

# INSTRUCTIONS FOR O.S. FP SERIES ENGINES

## (MAX-10FP, 15FP, 20FP, 25FP, 35FP & 40FP)

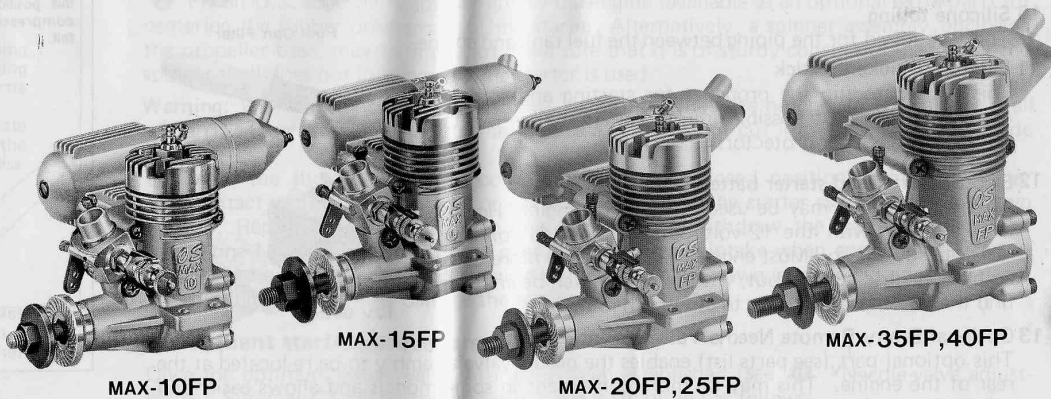
**IMPORTANT:** Before attempting to operate your engine, please read through these instructions so as to familiarize yourself with the controls and other features of the engine. Also, pay careful attention to the recommendations contained in the "Safety Instructions and Warnings" leaflet enclosed.

The O.S. MAX "FP" Series engines have been introduced to meet the requirements of both beginners and sport flyers. Of modern design and featuring Schnuerle type porting, they offer the advantages of improved performance, reliability and easy handling, at lower cost.

Like all O.S. engines, the FP Series engines are manufactured to standards of skilled craftsmanship that have been developed through more than 50 years of O.S. engine production history. Fully computerized modern precision machinery and carefully selected top quality materials are employed to ensure consistent performance and long life.

**EXPERIENCED MODELLERS PLEASE NOTE.** The following information includes some elementary instructions that may appear to be needlessly detailed. Please understand that these are for the benefit of newcomers with no previous experience of model engines.

As the "FP" Series engines feature 'ABC' type construction, the piston will feel tight at the top of its stroke when the engine is cold. This is normal. The piston and cylinder are designed to achieve a perfect running clearance when they reach their normal running temperatures.



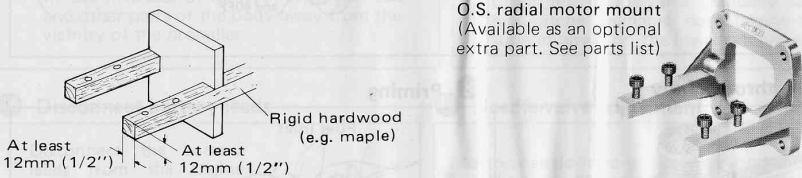
### SPECIFICATIONS

	10FP	15FP	20FP	25FP	35FP	40FP
Displacement	1.76c.c. (0.1073cu.in.)	2.49c.c. (0.1517cu.in.)	3.46c.c. (0.2113cu.in.)	4.07c.c. (0.2485cu.in.)	5.90c.c. (0.3599cu.in.)	6.49c.c. (0.3963cu.in.)
Bore	13.44mm (0.5291in.)	15.2mm (0.5984in.)	16.6mm (0.6535in.)	18.0mm (0.7087in.)	20.2mm (0.7953in.)	21.2mm (0.8346in.)
Stroke	12.4mm (0.4882in.)	13.7mm (0.5393in.)	16.0mm (0.6299in.)	16.0mm (0.6299in.)	18.4mm (0.7244in.)	18.4mm (0.7244in.)
Weight (Less Silencer)	119g (4.20oz.)	142g (5.01oz.)	198g (6.99oz.)	190g (6.71oz.)	256g (9.04oz.)	248g (8.75oz.)
Power Output	0.27BHP/17,000r.p.m.	0.41BHP/17,000r.p.m.	0.58BHP/15,000r.p.m.	0.68BHP/15,000r.p.m.	0.88BHP/14,000r.p.m.	1.08BHP/15,000r.p.m.
Practical R.P.M.	2,500~18,000r.p.m.	2,500~18,000r.p.m.	2,500~16,000r.p.m.	2,500~16,000r.p.m.	2,500~15,000r.p.m.	2,500~16,000r.p.m.
Shaft Thread	M5	U 7/32"-32	UNF 1/4"-28	UNF 1/4"-28	UNF 1/4"-28	UNF 1/4"-28

