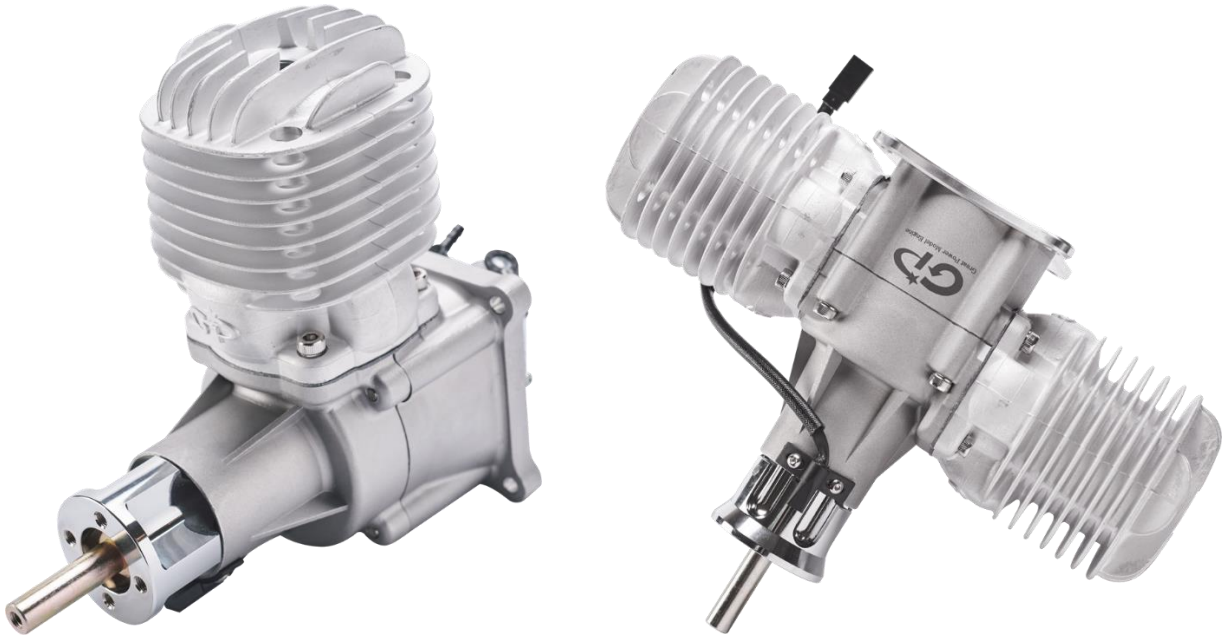
Great Power Engine

GP-Engine-Owner's Manual



www.geme.com.tw

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Please Read These Instructions Carefully Before Operating The Engine

※Technical Specifications※

GP-61

Item	Data	Item	Data
Bore	46.5 mm	RPM Range	1600-8900 RPM
Net Weight	1440 g	Output	6.5 Horsepower
Weight of Ignition	136 g	Fuel	Unleaded 89-93 octane fuel
Weight of Muffler	160 g	Lubrication	Synthetic oil with octane fuel in mixture 1:40

GP-123

Item	Data	Item	Data
Bore	46.5 mm	**RPM Range**	1500-8900 RPM
Net Weight	2300 g	**Output**	12 Horsepower
Weight of Ignition	202 g	**Fuel**	Unleaded 89-93 octane fuel
Weight of Muffler	330 g	**Lubrication**	Synthetic oil with octane fuel in mixture 1:40

GP-88

Item	Data	Item	Data
Bore	53 mm	RPM Range	1200-7700 RPM
Net Weight	1980 g	Output	STD: 9 Horsepower EVO: 10 Horsepower
Weight of Ignition	135 g	Fuel	Unleaded 89-93octane fuel
Weight of Muffler	345 g	Lubrication	Synthetic oil with octane fuel in mixture 1: 40

