GF-9(9cc) Electric Ignition Gasoline Engine Manual
(for .55 size Aircraft)

The convenience of glow with the economy of gasoline.The SH 9cc (0.55c.i.) Ignitionless gasoline engine; the perfect choice for most all .40-.55c.i. aircraft.
In June 2019, the SH R&D team began developing the 9cc gasoline engine as a drop-in replacement for the typical .46ci size engine, designed to give superior reliability while using more affordable and commonly available gasoline.
To deliver consistent fuel flow in all flight attitudes, the SH team developed aneasy-to-operate constant pressure pump fuel circuitdesigned around a crankcase-pressure driven adjustable fuel pump.
Today, we offer you our first pulse-type constant pressure pump system.Each 9cc gasoline engine includes this constant pressure pump system as standard feature.
Our all-new system provides fuel supply stability regardless of the aircraft's flight-attitude while reducing the effects of fuel tank level differences.Climbing or diving, the GF-9to maintains stable and smooth power output due to this fuel pump system. The SH9 is ready for even the most challenging aerobatic and scale applications.
We know you will enjoy owning and operating this unique model engine.

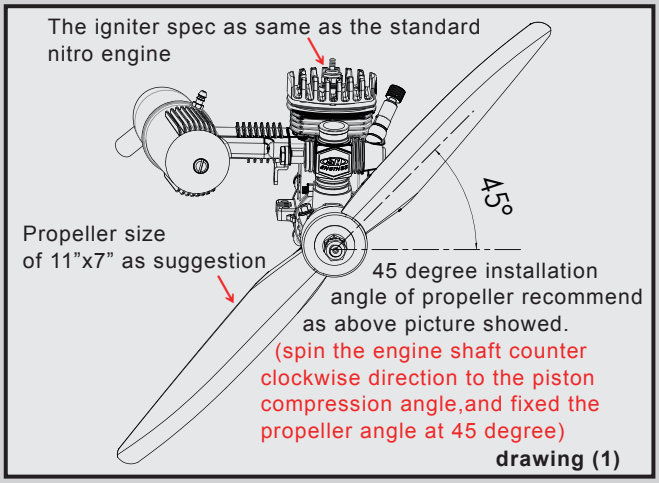
- Suitable for all 2-stroke .40-.55 size model aircrafts on the market.
- Proper installation, setup, and run-in (break-in) of the engine is important to ensure that you get the highest performance and lifetime of your engine. While similar to glow/alcohol engines, this gasoline engine does have unique setup and break-in requirements. Please follow these instructions carefull.

※Attention※

1. SAFETY FIRST: When run on the engine, please always make sure engine assembled tight on the plane or test stand with the propeller carefully balanced and installed.

2. Carburetor Install: Ensure the carb is down tight with the o-ring sealed before tightening the cinch bolt.
Do NOT over-tighten the cinch nut to prevent damaging the carburetor.
Use a mixture of 91 or 92 Octane gasoline and SH specified 2-cycle oil.

Oil Requirement: Required gasoline/oil ratio is no less than oil than24:1, roughly around 4.0% 250ml engine oil can be mixed with 6 liters of gasoline or 80ml engine oil mixed with 1.92 liters of gasoline. (1920/80=24)- Mix 5oz of oil to 1 gallon of gasoline.



drawing (1)

3. Glow Plug：The engine is equipped with an SH factory specified manufacture 1.5V glow plug.
(The glowplug is a turbo-style plug which is compatible with most standard nitro engine glow plug clips. Not compatible with ¼-turn lock style).
Glow plug requires 1.5Volt current during the starting procedure but does not require power once the engine is running.

4. Propeller: We suggest a propeller size of 11"x7"or 11"x8 " or 12"x6" Install as shown in drawing (1).

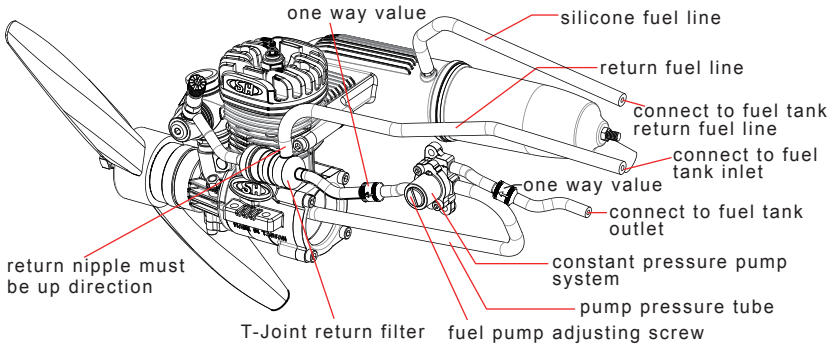
- **An inappropriate (too big) size propeller will overload the engine. This will void any warranty and shorten engine life.**
- **SAFETY WARNING: It is the user's responsibility to ensure the propeller nut is installed tightly to ensure the propeller does not come loose AND that propeller arc is clear of people and debris.**