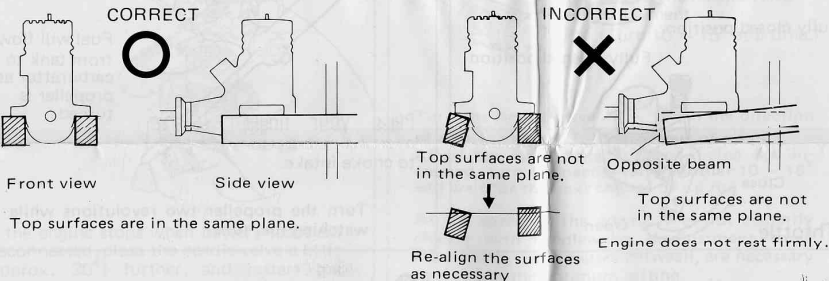
### INSTALLATION OF THE ENGINE

#### Installation in the model

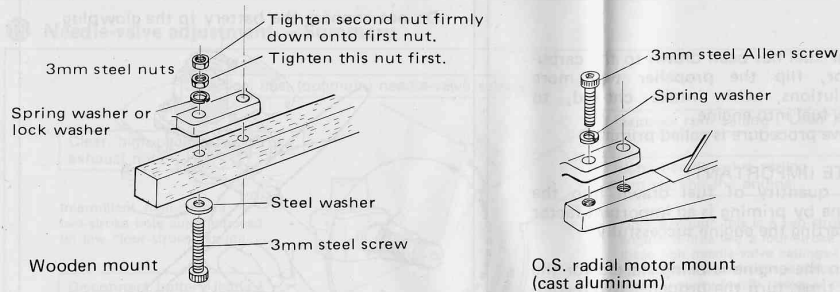
A typical method of beam mounting is shown below, left.



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

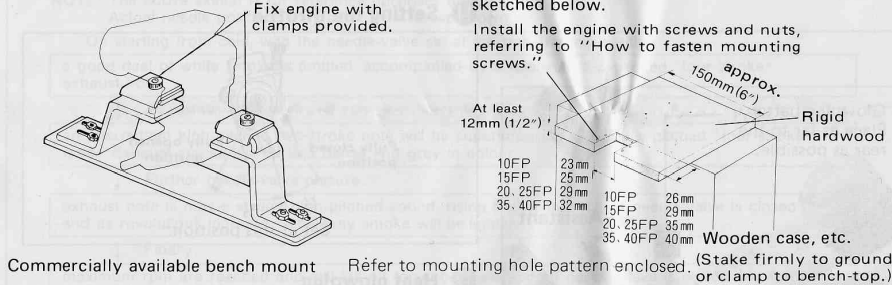


#### How to fasten the mounting screws.



#### Bench mount

Usually, the engine is installed directly in the model. If, however, you are unfamiliar with handling model engines, it is recommended that you first run the engine on a bench mount as shown below.

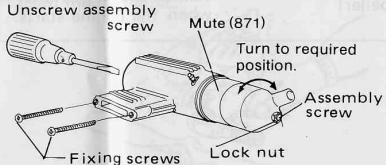


### INSTALLATION OF SILENCER

Attach the silencer to the engine by means of the two fixing screws provided, after fitting the engine to the model or bench mount. The angled exhaust of the silencer can be rotated to any desired position in the following manner:

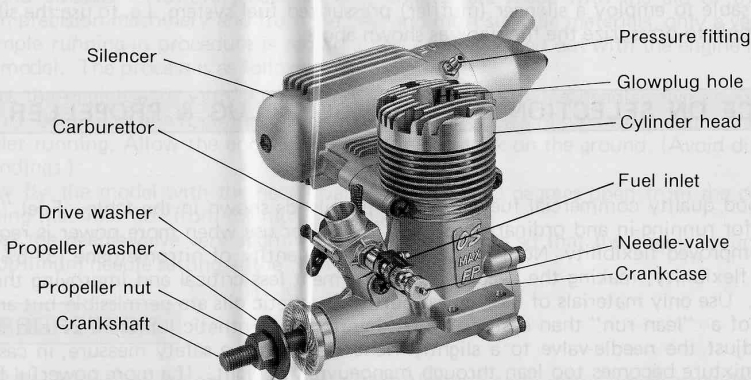
- 1) Loosen the locknut and assembly screw.
- 2) Set the exhaust outlet at the required position by rotating the rear part of the silencer.
- 3) Re-tighten the assembly screw, followed by the locknut.

**Note:** The O.S. 871 silencer for the 10FP and 15FP is equipped with a "mute" in the middle of the silencer.



### NAMES OF ENGINE PARTS

In the following instructions, engine parts are identified as shown:

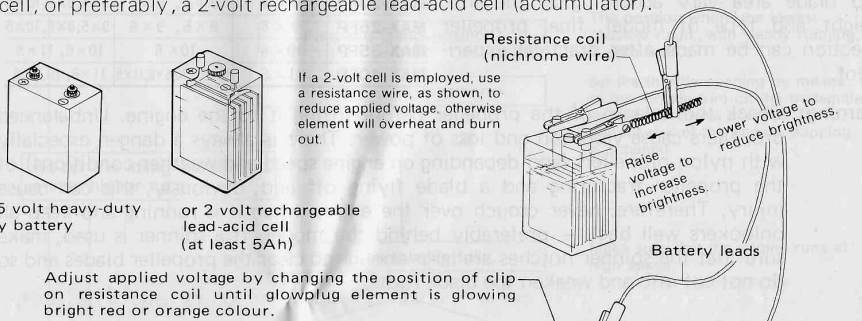


### BEFORE STARTING

#### Tools, accessories, etc.

The following items are necessary for operating the engine.

