

It is of vital importance, before attempting to operate your engine, to read the general 'SAFETY INSTRUCTIONS AND WARNINGS' in the following section 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.

SAFETY INSTRUCTIONS AND WARNINGS ABOUT YOUR O.S. ENGINE

Remember that your engine is not a "toy", but a highly efficient internal-combustion machine whose power is capable of harming you, or others, if it is misused or abused. As owner, you, alone, are responsible for the safe operation of your engine, so act with discretion and care at all times. If at some future date, your O.S. engine is acquired by another person, we would respectfully request that these instructions are also passed on to its new owner.

- The advice which follows is grouped under two headings according to the degree of damage or danger which might arise through misuse or neglect.

⚠ WARNINGS

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

⚠ NOTES

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

⚠ WARNINGS



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.



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.

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.

⚠ NOTES

- This engine is intended for model cars. Do not attempt to use it for any other purpose.
- Mount the engine in your model securely, following the manufacturers' recommendations, using appropriate screws and locknuts.

- Install an effective silencer (muffler). Frequent close exposure to a noisy exhaust (especially in the case of the more powerful highspeed engines) may eventually impair your hearing and such noise is also likely to cause annoyance to others over a wide area.
- The wearing of safety glasses is also strongly recommended.
- Take care that the glowplug clip or battery leads do not come into contact with rotating parts. Also check that the linkage to the throttle arm is secure.
- For their safety, keep all onlookers (especially small children) well back (at least 20 feet or 6 meters) when preparing your model for running.
- 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.
- To stop the engine, fully retard the throttle stick and trim lever on the trans-mitter, or, in an emergency, cut off the fuel supply by pinching the fuel delivery line from the tank.
- 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.

■ NOTES ON OPERATION

GUARANTEE

This engine is constructed from the very best materials available and to the very highest engineering standards, using the most advanced precision machinery. However, the extremely high stresses imposed by car racing operation under very severe conditions, as well as stresses which are exacerbated by the use of powerful fuels containing very high concentrations of nitromethane, constitute hazards which are beyond a manufacturer's control. Accordingly, we regret that it is not possible to extend our usual warranty terms to this particular engine -i.e. no guarantee is offered against material wear, or damage resulting therefrom, in actual use.

While Operating

- Please do not run on a public street, this could cause serious accidents, personal injuries and/or property damage.
- Please do not run near pedestrians or small children.
- Please do not run in small or confined areas.
- Please do not run where loud noises can disturb others, such as hospitals and residential areas.

NOTE

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

■ ABOUT THE ENGINE

MAX-21XR-B is a 1/8 off-road engine with smooth acceleration and easy handling. The newly developed carburetor has polished up easiness of adjustment, that is distinctive characteristic of O.S. engine.

■ TOOLS, ACCESSORIES, etc.

The following items are necessary for operating the engine.

● Items necessary for starting

FUEL

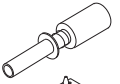
Generally, it is suggested that the user selects a fuel that is commercially available for model two-stroke engines and contains 10-30% nitromethane. As a starting point, we recommend a fuel containing 20% nitromethane, changing to a fuel containing more nitro if necessary. When the brand of fuel is 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.

FUEL FILTER

To installed in the fuel line between fuel tank and carburetor to prevent foreign matter from entering the carburetor.

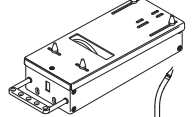
■ GLOWPLUG IGNITER

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



■ STARTER BOX

For starting the engine.



■ FUEL PUMP

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



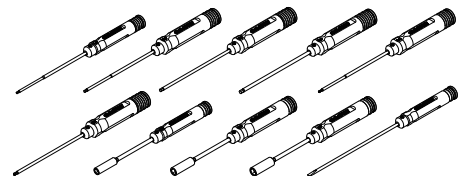
■ SILICONE FUEL LINE

Heatproof silicone tubing of approx. 5mm o.d. and 2mm i.d. is required for the connection between the fuel tank and engine.



