4 turns counter-clockwise smartly by finger in the direction of arrow. Turn approx. 10 turns when the engine is cold.



16

⑧ Hold model securely when starting

Assistant should hold the model so that it cannot move forward when the engine starts.

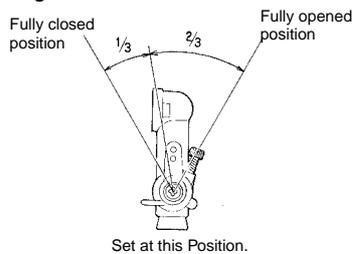


Glowplug battery. Place as far to the rear as possible.

Be careful not to be hit by propeller!

⑨ Setting the throttle

Fully closed position

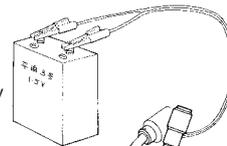


Fully opened position

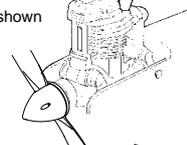
Set at this Position.

⑩ Heat glowplug

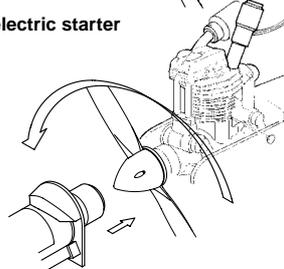
Starting battery



Connect battery leads as shown (polarity is immaterial.)



⑪ Apply electric starter



17

Check that the throttle is one-third open from the fully closed position. Bring the starter into contact with the spinner nut or spinner and depress the starter switch for one or two seconds. Repeat if necessary. When the engine fires, withdraw the starter immediately.

Attention: Never place your finger over the carburetor intake when applying the starter. Such an action will cause an excess quantity of fuel to be drawn into the cylinder and result in hydraulic lock that may damage the engine.

12 Engine starts

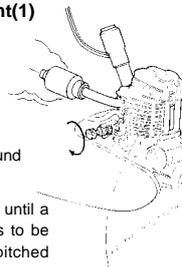


BEWARE of the rotating propeller.

In the interests of safety, keep your face and other parts of the body away from the vicinity of the propeller.

13 Needle-valve adjustment(1)

Slowly advance throttle to its fully open position, then gradually close the needle-valve until the exhaust sound changes pitch.

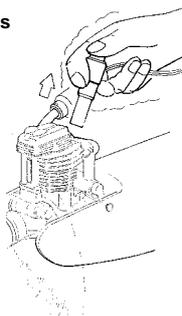


Listen to the sound carefully.

Close the needle-valve gradually until a high-pitched exhaust note begins to be superimposed on the lower-pitched sound.

14 Disconnect battery leads

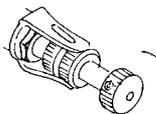
Disconnect the battery leads from the engine with care so that the plug clip does not touch the rotating pro-peller.



If the engine stops when battery leads are disconnected, close the needle-valve a little (approx. 45°) further, and restart the engine.

15 Needle-valve adjustment(2)

As the needle-valve is closed beyond the initial readjustment, the rpm of the engine will be increased and a continuous high-pitched exhaust note, only, will be heard.

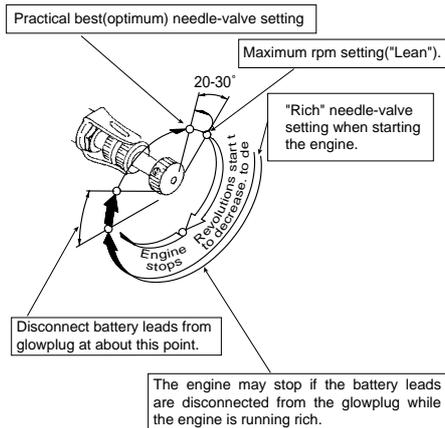


Key to the needle-valve adjustment.
(Turn 15-30° at a time.)

Turn the needle-valve 15-30° in the direction of arrow, and wait momentarily for the change of r.p.m.
After the rpm of the engine increases, turn the needle-valve another 10-15° 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.

16 Needle-valve adjustment(Summary)



The engine may stop if the battery leads are disconnected from the glowplug while the engine is running rich.

NOTE:
The above sketch is for reference purposes only.
Actual needle positions may differ from those shown.

On starting from cold, with the needle-valve set at the rich starting position:

a good deal of white smoke is emitted.

As the needle-valve is closed and the r.p.m. increases

Exhaust smoke will be less dense and grey in color.

Further needle-valve closure:

rpm will increase and exhaust smoke will be reduced.

