

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

 Never touch, or allow any object to come into contact with, the rotating parts.

 Gasoline is poisonous. Do not allow it to come into contact with the eyes or mouth. Always store it in a clearly marked container in a cool and dark place and out of the reach of children. There is a possibility that it may damage your health.



Gasoline is highly flammable. Keep it away from an open flame, excessive heat, sources of sparks, or anything else which might cause it to ignite. Do not smoke or allow anyone else to smoke near to it.



Carry out the mixing of the gasoline and oil outdoors or in a well ventilated place away from any source of fire to prevent the possibility of a fire.



Refill the fuel tank only after the engine is well cooled down, or there is a danger of fire.



Model engines generates 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 results in a serious burn.

- Observe the laws and regulations in each country and district concerning the usage, transportation and storage of gasoline. Ask for details at the fire station in each district.
- 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.
- Do not operate the engine or model alone, or there is a possibility of injury.

⚠ NOTES

- This engine was designed for model helicopters. Do not attempt to use it for any other purpose.
- Start the engine only after installing it in the model. Do not start the engine before installing it in the model, or there is a possibility of injury.
- Be sure to use an effective silencer (muffler). Frequent exposure to an open exhaust may eventually impair your hearing. Such noise is also likely to cause annoyance to others over a wide area.
- Mount the engine in your model securely, following the manufacturers' recommendations.
- For their safety, keep all onlookers (especially small children) well back (at least 10 meters) when preparing your model for flight.

1) This engine is designed to be expressly run by gasoline fuel.

Use regular gasoline. (No need to use high octane gasoline.) Mix commercially available 2 stroke engine oil with a 25:1 ratio. Pre-mixed gasoline is also usable but do not use such as pre-mixed gasoline which requires the needle settings far away from the factory settings, otherwise needle settings would be very difficult.

2) Carburetor is set at the factory when the engine leaves the factory.

First run the engine with this factory settings. Refer to the INITIAL OPENING OF THE NEEDLES described later concerning the factory settings.

3) Be aware of long flight time due to low fuel consumption.

3 Be sure to use a power source of more than 1500mAh capacity for the receiver when more than 15 minutes of flight is expected. Also, it is suggested to check the remaining level frequently and charge the batteries if necessary.

4) It is recommended to use 2.4GHz transmitter/receiver.

Since a gasoline engine uses a spark ignition system it is possible that radio frequency noise from the ignition module can interfere with the receivers operation if a 72MHz or 40MHz radio is used. Therefore it is recommended that a 2.4GHz radio system be used, which is not effected by radio frequency noise.

5) Use the exclusive silencer

Use the Powerboost Pipe GT15HZ (code no. 72148000) with GT15HZ600. Using a silencer developed for glow engines may cause overheating. Any damages caused by a use of such silencer are not covered under warranty.

- When checking a spark plug with the power source on, do not hold the plug, plug cap, high tension cord , or you will get a shock.
- Take care that loose clothing (ties, shirt sleeves, scarves etc.) do not come into contact with the rotor. Do not carry loose objects (such as pencils, screwdrivers, etc.) in a shirt pocket from where they could fall through the rotor disc.
- Be sure to use an electric starter and wear safety goggles and gloves when starting the engine, or you will be injured.
- Always check the throttle linkage. If it is disconnected, throttle action becomes uncontrollable, which may result in a serious accident.
- Use an electric starter for this engine. The wearing of safety glasses is also strongly recommended. Press the rotor head down securely.
- Do not run the engine at high rpm abruptly after starting the engine, or you will be injured by rotating rotor.
- Be sure to carry out adjustments of the high speed needle and slow speed needle after stopping the engine.