■ TOOLS

O.S. SPEED DRIVER TOOLS



O.S. SPEED FLYWHEEL KEY



O.S. SPEED CLUTCH WRENCH & ADJUSTER



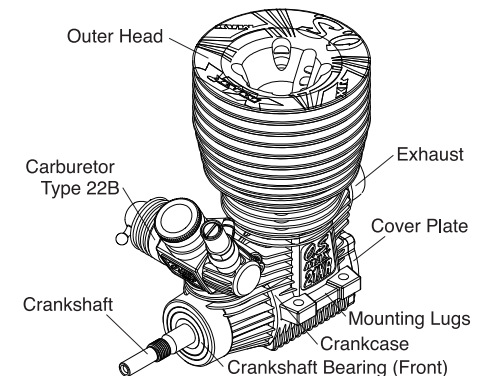
O.S. SPEED FLYWHEEL PULLER



O.S. SPEED PLUG WRENCH

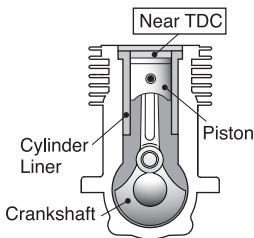


■ BASIC ENGINE PARTS

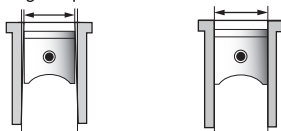


ENGINE CONSTRUCTION

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.



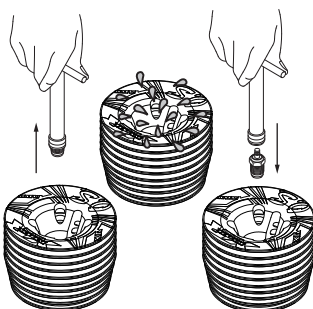
Slight taper



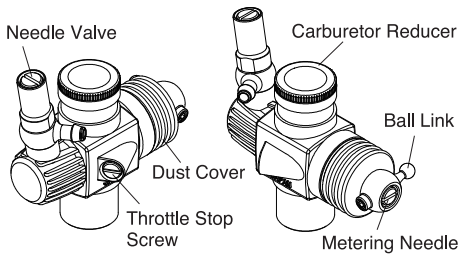
When the engine is cold. When the engine is hot.

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 any pumped out fuel from getting into your eyes.



■ CARBURETOR CONTROLS



Three adjustable controls are provided on this carburetor.

● The Needle-Valve:

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

● The Metering Needle:

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

● The Throttle Stop Screw:

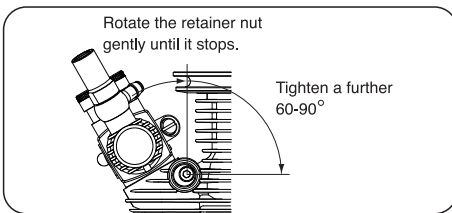
For setting the minimum idle speed:

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

■ INSTALLATION OF THE CARBURETOR

As delivered, the engine has its carburetor lightly installed in 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 spacer.



■ ENGINE INSTALLATION

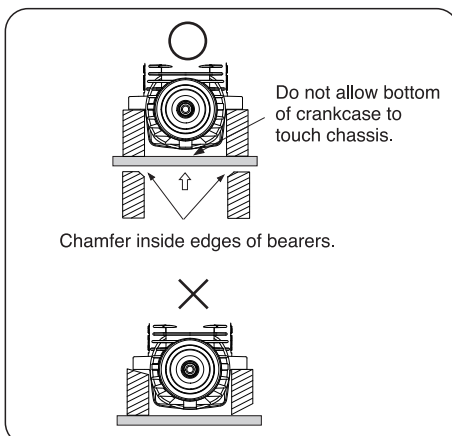
Make sure that the vehicle's engine mounting surfaces are level and in the same plane. Poor installation may cause distortion of the crankcase, bearings, etc., resulting in erratic running and loss of performance. The recommended screws for securing the engine are 3mm or 4-40 steel Allen hexagon socket type. If existing holes in the engine mount do not align perfectly with engine mounting lugs, enlarge them slightly with a needle-file so that screws are in alignment with the mounting holes.

NOTE

The engine bottom may interfere with chassis of some models. In this case, file off the chassis so that the engine may not interfere with the chassis when it is installed.

Note:

Be sure to use a collet supplied when use a optional 28XZ Hyper Flywheel Set.