Finally:

maximum rpm is reached and will fall off (or engine will stop) if needle -valve is closed any further. Exhaust gas will be very light.

Now, re-open needle-valve 20-30 degree

This will produce the practical best (i.e. optimum)rpm setting (lower than maximum rpm). A light grey exhaust emission may be observed.

Take note of this position of the needle-valve.

Subsequent starting procedure

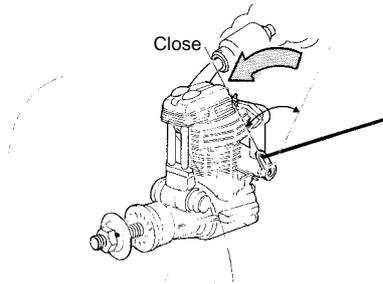
Once the optimum needle-valve setting has been established (see 16 "Needle-valve adjustment-Summary") the procedure for starting is simplified as follows:

- 1) Open the needle-valve one half-turn (180°) from the optimum setting.
- 2) Open the throttle fully, place your finger over the carburettor intake and rotate the propeller through two revolutions to prime the engine.
- 3) Set the throttle one-third open from the fully closed position, energize the glowplug and apply the 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. Also, if the engine is being re-started immediately after a run (i.e.hot), priming should not be necessary.

17 How to stop the engine

Close the throttle to reduce to the lowest possible r.p.m.



With the transmitter throttle trim lever fully retarded, adjust the throttle servo linkage so that the throttle rotor is fully closed (i.e.engine stopped) when the stick is fully retarded.

RUNNING-IN ("Breaking-in")

