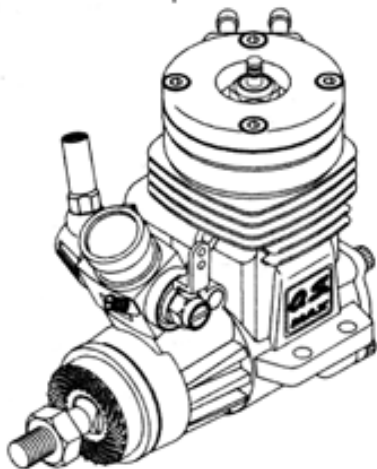

***O.S. ENGINE* MAX-18CV-RM & MAX-18CV-RMX**

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 2-5 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 vehicle, 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 applies basically to ALL MODEL ENGINES and is grouped under two headings according to the degree of damage or danger which might arise through misuse or neglect.



WARNINGS

These cover events which might involve serious (in extreme circumstances, even fatal) injury.



NOTES

These cover the many other possibilities, generally less obvious sources of danger, but which, under certain circumstances, may also cause damage or injury.



WARNINGS

- Never touch, or allow any object to come into contact with, the rotating propeller and do not crouch over the engine when it is running.



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



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



- Never operate your engine in an enclosed space. Model engines, like automobile engines, exhaust deadly carbon-monoxide. Run your engine only in an open area.

- Model engines generate considerable heat. Do not touch any part of your engine until it has cooled. Contact with the muffler (silencer), cylinder head or exhaust header pipe, in particular, may result in a serious burn.





NOTES

- This engine was designed for model boats. 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.
- Install an effective silencer (muffler). Frequent close exposure to a noisy exhaust (especially in the case of the most powerful high-speed engines) may eventually impair your hearing and such noise is also likely to cause annoyance to others over a wide area.
- For their safety, keep all onlookers (especially small children) well back (at least 20 feet or 6 meters) when preparing your model for running.
- Take care that the glowplug clip or battery leads do not come into contact with the propeller or any other rotating parts. Also check that the linkage to the throttle arm is secure.
- If your engine does not have a built-in recoil starter, use an electric starter. The wearing of safety glasses is also strongly recommended.
- When handling the boat immediately prior to launching, be especially cautious. Keep the propeller and other rotating parts away from you.
- Before starting the engine, always check the tightness of all the screws and nuts especially those of joint and movable parts such as throttle arm. Missing retightening the loose screws and nuts often causes the parts breakage that is capable of harming you.



NOTES

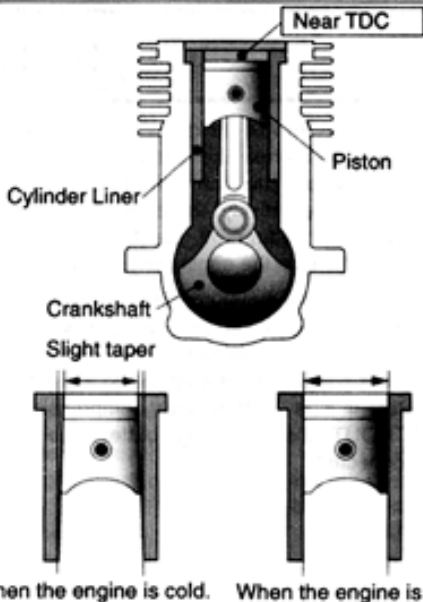
- Adjust the throttle linkage so that the engine stops when the throttle stick and trim lever on the transmitter are fully retarded. Alternatively, the engine may be stopped by cutting off the fuel supply. Never try to stop the engine physically.
- Warning! Immediately after a glowplug-ignition engine has been run and is still warm, conditions sometimes exist whereby it is just possible for the engine to abruptly restart if it is rotated over compression **WITHOUT** the glowplug battery being reconnected.
- If your engine is equipped with a recoil starter, pull the operating handle straight out when starting the engine, so that the cord does not rub against the hull or engine. This will help prevent the cord from being damaged by abrasion or engine heat.
- Do not extend the starter cord more than 45cm (18"). Do not abruptly release the operating handle. Allow the cord to rewind smoothly while still holding the handle.
- Do not attempt to disassemble the recoil starter (if equipped). If you do so, the very strong spring inside will be suddenly ejected. This can be very dangerous.

