

SPE 40CC Gasoline Engine

Operator's Manual

Specifications:

Displacement: 40cc

Horsepower: 3.2 HP 2.35KW

Ignition Style: Auto Advanced Electronic Ignition

RPM: 1,400 – 9,000 RPM

Fuel: Mixed Gasoline (1:45) Break in 1:30

Weight: Approximately 51 oz with all accessories

Thrust: 20 lbs at 7,400 RPM

Recommended Props: 18*8 - 22*6 (recommend 20*10)

Recommended Planes: Minimum Aerobatic Plans 13-20 lbs
3D Aerobatic Planes less than 13 lbs

SAFETY TIPS AND WARNINGS

This engine is designed for experienced radio control model airplane pilots only and could cause serious harm if used incorrectly. Always take care when running large gas engines.

- This engine is specifically designed for use on a radio-controlled model plane. Do NOT use this engine for any other purpose. Read user manual in its entirety before commencing use of this engine.

- Always mix fuel in a well-ventilated space.
- Never operate this motor alone
- Any adjustments to carburetor must be done with engine and ignition turned off
- Any one in the immediate area should wear safety glasses while motor is running
- Never stand in front of or to the side of propeller while motor is running.
- Always install ignition kill switch which is easily accessible from outside the aircraft for emergency use. Do NOT attempt to stop the engine by throwing anything into the path of the propeller.
- Check propeller is secure before each start
- Ensure idle stop screw is adjusted to allow engine to stop when carburetor is fully closed
- Ensure spinner cone does not touch the propeller
- Never operate engine indoors or in a confined space
- Gasoline is extremely flammable. Always allow engine to cool before refueling and keep fuel

away from other ignition sources

- Always perform Radio range check before flying with engine running. If glitches are noticed,

do not fly. Check spark plug lead for holes or nicks and check there is no vibrating metal to metal

connections

- Always use a balanced spinner and a balanced prop. An unbalanced spinner and prop combination will cause high levels of vibration and may cause the propeller shaft to break.
- Always use a lightweight spinner on your engine. Lightweight spinners are considered to be those with a cone wall of 1mm or less. Heavy spinners could cause the propeller shaft to break.

- Securely tighten the spinner and prop on the engine to prevent it from being thrown off the engine while running. Check the propeller prior to each use and replace if damaged.

- Never use a prop that has hit the ground. Even though it may look good from the outside, it may be cracked on the inside which may cause it to disintegrate while in use. Do not use a nicked, cracked or split propeller.
- Keep clear of the prop while motor is running. Keep foreign objects away from the propeller. Make sure that nothing can be "sucked in" by the propeller. Never start the engine on loose gravel or sand.
- Keep onlookers away from the running engine, especially small children.
- Make sure the fuel line is well-secured to the engine and to the fuel tank so that it won't come off in flight.
- Do not use silicone fuel line because it will be attacked by the fuel. Use vinyl or neoprene rubber fuel line.
- Always secure the fuel line away from the cylinder head. The engine's heat can damage the fuel line.
- Never touch the engine after a run. The engine will be hot and it may burn you.
- Before transporting your model, remove all the fuel from the fuel tank and fuel lines.
- Always use high-quality oil intended for 2-stroke engines.
- Use only low octane, alcohol-free gasoline. The carburetor diaphragm will gradually deteriorate if you use gasoline with alcohol (ethanol, gasohol, etc.).
- You will need to replace the diaphragm in about 80 hours of operation if you use gasoline with alcohol.
- Muffler pressure to the fuel tank is not required.
- Do not install your throttle servo or kill switch servo inside the engine compartment. Doing so could cause radio interference. Install all electronic radio devices at least 305mm [12"] away from the engine. The throttle pushrod should be non-metallic.
- If the engine is not to be used for more than a month, drain the fuel tank and remove any fuel from inside the carburetor. Do this by running the engine at idle until it quits by running out of fuel. To keep gasoline inside the carburetor over an extended period of time will damage the diaphragm valve and clog passages inside the carburetor.
- Because the carburetor is more complicated than those used in glow engines, keep the fuel clean by using a fuel filter. Use a filter intended to be used with gasoline engines. Metal filters intended for glow engines are too coarse and will not screen out finer particles. Always filter your fuel by using an appropriate filter before putting it into the airplane's fuel tank.
- If you intend to run this engine on an engine stand, or on any other rigid mount, use rubber mounts. The crankcase and other parts of the engine may crack if you do not provide some kind of vibration absorption mechanism.