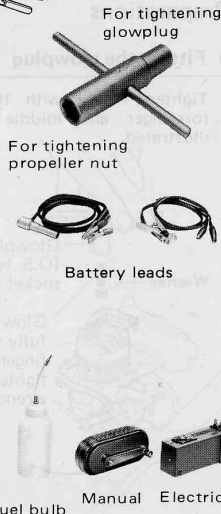
- 1 Fuel  
Model glowplug engine fuel of good quality, preferably containing a small percentage of nitromethane. (See "Advice on selection of fuel, glowplug and propeller")
- 2 Glowplug  
O.S. No.8 glowplug is recommended.
- 3 Propeller  
Obtain one of the following propellers according to the size of your engine.  
7 x 4 for 10FP, 8 x 4 for 15FP, 9 x 4 for 20FP, 9 x 5 for 25FP, 10 x 6 for 35FP, 11 x 5 for 40FP
- 4 Glowplug battery  
The power source for heating the glowplug may be either a large heavy-duty 1.5-volt dry cell, or preferably, a 2-volt rechargeable lead-acid cell (accumulator).



- 5 Plug wrench  
Used for tightening glowplug. The O.S. two-way socket wrench, which also fits the propeller-nut, 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, as illustrated above, 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, an 80cc (3 oz.) tank is suggested for the 10FP, a 100cc (3.5oz.) tank is suggested for the 15FP and a 150cc (5 oz.) tank is suggested for the 20FP and 25FP. A 200cc (7 oz.) tank will be sufficient for the 35FP and 40FP. For bench running, a rectangular tank of about 200cc capacity may be found more convenient.

- 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 Fuel Can Filter

Fit a filter to the outlet tube of your refuelling container to prevent entry of foreign matter into the fuel tank. (Refer to 4 of STARTING THE ENGINE section.)

10 Silicone tubing

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

11 Safety ("Chicken") stick

This is used to flip the propeller for starting and so protect one's fingers against possible injury. An alternative is a thick ribbed rubber finger protector.

12 Electric starter and starter battery

An electric starter may be used to start the engine. However, this, together with the 12-volt battery required for it, is a rather costly luxury. Most engines can be started more quickly with an electric starter, but, with practice, even beginners will find the FP series quite easy to start by hand.

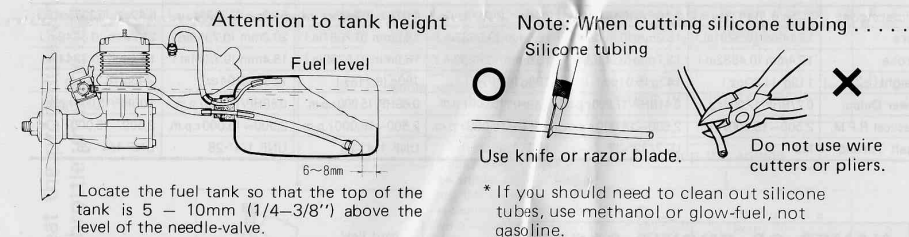
13 Optional Safety Remote Needle-Valve Mounting Kit

This optional part (see parts list) enables the needle-valve assembly to be re-located at the rear of the engine. This may be more convenient in some models and allows easier and safer adjustment, well back from the rotating propeller.

Fuel and pressure lines

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

Piping and position of fuel tank



Silencer (muffler) pressurized fuel system

To reduce the variation in fuel "head" and ensure steady fuel delivery at the carburettor, 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 above.

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 manoeuvres in flight. If a more powerful 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.

Attention: Methanol (methyl alcohol) and nitromethane are poisonous. Keep out of the reach of small children. Use and keep in a well ventilated area, also keep away from heat and open flame.

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

Glowplug

The type of glowplug used can have a considerable effect on performance and reliability. The recommended glowplug for use with mild fuels (0-5% nitromethane) is the O.S. No.8 plug. For use with fuels of higher nitro content, use the O.S. No.8 or the one found to give most satisfactory results after practical tests among O.S. No.3, No.7 and No.9 plugs.

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 can be made after practical experiment.

	Running-in	Trainer & Sport type aircraft	Scale aircraft
MAX-10FP	7 x 4	7 x 4, 7 x 5	7 x 4, 7 x 5
MAX-15FP	8 x 4	7 x 5-6, 8 x 4-5	7 x 5-6, 8 x 4-5
MAX-20FP	9 x 4	9 x 4, 9 x 5	9 x 4, 9 x 5, 10 x 4
MAX-25FP	9 x 5	9 x 5, 9 x 6	9 x 5, 9 x 6, 10 x 5
MAX-35FP	10 x 6	10 x 6	10 x 6, 11 x 5
MAX-40FP	11 x 5	10 x 6, 5, 10 x 5, 6, 11 x 5	11 x 6, 10, 5 x 6

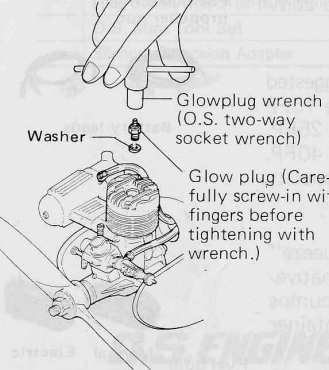
Warning: Check the balance of the propeller before fitting it to the engine. Unbalanced propellers cause vibration and loss of power. There is always a danger, especially with nylon propellers (and depending on engine speed and weather conditions) of the propeller fracturing and a blade flying off and, obviously, this can cause injury. Therefore, never crouch over the engine when it is running and keep all onlookers well back - preferably behind the model. If a spinner is used, make sure that the spinner notches are large enough to clear the propeller blades and so do not cut into and weaken the blade roots.

STARTING THE ENGINE

Preparations

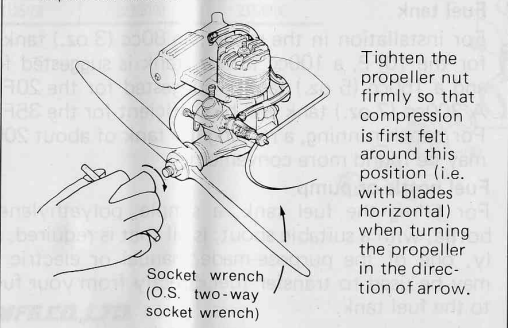
1 Fitting the glowplug

Tighten firmly with the thumb, forefinger and middle finger as illustrated.