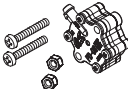
- If you have to carry the model to the take-off point with the engine running, be especially cautious. Hold the rotor securely and keep well clear of spectators.
- Switch off the ignition module to stop the engine or fully close the throttle valve via the transmitter to shut off the fuel supply. Otherwise there is a possibility of injury.
- Immediately after the engine is stopped, the engine may start with a crank even when the ignition switch is off. Do not crank the engine, or there is a possibility of injury.
- Be sure to install an externally operable switch for the ignition system battery to stop the engine if it is started unintentionally with the radio transmitter turned off or there is the possibility of injury.
- Connect the throttle linkage so that the engine can be stopped via radio operation.

ABOUT THE ENGINE

This is a 2-stroke 15cc gasoline engine GT15HZ600 expressly designed for 600 size (50 glow engine class) R/C helicopters. Its mount size is the same as GT15HZ, which is for 700 size (90 glow engine class) helicopters, but the crankshaft diameter of the threaded part is the same as standard 50 class glow engine. Therefore you can fit a fan pulley and a clutch of 600 size helicopter directly to the crankshaft without modifications. The new 61HA carburetor achieves linear power transition with a combination of pump unit PD-08. #72520000 conversion kit enables a direct fit to ALIGN T-REX 600N helicopter. The conversion kit consists of Main frames, a bottom frame, a pinion gear, a set of engine mount, ball bearings, and collars.

* The cooling fan cover for T-REX 700 DFC (ALIGN code no. H7NB011XXW) and the optional metal engine fan (ALIGN code no. HN6060) for T-REX 600N are necessary to fit GT15HZ600 to ALIGN T-REX 600N helicopter.

STANDARD ACCESSORIES

- Spark Plug CM-6 
- Pump Unit PD-08 1pc.
- Pan Head Screw (N.+M3x18) 2pcs.
- Nylon Nut M3 2pcs.
- Fluororubber Tube 1pc.
- ID.2mmxOD.4mmx150mm Length 

- Throttle Lever 
- Ignition Module Assembly (IG-05) 

- PowerBoost Pipe GT15HZ (Included only in code #38173 GT15HZ600 W/PowerBoost Pipe)



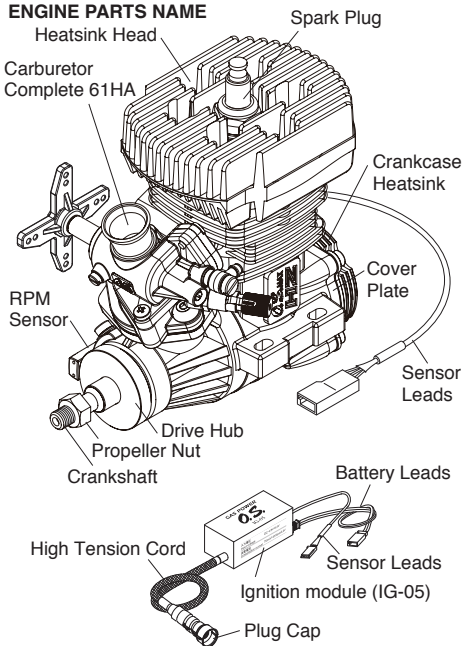
Notice on 61HA carburetor clogging

Gasoline engine carburetors generally have narrower fuel passages for better fuel mileage than glow engines. As a result, the passages clog easily if a fuel filter is not used. You should insert a gasoline-resistant fuel filter — finer than #200 mesh — between the fuel tank and the engine (if a T-shaped tank nipple is used, place the filter between the nipple and the engine).

When filling your fuel tank from a gasoline container, always use the O.S. Super Filter L (part #72403050) to prevent dust from entering the tank. A clogged carburetor can cause inconsistent running, stalling, and overheating. If your carburetor becomes clogged, it must be disassembled and cleaned.

When taking apart the carburetor, remember the assembling order. Be careful not to lose small internal parts. If you're not confident performing this type of maintenance, take the engine to the hobby shop where you purchased it or send it to the service center of your country's O.S. distributor.

ENGINE PARTS NAME



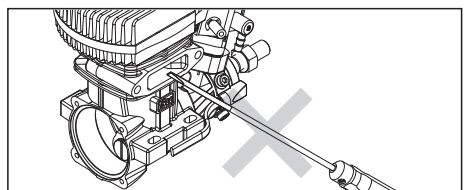
NOTES ON INSTALLING COOLING FAN AND CLUTCH

The O.S. Crankshaft Clamp is a must-have for installing the cooling fan!!