- A rubber mount is not necessary if the engine is mounted on a model airplane.
- Gasoline is extremely flammable. Keep it away from an open flame, excessive heat or sources of sparks. Do not smoke near the engine or the fuel tank.
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An important notice to our customer!

This engine is NOT a toy. Any test, flight and later flight by this engine are done at your own risk.

Please enjoy your hobby and fly safely!

Waiver

This waiver means that if I, the buyer of this engine, am involved in any claim or suit I will not sue

Maxford USA or any of its representatives. I am aware that modeling may present hazards to

participants and spectators. When purchasing this engine, I exempt, waive, and relieve Maxford

USA from all current or future liability for personal injury, property damage, or wrongful death caused by negligence.

PARTS LIST

SPE-40cc Engine w/Muffler

Ignition Module

Propeller Flange with Propeller Washer

Propeller Bolt

(4 pcs) 6mm x 10mm socket head cap screws with Lock Washers and Flat Washers

(4 pcs) 6mm x 12mm socket head cap screws with Lock Washers and Flat Washers

Spark Plug Wrench

4mm Allen Wrench

(4 pcs) Stand Off

Features

- Automatic Ignition Timing: The SPE-40cc features an electronic ignition system that advances the ignition timing as the engine RPM increases. This insures retarded ignition timing at

low RPM for easy starts and good low-end engine performance, and advanced timing at high RPM

for good high-end power.

- The ignition module is waterproof and vibration proof.
- The ignition module runs on any 4.8-6V battery, recommend 6V for better performance.
- The current consumption is approximately 188 mAh.

Spark Plug

The recommended spark plug is a Champion RDJ-8J. To avoid improper operation or possible

engine damage, do not use any other type of spark plugs. The plug gap should be 0.4mm to 0.6

mm [0.016" to 0.024"]. If the plug gap is incorrect, adjust it with a spark plug gapping tool,

wash it
with gasoline and allow it to dry completely before you reinstall the plug in the engine.

Note: If you want to check if the spark plug works, remove the spark plug from the engine, connect it to the coil and make sure the metallic threaded end of the spark plug touches the engine. Spin the propeller rapidly through top dead center and check for a spark. This procedure only works in a dark room as there is too much light outside to see the spark. The various spark plug manufacturers have much information on their web sites regarding spark plug performance and health.

For more information, check:
<http://www.championsparkplugs.com/sparkplug411.asp>

Propeller

Always use a well-balanced, high-quality propeller. Recommended Props: 18*8 -22*6 (recommend 20*10)

Check the Engine before you Install

- Check to see that all screws and bolts are tight. Check carefully for any cracks, broken or missing parts. Tighten or replace before proceeding.
- Install the engine mounting stand-offs on the engine using four 6mm x 12mm [3/16" x 15/32"] socket head cap screws.
- Secure the ignition control module ground wire to the engine using one of the 6mm x 12mm (3/16" x 7/8") socket head cap screws.
- Connect the ignition control module to the pick up sensor. The connector is polarized and will only plug in one way.
- Connect a kill switch to the ignition control module. It is recommended to install a manual switch and a servo operated switch.
- Connect the ignition module battery. Any 4.8-6V, 500mAh and above battery will work well for this, recommend 6V for better performance. The approximate current consumption of the ignition switch module is 188mAh. Always check the battery voltage before you try to start the engine. If the battery voltage is lower than 3V, the ignition will not work properly.

Install the engine on your airplane

Note: The length of the engine from the back on the engine mount to the propeller washer is 154mm [6.0625"].

1. Use the supplied mounting template (on the back cover of this manual) to drill the engine

mounting bolt holes and the necessary clearance hole on the firewall.