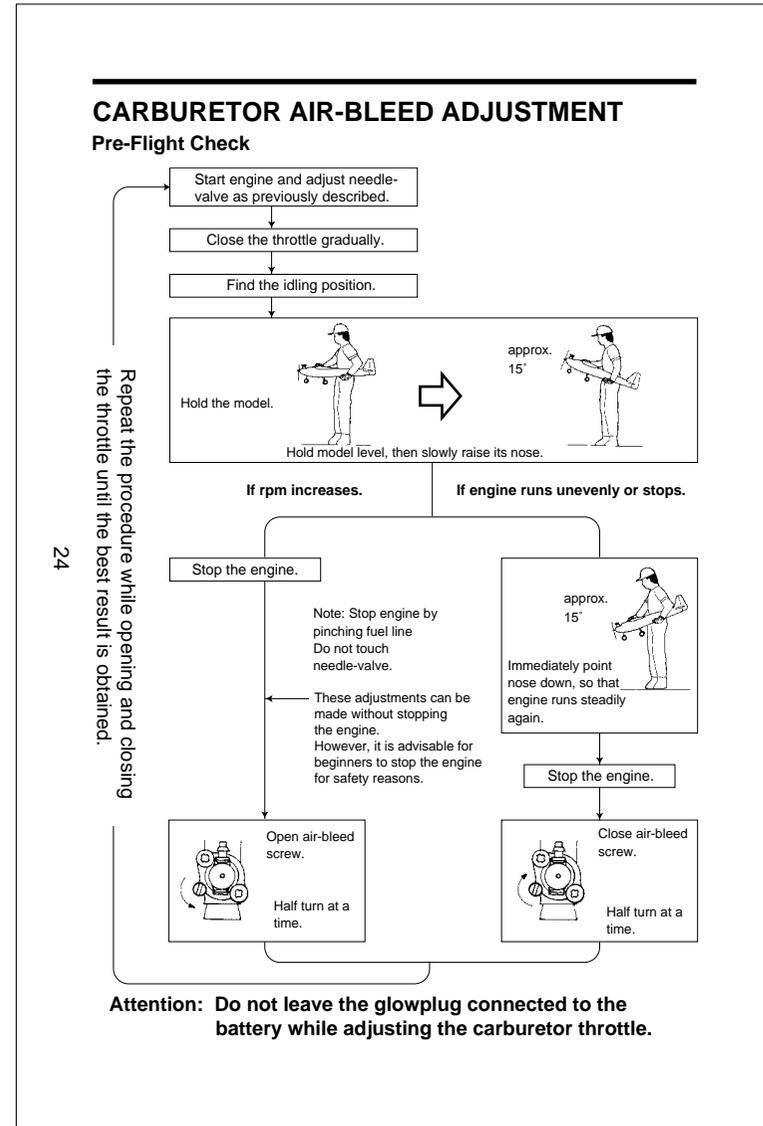
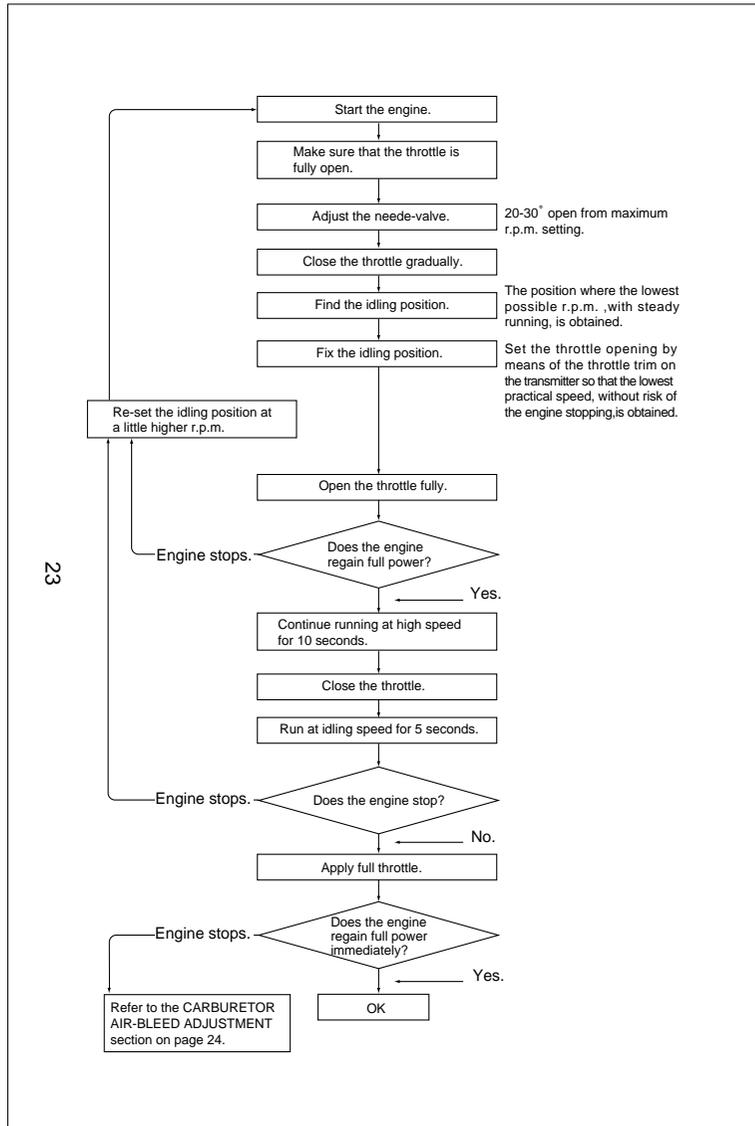
All internal-combustion engines benefit, to some degree, from extra care when they are run for the first few times - known as running-in or breaking-in. This is because the working parts of a new engine take a little time to settle down after being subjected to high temperatures and stresses. However, because O.S. engines are made with the aid of the finest modern precision machinery and from the best and most suitable materials, only a very short and simple running-in procedure is required and can be carried out with the engine installed in the model. The process is as follows:

- 1) Start the engine and, with the throttle fully open, open the needle-valve an extra half turn (180°) from the optimum setting. This will produce a rich mixture that will result in cooler running. Allow the engine to run out a full tank on the ground. (Avoid dusty surroundings.)
- 2) Now fly the model with the needle-valve re-set 20-30 degrees open from the optimum setting (i.e. 40-60° from the highest rpm setting).
- 3) Close the needle-valve very slightly on successive flights so that the engine is running on its optimum needle setting at the fifth or sixth flight.

CARBURETOR

These engines are equipped with a throttle type carburetor which provides a wide range of engine speed control. With the throttle lever linked to a suitable servo in the model, movement of the throttle control on the transmitter will enable engine to be varied, proportionally, from idling speed to full power.

The carburetor of your engine has been factory set for the approximate best results and no adjustment (except to the needle-valve) should be required provided that the fuel tank is correctly located, as previously described. After the engine has been run-in, check the operation of the throttle according to the following chart. Re-adjust the controls only when necessary.



TROUBLE SHOOTING WHEN THE ENGINE FAILS TO START

Four key points

For quick, reliable starting, the following four conditions are required.

- ① **Good compression.** ② **Adequate "glow" at glowplug.** ③ **Correct mixture.**
 ④ **Sufficient electric starter rotating speed.**

If the engine fails to start, or does not keep running after being started, check symptoms against the following chart and take necessary corrective action.