Do not grip the engine mounting beams with a vise, or the crankcase will be distorted which will result in engine breaking. Do not use a tool which locks piston when installing a cooling-fan and clutch, or top of the piston may be damaged. Also, do not insert a screw driver or the similar into the exhaust port.

When removing and installing the cover plate, be sure to do it with the piston at TDC. Otherwise it is possible the piston skirt will interfere with the cover plate and become damaged.

Warning: Locking piston by inserting a tool from the plug hole or exhaust port while installing the cooling fan and clutch may damage the engine.



71530510 and 71530520 cannot be used with the GT15HZ600. If they are used, piston skirt will become broken or damaged.

We strongly recommend to use Crankshaft Clamp 91/105/GT15 (Code No.71530530) available as an optional tool.

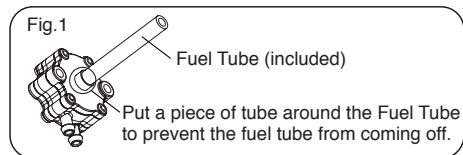
INSTALLATION OF THE ENGINE

Install the cooling fan and clutch on the engine, then install the engine in the model referring to the instruction manual supplied with the model.

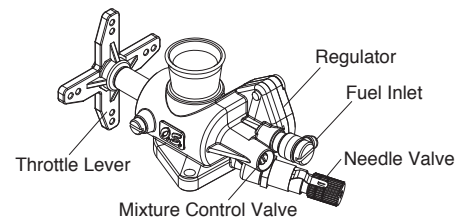
At this time some small modifications are required so that the carburetor parts may not interfere with the cooling duct.

MOUNTING THE PUMP UNIT

Mount the PD-08 Pump Unit on the distant location from the engine, where it can get good ventilation but within the reach of the accessory tube. Mounting the Pump Unit close to the engine cover plate may cause malfunction of the Pump Unit due to high temperature. Connect the nipple in the back of the Pump Unit to the engine cover plate nipple with the Fluoro-rubber Tube (included). The tube length should be around 10 cm. Put a piece of tube around the end of the fuel tube as shown in Fig 1 to prevent the tube from coming off.



CARBURETOR PARTS NAME



Two adjustable controls are provided on this carburetor.

• The Needle-Valve

For adjusting the mixture strength when the throttle is fully open Needle-valve adjustment effect the mixture strength at round mid speed.

• The Mixture Control Valve

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

Therefore, it is required to adjust also the needle-valve when the mixture control valve is adjusted. Mixture control valve is pre-set at nearly best position when the engine leaves the factory. Therefore, it is not necessary to adjust the mixture control valve until running-in is completed.

INITIAL OPENING OF THE NEEDLES

This carburetor is equipped with the following two needles.

The Needle-Valve

Open it 2.5-3.0 turns from the fully closed position. This is to adjust from hovering to the flight up in the air.

The Mixture Control Valve

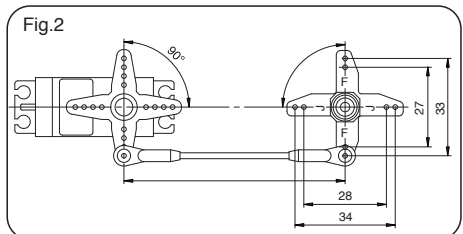
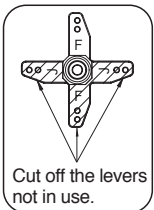
The default setting is made at the factory. This is to adjust the fuel mixture from idling to hovering.

The initial opening is just a basic position and not necessarily the optimum position.

Carry out adjustments according to the procedures described in the NEEDLE ADJUSTMENTS section.