■ STARTING THE ENGINE & RUNNING-IN ('Breaking-in) RUNNING-IN ('Breaking-in)

Running-in is a procedure for an engine to come close to actual running conditions (fuel, r.p.m., engine temperature, etc.).

Excessively rich running and prolonged low speed running should be avoided. Prolonged low speed running and low temperature running may result in the oil in the fuel becoming gelled and the piston/liner becoming stuck together.

PRESSURIZED FUEL SYSTEM

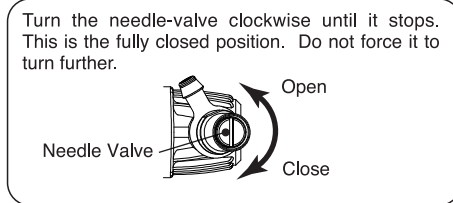
It is recommended that a muffler pressurized fuel feed system be used so that the fuel may be stably fed to the carburetor.

The following procedure is suitable when a fuel containing 30% nitro-methane is used.

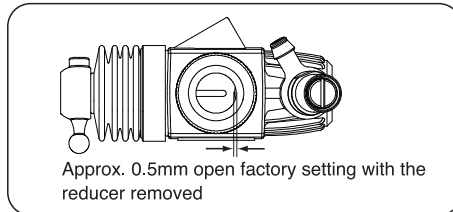
- Fill the tank completely with fuel.

The carburetor is set as shown below at the factory. Start the engine as it is.

- The needle-valve is set approx. 3 and 1/4 turns opened from the fully closed position.



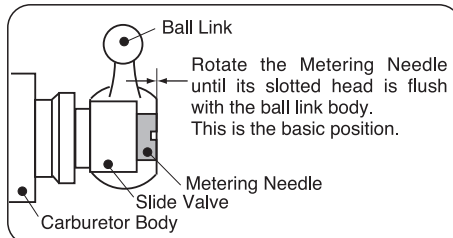
- Throttle is set approx. 0.5mm open.



■ REALIGNMENT OF METERING NEEDLE

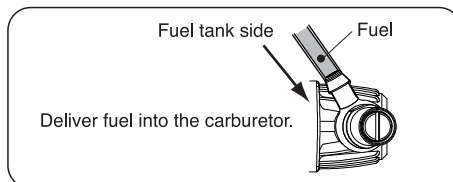
In the course of making carburetor adjustments, it is just possible that the Metering Needle may be inadvertently screwed in or out too far and thereby moved beyond its effective adjustment range.

The basic positions can be found by rotating the Metering Needle until its slotted head is flush with the ball link body.



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

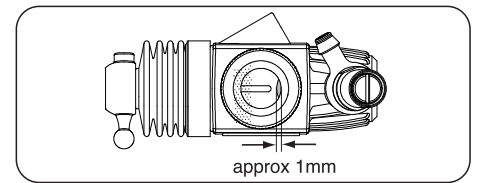
- ◆ Turn the engine with starter box to draw fuel into the engine.



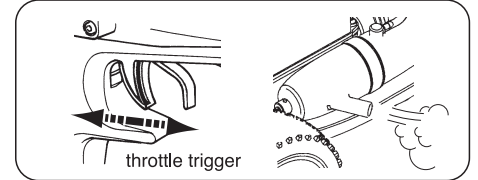
- ◆ Now connect glowplug battery lead to heat the plug filament and start the engine.

When the engines does not start or stops right after being started, try the followings.

- Set the needle-valve approx. 3 turns open from the fully closed position. Do not force the needlevalve to turn beyond a lightly closed position.
- Set the throttle opening a little wider that the factory setting by adjusting the Throttle Stop Screw.



- ◆ When the engine starts, warm it up by repeatedly increasing the rpm to medium speed and back again to a fast idle with the mixture set very rich, the glowplug connected, and the driving wheels clear of the ground. The rich mixture will provide adequate lubrication and cooling indicated by profuse exhaust smoke.



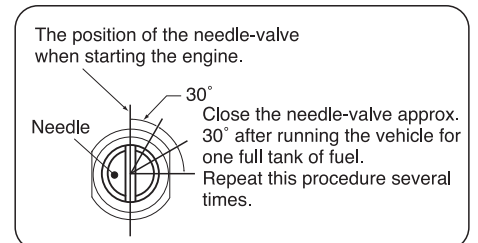
Attention:

It is vitally important to set the throttle at the correct position before starting the engine. If the engine is allowed to run with the throttle too far open under "no load" conditions (i.e. with the driving wheels not in contact with the ground) it will rapidly over-heat and may be seriously damaged.