ENGINE CONSTRUCTION

With this engine, the piston will feel tight at the top of its stroke (TDC) when the engine is cold. This is normal.

The cylinder bore has a slight taper.

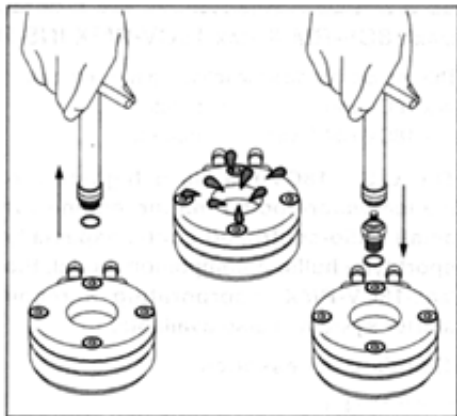
The piston and cylinder are designed to achieve a perfect running clearance when they reach operating temperature.



NOTES WHEN APPLYING AN ELECTRIC STARTER

Do not over-prime. This could cause a hydraulic lock and damage the engine on application of the electric starter.

If over-primed, remove glowplug, close needle-valve and apply starter to pump out surplus fuel. Cover the head with a rag to prevent pumped out fuel getting into your eyes.



NOTE

We do not recommend running your boat on the sea, or in any other saltwater environment. Under such conditions, it is difficult to prevent the engine from becoming corroded and, eventually, inoperative.

MAX-18CV-RM & MAX-18CV-RMX INSTRUCTIONS

This manual handles the following two versions.

MAX-18CV-RM with 11J carburetor

MAX-18CV-RMX with 11J carburetor

The O.S. "18CV-RM" is a high-performance water-cooled marine engine for small radio-controlled boats, especially sport type hulls. A companion model, the MAX-18CV-RMX incorporating a recoil starter system is also available.

Standard accessories

- Glow Plug No.8

NOTE

As delivered, the engine has the carburetor lightly fit into its intake. Secure it changing its angle according to the hull.

About the Head Gasket

These engines are equipped with two head gaskets of 0.1mm thick and 0.2mm thick. It is suggested to adjust the total thickness according to atmospheric temperature, humidity and glowplug used.

- At early stage of running-in, when a glowplug tends to burn out early or when high nitromethane content fuel is used, try to run the engine with both gaskets.
- When low nitromethane content fuel is used, try to run the engine removing the 0.1mm gasket.

TOOLS, ACCESSORIES, etc.

The following items are necessary for operating the engine.


■ Items necessary for starting


FUEL

Generally, it is suggested that the user selects a fuel that is commercially available for model two-stroke engines and contains 10-30% nitromethane. As a starting point, we recommend a fuel containing 20% nitromethane, changing to a fuel containing more nitro if necessary. When the brand of fuel is changed, or the nitro content increased, it is advisable to repeat the running-in procedure referred to in the RUNNING-IN paragraphs. Please note that with high-nitro fuels, although power may be increased for competition purposes, glowplug elements do not last as long and engine life will be shortened.



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.

SUPER FILTER (L) (Option)

Fit a filter to the outlet tube of your refuelling container to prevent entry of foreign matter into the fuel tank.



GLOWPLUG IGNITER

Commercially available handy glowplug heater in which the glowplug battery and battery leads are integrated.



PROPELLER

Use well balanced propellers only. As the ideal diameter, pitch and shape vary according to the size, weight and type of model, final selection can be made after practical experiment. As a starting point, suggested propeller diameter is 36-40mm with a pitch/dia ratio of 1.2-1.6 for Vee type hulls.



NOTE Never use a propeller that has even a slight damage.

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.



STARTER BELT

Necessary for starting the engine. It is suggested to keep a starter rope as a reserve.



