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 danger or damage which might arise through misuse or neglect.

WARNING

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.

WARNING

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.

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 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 it.

NOTES

Any propeller requires utmost attention to handle. Be sure to follow the instruction manual supplied with a propeller.

This engine was designed for model aircraft. 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.

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.

Install a top-quality propeller of the diameter and pitch specified for the engine and aircraft.

ABOUT THE ENGINE

This engine is designed for experienced fliers. Beginners and newcomers should not use this engine.

The engine unit, silencer and carburetor are specially designed.

The normal rotation direction of the engine is counterclockwise faceing to the propeller.

It offers broad power characteristics suitable for sport flight as well as acro flight.

The specially designed ignition module “1G-02” is equipped with a micro computer and designed not to operate below 120 rpm.

The new E-6020 silencer develops very efficient silencing.

The engine can be easily choked for starting by connecting a choke rod (not supplied) to the carburetor choke lever.

ENGINE PARTS NAME

| Spark Plug | E-6020 Silencer | Carburetor Complete |
| Block Cylinder | HDA-313 | Sensor Leads |
| Front Housing | Drive Space | Battery Leads |
| RPM Sensor | Propeller Washer | Tension Cord |
| Pilot Shaft | | |
| Cap Screw M5x45 | Battery Leads | |
| Cap Screw M5x50 | Sensor Leads | |

INSTALLATION

Use a strong enough material for the mounting face of the model, such as birch plywood firewall of more than 8mm thick.

Make sure the mounting face of the model is flat. If it is uneven, work on it to be flat. (When shims are added to change the thrust angle, work on it to be flat.)

Engine mounting face has been high-precision machined flat. Make sure mounting face of the model is also flat.

FUEL TANK & LINES

Use a tank designed for gasoline. (Tanks designed for glow fuel use a rubber cap which is deteriorated by gasoline.)

A 600cc tank will provide 12–13 minutes flight. (With full throttle, it will provide 7–8 minutes flight.)

Install a commercially available gasoline fuel filter between fuel tank and carburetor. (Clean the filter frame to time.)

For plumbing use TYGON RF-400 (Yellow color) or strong nitrite rubber of more than 3mm ID and 6mm OD. Replace tubing periodically as it becomes hardened. (Replace tubing inside the fuel tank every six months.)

Use fuel line keepers of stainless wire, etc. at the end of the tubing to prevent at from coming off.

This engine does not require a muffler pressurized fuel system but be sure to provide an air vent.

WARNING

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| Front Housing | Drive Space | Battery Leads |
| RPM Sensor | Propeller Washer | Tension Cord |
| Pilot Shaft | | |
| Cap Screw M5x45 | Battery Leads | |
| Cap Screw M5x50 | Sensor Leads | |

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For plumbing use TYGON RF-400 (Yellow color) or strong nitrite rubber of more than 3mm ID and 6mm OD. Replace tubing periodically as it becomes hardened. (Replace tubing inside the fuel tank every six months.)

Use fuel line keepers of stainless wire, etc. at the end of the tubing to prevent at from coming off.

This engine does not require a muffler pressurized fuel system but be sure to provide an air vent.

WARNING

If you try hand starting, be sure to use a chicken stick or heavy glove. Never attempt to start the engine with a bare hand.

Be sure to carry out adjustments of the high speed needle and slow speed needle after stopping the engine.

Do not start your engine in an area containing loose gravel or sand. The propeller may throw such material in your face and eyes and cause injury.

If you have to carry the model to the take-off point with the engine running, especially cautiously. Keep the propeller pointed away from you and walk well clear of spectators.

Switch off the ignition module to stop the engine or fully close the throttle valve before 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 igniter 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.
Be sure to install an in-line fuel filter between the tank and carburetor to prevent foreign matter in the tank from entering the carburetor. Clean the filter periodically.

To carburetor fuel inlet tubing for-fuelung Be sure to use fuel line keepers of stainless steel, etc. to prevent tubing from coming off. Be sure to replace tubing inside periodically.

