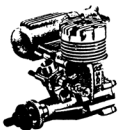


INSTRUCTIONS FOR O.S. FP SERIES ENGINES (MAX-10FP, 20FP, 25FP, 35FP & 40FP)



MAX-10FP



MAX-20FP, 25FP

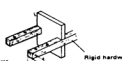


MAX-35FP, 40FP

INSTALLATION OF THE ENGINE

Installation in the model

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

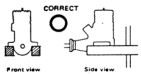


O.S. radial motor mount
(Available as an optional
extra part. See parts list.)



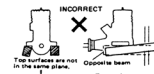
At least 12mm (1/2")
At least 12mm (1/2")
Rigid hardwood
(e.g. maple)

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



CORRECT

Top surface are in the same plane.

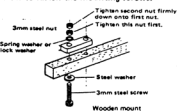


INCORRECT

Top surfaces are not in the same plane.
Opposite beam.
Engine does not rest firmly.

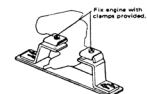
Re-align the surfaces as necessary

How to fasten the mounting screws.

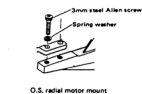


Bench mount

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.



Commercially available bench mount. Refer to mounting hole pattern enclosed.



O.S. radial motor mount



You may make such a bench mount as sketched below.

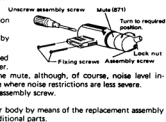
Install the engine with screws and nuts, referring to "How to fasten mounting screws."

Wooden case, etc.
Stake firmly to ground or clamp to bench-top.

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) Retighten the assembly screw, followed by the locknut.
- The O.S. 811 silencer for MAX-10FP is equipped with the mute at the middle of the silencer. Extra power can be obtained by removing the mute, although, of course, noise level increases. You may use the silencer less the mute where noise restrictions are less severe.
- 1) Disassemble the silencer, removing the long assembly screw.
 - 2) Remove the mute.
 - 3) Join the front and rear parts of the silencer body by means of the replacement assembly screw (M3 x 80) and locknut supplied as additional parts.



SILENCER MUTE

The O.S. silencer mutes are devices that can be added to the OS-842 and OS-843 silencers to further reduce exhaust noise levels. They are available as optional extra parts for use where anti-noise regulations are exceptionally severe, or where the user prefers quiet operation. By fitting the mute, noise levels are reduced quite considerably, but at the expense of a slight extra loss of power.

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 fliers. Of modern design and featuring Schenck-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 nearly 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.

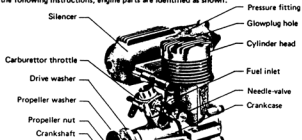
EXPERIENCED MODELLERS PLEASE NOTE. The following information includes some elementary instructions that may appear to be needless detail. Please understand that these are for the benefit of newcomers with no previous experience of model engines.

SPECIFICATIONS

	10FP	20FP	25FP	35FP	40FP
Displacement	1.76cc (0.107cu.in.)	3.46cc (0.211cu.in.)	4.67cc (0.284cu.in.)	8.6cc (0.526cu.in.)	8.46cc (0.516cu.in.)
Bore	13mm (0.5118in.)	16mm (0.6299in.)	16mm (0.6299in.)	20mm (0.7874in.)	20mm (0.7874in.)
Stroke	12mm (0.4724in.)	16mm (0.6299in.)	16mm (0.6299in.)	18mm (0.7087in.)	18mm (0.7087in.)
Weight	170g (6.01oz)	185g (6.53oz)	185g (6.53oz)	250g (8.81oz)	240g (8.47oz)
Power Output	0.70HP (0.51kW)	1.40HP (1.02kW)	1.73HP (1.27kW)	3.00HP (2.20kW)	3.00HP (2.20kW)
Propeller S.P.M.	2,500-16,000 r.p.m.	2,500-16,000 r.p.m.	2,500-16,000 r.p.m.	2,500-16,000 r.p.m.	2,500-16,000 r.p.m.
Shaft Thread	M3	UMF 1/4"-28	UMF 1/4"-28	UMF 1/4"-28	UMF 1/4"-28

NAMES OF ENGINE PARTS

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

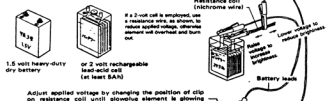


BEFORE STARTING

Tools, accessories, etc.

The following items are necessary for operating the engine.