Pulse-Type Constant Pressure Pump System Diagram and Introduction

Set the fuel line as shown using the filter/overflow and both 1-way fuel fittings.

1. This engine uses a unique fuel system. Between the pump and the carburetor is a unique item: the T-joint return filter.This filter keeps the fuel supply clean, removes bubbles from the system, and returns excess fuel back into the tank.
Important: The T-joint return filter return nipple must be "up" when the plane is in its normal upright position (regardless of engine orientation). This is important for proper fuel flow.
The overflow from the T-joint return should be on a 3rd line to the tank and inside the tank, that return line should be setup to feed back to the bottom of the tank.

2. Constant pressure pump and one way value.
Setting follows the drawing (2) You can see the fuel direction from the arrow markings.
Please install the pump close to the tank and engine in an accessible position, i.e.
Under the fuselage or on the side for better adjustment and observation.
Please use the included O-rings when mounting the pump to insulate it from the fuselage vibration.



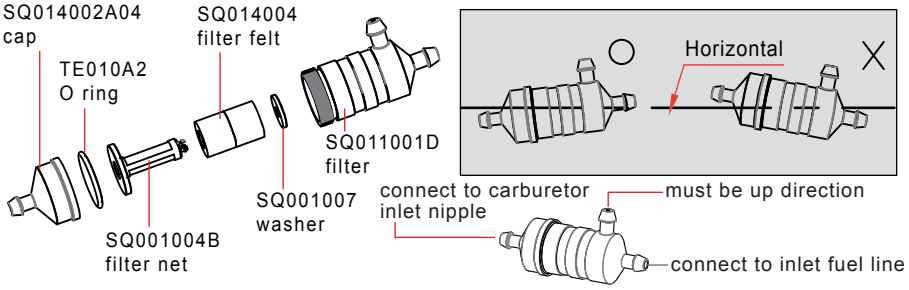
drawing (2) 9cc constant pressure pump system diagram

(Do not over tighten the mounting screw/orings as this will negatively affect pump operation)

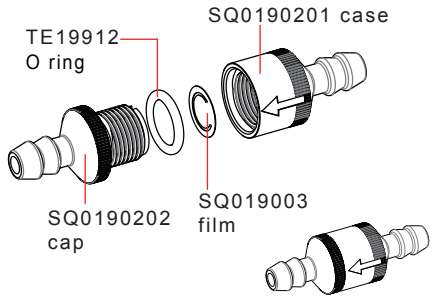
3. One way value use. Both inlet and outlet of fuel pump requires use ofthe supplied one way value to prevent fuel backflow. Again, any debris in the fuel will negatively affect fuel flow. Keep the fuel system clean and debris-free.

4. Fuel line and tank setup. The diaphragm action of the fuel pump is a result of the crankcase pressure connected to the fuel pump as show. A silicone fuel line is used here to help prevent heat transfer from the engine, via the fuel line into the pump.

The factory setting of fuel pump adjusting screw:10 hours from the bottom



drawing (3) T-Joint return filter



drawing (4) one way value

※Carburetor Setting and Run-In Procedure※

The following factory settings all based on the use of the 11x7 propeller for break-in AND the use of the stock mufflers.

Adjustment will be needed as you complete break-in and switch to other propellers or use other mufflers for your application.