**CARBURETOR PARTS NAME**
- Fuel Inlet
- Throttle Valve Lever
- Retaining Screw
- Slow Speed Needle
- High Speed Needle
- Choke Valve Lever
- Retaining Screw
- Throttle Valve Lever
- Choke Valve Lever
- Choke Valve Lever
- Close
- Open
- Open (OFF)
- Choke
- Close (ON)

**CARBURETOR LINKAGE**

**NOTE**

When changing the throttle valve lever and choke valve lever direction, loosen and tighten each retaining screw placing each lever at mid position. (If the throttle valve lever retaining screw is loosened or tightened with the throttle valve fully opened or closed, excessive force will be applied, which will results in breaking the lever.)

- Before connecting the linkage, make sure that the throttle valve lever does not interfere with the bulkhead or mount of the model when it is fully opened and closed.
- In order to obtain suitable idling, connect the throttle linkage so that the throttle valve lever may be located at 2 to 3 degrees opened position from fully closed position when the throttle stick on the transmitter is fully pulled down, and the throttle valve may be fully closed when the throttle stick as well as the rim lever on the transmitter are fully pulled down or engine cut-off mixing is operated.
- Connect the linkage so that the throttle valve is fully opened when the throttle stick on the transmitter is fully advanced. (Adjust the movement so that the pushrod does not bind when the throttle valve is fully closed and fully opened.)
- Connect the linkage so that the servo arm and pushrod, and throttle valve lever make a right angle when the throttle stick on the transmitter is placed at mid position to avoid differential action.

**CHOKE VALVE ROD LINKAGE**

**NOTE**

Linkage parts are not supplied.

**IGNITION MODULE**

- Major specifications
  - Consumption current is 600mA/6,000rpm. Use a power source of more than 1000mAh capacity.
  - The ignition module is set not to operate below 120rpm for safety.
  - The voltage of power source is 4.8-7.6V (rated). (Ni-Cd, Ni-MH 4-6 cells, Li-Po, Li-Fe 2 cells)

**Installation**

- Install the ignition module taking sufficient anti-vibration measures.
- Install the ignition module at least 100mm away from the engine and in a place where there is airflow so that engine exhaust heat and radiation heat do not affect it's operation.
- Do not share the power source with receiver and use a separate power source.
- Equip an ON/OFF switch between the ignition module and its power source and install it in a place where can be operated from outside the model.
- Install the ignition module and its power source as far as possible away from the servos and receiver power source.
- Connect the sensor leads of the igniter module (while, 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.
- Make sure the jackets of high tension cord does not touch the engine and coolant to avoid accidental short circuit.
- Install the plug cap on the plug securely.

**Precautions**

- Do not disassemble the ignition module and plug cap. (The ignition module is irreplaceable. Replace it when necessary.)
- Be careful not to mount the ignition module so that it can be hit by water, gasoline or exhaust.
- Avoid using the engine when the external temperature is over 40°C.
- Do not move the rpm sensor as it is placed at it's optimum position, otherwise the engine will not run properly.
- Do not pull on the high tension cord to remove the plug cap, or the wire will break. Be sure to hold the plug cap to remove it. Be careful not to damage your fingers while removing it.
- Do not connect nor disconnect the rpm sensor with your fingers while removing it.
- Be careful not to mount the ignition module on, otherwise there is a possibility it will fire and the engine start.
- Check the ignition module for spark when installing the plug cap on the plug and be careful about getting a shock. Make sure there is no flammable material or gasoline vapors near by that could ignite.
- Do not turn the propeller with the ignition module on, or there is a possibility the engine will start.

**PROPELLER**

Use a wooden or a carbon fiber propeller. Do not use a nylon propeller.

The choice of propeller depends on the design and weight of the aircraft and on the type of flying in which you will be engaged. Determine the best size and type after practical experimentation. As a starting point, refer to the props listed in the table shown below. Slightly larger, or even slightly smaller props than those shown in the table may be used, but remember that propeller noise will increase if blade tip velocity is raised due to high rpm or if a larger diameter/ lower pitch prop is used. Be well aware propeller rotating arc is very large due to a large propeller used with this engine. Carry out the needle adjustments only after stopping the engine. Do not allow your face or hands to come close to the rotating prop.