- ◆ Next, disconnect the glowplug battery and try running the car on the track. 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 rich, close the Needle-Valve 30° and try again.

- ◆ Run the car on the track until one tank of fuel has been consumed, then close the Needle-Valve 30° and run the car for another full tank of fuel. Repeat this procedure until approx. 2 liters 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 Metering Needle 30°.

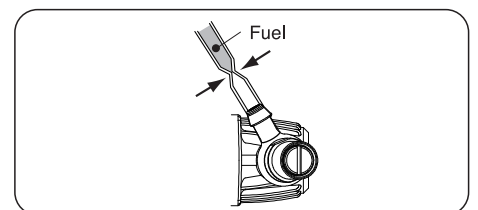


Note:

In the event of any major working parts (e.g. piston/cylinder liner assembly) being replaced or the fuel being changed, especially to high nitro fuel, the complete running-in should be repeated.

■ How to stop the engine

To stop the engine, close the throttle to idle speed and shut it off completely with the trim lever on the transmitter then cut off the fuel supply by pinching the fuel delivery tube to the carburetor.

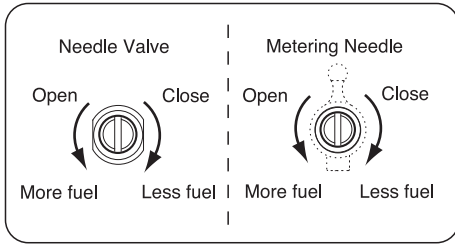


Warning!

Do not touch rotating parts, engine and silencer when stopping the engine as they become very hot, and contact with them may result in a serious burn.

FINAL ADJUSTMENT

Final adjustment should be carried out only after the running-in has been completed.



- ◆ Run the vehicle (with throttle fully open) over the longest available straight course, in order to observe the model's speed. Next return the car to the starting point, close the Needle-Valve 15° and repeat the run, taking note of the improvement in performance.
- ◆ Continue with further runs, gradually reducing the Needle-Valve setting and aiming to achieve the highest straight-line speed. Remember, however, that, if the Needle-Valve is shut down too far, the engine will overheat, accompanied by visibly diminished exhaust smoke and the model will lose speed. At this point, throttle down immediately, stop the vehicle and reopen the Needle-Valve 45-90°.
- ◆ With the engine running, close the throttle and allow it to idle for about five seconds, then reopen the throttle fully. If, at this point, the engine puffs out an excessive amount of smoke and the vehicle does not accelerate smoothly and rapidly, it is probable that the idle mixture is too rich. In this case, turn the Metering Needle clockwise 15-30°. If, on the other hand, the engine tends to speed up momentarily and then cut out abruptly when the throttle is opened, the idle mixture is too lean. Correct this by turning the Metering Needle counter-clockwise 15-30°.

NOTE:

Metering Needle adjustment should be made in steps of not more than 15-30°, carefully checking the effect on throttle response, of each small adjustment.

- ◆ Carry out adjustments patiently, under actual running conditions, until the engine responds quickly and positively to the throttle control.

Warning!

Mixture adjustments (whether via the Metering Needle, or the Needle-Valve) cannot be made accurately under 'no-load' conditions, which, in any case, are not advised, since such operation carries the risk of seriously damaging the engine through over-revving and overheating.

- ◆ With the optimum mixture control position, light smoke is visible during high speed running, and the engine rpm increases smoothly during acceleration. Remember that, if the engine is operated with the fuel/air mixture slightly too lean, it will overheat and run unevenly. As with all engines, it is advisable to set both the needle-valve and metering needle slightly on the rich side of the best rpm setting, as a safety measure.
- ◆ If the engine runs too fast with the throttle closed, the throttle stop screw should be turned counter-clockwise to allow the throttle opening to be reduced.
- ◆ Finally, beyond the nominal break-in period, a slight readjustment toward a leaner needle setting may be required to maintain maximum performance.