ELECTRIC STARTER AND STARTER BATTERY

Use a 12-volt electric starter with suitable battery for starting the engine.(18CV-RM)



SILICONE TUBING

This is required for the connection between the fuel tank and engine, also for the water cooling system. Inner dia. of 2.3mm and outer dia. of 5-5.5mm would be suitable.



■ TOOLS

HEX SCREWDRIVER

Necessary for engine installation.
1.5mm, 2mm, 2.5mm, 3mm



SCREWDRIVER

Necessary for carburetor adjustments.
No.1, No.2, etc



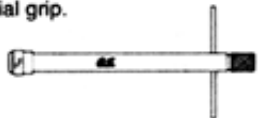
SOCKET DRIVER

It is required to tighten and loosen the carburetor retainer nut. Opposite side distance of 6mm

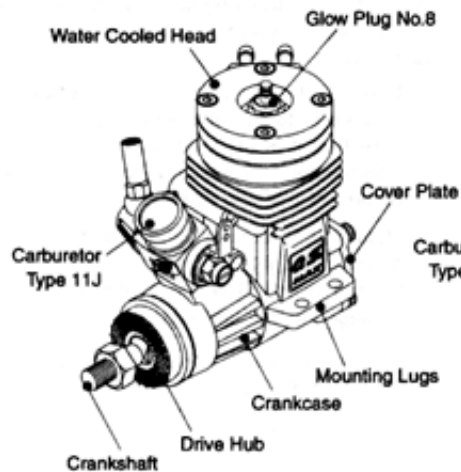


LONG SOCKET WRENCH WITH PLUG GRIP

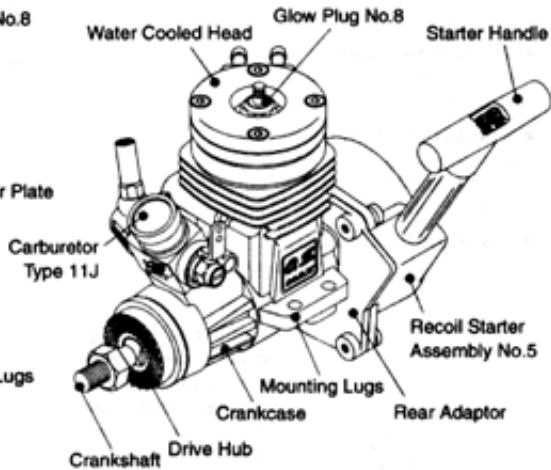
Recommended for easy removal and replacement of the angled and recessed glowplug, the O.S.Long Socket Wrench incorporates a special grip.



BASIC ENGINE PARTS



18CV-RM



18CV-RMX

CARBURETOR CONTROLS (11J)

Three adjustable controls are provided on this carburetor.

- **The Needle-Valve:**

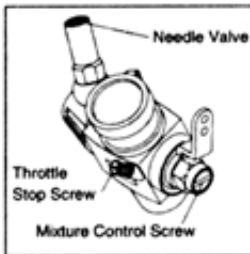
For adjusting the mixture strength when the throttle is fully open.

- **The Mixture Control Screw:**

For adjusting the mixture strength at part-throttle and idle speed, to obtain steady idling and smooth acceleration to mid speeds.

- **The Throttle Stop Screw:**

For setting the minimum idle speed:



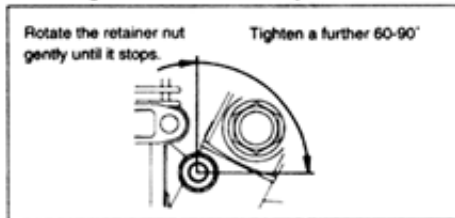
NOTE:

Readjustment may be necessary, occasionally to allow for changes in fuel, gear ratio or clutch engagement point.

INSTALLATION OF THE CARBURETOR

As delivered, the engine has its carburetor lightly installed into the intake boss. Secure it as follows.