**RUNNING-IN / STARTING**

- Use a fuel with increased oil content and set the needle a little on the rich side. Too rich a needle setting may cause misfiring or erratic running due to fouling of the plug.
- Use a 25:1 fuel/oil mixture if the particular brand of oil states 50:1 mix. Use a 20:1 fuel/oil mixture if the particular brand of oil states 30:1 mix. Use a 10:1 fuel/oil mixture if the particular brand of oil states 20:1 mix. Set only the high speed needle a little on the rich side. Too rich a needle setting may cause misfiring or erratic running due to fouling of the plug.
- Use a fuel/oil mixture ratio of gasoline and oil. If there is no recommendation, mix with a 30:1 ratio. We have checked and approved the following oil mixture ratio. KLOTTZ ModelLube 50:1, COSMO Cosmo Terra 2 cycle 50:1, RED LINE Two-Stroke Racing Oil 40:1. (This does not mean we guarantee the quality of these oils.) Follow the instructions in the running-in section concerning the mixture ratio for running-in.
- 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).

**WARNING:**

- When ground running the engine, avoid dusty or sandy locations. If dust or grit is drawn into the engine, this can have a ruinous effect, drastically shortening engine life in a matter of minutes.

- Make sure that the propeller is well balanced. An unbalanced propeller and/or spinner can cause serious vibration which may weaken parts of the airframe or affect the safety of the radio-control system.
- Do not use any propeller which has become split, cracked or nicked even very slightly, or received strong impact even if no apparent damage is visible.

- If the supplied retaining screws are too long due to a thinner prop hub or too short due to a thicker prop hub (cannot be screwed into the drive hub by more than 10mm). Use suitable length strong steel hex socket head cap screws.
- Install the propeller before the first flight of the day and remove it after the day’s flight.
- Make a habit of always checking the tightness of propeller retaining screws making sure they are free of, damage or rust before starting the engine. Replace the propeller periodically (every 50 flights) even if it looks as if nothing is wrong.

Since the GT60 is intended to be started with an electric starter, the addition of a spinner assembly for centering the starter sleeve is desirable. Special propeller locknut sets are available for use with spinners. Use a good quality well balanced spinner, enclosing the propeller boss. Make sure that it is of precision-made and sturdy construction so that the spinner shell cannot loosen when the starter is used. Make sure the spinner nuts do not interfere the propeller. If they do, cut the notches to clear.

**MIXING OF OIL**

- Use regular gasoline. (No need to use high octane gasoline.)
- Alcohol based glow fuel cannot be used in this engine. Not only will the engine not work properly but the internal carburetor plastic parts will be damaged.
- Use high quality commercially available 2 stroke engine oil.
- Follow the oil manufacturer’s recommendations concerning the mixture ratio of gasoline and oil. If there is no recommendation, mix with a 30:1 ratio. We have checked and approved the following oil mixture ratio. KLOTTZ ModelLube 50:1, COSMO Cosmo Terra 2 cycle 50:1, RED LINE Two-Stroke Racing Oil 40:1. (This does not mean we guarantee the quality of these oils.) We have checked and approved the following oil mixture ratio. KLOTTZ ModelLube 50:1, COSMO Cosmo Terra 2 cycle 50:1, RED LINE Two-Stroke Racing Oil 40:1. (This does not mean we guarantee the quality of these oils.)
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Carry out the needle settings as follows. Adjustment on the ground
1. Set the high speed needle 2 turns open and the slow needle at 2 turns open from fully closed position.
2. Start the engine. Open the throttle valve slowly until fully open and run the engine for 10 seconds to warm the engine.
3. Set the throttle stick 2-3 clicks advanced from the bottom and measure rpm with a tachometer and write it down.
4. Close the slow speed needle approx. 30 degrees and measure rpm with a tachometer and write it down. (Be sure to adjust the slow needle only after stopping the engine.)
5. Repeat step 4, to locate the slow speed needle position where maximum rpm is achieved. Open it approx. 180 degrees from this position. This is the basic slow needle position.
6. Open the throttle valve fully and measure rpm with a tachometer and write it down.
7. Close the high needle approx. 30 degrees and measure rpm and write it down. (Be sure to adjust the high needle only after stopping the engine.)
8. Repeat step 7, to locate the high needle position where maximum rpm is achieved. Open it approx. 60 degrees from this position. This is the basic high needle position.
9. Set the throttle trim on the transmitter so that the idle rpm is approx. 1,900rpm (approx. 1,600rpm when idle down function is used).
10. Warm the engine for 10 seconds with the throttle fully open, then idle the engine for 5 seconds, then quickly open the throttle fully. Make sure the engine does not respond sluggishly to increase rpm nor hesitates before picking up speed or even ceases firing.
11. If the engine responds sluggishly to increase rpm, the mixture is too rich due to the slow speed needle being open too far. Close the slow speed needle approx. 15 degrees. Repeat this procedure until the engine accelerates smoothly. (Be sure to adjust the slow speed needle only after stopping the engine.)
12. If the engine hesitates before picking up speed or ceases firing, the mixture is too lean due to the slow speed needle being open too far. Open the needle approx. 15 degrees. Repeat this procedure until the engine accelerates smoothly. (Be sure to adjust the slow speed needle only after stopping the engine.)