2. Install the engine on the firewall using four 6mm x 12mm or [10-24" x 3/4"] socket head cap screws, four #10 flat or lock washers and four #10 blind nuts. Use thread-locking compound for security
3. Install a manual and radio operated kill switch (GPMG2150). Install a kill switch servo at least 305mm [12"] away from the engine.
4. Install the throttle servo at least 305mm [12"] away from the engine. Make sure that you get the carburetor's full range of rotation with your servo travel.
5. Install the ignition module securely in the airplane forward area. It is recommended that a thin piece of foam rubber be placed between the module and the mounting surface and that rubber bands are used to hold the module in place. 4mm [5/32"] screws and washers can also be used to secure it in place, but soft mounting the module is always the best choice.
6. Secure all connections with shrink tubing.

Note: The SPE-40cc engine must be installed on a 9mm [3/8"] lite-ply firewall or on a 6.4mm [1/4"] birch ply firewall. The firewall must be securely glued to the airplane. Use triangle stock and pin the firewall with hardwood dowels to reinforce the firewall glue joints. Never install the SPE-40cc engine onto a firewall thinner than specified because it may fail due to the power of the engine.

7. Cut all necessary clearance and cooling holes in the cowl.
8. Make sure the cowl is secured to the airplane and that the spinner to cowl clearance is at least 3mm [1/8"].

Breaking in the engine

- The fuel mix ratio is 1:30 for break in
- Break in your engine for at least 2 hours at RPM 2,000~3,000
- Do not adjust the high-speed needle on the carburetor to break in the engine. If you do so, carbon will accumulate in the spark plug and that will make ignition difficult.
- Do not run at full power for extended periods of time while breaking in your engine.
- Make sure that the engine has adequate cooling. While breaking in, the engine may run at slightly higher temperatures.
- If you wish to do so, you can break in your engine while flying your airplane. Just make sure you observe all recommendations above.

Starting Procedures

If this is your first gas engine, make sure you have an experienced gas engine pilot stand by to

help you.

Manual Starting:

Note: Use a thick glove to protect your hand while hand-starting the Engine.

1. The propeller should be installed on the prop spacer so that it is comfortable for you to flip it through compression. You also need to position it in a way that when you flip the propeller; the magnets are 20° clockwise from the magnet pick up.
2. Have someone help you hold the airplane while you start the engine.
3. Make sure the ignition is OFF, close the choke on the carburetor and open the throttle slightly from the idle position.
4. Rotate the propeller slowly about 10 to 20 times (more in winter) until fuel begins to be drawn into the carburetor. Another way to prime the engine is to rotate the prop clockwise from bottom dead center to top dead center (compression) and then counterclockwise back to bottom dead center repeatedly.
5. Switch the ignition to ON.
6. Flip the propeller clockwise several times briskly.
7. After you hear some initial firing sounds, move the choke lever to the OPEN position.
8. Set the throttle to a high idle. Set the prop so that the magnets are 20° clockwise from the magnet pick up when viewed from the front.
9. Flip the prop through compression rapidly. If this is done properly, the engine will start between the first and the eighth flip of the prop. During our testing, starting took an average of 3-4 flips.
10. After starting, let the engine idle for two to three minutes. Open and close the throttle slowly until the engine runs smoothly at idle and at full throttle. Acceleration should also be smooth.
11. If your engine does not start, repeat the procedure.

Engine Adjustments

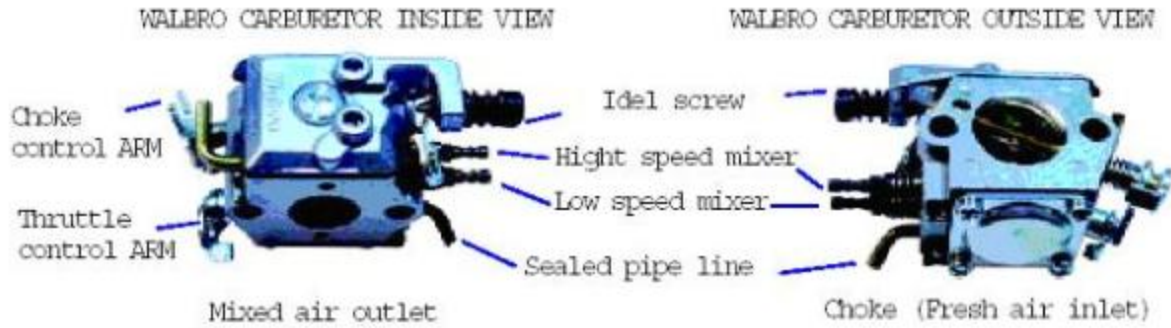
Always make high- and low-speed needle adjustments with the engine shut off. Also make sure the ignition is OFF. Adjust the needle marked "H" for high-speed RPM. Adjust the needle marked "L" for low-speed RPM.