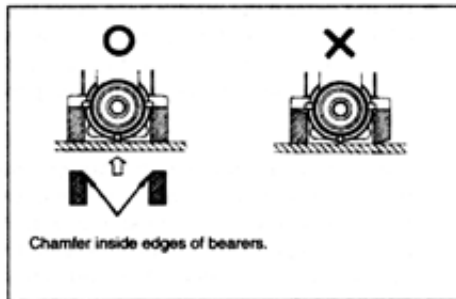
1. Loosen the retainer screw, rotate the carburetor to its correct position and make sure that it is pressed well down into the intake boss, compressing the rubber gasket, before retightening screw.
2. Rotate the retainer screw gently until it stops, then tighten a further 60-90°. Do not overtighten the screw as this will damage the carburetor body.



INSTALLATION

1. Make sure that the engine mounting beams in the hull are parallel, with their top surfaces in the same plane. If they are not, the engine will not rest firmly as the engine mounting faces (undersides of the mounting lugs) are precision machined to be flat and in the same plane. Poor installation may not only cause vibration, erratic running and loss of performance, but may also damage the engine itself by deforming the crankcase, cylinder, etc.
2. The mounting beams and adjacent hull structure should be as rigid as possible so that the engine may develop its full performance. Use 3mm steel screws, such as Allen socket-head type, with locknuts, for bolting the engine to the mounting beams.

3. If the holes in the mounting beams do not align exactly with the engine's mounting lugs, enlarge them slightly with a needle file so that the mounting screws pass through the holes smoothly without being forced.



NOTES CONCERNING THE RECOIL STARTER (18CV-RMX ONLY)

REMINDER!

- Do not attempt to disassemble the recoil starter. If you do so, the very strong spring inside will be suddenly ejected. This can be very dangerous.
- Do not extend the starter cord more than 45cm(18"). Do not abruptly release the operating handle. Allow the cord to rewind smoothly while still holding the handle.
- Pull the operating handle straight out when starting the engine, so that the cord does not rub against the vehicle body or engine. This will help prevent the cord from being damaged by abrasion or engine heat.
- Try to avoid spilling fuel over the starter unit and its cord. Some fuels have a detrimental effect on these parts.
- The starter prevents the engine from being rotated in the wrong direction. The unit will be damaged if you attempt to force the flywheel in the opposite direction (i.e. clockwise when viewed from the crankshaft end).

NOTE: Because, in the interests of personal safety, dismantling of the starter mechanism is strongly discouraged, the Recoil Starter is available for replacement only as a pre-assembled unit. However, some related parts, such as Starting Shaft and Rear Adaptor, are obtainable separately. (See Parts List.)

GLOWPLUG

Since the glowplug and fuel combination used may have a marked effect on performance and reliability, it would be worthwhile to experiment with different plug types. An O.S. No.8 glowplug is supplied with the engine. Another Recommended O.S. plug is A5.

Carefully install plug finger-tight, before final tightening with the correct size plug wrench.

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 becomes cooler and ignition is retarded.

Glowplug life

Particularly in the case of very high performance engines, glowplugs must be regarded as expendable items.

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 & RUNNING-IN ('Breaking-in')

PRESSURIZED FUEL SYSTEM

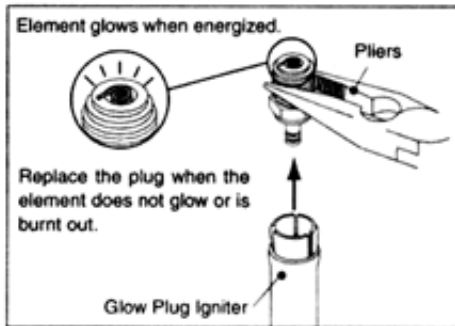
- The somewhat violent changes of hull attitude that occur in running, combined with the fact that, in boats the fuel tank is often located some distance from the carburetor, means that fuel 'head' at the carburetor can vary and upset running. Therefore, it is recommended that a muffler pressurized fuel feed system be used.