Main needle: 3 turns from the bottom

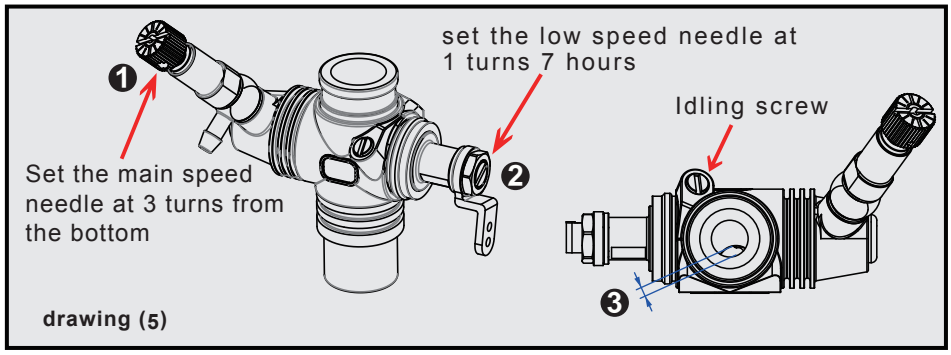
Low needle: 1 turn and 7 hours from the bottom

For needle adjustments, image the slot in theneedle is the hour band on a clock and only adjust the needle from 1-2 hour increments eachchange.

1. Carburetor barrel position. First, adjust the idle stop screw or servo to the position showed in drawing (5) of mark ❸
(2mm open from fully closed)

2. Then add the 24:1 fuel/oil mixture into the fuel tank. For initial break-in it is recommended to use 20:1 fuel/oil mix.

3. First stage of run-in: The main needle and low speed needle are preset from the factory. Please turn the main needle see back side attached drawing (5) of mark ❶
Set the main needle at 2 turns 6 hours from the bottom and low speed needle at 1 turn 7 hours from the bottom.



drawing (5)

Initial Starting Procedure

1. Open the carburetor to about 1/3throttle. Block the carburetor inlet by hand and spin the engine counter-clockwise direction to prime the system (help push fuel into the pump,T-Joint return), carburetor and inside the engine.

2. Connect the glow plug igniter and apply an electric starter to start the engine. Once it fires, keep the engine running in the mid-range (1/3 to ½ throttle), and then you can remove the plug igniter.
(RPM going a little lower is normal once you remove the plug igniter during idling)

3. Engine RPM: Keep the engine operating in a low rpm range (under 5000rpm). You may need to richen the high speed needle throughout this process. Open it 2-3 hours (1/4 turn) or more as needed.

4. Operate at this low rpm for approximate 500cc of fuel (16oz) of fuel running through.
●The exhaust should emit dark smoke and be quite oily to the touch, indicating that engine is in rich condition.

Once the 16 oz of fuel has been run through the engine, you can make initial adjustment to the idle speed and mixture:

1. Low speed needle adjustment: Adjust the idling screw to the position showed in drawing (5) of mark ❸ ,fully closed from the bottom and open approx. 2.5mm.

2. If the engine idle speed is high and continues to increase and not slow down, it's too lean, and the low speed needle needs to be turned counter clockwise 1 hours until idle is stable.

3. If the engine at idle speed is too low and leads to stalling, it's too rich and the low speed needle needs to be turned clockwise about 1 hours until the idle is stable.

Stay at 3000-3200 RPM for best idle speed of this time.
(Note: Idle RPM will slow when you remove the glow plug ignitor. This is normal.)

Second stage of run-in:

1. Once started, set the throttle to fully open, then set the main needle adjustment. The engine needs to stay in a very rich condition during the run-in procedure and the exhaust should emit a lot of fuel and white/blue smoke.

2. Use the needle to keep the engine running below 7000 rpm with the carb in full throttle. Richen as necessary to keep the engine running consistently at 7000rpm.

3. Run the engine at this setting for approximately 400cc(13oz) of fuel.

●Always watch out for the engine speed and how much fuel is running through; Make sure engine speed stays under 8,000 RPM

At this stage, we canproceed to setting for initial flight.

1. Make sure the receiver battery is fully charged, fuel tank is full and the servos have the correct forward and reverse direction. Double check the propeller and spinner used. Is it installed properly, is the propeller and spinner in proper working order. Is the area where you will operate your model safe.

2. Then start the engine and allow a 2-minute warm up in the mid speed range of running.

3. Put the aircraft model on a flat surface and secure it so it cannot move on its own. Set the throttle position to fully open and adjust the main needle.

4. If the engine starves for fuel regardless of mixture settings, adjust the fuel pump adjustment screw. Counter clockwise for more fuel pump pressure. Adjust in 2 hour increments.