A. Normal high- and low-speed needle settings:

It is not necessary to change the needle settings if the engine runs smoothly. Normally only the "H" needle will need adjustment from time to time and only by a small amount.

H: Open the needle 2 turns from the closed position ($\pm 1/4$ of a turn in winter).

L: Open the needle 1-3/8 turns from the closed position ($\pm 1/4$ of a turn in winter). Only adjust the high- and low-speed needle within the above range.



B. Idle adjustment:

Note: Do not confuse the idle screw with the low-speed needle "L". The idle screw physically adjusts how much the carburetor valve can close. The low-speed needle "L" adjusts the gasoline-to-air mixture when the engine is running at low RPM. If your engine appears to work correctly except that the low RPM are not as low as you want them to be, and then adjust the idle screw. If your engine behaves erratically at low RPM, then adjust the low-speed needle "L". When adjusting, turn the screw about 1/8 of a turn each time. A dirty plug will make it difficult to adjust the idle RPM. Follow the recommended procedures if any of the following happens:

Problem:

1. The engine hesitates when accelerated rapidly.
2. The RPM increases at idling.
3. The engine stops when the throttle is moved from high to low.

Solution:

Your low-speed needle "L" is too lean. Open it up about 1/8 of a turn and try again.

Problem:

The idle is not steady.

Solution:

Your low-speed needle "L" valve is too rich. Close it 1/8 of a turn and try again.

C. High-speed Adjustment:

The high-speed RPM and transition performance is adjusted with the high-speed "H" needle valve. When adjusting, turn the screw about 1/8 of a turn each time. The position of the "H" needle will vary according to air temperature and field elevation. If your engine is running smoothly, then do not adjust this needle valve. Follow the recommended procedures if any of the following happens:

Problem:

1. Engine stops at full throttle.
2. Engine hesitates when accelerated rapidly.
3. The engine will not come up to full RPM at full throttle.

Solution:

Your high-speed needle valve "H" is too lean. Open it up 1/8 of a turn and try again.

Problem:

1. Your engine does not reach full RPM.
2. Carbon build-ups appear consistently on your spark plug.

Solution:

Your high-speed needle valve "H" is too rich. Close it up 1/8 turn and try again.

Trouble Shooting

Engine won't start:

- Engine could be flooded (the engine only needs choking for the first start of the day).
- Low battery voltage.
- Check tank venting, clunk position, fuel flow.
- Check fuel lines for kinks, holes or damage.
- Check fuel flow while flipping.
- Check throttle is open.
- Ensure prop is flipped over with authority.

Motor runs poorly:

- Engine could be too rich. Ensure both needles are adjusted correctly.
- Ensure carburetor has not become loose, causing air leakage.
- Check all ignition connections and switches.
- Ensure fuel is freshly mixed and is free of humidity and water.

Warranty

Your SPE engine and ignition system are covered with a two (2) years warranty from the initial date of purchase for defects in workmanship or materials. During that period, SPE Engines will, at its option, repair or replace without service charge any product deemed defective due to those causes. You will be required to provide proof of purchase date and product serial number. For repairs not covered under warranty, you will be notified of the charges.

This warranty does not cover

- Any damage caused by crash, abuse, misuse, alteration or accident.
- Damage caused by customer disassembly, tampering, use of substandard fuel, use of incorrect accessories (spark plug, prop, etc.)
- Damage caused by improper handling, operation, maintenance, modifications, fuel or crash.

Any modifications to, disassembly of engine or ignition or any use of the engine for which it is not specifically intended will automatically void the warranty of the engine. If you attempt to disassemble or repair this engine yourself, it may void the warranty.

This limited warranty only covers customers in United States. For customers outside of United

States, please contact local importer for warranty information.

SPE Engine Authorized Service 800-704-6229