- 1 Fuel
Model glowplug engine of good quality, preferably containing a small percentage of nitromethane. (See "Advice on selection of fuel, glowplug and propeller")
- 2 Glowplug
O.S. No. 6 glowplug is recommended.
- 3 Propeller
Obtain one of the following propellers according to the size of your engine.
7 x 4 for 10FP, 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).



Adjust applied voltage by changing the position of clip on glowplug element is glowing bright red or orange colour.

- 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, a 80cc (3 oz.) tank is suggested for the 10FP, while a 150cc (5 oz.) tank is suggested for the 20FP and 25FP. A 200cc (7 oz.) tank will be sufficient for the 35, 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 is available to transfer fuel directly from your fuel container to the fuel tank.
- 9 Silicone tubing
This is required for the piping between the fuel tank and engine.
- 10 Safety ("Chicken") stick
This is used to flip the propeller for starting and to protect one's fingers against loose propeller. An alternative is a thick ribbed rubber finger protector.

11 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.

12 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



Locate the fuel tank to the top of the tank 5-10mm (1/4-3/8") above the level of the needle-valve.

Note: When cutting silicone tubing



* If you would need to clean out silicone tubes, use methanol or glow-fuel, not gasoline.



Priming quantity

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

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 intake, 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.

3

Do not connect the battery to the glowplug.



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

STARTING THE ENGINE

Preparations

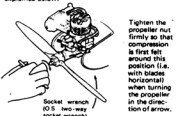
1 Fitting the glowplug

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



2 Fitting the propeller

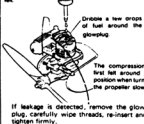
First, fit the propeller to the engine by tightening the prop. nut lightly, and make sure of the position where compression is felt, turning the propeller counter-clockwise slowly. Then tighten firmly as explained below.



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 Checking for gas leakage

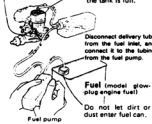
Open gas tap slowly by turning the propeller up to the position after compression is felt.



If leakage is detected, remove the glow-plug, carefully wipe threads, re-insert and tighten firmly.

4 Filling the fuel tank

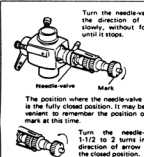
Re-connect delivery tube to engine after tank is filled. Fuel will overflow into this tube when the tank is full.



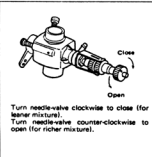
Disconnect delivery tube from the fuel line, and connect it to the tubing from the fuel pump.
Fuel (not dirt or dust enter fuel can.)
Do not let dirt or dust enter fuel can.

Starting

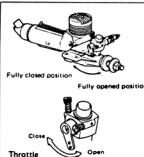
1 Setting the needle-valve



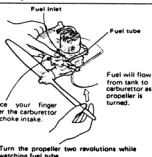
2 Opening and closing of the needle-valve



3 Open the throttle fully



4 Priming



1

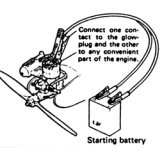
Glowplug battery. Place as far to the rear as possible.



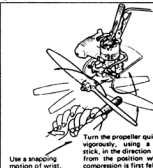
Be careful not to be hit by propeller!

2 Heat glowplug

Connect battery leads as shown (Polarity is unimportant).



3 Flip propeller to start



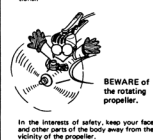
Use a snapping motion of wrist.

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 accurate priming, as described in 4, are the keys to starting the engine successfully.

4 Engine starts

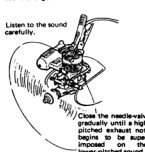
The engine will start after a few flips. If it does not, refer to the "TROUBLE SHOOTING" chart later in these instructions.



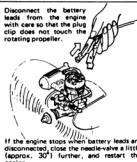
In the interests of safety, keep your face and other parts of the body away from the vicinity of the propeller.

5 Needle-valve adjustment (1)

Close the needle-valve until the exhaust sound changes.



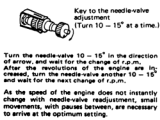
6 Disconnect battery leads



If the engine stops when battery leads are disconnected, close the needle-valve a little (approx. 30°) further, and restart the engine.

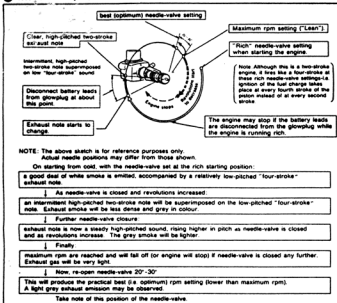
7 Needle-valve adjustment (2)

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

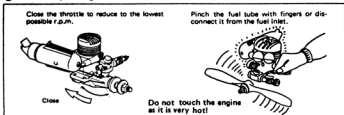


Turn the needle valve 10 - 15° in the direction of arrow, and wait for the change of r.p.m. After the revolutions of the engine are increased, turn the needle valve another 10 - 15° and wait for the next change of r.p.m. As the speed of the engine does not instantly change with needle-valve readjustment, small movements, with pauses between, are necessary to arrive at the optimum setting.