The initial engine RPM setting is around 9,000-9,500 rpm when the aircraft is on flat ground.
This is with an 11x7 propeller.
Hold the model with the nose up(around 50-60 degrees), the RPM will increase by approximately 200rpmand maintain that rpm. Then put the model back to a flat surface the RPM shouldreturrn to the original rpm setting.
After 2 flights, make slight main needle adjustments when the aircraft model is on a flat surface,
and set the engine to maintain 9,600 RPM operation during flying. Finally, we have completed the run-in procedure. We hope this engine brings more flying fun and saves as much as fuel costs.

NOTES

1. Check the fuel lines to ensure there is no leaking or clogged issue when the engine is running unsmooth or when you have needle setting difficulties. Installing a SH specified fuel filter SB011 into the fuel tank is suggested.

2. Please use the SH specified 2 cycle engine oil to maintain proper engine operation. We recommend Redline synthetic 2 stroke racing oil or very similar high-performance synthetic two stroke oil.

3. Use 90-92 gasoline and SH specified 2 cycle oil mixed up; Gasoline and engine oil ratio is 24:1 or more. That is NO LESS than 4.0% oil content.

DO NOT USE METHANOL, ALCOHOL, OR NITROMETHANE IN THIS ENGINE. DAMAGE WILL RESULT.

4. Please use the SH specified plug of GT4 plug.

5. We suggest the propeller with size 11"x7" for break in and first flights and the use of a 12"x6" (no larger) after that to obtain the best performance. However, your model, altitude, etc may require a different propeller.

(Using too large of a propeller engine will overload the engine. This will shorten life of your engine. Use other propeller sizes with caution.)

6. This is a gasoline engine, thus you must use gasoline compatible fuel line, tank, tank stopper, etc.

7. The needles may need to be reset if there are any big changes to the operating flight environment.
(Hot/cold or any differences in altitude)

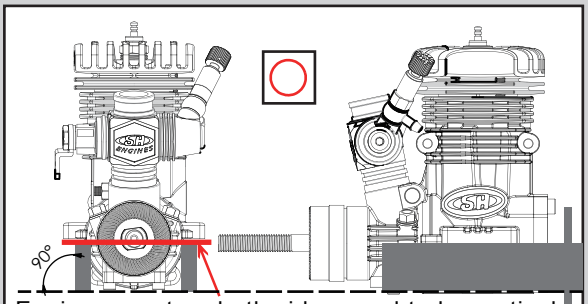
8. Please clean the spark plug and burn room after 1 gallon of fuel has run through the engine.
If the heating screen of burn room has serious carbonated damage or the plug bottom has carbon deposits, please replace with a new one.
(Both plug and burn room are consumables, please replace as necessary.)

9. The fuel is flammable and dangerous; always stay away from sparks, heat or any other ignition source.
Don't store the fuel in the gas tank and fuel line after you have finished flying your aircraft model.
Store your fuel, gasoline or mixed fuel safely in a cool, dry location. Fuel must NOT be stored in living quarters of any kind.

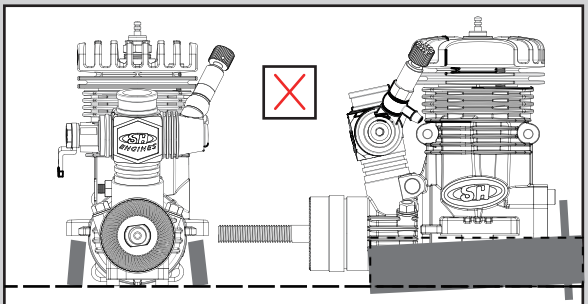
10. Warranty is limited to mfg defect at time of purchase. Repair or replacement decision is as the sole discretion of SH.

11. Storage – Run the engine dry at the end of the day of running and empty the fuel tank. If the engine will be stored for some time, oil it and place it in a plastic bag in a cool dry location. It may clog and the valves and pump may need to be cleaned, fuel lines may need to be replaced, etc. Re-adjust the needle setting as recommended and assembled the relative parts back. Then restart the engine.

12. When run on the test stand or for installation, please make sure engine mountsare to be vertical and parallel at the same height to ensure the engine case is not distorted in the mounting process.
(see right figure for reference)



Engine mount on both sides need to be vertical and parallel at the same height.


Engine mount on both sides are not vertical and parallel at the same height, which will caused engine mount to deform once assembled to the engine

Patent No.

NO.	Country	Patent No.	NO.	Country	Patent No.	NO.	Country	Patent No.
1	Taiwan	M441718	3	Germany	202012102665.1	5	Taiwan	M477016
2	China	ZL201220334172.9	4	America	8985078	6	America	9169776