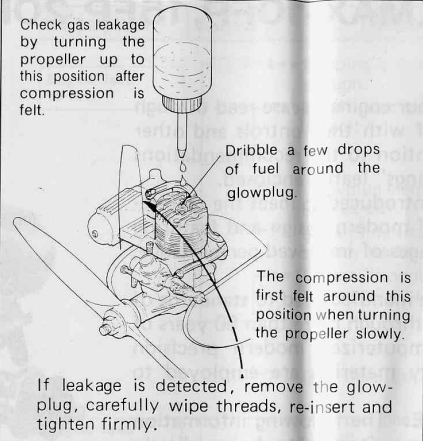


2 Fitting the propeller

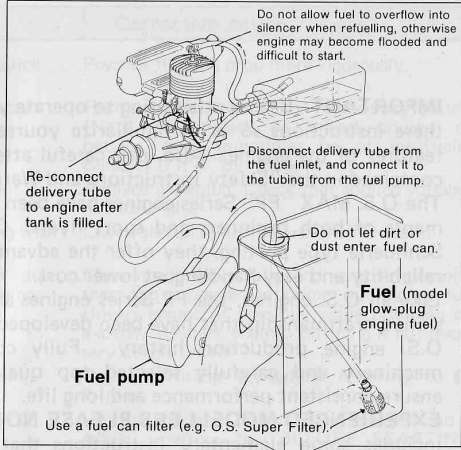
First, fit the propeller to the engine by tightening the prop. nut lightly, and make sure of the position where compression is felt, turning the propeller counter-clockwise slowly. Then tighten firmly as explained below.



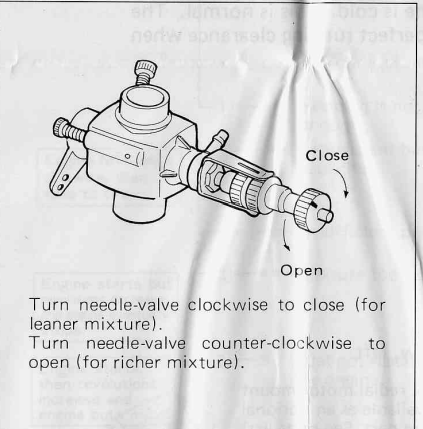
3 Checking for gas leakage



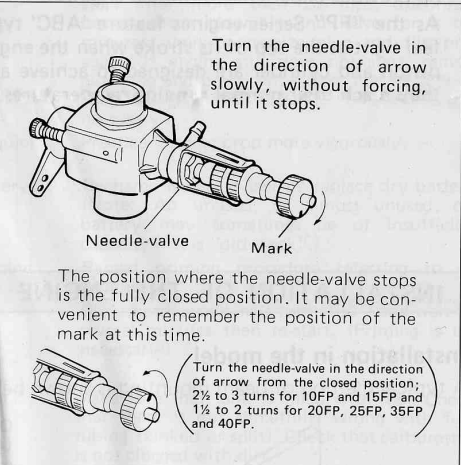
4 Filling the fuel tank



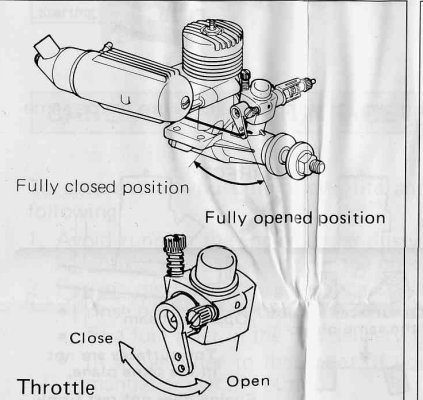
5 Opening and closing of the needle-valve



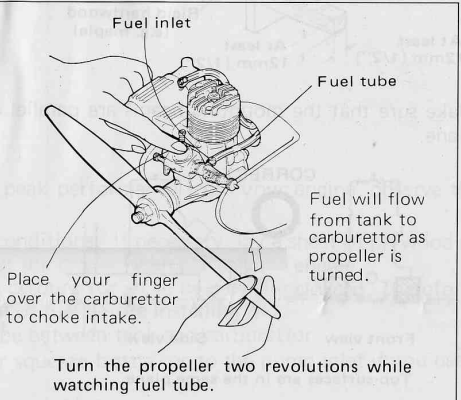
6 Setting the needle-valve



7 Open the throttle fully



8 Priming



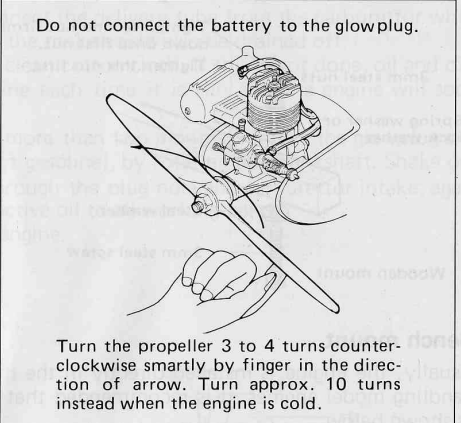
Priming quantity

After fuel has been drawn to the carburettor, flip the propeller two more revolutions, with intake choked, to draw fuel into engine. Above procedure is called priming.