④ Needle-Valve Adjustment – Summary



⑤ How to stop the engine



Starting the engine with an electric starter

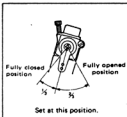
If an electric starter is used, the procedures are the same as for hand starting outlined above, except for steps ② and ③ which are modified as follows:

① Fit an O.S. solid alloy spinner-nut to the engine (available as an optional extra part) for control of 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.

② When using a spinner assembly, make sure that the nozzles in the spinner shell are large enough to clear the propeller blades and so do not cut into and weaken the blade roots.

③ Re-set the throttle at 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 an hydraulic lock that may damage the engine.



Subsequent starting procedure

Once the optimum needle-valve setting has been established see ④ "Needle-valve adjustment – Summary" (7) the procedure for starting is simplified as follows:

- 1) Open the needle-valve one 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, energise the glowplug and flip the prop.

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.

⑥ 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 (100°) from the optimum setting, under 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°-50° 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.

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 for use in 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, re-adjust 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 20% lubricant.

Attention: Methanol (methyl alcohol) and nitromethane are poisonous. Keep out 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%	70%
Castor Oil	25%	20%
Nitromethane	10%	10%

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 the fuels of higher nitro content, use the O.S. No.9 or for one running to get the most satisfactory results after practical tests among O.S. No.3, No.7 and No.9 plugs.

Propeller

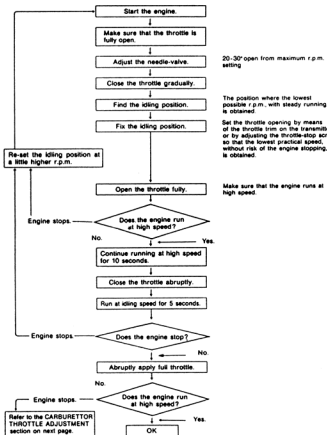
Suggested propeller sizes are given in the table. As the ideal propeller diameter, pitch and blade area vary according to the size, weight and type of model, final propeller selection can be made after practical experience.

Running-in	Trainer & Sport type aircraft	Scale aircraft
MAX-10FP	7 x 4	7 x 4, 7 x 5
MAX-20FP	8 x 4	8 x 4, 8 x 5
MAX-25FP	9 x 5	9 x 4, 9 x 5
MAX-35FP	10 x 6	10 x 6, 10 x 6.5
MAX-40FP	11 x 5	10 x 5, 10 x 6, 10 x 6.5

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 touch 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 snug enough to clear the propeller blades and so do not cut into and weaken the blade roots.

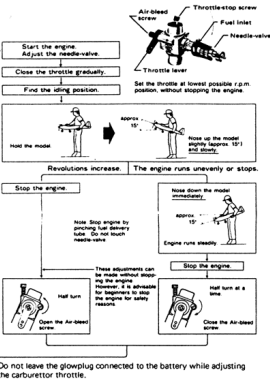
CARBURETTOR

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

Repeat the procedure while opening and closing the throttle until the best result is obtained.



Symptom	Factor	Cause/symptom	Corrective action
Engine fails to fire	①	Flipping is not quick enough.	Practice flipping prop more vigorously.
	②	Inefficient battery.	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	Glowplug element is too high.	Replace glowplug. Check that applied voltage is burned out. Check glowplug heating using other leads.
Engine "flooded" due to excessive priming.	①	Something wrong with battery leads.	Check glowplug heating using other leads.
	②	Engine "flooded" due to excessive priming.	Close needle-valve fully and remove glowplug, then flip propeller to pump out excess fuel. (lowest engine, if possible, while pumping out excess). Re-start engine. (Priming is not necessary at this time.)
	③	Inefficient priming.	Repeat priming procedure referring to ② Priming.
Engine fires, intermittently but does not run.	①	Incorrect heating.	Voltage too high or too low. Re-check and re-adjust referring to "BEFORE STARTING" paragraph 4.
	②	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-energise 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.)
Engine fires once or twice, then fails to fire.	①	Flipping is not quick enough.	Practice flipping prop more vigorously.
	②	Inefficient battery.	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 stalls.	①	Inefficient priming.	Repeat priming procedure referring to Priming.
	②	Mixture too rich.	Close needle-valve half turn (180°) and wait for several minutes; then re-start. (Priming is not necessary.)
Engine starts, then revolutions increase and engine cuts out.	①	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 airtight). Check that carburettor is not clogged with dirt.
	②	Mixture too rich.	Close the needle valve a little.
Engine stops when throttle is depressed after starting.	①	Mixture of glow-plug and fuel.	Change fuel or glowplug.