CARE AND MAINTENANCE

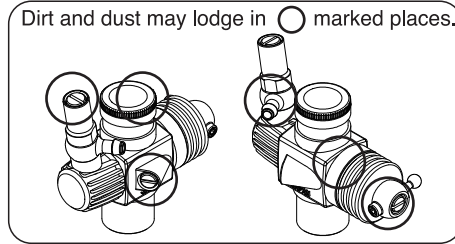
1. The minute particles of foreign matter, that are present in any fuel may, by accumulating and partially obstructing fuel flow, cause engine performance to become erratic and unreliable. O.S. 'Super-Filters' (large and small) are available, as optional extras, to deal with this problem. One of these filters installed to the pickup tube inside your refueling container, will prevent the entry of foreign material into the fuel tank. It is also recommended that a good in-line filter be installed between the tank and carburetor.
2. Do not forget to clean the filters regularly to remove dirt and lint that accumulate on the filter screens. Also, clean the carburetor itself occasionally.

3. At the end of each operating session, drain out any fuel that may remain in the fuel tank. Afterwards, energize the glow-plug and try to restart the engine, to burn off any fuel that may remain inside the engine. Repeat this procedure until the engine fails to fire. Do this while the engine is still warm.
4. Then, inject some after-run oil into the engine, and rotate the engine with an electric starter for 4 to 5 seconds to distribute the oil to all the working parts.

Note:

Do not inject after-run oil into the carburetor as this may cause the O-rings inside the carburetor to deteriorate. These procedures will reduce the risks of starting difficulties or corrosion after a period of storage.

5. Finally, when cleaning the exterior of the engine, use methanol or a household cleaning agent. Do not use gasoline, kerosene, or any petroleum based chemical which can damage silicone fuel tubing.



CHECKING THE ENGINE

If the engine will not develop normal performance after long time running due to wearing of parts. It is suggested to replace necessary parts when the following symptoms are detected.

- ◆ Engine sound changes and easily overheats.
- ◆ Power has dropped extremely.
- ◆ Idle is unstable and/or engine tends to stop at idle.

In most cases, ball bearings, cylinder & piston assembly, connecting rod and/or crankcase have become worn. Check the parts carefully and replace them if necessary.

O.S. GENUINE PARTS & ACCESSORIES

- **O.S. GLOW PLUG**
 - P3 (71641300) ● P4 (71641400) ● P5 (71641500)
- **T-2060SC WN TUNED SILENCER COMPLETE SET** (72106135)
 - **T-2060SC WN Tuned Silencer Assembly** (72106130)
 - Exhaust Seal Ring (2pcs.) (22826140)
 - Joint Spring (3pcs.) (72106042)
 - **M2000SC Exhaust Header Pipe Assembly** (72106440)
 - Header Pipe Spring (2pcs.) (72101272)
 - Exhaust Seal Ring (2pcs.) (22826140)
- **T-2090SC TUNED SILENCER COMPLETE SET** (72106192)
 - **T-2090SC Tuned Silencer Assembly** (72106190)
 - Exhaust Seal Ring (2pcs.) (22826140)
 - Joint Spring (3pcs.) (72106042)
 - **M2000SC Exhaust Header Pipe Assembly** (72106440)
 - Header Pipe Spring (2pcs.) (72101272)
 - Exhaust Seal Ring (2pcs.) (22826140)
- **M2002SC Exhaust Header Pipe Assembly** (72106480)
 - Header Pipe Spring (2pcs.) (72101272)
 - Exhaust Seal Ring (2pcs.) (22826140)
- **28XZ HYPER FLYWHEEL SET**
 - **(For MUGEN)** (71812000)
 - 28XZ Hyper Flywheel MUGEN (71812100)
 - Collet (71801100)
 - **(For KYOSHO)** (71813000)
 - 28XZ Hyper Flywheel KYOSHO (71813100)
 - Collet (71801100)

● SUPER AIR CLEANER 203

(72413000)

- 203 Filter Element (4pcs.) (72413200)

● SUPER AIR CLEANER 204

(72415000)

- 204 Filter Element (4pcs.) (72415200)

● O.S. SPEED CLUTCH WRENCH & ADJUSTER

(71415300)