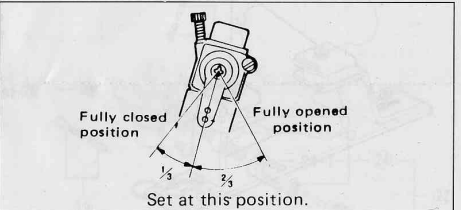
NOTE (IMPORTANT)  
The quantity of fuel drawn into the engine by priming is an important factor in starting the engine successfully.

When the engine is being started for the first time, turn the propeller two revolutions after fuel reaches the fuel inlet, as described above. However, when re-starting the engine immediately after a run, one revolution, or even no priming at all may be required. The engine's requirements will be quickly learned with experience.

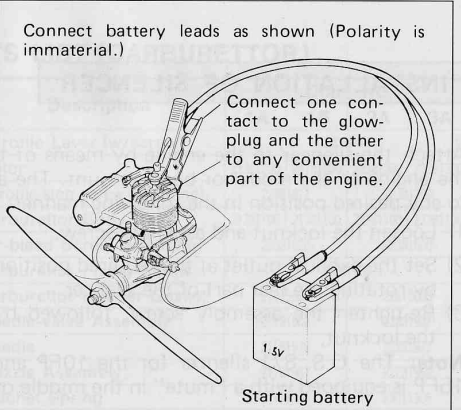
9



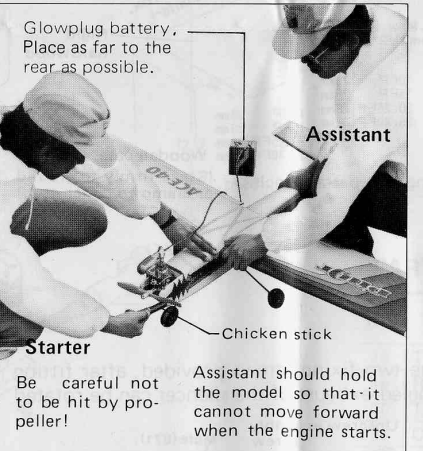
11 Setting the throttle



12 Heat glowplug

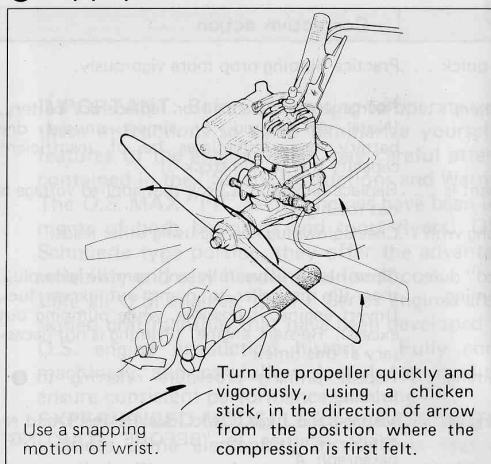


10





### 13 Flip propeller to start



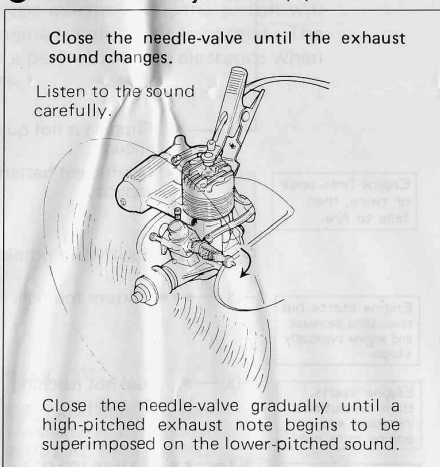
Note for those starting a model engine for the first time.

You may need to practise flipping the propeller without connecting the battery, to give enough inertia to the propeller for a quick start. Quick flipping and adequate priming, as described in 8, are the keys to starting the engine successfully.

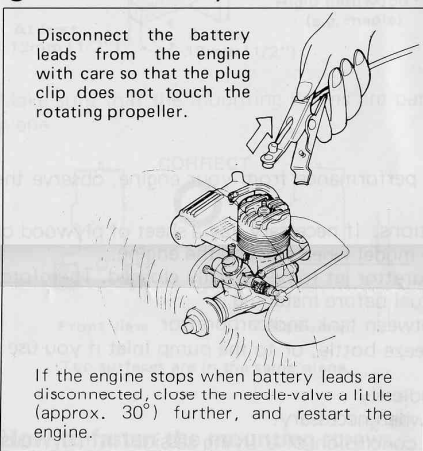
### 14 Engine starts



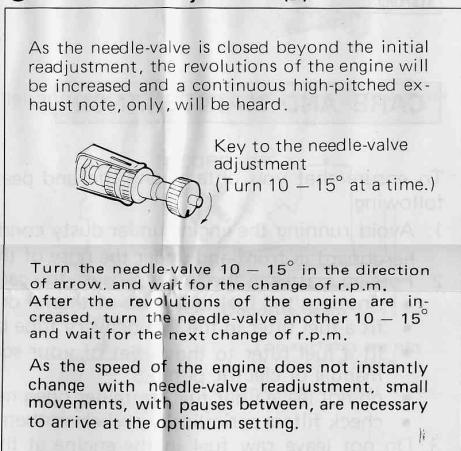
### 15 Needle-valve adjustment (1)