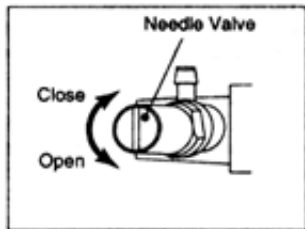
Before starting the engine, always check the tightness of all the screws and nuts especially those of joint and movable parts such as throttle arm. Missing retightening the loose screws and nuts often causes the parts breakage that is capable of harming you.

The following procedure is suitable for these engines when the fuel containing up to 30% nitromethane are used.

- ◆ Fill the tank completely with fuel.
- ◆ Temporarily remove the glowplug to check that it glows bright red when energized.

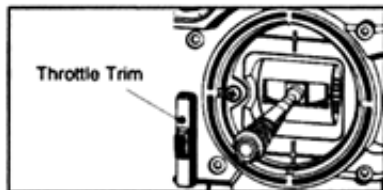


- ◆ Turn the needle-valve clockwise slowly until it stops. This is the fully closed position. Do not force to turn further.
- ◆ Open the Needle-Valve 2 turns from the fully closed position.

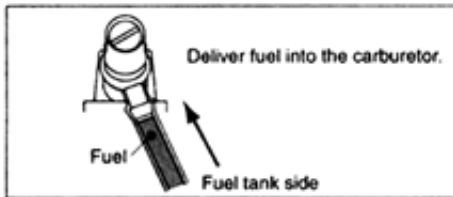


- ◆ Switch on the transmitter and make sure that each linkage moves correctly.

- ◆ Raise the throttle trim 2 or 3 clicks on the transmitter for easier starting.



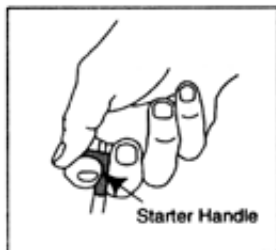
- ◆ Turn the engine with an electric starter or recoil starter to draw fuel into the engine.



- ◆ Now connect glowplug battery lead to heat the plug filament and start the engine.
- ◆ Start the engine using an electric starter making sure the engine rotation direction is correct (counter-clockwise seen from the crankshaft end).

■ In case of the 18CV-RMX

- Pull the starter handle briskly straight out several times to start the engine.



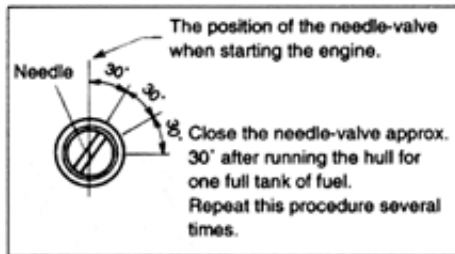
- ◆ When the engine starts, first repeat low speed running and medium speed running by raising and lowering throttle stick on the transmitter to warm up the engine. Avoid high speed running.

PRECAUTIONS

When starting the engine, with the hull out of the water and no load on the engine, even below half throttle, the engine can over-rev. Prolonged running at higher throttle settings can result in seizure of the connecting rod and crankpin. Never run the engine with the throttle above the starting setting with the hull out of the water and no load on the engine.



- ◆ Next, disconnect the glowplug battery and try running the hull on the water. If the engine stalls, open the throttle fractionally, but try to keep the engine running as rich as possible: if it stops because of being excessively over-rich, close the Needle-Valve 30° and try again.
- ◆ Run the hull on the water until one tank of fuel has been consumed, then close the Needle-Valve 30° and run the hull for another full tank of fuel. Repeat this procedure until 5 more tanks of fuel have been consumed, during which time the throttle may be opened for brief bursts of increased power. If the engine stops at medium speeds, close the Mixture Screw 45-90°.



Remember!

If the engine should need to be disassembled (e.g. for cleaning or minor parts replacement) it is advisable to return the Needle-Valve to the original rich, starting setting and check whether further running-in time is required before the car is raced again. In the event of any major working parts (e.g. piston/cylinder liner assembly) being replaced, the complete running-in should be repeated.