● O.S. SPEED FLYWHEEL KEY

(71415200)

● O.S. SPEED FLYWHEEL PULLER

(71415100)

● O.S. SPEED PLUG WRENCH

(71520100)

● O.S. SPEED DRIVER TOOLS

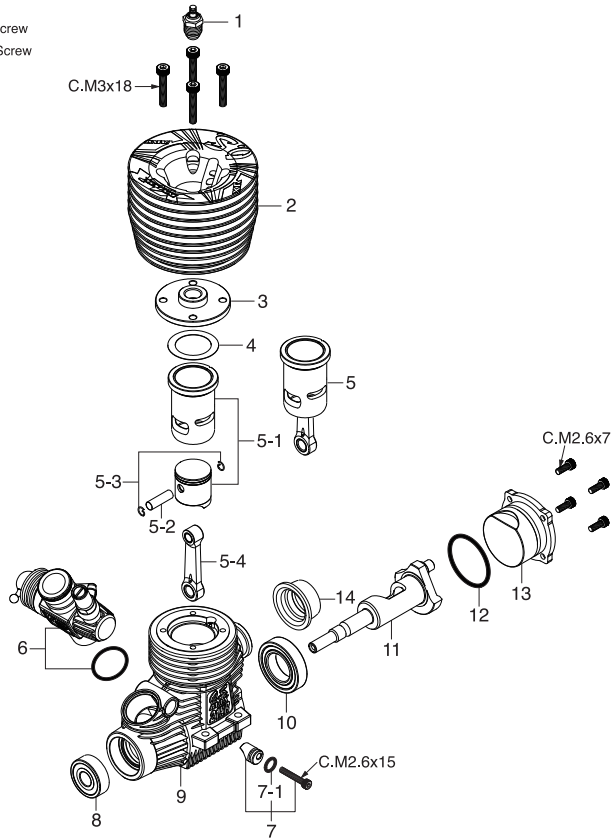
Code No.	Description
71410150	O.S. SPEED HEX WRENCH DRIVER 1.5
71410200	O.S. SPEED HEX WRENCH DRIVER 2.0
71410250	O.S. SPEED HEX WRENCH DRIVER 2.5
71410300	O.S. SPEED HEX WRENCH DRIVER 3.0
71411200	O.S. SPEED HEX BALL WRENCH DRIVER 2.0
71411250	O.S. SPEED HEX BALL WRENCH DRIVER 2.5
71412300	O.S. SPEED FLAT HEAD SCREWDRIVER 3.0
71413550	O.S. SPEED NUT DRIVER 5.5
71413600	O.S. SPEED NUT DRIVER 6.0
71413700	O.S. SPEED NUT DRIVER 7.0

Code No.	Description
71414015	O.S. SPEED HEX WRENCH TIP ONLY 1.5
71414020	O.S. SPEED HEX WRENCH TIP ONLY 2.0
71414025	O.S. SPEED HEX WRENCH TIP ONLY 2.5
71414030	O.S. SPEED HEX WRENCH TIP ONLY 3.0
71414120	O.S. SPEED HEX BALL WRENCH TIP ONLY 2.0
71414125	O.S. SPEED HEX BALL WRENCH TIP ONLY 2.5
71414230	O.S. SPEED FLAT HEAD SCREWDRIVER TIP 3.0
71414355	O.S. SPEED NUT DRIVER TIP ONLY 5.5
71414360	O.S. SPEED NUT DRIVER TIP ONLY 6.0
71414370	O.S. SPEED NUT DRIVER TIP ONLY 7.0

The specifications are subject to alteration for improvement without notice.

ENGINE EXPLODED VIEW

* Type of screw
C...Cap Screw



ENGINE PARTS LIST

No.	Code No.	Description
1	71641300	Glow Plug P3
2	22204000	Outer Head
3	22204010	Inner Head
4	22014160	Head Gasket (0.2mm)
5	22203010	Built-Up Parts Set
5-1	22203000	Cylinder & Piston Assembly
5-2	22016000	Piston Pin
5-3	21817000	Piston Pin Retainer (2pcs.)
5-4	23605010	Connecting Rod
6	22281000	Carburetor Complete (Type 22B)
7	23618171	Carburetor Retainer Assembly
7-1	24881824	"O" Ring (2pcs.)
8	23731020	Crankshaft Ball Bearing (Front)
9	22201000	Crankcase
10	23730020	Crankshaft Ball Bearing (Rear)
11	22202000	Crankshaft
12	23764020	Cover Gasket
13	22207000	Cover Plate
14	22826140	Exhaust Seal Ring