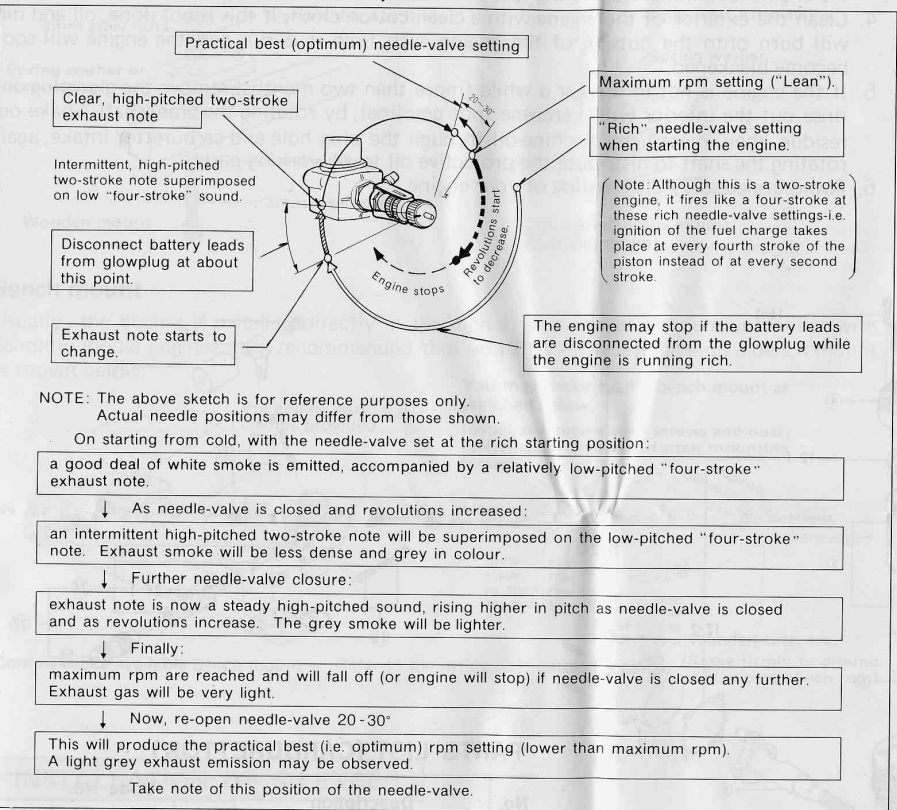
### 16 Disconnect battery leads



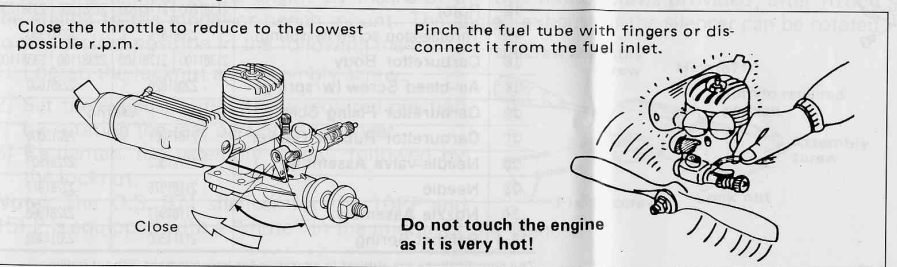
### 17 Needle-valve adjustment (2)



### 18 Needle-valve adjustment – Summary



### 19 How to stop the engine



### Starting the engine with an electric starter

If an electric starter is used, the procedures are the same as for hand starting outlined above, except for steps 2 and 13 which are modified as follows:

2 Fit an O.S. solid alloy spinner-nut to the engine (available as an optional extra part) for centering the rubber drive insert of the starter. Alternatively, a spinner assembly, enclosing the propeller boss, may be used, but make sure that it is of sturdy construction and that the spinner shell does not loosen when the starter is used.

**Warning:** When using a spinner assembly, make sure that the notches in the spinner shell are large enough to clear the propeller blades and so do not cut into and weaken the blade roots.

13 Re-set the throttle 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 carburettor 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.

### Subsequent starting procedure

Once the optimum needle-valve setting has been established (see 18 "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 flip the prop. 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.

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

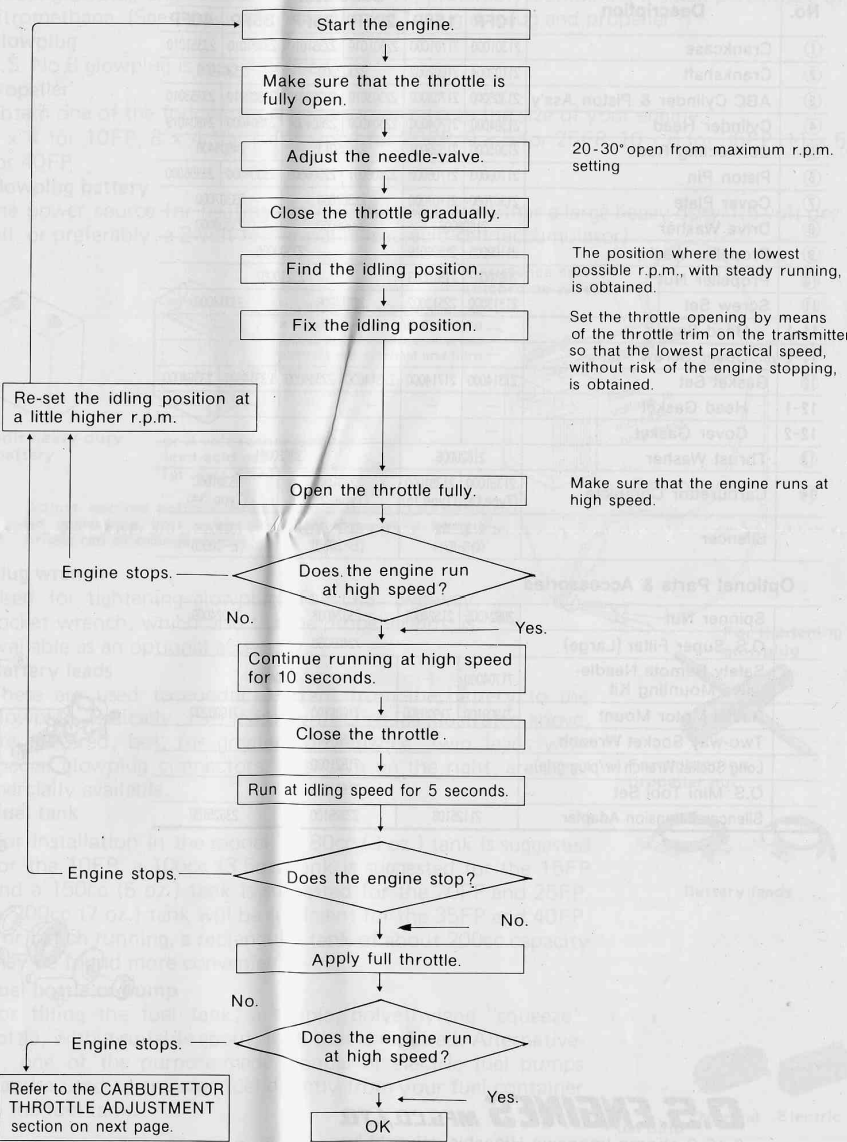
All internal-combustion engines benefit, to some degree, from extra care when they are run for the first few times – known as running-in or breaking-in. This is because the working parts of a new engine take a little time to settle down after being subjected to high temperatures and stresses. However, 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.