LINKAGE TO THE CARBURETOR

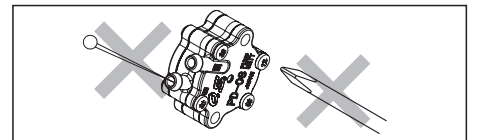
Select either F lever or J lever of the Throttle Valve Lever supplied according to the servo used. Select a hole so that both servo horn and Throttle Valve Lever make right angle against the linkage rod. Cut off the levers not in use with nippers.



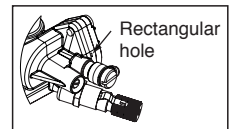
Carry out the linkage making sure of the moving direction of the throttle valve. The moving angle of the throttle valve from fully closed position to fully opened position is 85 degrees. Connect the throttle linkage so that the engine can be completely stopped via radio operation. The throttle opening when starting should be approx. 30 % of the total movement. After starting the engine, you can set the idling position lower as the engine is warming up. We recommend you to set a specified starting mode in a vacant idle-up channel for example idle-up 3, so that you can use the mode until the engine warms up.

CARE OF FUEL PUMP & REGULATOR

- NEVER disassemble the fuel pump or pressure regulator. Their original performance may not be restored after reassembly.
- DO NOT allow foreign matter to enter the fuel system. Dirt inside the pump or regulator, no matter how small, may obstruct the flow of fuel and prevent these components from working properly.
- NEVER insert anything into the inlet or outlet nipples in an attempt to clear a suspected obstruction.



- DO NOT obstruct the small rectangular hole at the bottom of the regulator, or the regulator will not function correctly.



- ALWAYS use fuel filters. Keep the fuel tank scrupulously clean and filter all fuel as it enters the tank (e.g. via an O.S.'Super-Filter' Code No.72403050) and use a good quality in-line filter between the tank and pump. Remember to inspect filter screens at regular intervals and rinse clean as necessary.
- NEVER use kerosene, thinner or any organic solvent for cleaning the pump. Rubber parts will be ruined by these materials. Use only alcohol (methanol) or gasoline.

IGNITION MODULE

This is a component for igniting a spark plug. Install the plug cap on the plug by using force to push it to the root. Then, install the module in the model.

■ Major specifications

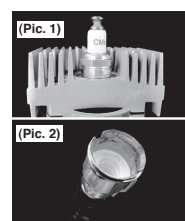
- Consumption current is 750mA/14,000rpm/6.0V. User a power source of more than 1500mAh capacity.
- The voltage of power source is 4.8~8.4V (rated). (Ni-Cd, Ni-MH 4~6 cells, Li-Po, Li-Fe 2 cells)

■ Installation

- Install the ignition module taking sufficient anti-vibration measures.
- Connect the sensor leads of the igniter module (white, red, black three parallel wires) to the sensor leads from the engine.
- Connect the battery leads of the igniter module (red, black two parallel wires) to the power source.
- Install the module to the place where good ventilation is secured because it becomes hot when the engine runs.
- Hold the high tension cord to the frame to prevent from breaking due to vibration.

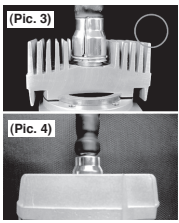
GT15HZ600 How to correctly fit the plug cap to the spark plug

The GT15HZ600 gasoline engine is equipped with a spark plug, and safe flight of the helicopter requires a firm connection of the plug cap to the spark plug. See the following instructions for details.



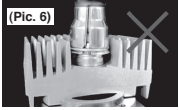
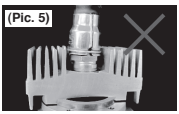
Cylinder head with spark plug (Pic. 1)

Make sure that the spark plug is tight in the head. Apply silicon grease to the plug top or inside of the plug cap for easy connection. (Pic. 2) (The shown cylinder head is a cutaway.)