Note: The most common causes of trouble are marked with three asterisks, the less common problems with one or two asterisks.

Symptom	Factor	Cause	Corrective action
Engine fails to fire.	①	★ Sluggish rotation	Recharge the electric starter battery.
		★★ Glowplug battery discharged.	Recharge lead-acid cell or replace dry battery. (Note: An unused, or almost unused, dry battery may sometimes be of insufficient capacity if it is "old stock".)
	②	★ Glowplug element is burned out	Replace glowplug. Check that applied voltage is not too high.
		★ Something wrong with battery leads.	Check glowplug heating using other leads.
		★★ Engine "flooded" due to excessive priming.	Close needle-valve fully and remove glowplug, then flip propeller to pump out excess fuel. (Invert engine, if possible, while pumping out excess). Re-start engine. (Priming is not necessary at this time.)
③	★ Insufficient priming.	Repeat priming procedure referring to ⑦ Priming.	

Symptom	Factor	Cause	Corrective action
Engine fires intermittently but does not run.	②	★★ Incorrect heating of glowplug.	Voltage too high or too low. Re-check and readjust referring to "BEFORE STARTING" paragraph 4.
		③	★★ Over priming.
	①	★ Sluggish rotation.	Then re-start. (Priming is not necessary.) Recharge the electric starter battery.
Engine fires once or twice, then fails to fire.	②	★★ Glowplug battery discharged.	Recharge lead-acid cell or replace dry battery. (Note: An unused, or almost unused, dry battery may sometimes be of insufficient capacity if it is "old stock".)
Engine starts but rpm decreases and engine eventually stops.	③	★★ Insufficient priming.	Repeat priming procedure referring to ⑦ Priming.
Engine starts, rpm increases and engine cuts out.	③	★★★ Mixture too rich.	Close needle-valve half turn (180°) and wait for several minutes then re-start. (Priming is not necessary.)
	③	★ Fuel not reaching the engine.	Make sure that tank is filled with fuel. Check that there is not something wrong with the fuel line (kinked or split). Check that carburettor is not clogged with dirt.
Engine stops when battery leads are disconnected after starting.	③	★★ Mixture too rich.	Close the needle-valve a little.
	②	★ Mismatch of glow plug and fuel.	Change fuel or glowplug.

VALVE ADJUSTING

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

**The kit comes in a plastic case and includes:
(Code No.72200060)**

- Feeler gauge 0.04mm
- Feeler gauge 0.1mm
- Hex. key 1.5mm
- Wrench 5mm

Note:

Valve clearances of all O.S. four-stroke-cycle engines must be checked and reset ONLY WHEN THE ENGINE IS COLD.

Procedure is as follows:

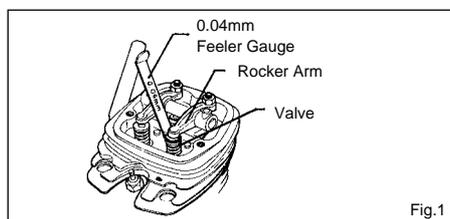
(1)

- 1.Remove the cover from the rocker-box on top of the cylinderhead, using the correct size Allen hex key.
- 2.Turn the propeller counter-clockwise until compression is first felt, then turn it futher quarter turn. At this point, both valves should be closed. (If the prop driver ('drive hub') of your engine is engraved with a letter 'T', this mark should now be at the top.)
- 3.The standard valve clearance, on both inlet and exhaust valves, is between 0.04mm and 0.10mm(0.0015-0.004 inch), measured between valve stem and rocker arm. Use the 0.04mm and 0.10mm feeler gauges to check clearances. (See Fig.1.)

Note:

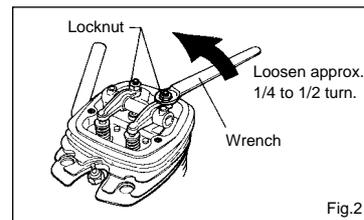
If the gap is found to be less than 0.04mm, it is not necessary to readjust the clearance if the engine has good compression and starts easily.

Equally, if the gap exceeds 0.10mm but is not more than 0.14mm (i.e. the thickness of both feeler gauges inserted together), it is not necessary to readjust the clearance if the engine runs satisfactorily.

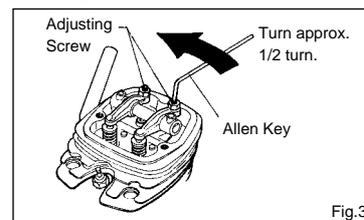


(2) If a clearance is found to be outside either of these limits, it should be reset as follows.