### CARBURETTOR

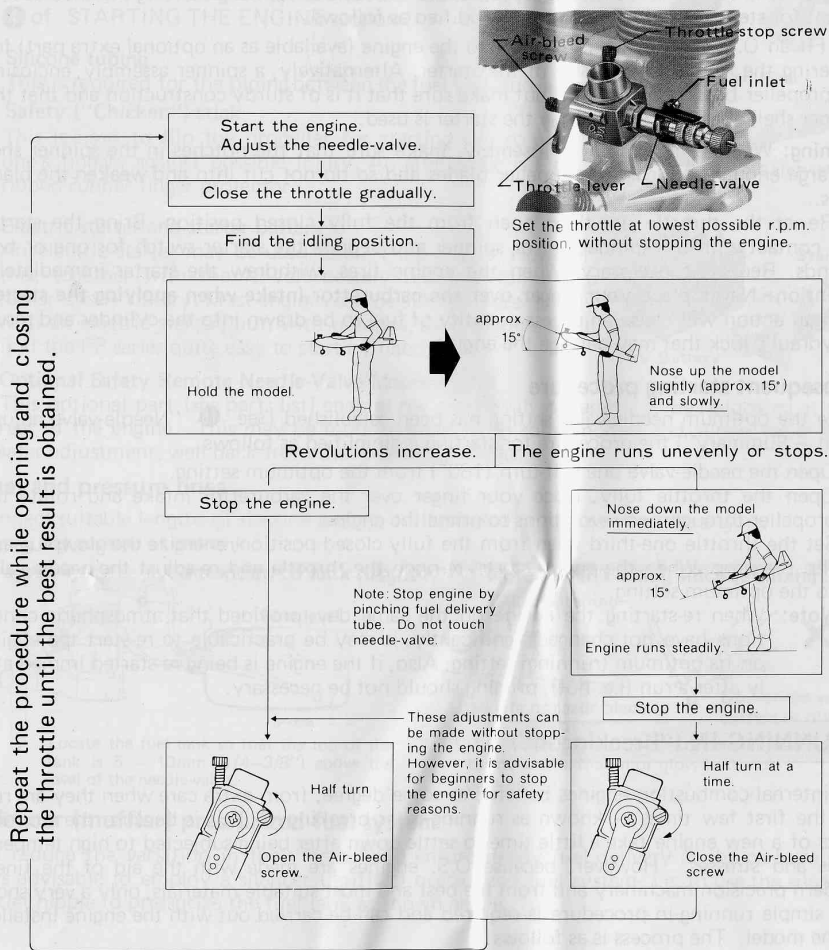
The FP Series engines are equipped with a throttle type carburettor which provides a wide range of engine speed control. With the throttle lever linked to a suitable electric servo in the model, movement of the throttle control on the transmitter will enable engine revolutions to be varied, proportionally,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

The carburettor of your FP 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.





CARBURETTOR THROTTLE ADJUSTMENT



Attention: Do not leave the glowplug connected to the battery while adjusting the carburettor throttle.

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 Quick flipping.

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	*** Flipping is not quick enough.	.Practice flipping prop more vigorously.
	②	** Insufficient battery capacity	.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".)
		* Glowplug element is burned out.	.Replace glowplug. Check that applied voltage is not too high.
	③	* 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.)
Engine fires intermittently but does not run.	②	** Incorrect heating of glowplug.	.Voltage too high or too low. Re-check and re-adjust referring to "BEFORE STARTING" paragraph 4.
		** Over priming.	.Continue flipping propeller. If engine does not start after more than 20 flips, disconnect battery from glowplug and leave for a few minutes, then re-energize plug and flip prop again. If engine still does not start, remove glowplug and pump out excess fuel by flipping prop quickly. Then re-start. (Priming is not necessary.)
	①	* Flipping is not quick enough.	.Practice flipping prop more vigorously.
Engine fires once or twice, then fails to fire.	②	** Insufficient battery capacity.	.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".)
	③	** Insufficient priming.	.Repeat priming procedure referring to ⑧ Priming.
	③	*** Mixture too rich.	.Close needle-valve half turn (180°) and wait for several minutes then re-start. (Priming is not necessary.)
Engine starts but revolutions decrease and engine eventually stops.	③	* Fuel not reaching the engine.	.Make sure that tank is filled with fuel. Check that there is not something wrong with fuel tubing (kinked or split). Check that carburettor is not clogged with dirt.
Engine starts, then revolutions increase and engine cuts out.	③	** Mixture too rich.	.Close the needle-valve a little.
Engine stops when battery leads are disconnected after starting.	②	* Mismatch of glow plug and fuel.	.Change fuel or glowplug.