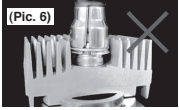
Correct connection (Pic. 3)

The 'tight fit' plug cap is designed not to detach from the spark plug easily. Press the plug cap firmly until it covers the hexagon plug base with a 'click'. The fully connected plug cap in the cylinder head doesn't show the stamped "O.S." logo on its side. (Pic. 4)



Halfway Connection 1 (Pic. 5)

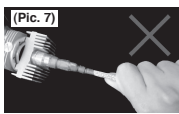
A spark between the plug cap and the plug generates radio 'noise', which may cause errors in receivers, gyros, governors and servos. The plug cap could also detach during flight. (The shown cylinder head is a cutaway.)



Halfway Connection 2 (Pic. 6)

The plug cap is not fitting on the spark plug hexagon base completely.

Radio 'noise' generated by partial connection may cause errors in receivers, gyros, governors and servos. Again, the plug cap may detach during flight.



How to remove the plug cap (Pic. 7)

Hold the plug cap body tight by wrapping with waste cloth and pull it straight. Do not pull the cable alone or it may cause the wire to break internally.

FUEL

Use regular gasoline. No need to use high octane gasoline. Mix commercially available 2 stroke engine oil with a 25:1 ratio.

We have checked and recommend the following oils.
Zenoah Genuine FC Class

KLOTZ ModelLube®

AMSOIL Saber

With these oils, you can set the needles without changing the factory settings too much.

Gasoline is highly flammable. Carry out the mixing of the gasoline and oil outdoors or in a well ventilated place away from any source of fire to prevent the possibility of a fire.

With a gasoline engine, passages in the carburetor are narrower than that of a glow engine, and therefore very sensitive against foreign matter such as dust. It is suggested to use optional accessory Super Filter L (Code No. 72403050) when filling a tank in the model from a container used for transportation or storing.

FUEL TANK & LINES

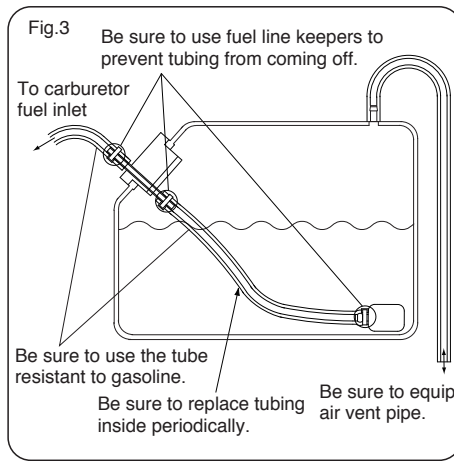
Use a fuel tank designed for gasoline engines.

Tanks designed for glow fuel use a rubber cap, which is easily deteriorated by gasoline. For tubing inside the tank, we recommend 2.0 mm I.D. fluoro-rubber tube (code no.28382100). Replace tubing inside the fuel tank every six months. Since the model attitude changes vigorously, flexible tube and heavy enough weight are required. It is suggested to use optional accessory Non-Bubble Weight (code no.71531010) for it. This engine does not require a muffler pressurized fuel system but be sure to provide an air vent as shown in Fig.3.

PIPINGS

Connect the fuel lines with fuel tubes. From the fuel tank outlet to the Pump Unit inlet, and also from the Pump Unit outlet to the carburetor inlet, We recommend to use TYGON® tube, in which the fuel is visible.

- Use a tank designed for gasoline. (Tanks designed for glow fuel use a rubber cap which is deteriorated by gasoline.)
- For tubing inside the tank use fluoro-rubber or nitrile rubber of 2.0mm ID. Replace tubing inside the fuel tank every six month. Since the model attitude changes vigorously, flexible tube and heavy enough weight are required. It is suggested to use optional accessory Non-Bubble Weight (Code No. 71531010) for it.
- This engine does not require a muffler pressurized fuel system but be sure to provide an air vent.



STARTING

Start the engine with the following procedure.

1. Fill the tank with mixed gasoline.
2. Turn the transmitter switch ON and check the movement of each servo.
3. Turn off the ignition switch, and open the throttle fully.
4. Apply an electric starter for several seconds. Note that the correct rotating direction of the starter is counter-clockwise facing the engine.
5. Make sure the fuel has reached the carburetor.
6. Make sure the throttle opening is set at the idling position approx. 30 % of the fully opened position.
7. Turn on the ignition switch, then apply the starter.