TROUBLE SHOOTING WHEN THE ENGINE FAILS TO START

Three key points

For quick, reliable starting, the following three conditions are required:

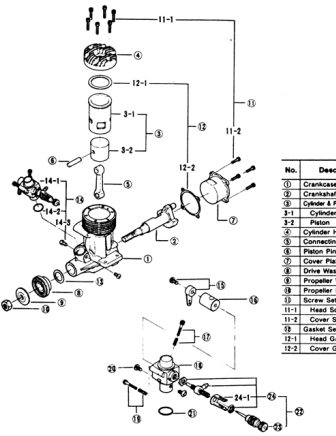
- ① Good compression.
- ② Adequate "glow" at glowplug.
- ③ Correct mixture.

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.

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 hardboard in front and under the nose of the model when starting the engine.
2. Foreign matter in the fuel can cause the carburettor jet to be partially clogged. Therefore:
 - 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.
3. The use of a mixture of kerosene and gasoline 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.
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 blackened.
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 carburettor intake, again rotating the shaft to distribute the protective oil to all working parts.
6. Avoid unnecessary dismantling of your engine.



PARTS LIST

No.	Description	Code No.				No.	Description	Code No.			
		10PF	20PF	25PF	35PF			40PF	10PF	20PF	25PF
①	Crankcase	215030	220300	225300	230300	②	Thrust Washer	216000	220000		
②	Crankshaft	215020	220020	225020	230020	③	Carburettor Complete	215000	220000	225000	230000
③	Cylinder & Piston Assy	215030	220030	225030	230030	④	Carburettor Throttle	216000	220000	225000	230000
3-1	Cylinder Liner					11-1	Carburettor Throttle	216000	220000	225000	230000
3-2	Piston					11-2	Carburettor Rubber Gasket	216000	220000	225000	230000
④	Cylinder Head	215040	220040	225040	230040	11-3	Carburettor Flange Gasket	216000	220000	225000	230000
⑤	Connecting Rod	215000	220000	225000	230000	⑤	Silencer	212000	220000	225000	230000
⑥	Piston Pin	211000	220000	225000	230000			212000	220000	225000	230000
⑦	Cover Plate	215020	220020	225020	230020						
⑧	Drive Washer	215000	220000	225000	230000						
⑨	Propeller Washer	211000	220000	225000	230000		Spinner Nut	220000	225000	230000	
⑩	Propeller Nut	220000	225000	230000			Silencer Nut	220000	225000	230000	
⑪	Screw Set	211000	220000	225000	230000		Safety Remote Needle-valve Mounting Kit	216000			
11-1	Head Screw	215020	220020	225020	230020		Ratchet Motor Mount	216000	220000	225000	230000
11-2	Cover Screw	215000	220000	225000	230000		Two-way Socket Wrench	216000	220000	225000	230000
⑫	Gasket Set	211000	220000	225000	230000		Long Socket Wrenching Set	216000	220000	225000	230000
12-1	Head Gasket	211000	220000	225000	230000		O.S. Mini Tool Set	216000	220000	225000	230000
12-2	Cover Gasket	211000	220000	225000	230000		Silencer Extension Adapter	212000	220000	225000	230000

Optional Parts & Accessories

PARTS LIST (CARBURETTOR THROTTLE)

No.	Description	Code No.			No.	Description	Code No.		
		1A	2A	3A			1A	2A	3A
①	Throttle Lever (w/screw)	220040			⑥	Carburettor Rubber Gasket	216000	220000	
②	Needle-Valve Assembly	211000	220000	225000	⑦	Needle	216000	220000	225000
③	Throttle stop screw/spring	220010	225010		⑧	Needle	216000	220000	225000
④	Carburettor Body	216000	220000	225000	⑨	Nozzle Assembly	211000	220000	
⑤	Air-Bleed Screw (w/spring)	220010	225010		11-1	Ratchet Spring	216000	220000	225000
⑩	Carburettor Flange Screw	220010	225010						

The specifications are subject to alteration for improvement without notice.

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