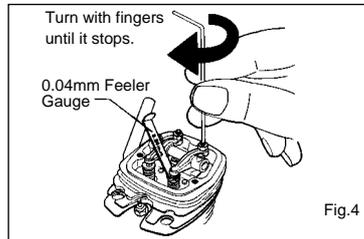
1. Carefully loosen the locknut on rocker-arm 1/4-1/2 turn with 5mm wrench. (Fig.2.)



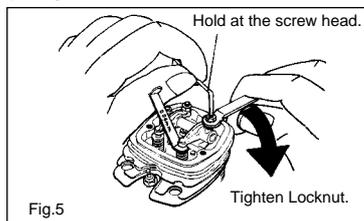
2. Turn adjusting-screw approx. 1/2 turn counter-clockwise to open gap, using appropriate tool -i.e. Allen hex key. (Fig.3.)



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



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



5. Remove 0.04mm feeler, rotate prop through two revolutions and recheck gap.
6. If clearance is correct, loosen the locknut on the other rocker-arm and repeat steps 1 to 5 above. Finally, replace rocker box cover.

Remember:

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

CARE AND MAINTENANCE

To ensure that you obtain long life and peak performance from your engine, observe the following.

1. Avoid running the engine under dusty conditions. If necessary, lay a sheet of plywood or hard-board in front and under the nose of the model when starting the engine.
2. Foreign matter in the fuel can cause the carburetor jet to be partially clogged.

Therefore:

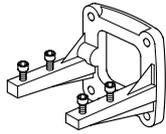
- rinse out the fuel tank with methanol or fuel before installing it.
- Install a fuel filter in the fuel line between tank and carburetor.
- Install a fuel filter in the outlet of your squeeze bottle, or to the pump inlet if you use a manual or electric pump.
- do not leave your fuel container open needlessly.
- check filters periodically and clean them when necessary.

3. Do not leave raw fuel in the engine at the conclusion of a flying session: it may cause corrosion. The best practice is to disconnect the fuel line from the carburetor while the engine is running. Remaining fuel in the tank should also be drained off.
4. Clean the exterior of the engine with a clean cotton cloth. If this is not done, oil and dirt will burn onto the outside of the engine each time it is run and the engine will soon become discolored.
5. If the engine is not in use for a while (more than two months) remove the glowplug and rinse out the interior with kerosene (not gasoline), by rotating the crankshaft. Shake out residue, then inject light machine-oil through the plug hole and carburetor intake, again rotating the shaft to distribute the protective oil to all working parts. Gasoline, thinner, kerosene and light machine oil cause swelling and deterioration of plastic parts, "O" rings and fuel tubing. Use methanol for cleaning these engines.
6. Avoid unnecessary dismantling of your engine.

O.S. GENUINE PARTS & ACCESSORIES

■ **O.S.Glow Plug
TYPE F**
(71615009)

■ **Radial Mount Set**
For FS-30S (71908300)
For FS-40S (71906000)



■ **Propeller Locknut Set**
For FS-40S (45810100)



■ **Valve Adjusting
Tool Kit**
(72200060)

■ **NEEDLE VALVE EXTENSION
SET**
(72200080)



■ **Flexible Exhaust Pipes**
For FS-40S 1010A (72108300)
1010B (72108310)



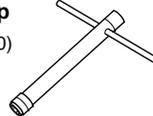
■ **Super Filter (L)**
(72403050)



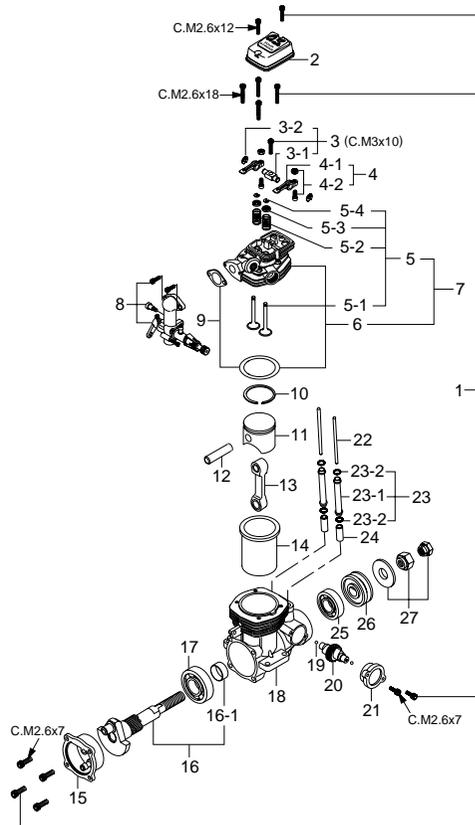
■ **NON-BUBBLE Weight**
(71531000)