NEEDLE ADJUSTMENTS

Carry out the needle settings as follows.

1. After starting the engine, make sure the clutch is disengaged and the main rotor is not rotating since the throttle opening at idling position is around 30 %.
2. When the idling becomes stable, bring the model to a safety place for warming up and continue warming up for 2 minutes. During the warming up, the rotor will rotate slowly but it will be no problem.
3. After the warming up, switch the start position mode to the normal hovering mode, then adjust the opening of throttle precisely.
4. If the idling is stable, advance the throttle stick gradually to take off. If the take-off is done normally, there is no problem. If there is a problem, carry out adjustments according to the symptoms.
 - A) If the engine responds sluggishly to increase rpm, turn the slow needle 5 degrees clockwise and try a takeoff again. Repeat the same procedure until you find the fine adjustment.
 - B) If the engine runs at very high rpm, or hesitates before picking up speed and stops, turn the mixture control valve 10 degrees counter-clockwise. Repeat the same procedure until you find a fine adjustment.
5. After confirming stable hovering, start the running-in consuming 2~3 liters of fuel. Carry out the running-in taking time and checking the remaining level of the receiver battery due to much lower fuel consumption with a gasoline engine. Running temperature of a gasoline engine even with a normal running comes to around 130°C. Never touch the engine nor silencer, or you will get a serious burn.
6. After breaking-in, switch the flight mode and start the flight in the air. If the engine quits or over-revs at full throttle with small pitch angle, you need to set the needle richer. Turn the needle valve 45 degrees counter-clockwise. Re-adjust the idle-up throttle curve flat and lower. In the rich needle setting, the engine responds sluggishly to increase rpm. Turn the main needle 2-3 clicks clockwise and see the change.

Generally a gasoline engine is more sensitive to a lean mixture in comparison to a glow engine and will over-heat and stop without warning. The engine should always be run with a slightly rich mixture setting.

MAINTENANCE AFTER THE DAY'S FLIGHTS

- Fill the carburetor with fuel at the conclusion of a day's flying. (Pay careful attention to fire and ignition source when carrying and storing the model.) If the engine is stored without filling the carburetor with fuel, inside parts will dry out and not work properly at the next running. If the engine quits out of fuel, refill the carburetor with fuel.
- With a gasoline engine rust hardly occurs. Check the exterior to make sure there is nothing wrong and wipe off any oil residue.
- Use gasoline to clean the outside of the carburetor. Do not use kerosene, or the inside parts will be damaged. Clean the outside only because the inside parts are sensitive to foreign matter.
- After cleaning the engine, dry it well then inject a small quantity of oil used to mix fuel and rotate the crankshaft several times to distribute the oil well inside the engine.
- Store the batteries for the ignition and the receiver removing from the model. In case of Li-Po batteries, utmost care should be taken not to get fired accidentally.

O.S. GENUINE PARTS & ACCESSORIES

- **SPARK PLUG CM-6(NGK)** (71669000)

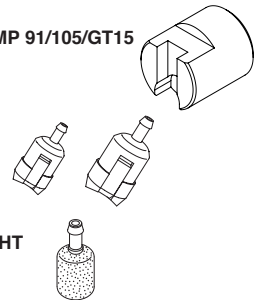
- **POWER BOOST PIPE GT15HZ**
(72148000)

- **CRANKSHAFT CLAMP 91/105/GT15**
(71530530)

- **SUPER FILTER**
(S) (72403051)
(L) (72403050)