Adjustment with flight
13. If the rpm drops or the exhaust sound weakens when vertically climbing from level flight with full throttle, the mixture is too lean. Land the model and turn the high speed needle approx. 15 degrees. Repeat this procedure until the engine sound is smooth.
14. If, on the other hand, exhaust sound is irregular when vertically climbing from level flight, the mixture is too rich. Land the model and close the high speed needle approx. 15 degrees. Repeat this procedure until the sound in level flight is steady.
15. If the power drops gradually or exhaust sound weakens (overheating symptom), when performing torque roll and hovering, the mixture is too lean. Land the model and open the slow speed needle approx. 15 degrees. Repeat this procedure until power remains steady.
16. If the above symptom is not detected with prolonged torque roll and hovering but sluggish to increased rpm when the throttle is fully opened abruptly, the mixture is too rich. Land the model and close the slow speed needle approx. 15 degrees until sluggish rpm increase disappears.

Note
Generally, a gasoline engine is sensitive to a lean mixture compared with a glow engine, and will stop without warning hesitation and stops with overheating. It is recommended that the engine be run with a slightly richer mixture.

FLIGHT & MAINTENANCE
Checking prior to flight
• When the engine is started, make sure the radio control system works normally (distance test).
• Engine does not run erratic with full throttle.
• Idling is stable.
• Responds positively to the throttle operation.
• Warm-up is finished.
Warm-up is required, as with all size aircraft and car engines. Take off the model after warming the engine for approx. 10 seconds with full throttle.

Precautions in flight
• A small engine rpm increase and decrease delay is normal. Abrupt throttle operation will cause the engine to quit. Move throttle smoothly.
• Due to the construction of the carburetor, 80~90% of maximum power develops with half throttle. If you feel uneasy with this, adjust with transmitter function (exponential and throttle curve, etc.) or differential of throttle linkage.
• Cooling is more vitally important to a gasoline engine than to a glow engine. If overheating symptoms (loss of power or full throttle or exhaust note at mid speed changes from cloudy one to clear one) are observed during flight, immediately stop flying and carry out the following countermeasures.
  1) Enlarge the air intake cutout on the cowling.
  2) Enlarge the air outlet cutout on the cowling. (It is vitally important.)
  3) Partly cover the air intake cutout on the cowling where air does not hit the engine.
  4) Install an air guiding plate on the fuselage and cowling so that cooling air may be guided to the cylinder portion of the engine and muffler.
• When the interval between the flights is short and the engine is still hot, it may be possible overheating symptoms appear. To avoid overheating, land the model or turn the engine off at a safe place from the former flight through the engine even if the overheating symptoms were not observed during the former flight. In this case, leave it until the engine is fully cooled down (in hot weather, it may take more than one hour.) or run the engine for 4 to 5 minutes at idle.