■ **Long Socket Wrench With
Plug Grip**
(71521000)



FS-30S ENGINE EXPLODED VIEW



* Type of screw

C...Cap Screw M...Oval Fillister-Head Screw

F...Flat Head Screw N...Round Head Screw S...Set Screw

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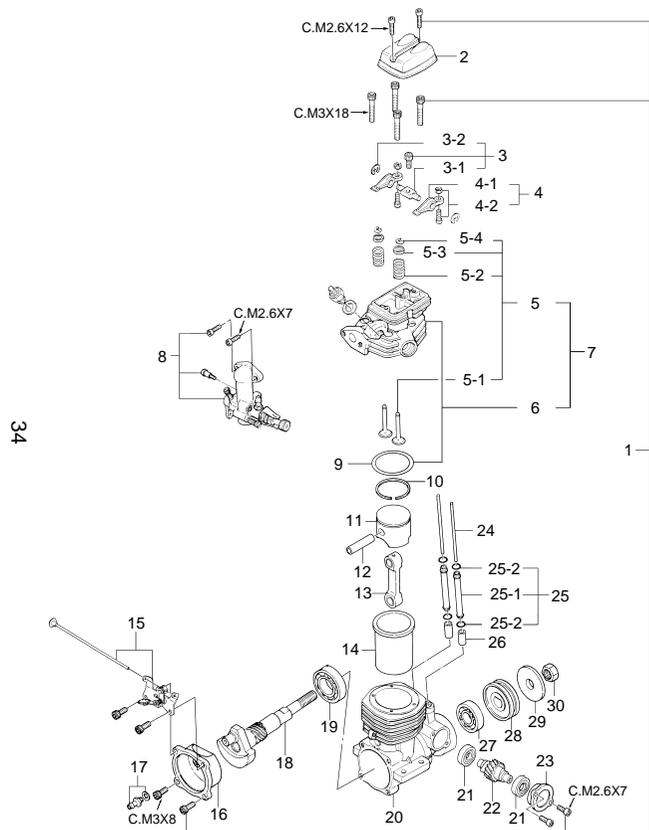
FS-30S PARTS LIST

No.	Code No.	Description
1	44113000	Screw Set
2	43004200	Rocker Cover
3	45761400	Rocker Support Assembly
3-1	45761410	Rocker Support
3-2	45761600	Rocker Arm Retainer (2pcs.)
4	45761000	Rocker Arm Assembly (1pair)
4-1	45761100	Rocker Arm (1pc.)
4-2	45761200	Tappet Adjusting Screw
5	43060000	Valve Assembly (1pair)
5-1	45760110	Intake Valve (1pc.)
5-2	43060200	Valve Spring (1pc.)
5-3	45060309	Valve Spring Seat (1pc.)
5-4	46160400	Valve Spring Retainer (2ps.)
6	44104100	Cylinder Head(W/Gasket)
7	44104030	Cylinder Head (W/Gasket and Valve Assembly)
8	43081000	Carburetor Complete (20N)
9	22714100	Gasket Set
10	43003400	Piston Ring
11	43003200	Piston
12	43006000	Piston Pin
13	45705000	Connecting Rod
14	43003100	Cylinder Liner
15	43007000	Cover Plate
16	43002000	Crankshaft
16-1	45702100	Crankshaft Spacer
17	22630002	Crankshaft Ball Bearing (Rear)
18	43001000	Crankcase
19	45762100	Thrust Ball(2pc.)
20	43062000	Camshaft
21	45701100	Cam Cover
22	44166000	Push Rod (2pcs.)
23	44166100	Push Rod Cover Assembly (2pcs.)
23-1	44166110	Push Rod Cover (1pcs.)
23-2	24881824	Push Rod Cover "O"Ring (2pcs.)
24	45264000	Cam Follower (2pcs.)
25	45231000	Crankshaft Ball Bearing (Front)
26	45208010	Drive Hub
27	45810100	Lock Nut Set
	43025000	F-2010 Silencer Assembly
	43025100	Silencer Body
	45771000	Pressure Nipple (No.5)
	43069000	Exhaust Header Pipe Assembly
	43069200	Manifold Nut (M9)
	71615009	Glow Plug Type F

Specifications are subject to alteration for improvement without notice.