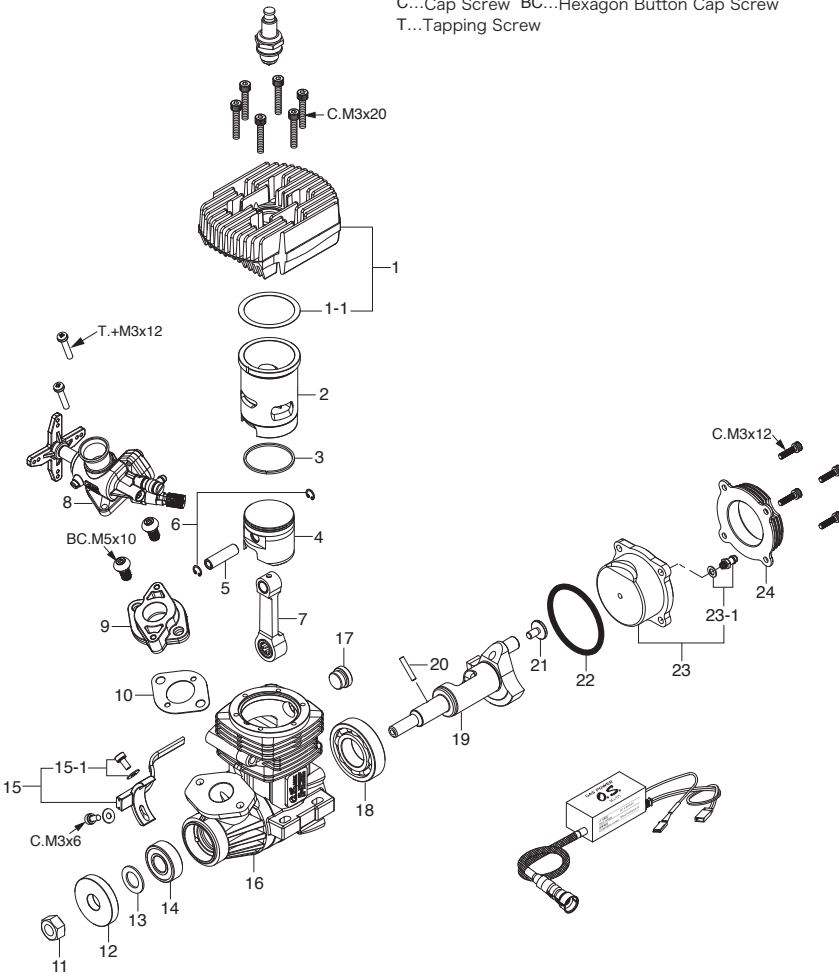
- **NON-BUBBLE WEIGHT**
(S) (71531010)

- **FLUORORUBBER TUBE**
ID. 2mm x OD. 4mm Length 500mm
(28382100)
ID. 3mm x OD. 5mm Length 500mm
(28382200)



ENGINE EXPLODED VIEW & PARTS LIST

* Type of Screw
 C...Cap Screw BC...Hexagon Button Cap Screw
 T...Tapping Screw



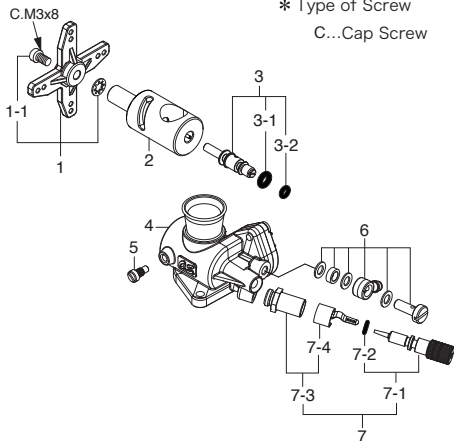
No.	Code No.	Description
1	28154000	Heatsink Head
1-1	29061406	Head Gasket (0.2mm)
2	28153100	Cylinder Liner
3	28153400	Piston Ring
4	28153201	Piston
5	26606008	Piston Pin
6	28117020	Piston Pin Retainer
7	28155000	Connecting Rod
8	28181020	Carburetor Complete (61HA)
9	28169470	Thermo Insulator
10	49415000	Carburetor Gasket (2pcs.)
11	23210007	Propeller Nut
12	28158000	Drive Hub
13	46120000	Thrust Washer
14	26731010	Ball Bearing (F)
15	74002320	Rotation Sensor
15-1	74002321	Rotation Sensor Retaining Screw Set (2pcs.)
16	28171000	Crankcase
17	28151300	Crankcase Plug
18	29030001	Ball Bearing (R)
19	28172000	Crankshaft
20	44408100	Drive Pin
21	28152100	Crank Pin Stop Screw
22	27414020	Cover Gasket
23	28177000	Cover Plate
23-1	22681953	Nipple No.1
24	29077100	Crankcase Heatsink
	74002610	Ignition Module (IG-05)
	71669010	Spark Plug CM-6 (Rcexl)
	72508100	Pump Unit (PD-08)
	29067120	Pump Unit Retaining Screw
	72148000	Powerboost Pipe GT15HZ
	29122520	Silencer Retaining Screw (L) C.M4x45 (2pcs.)
	72145010	Exhaust Tube
	72145020	Exhaust Gasket Set (2pcs.)