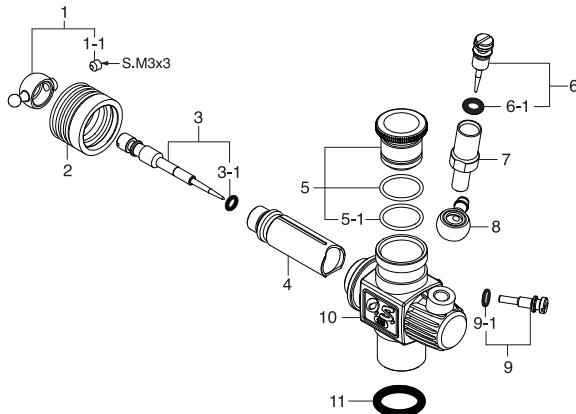
The specifications are subject to alteration for improvement without notice.

CAP SCREW SETS (10pcs./set)

Code No.	Size	Pcs. used in an engine
79871020	M2.6x7	Cover Plate Retaining Screw (4pcs.)
79871050	M2.6x15	Carburetor Retainer Retaining Screw (1pc.)
79871180	M3x18	Cylinder Head Retaining Screw (4pcs.)

CARBURETOR EXPLODED VIEW

* Type of screw
C...Cap Screw S...Set Screw



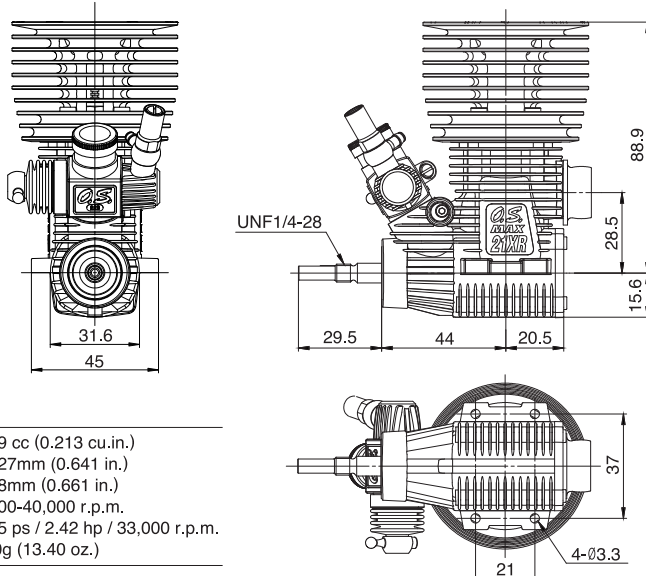
CARBURETOR PARTS LIST

No.	Code No.	Description
1	23781400	Ball Link No.3
1-1	26381501	Retaining Screw
2	23981520	Dust Cover
3	23818340	Metering Needle Assembly
3-1	27881820	"O" Ring (2pcs.)
4	22848210	Slide Valve
5	71533000	Carburetor Reducer 8mm (RED)
5-1	22615000	"O" Ring
6	23618197	Needle Assembly
6-1	46066319	"O" Ring (2pcs.)
7	23618194	Needle Holder
8	22082960	Fuel Inlet (No.16)
9	22848160	Throttle Stop Screw
9-1	27881820	"O" Ring (2pcs.)
10	22281100	Carburetor Body
11	29015019	Carburetor Rubber Gasket

The specifications are subject to alteration for improvement without notice.

THREE VIEW DRAWING

Dimensions (mm)



Specifications

■ Displacement	3.49 cc (0.213 cu.in.)
■ Bore	16.27mm (0.641 in.)
■ Stroke	16.8mm (0.661 in.)
■ Practical R.P.M.	4,000-40,000 r.p.m.
■ Output	2.45 ps / 2.42 hp / 33,000 r.p.m.
■ Weight	380g (13.40 oz.)

O.S. ENGINES MFG.CO.LTD.

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