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FS-40S ENGINE EXPLODED VIEW



* Type of screw
 C...Cap Screw M...Oval Fillister-Head Screw
 F...Flat Head Screw N...Round Head Screw S...Set Screw

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FS-40S PARTS LIST

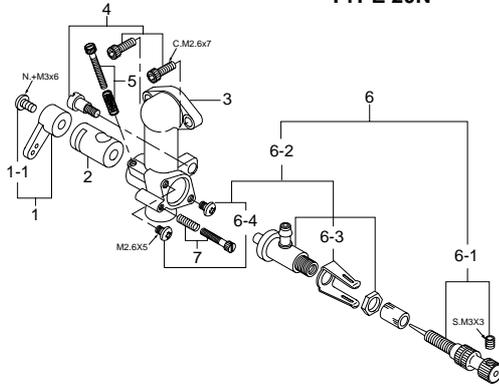
No.	Code No.	Description
1	45213010	Screw Set
2	45204210	Rocker Cover
3	45261400	Rocker Support Assembly
3-1	45261410	Rocker Support
3-2	45761600	Rocker Arm Retainer (2pcs.)
4	45261010	Rocker Arm Assembly (1pair)
4-1	45261110	Rocker Arm (1pc.)
4-2	45761200	Tappet Adjusting Screw
5	45260010	Valve Assembly (1pair)
5-1	45260110	Intake Valve (1pc.)
5-2	45060205	Valve Spring (1pc.)
5-3	45060309	Valve Spring Seat (1pc.)
5-4	45060402	Valve Spring Retainer (2ps.)
6	45204110	Cylinder Head(W/Gasket)
7	45204010	Cylinder Head (W/Gasket and Valve Assembly)
8	45281020	Carburetor Complete
9	45214100	Head Gasket
10	24203410	Piston Ring
11	45203210	Piston
12	23356000	Piston Pin
13	45205000	Connecting Rod
14	45203100	Cylinder Liner
15	45284000	Choke Valve Assembly
16	45207000	Cover Plate
17	45771000	Breather Nipple
18	45202010	Crankshaft
19	22630002	Crankshaft Ball Bearing (Rear)
20	45201040	Crankcase
21	45231100	Camshaft Bearing
22	45262010	Camshaft
23	45201110	Cam Cover
24	45266010	Push Rod (2pcs.)
25	45266102	Push Rod Cover Assembly (2pcs.)
25-1	45266112	Push Rod Cover (1pcs.)
25-2	24881824	Push Rod Cover "O"Ring (2pcs.)
26	45264000	Cam Follower (2pcs.)
27	45231000	Crankshaft Ball Bearing (Front)
28	45208010	Drive Hub
29	23209003	Propeller Washer
30	23210007	Propeller Nut
	45225000	Silencer Assembly
	45225010	Silencer
	45226000	Exhaust Header Pipe
	71615009	Glow Plug Type F

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Specifications are subject to alteration for improvement without notice.

CARBURETOR EXPLODED VIEW & PARTS LIST

TYPE 20N



No.	Code No.	Description
1	22081408	Throttle Lever Assembly
1-1	22081313	Throttle Lever Retaining Screw
2	45281200	Carburetor Rotor
3	43081100	Carburetor Body
4	45281700	Carburetor Retaining Screw(3pcs.)
5	22081811	Throttle Stop Screw
6	43081900	Needle-valve Assembly
6-1	45781970	Needle
6-2	43081960	Nozzle Assembly
6-3	22611302	Ratchet Spring
6-4	45281920	Nozzle Retaining Screw(2pcs.)
7	22081820	Air-bleed Screw

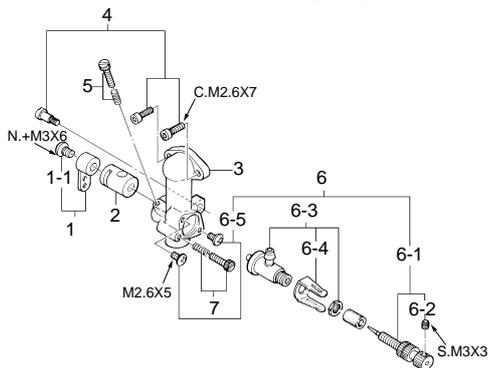
Specifications are subject to alteration for improvement without notice.