SCREW SETS (10pcs.)

Code No.	Size	Pcs. used in an engine
79871140	C.M3x12	Cover Plate Retaining Screw (4pcs.)
79871200	C.M3x20	Heatsink Head Retaining Screw (6pcs.)
79860110	T.M3x12	Thermo Insulator Retaining Screw (2pcs.)
79860310	BC.M5x10	Carburetor Retaining Screw (2pcs.)

■ CARBURETOR EXPLODED VIEW & PARTS LIST

* Type of Screw
 C...Cap Screw

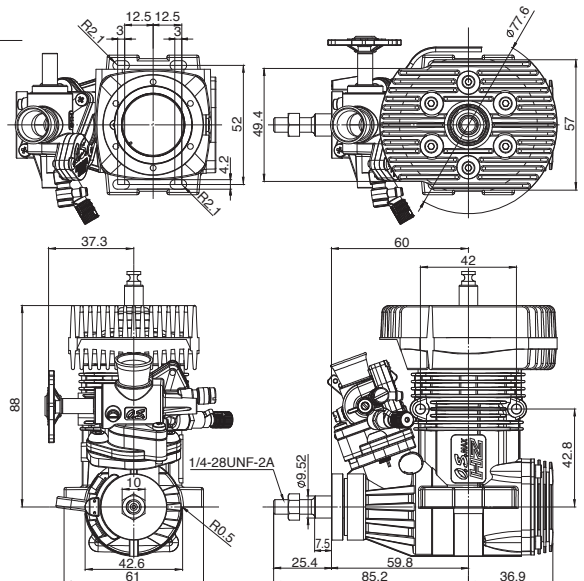


No.	Code No.	Description
1	29085140	Throttle Lever Assembly
1-1	79871110	Throttle Lever Retaining Screw (10pcs./set)
2	28181220	Carburetor Rotor
3	28181600	Mixture Control Valve Assembly
3-1	28181920	"O" Ring (L) (2pcs.)
3-2	28181910	"O" Ring (S) (2pcs.)
4	28181110	Carburetor Body
5	45581820	Roter Guide Screw
6	45571110	Universal Nipple L3.5
7	28181900	Needle Valve Assembly
7-1	28181970	Needle Assembly
7-2	28181910	"O" Ring (2pcs.)
7-3	27381940	Needle-valve Holder Assembly
7-4	26711305	Ratchet Spring No.4

■ THREE VIEW DRAWING Dimensions (mm)

SPECIFICATIONS

■ Displacement	14.95 cc / 0.912 cu.in.
■ Bore	27.7 mm / 1.091 in.
■ Stroke	24.8 mm / 0.976 in.
■ Output	2.5 ps / 2.47 hp / 14,000 r.p.m.
■ Practical R.P.M.	2,000-16,000 r.p.m.
■ Weight	685 g / 24.17 oz. (Engine) 92.0 g / 3.25 oz. (Ignition module) 197.5 g / 6.97 oz. (PowerBoost Pipe GT15HZ)



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