CARE AND MAINTENANCE

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

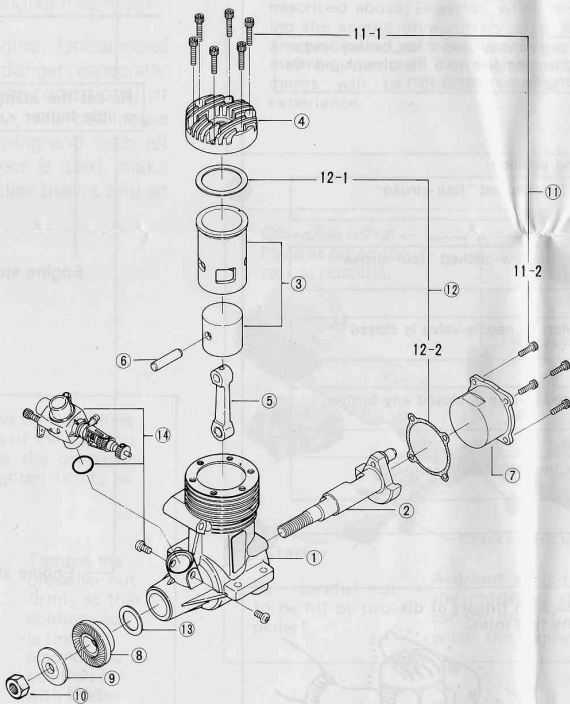
- Avoid running the engine under dusty conditions. If necessary, lay a sheet of plywood or hardboard in front and under the nose of the model when starting the engine.
- Foreign matter in the fuel can cause the carburettor jet to be partially clogged. Therefore:
  - rinse out the fuel tank with methanol or fuel before installing it
  - fit a fuel filter in the fuel delivery tube between tank and carburettor
  - fit a fuel filter to 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.
- 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 delivery tube from the carburettor while the engine is running. Remaining fuel in the tank should also be drained off.
- 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 blackened.
- 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 carburettor intake, again rotating the shaft to distribute the protective oil to all working parts.
- Avoid unnecessary dismantling of your engine.

PARTS LIST

No.	Description	Code No.					
		10FP	15FP	20FP	25FP	35FP	40FP
①	Crankcase	21301000	21701000	22301010	22351010	23301010	23351010
②	Crankshaft	21102004	21602002	22302000		23302000	
③	ABC Cylinder & Piston Ass'y	21303000	21703000	22303010	22353010	23303010	23353010
④	Cylinder Head	21304000	21704000	22304000	22604004	23304000	24904019
⑤	Connecting Rod	21305000	21505001	22405013		24805408	
⑥	Piston Pin	21106003	21706000	22406001	22606009	23306000	23356000
⑦	Cover Plate	21307000	21707000	22307000		23307000	
⑧	Drive Washer	21608006		22308000		23308000	
⑨	Propeller Washer	21109005	21509019	23009006			
⑩	Propeller Nut	20810007	21510003	23210007			
⑪	Screw Set	21313000	22513002	22613006		23313000	
11-1	Head Screw	—	—	—		—	
11-2	Cover Screw	—	—	—		—	
⑫	Gasket Set	21314000	21714000	22314000	22364000	23314000	23364000
12-1	Head Gasket	—	—	—		—	—
12-2	Cover Gasket	—	—	—		—	
⑬	Thrust Washer	21620006			22020001		
⑭	Carburettor Complete	21381000 (Type 1A)	21781000 (Type 15)	22381000 (Type 2A)		23381000 (Type 3A)	
	Silencer	21225000 (OS-871)		22325020 (E-2030)		23325020 (E-3030)	

Optional Parts & Accessories

	Spinner Nut	20824005	21524001	23024008	23024009
	O.S. Super Filter (Large)	72403050			
	Safety Remote Needle-valve Mounting Kit	71704000	—	71704000	
	Radial Motor Mount	71909100	71909300	71908100	71906200
	Two-way Socket Wrench	71501007			
	Long Socket Wrench (w/plug grip)	71521000			
	O.S. Mini Tool Set	71511006			
	Silencer Extension Adapter	21125108	22325100		23325100



PARTS LIST (CARBURETTOR)

No.	Description	Code No.			
		1A	15	2A	3A
15	Throttle Lever (w/screw)	22081408			
16	Rotor	21381200	21781200	22381200	23381200
17	Throttle-stop screw (w/spring)	22081811		22381300	
18	Carburettor Body	21381100	21781100	22381100	23381100
19	Air-bleed Screw (w/spring)	22081820		22381600	
20	Carburettor Fixing Screw	23081706			
21	Carburettor Rubber Gasket	21015001		22615000	
22	Needle-valve Assembly	21181902		22281903	
23	Needle	21181976		22281977	
24	Nozzle Assembly	21181967		22281968	
24-1	Ratchet Spring	21111300		23011308	

The specifications are subject to alteration for improvement without notice.

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