Maintenance after the day’s flights
Please pay attention to the matter described below to ensure that your engine serves you well in regard to performance, reliability and long life.
• Check the tightening of each screw, especially engine installation screws and silencer installation screws time each. Also, for the first 4 to 5 flights, tighten the screws slightly. After that, tighten the silencer installation screws every two to three flights until the gasket has been stabilized (total 10 to 15 flights).
• As previously mentioned, it is vitally important to avoid operating the engine in conditions where dust, distributed by the propeller, may be deposited on the engine and enter its working parts.
• Remember to check the fuel container closed to prevent foreign matter from contaminating the fuel.
• Install a fuel filter to prevent foreign matter in the fuel container from entering the fuel tank. O.S. Super Filter (L) is available as an optional extra.
• Install an in-line fuel filter between the tank and carburetor to prevent foreign matter in the tank from entering the carburetor.
• Clean these filters periodically.
• If these precautions are neglected, restrictions of fuel flow may cause the engine to cut out, or the fuel/air mixture to become too lean causing the engine to overheat.
  With a gasoline engine rust hardly occurs. Check the exterior to make sure there is nothing wrong and wipe off any oil residues.
• 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 the 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.
When the engine is not to be used for a long period (more than a year), remove the engine from the model, clean the outside then remove the carburetor, and plug all tubing. Clean inside the engine by rotating the crankshaft with the engine immersed in container filled with gasoline.

Also use gasoline to clean the outside of the carburetor. Clean the outside only because the inside parts are sensitive to foreign substances.

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. Finally reassemble the engine and store it in a dry place after inserting it in a heavy vinyl bag.

**O.S. GENUINE PARTS & ACCESSORIES**

- **SPARK PLUG CM-6 (NGK)** (71669000)
- **LOCK WASHER (10sets)** M5 (55500004) (S) (72403051)
- **NON-BUBBLE WEIGHT** (S) (71531010)
- **BLIND NUT (10pcs.)** M5 (79870050)

**FLUORORUBBER TUBE**

- ID. 3mm × OD. 4mm Length 500mm (28382100)
- ID. 3mm × OD. 5mm Length 500mm (28382200)

**M5 STAND OFF ENGINE MOUNTS (4pcs.)**

- M5 Stand Off Engine Mount 1/4" (6.4mm) (74003510)
- M5 Stand Off Engine Mount 1/2" (12.7mm) (74003520)
- M5 Stand Off Engine Mount 3/4" (9.5mm) (74003530)
- M5 Stand Off Engine Mount 1" (25.4mm) (74003540)
- M5 Stand Off Engine Mount 1-1/4" (31.8mm) (74003550)
- M5 Stand Off Engine Mount 1-1/2" (38.1mm) (74003560)
- M5 Stand Off Engine Mount 1-3/4" (44.5mm) (74003570)
- M5 Stand Off Engine Mount 2" (50.8mm) (74003580)

The specifications are subject to alteration for improvement without notice.

**THREE VIEW DRAWING**

**ENGINE EXPLODED VIEW**

**ENGINE PARTS LIST**

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<th>Code No.</th>
<th>Description</th>
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<tr>
<td>1</td>
<td>28603100</td>
<td>Cylinder Block</td>
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<td>2</td>
<td>28603400</td>
<td>Piston Ring</td>
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<td>28603200</td>
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<td>Connecting Rod</td>
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<td>28614000</td>
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<td>28609300</td>
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<td>29708100</td>
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<td>74003230</td>
<td>Rotation Sensor</td>
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<td>74003231</td>
<td>Rotation Sensor Retaining Screw Set (2pcs.)</td>
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<tr>
<td>13</td>
<td>28631000</td>
<td>Ball Bearing (R)</td>
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**Specifications**

- **Displacement**: 59.91 cc / 3.656 cu.in.
- **Bore**: 44.0 mm / 1.732 in.
- **Stroke**: 39.4 mm / 1.551 in.
- **Practical R.P.M.**: 1,600-8,000 r.p.m.
- **Output**: 6.08 ps / 6.00 hp / 8,000r.p.m.
- **Weight**: 178.0 g / 6.28 oz. (Silencer)
- **Weight**: 105.0 g / 3.70 oz. (Ignition module)

**CAP SCREW SETS (10pcs./sets)**

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<td>M5x15</td>
<td>Cylinder Block Retaining Screw (4pcs.)</td>
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<tr>
<td>79871520</td>
<td>M5x20</td>
<td>Rear Housing Retaining Screw (4pcs.)</td>
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<tr>
<td>79871560</td>
<td>M6x60</td>
<td>Carburetor &amp; Reed valve Retaining Screw (2pcs.)</td>
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