*Type of screw
 C...Cap Screw M...Oval Fillister-Head Screw
 F...Flat Head Screw N...Round Head Screw S...Set Screw

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CARBURETOR EXPLODED VIEW & PARTS LIST

TYPE FS-40S



No.	Code No.	Description
1	22081408	Throttle Lever Assembly
1-1	22081313	Throttle Lever Retaining Screw
2	45281120	Carburetor Rotor
3	45281110	Carburetor Body
4	45281700	Carburetor Retaining Screw(3pcs.)
5	22081811	Throttle Stop Screw
6	45281910	Needle-valve Assembly
6-1	45781970	Needle
6-2	26381501	Set-screw
6-3	45283960	Nozzle Assembly
6-4	23011308	Ratchet Spring
6-5	45281920	Nozzle Retaining Screw(2pcs.)
7	22081820	Air-bleed Screw

Specifications are subject to alteration for improvement without notice.

*Type of screw
 C...Cap Screw M...Oval Fillister-Head Screw
 F...Flat Head Screw N...Round Head Screw S...Set Screw

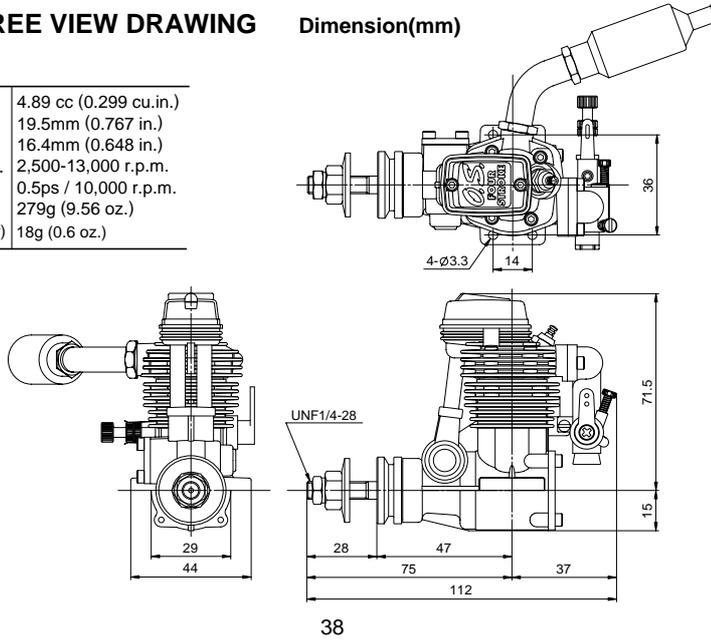
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FS-30S THREE VIEW DRAWING

Dimension(mm)

Specification

■ Displacement	4.89 cc (0.299 cu.in.)
■ Bore	19.5mm (0.767 in.)
■ Stroke	16.4mm (0.648 in.)
■ Practical R.P.M.	2,500-13,000 r.p.m.
■ Power output	0.5ps / 10,000 r.p.m.
■ Weight	279g (9.56 oz.)
(Weight of Silencer)	18g (0.6 oz.)



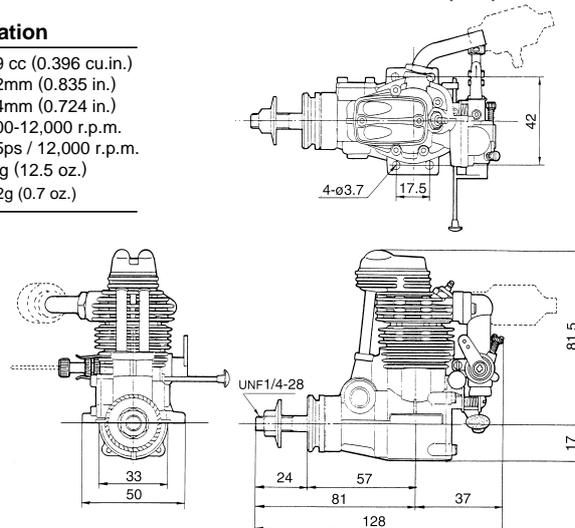
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FS-40S THREE VIEW DRAWING

Dimension(mm)

FS-40S Specification

■ Displacement	6.49 cc (0.396 cu.in.)
■ Bore	21.2mm (0.835 in.)
■ Stroke	18.4mm (0.724 in.)
■ Practical R.P.M.	2,200-12,000 r.p.m.
■ Power output	0.65ps / 12,000 r.p.m.
■ Weight	355g (12.5 oz.)
(Weight of Silencer)	21.2g (0.7 oz.)



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MEMO



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