GP-176

Item	Data	Item	Data
Bore	53 mm	RPM Range	1100-8900 RPM
Net Weight	3550 g	Output	STD: 19 Horsepower EVO:20.5 Horsepower
Weight of Ignition	202 g	Fuel	Unleaded 89-92 octane fuel
Weight of Muffler	430 g	Lubrication	Synthetic oil with octane fuel in mixture 1: 40

※Safety Instructions※

IMPORTANT - PLEASE READ:
WARNING It is vital to follow these safety instructions in order to prevent misuse of the engine that could result in severe harm to you and/or others. Great Power Model Engine cannot take responsibility for loss, damage or injury that results from failing to observe the instructions and precautions in this manual. You are responsible for operating the engine safely. Note that the engine may stop suddenly for a number of reasons. Take this into account when flying your plane to avoid it being damaged in the event of a sudden stop. Do not fly the plane if you suspect it will be damaged if the engine stops running.

1. By operating the engine, you agree to be held completely responsible for any damage or injury that is incurred as a result.
2. Read all instructions before operating your engine.
3. When operating the GP engine, always abide by the laws of your country.
4. Use original spare parts only.
5. Make sure all parts of your body area safe distance away from the plane of the spinning propeller.
6. Ensure to check all propeller screws and spinner are tightened and in a good condition before every flight. (90~110 inch. / lbs.).
7. Check the engine is firmly fixed to the engine mount periodically.
8. Do not operate the engine or fly your airplane alone.
9. Do not allow anyone to stand in front of your engine or next to the propeller when the engine is running. Remember to always stand behind your engine and propeller when operating.
10. Wear close-fitting clothes when operating the engine. When operating the engine near to lose material, such as gravel, power cords, rope etc. beware that it may be drawn into the spinning propeller, potentially causing severe injury or even death.
11. Only start the engine in well-ventilated areas, do not operate it indoors.
12. Make sure spectators or bystanders, especially children and pets, are at least 10 meters away when running the engine.
13. Always turn the engine off before making adjustments.
14. Use the ignition kill switch to stop the engine.

15. Gasoline is a highly flammable substance. Sparks from electrical contacts such as battery chargers, fuel pumps etc. can be dangerous. Smoking near the fuel supply or engine is also dangerous. Fuel must be stored in well ventilated areas in approved containers.
16. The temperature of the engine will be very high after being turned on. Please do not touch or refuel the engine until it cools down.
17. ***Caution: Do not connect GP engines with RC Excel's tachometer, as doing so could cause ignition failure and damage to the engine.***
18. ***Important: Normal carbon-steel screw is not strong enough for huge horsepower engines, hence, we attach M6x55mm special alloy screws for GP-176 engine, the M6x55mm screws are special alloy (SNCM439) [1]which has a better tensile strength to prevent the possibility of breaking prop screws during flight. Please use GP M6x55mm on GP-176 only.***

※Choosing a Suitable Propeller※

Propellers of the same dimensions produced by different manufacturers tend to vary. Even propellers of the same dimensions made by the same manufacturer can vary. Environmental factors, such as temperature and atmospheric pressure, the weight of the plane, the exhaust system etc., will have an effect on propeller load. Carbon fiber propellers usually produce higher RPM than a wood propeller of the same diameter and pitch. Never forget to balance your propeller and, this procedure is absolutely critical to the health of your engine. Must use a drill press to drill your propeller from the rear, we received a lot of engine issues of sheared propeller bolts, most of them are caused by imprecisely drilling.[2] Therefore, only balanced, precisely bored propellers may be used for your engine.

We don't recommend to use carbon fiber back plate and carbon fiber spinner combination, it may cause propeller bolts sheared, alloy spinner back plate is suggested. Ignorance of the above-listed instructions can lead to bearing damage or crankshaft twisted caused by vibration of the unbalanced propeller.

Following chart shows the suggested propellers:

[1] SNCM439 is supplied in the heat-treated condition with a tensile strength in the range 950-1100MPa. This grade has a high hardenability enabling it to be used for high tensile applications in large sections.
[2] If you notice you cannot hand tighten propeller bolts easily then it means you didn't drill propeller precisely, don't use the propeller with incorrect drilling, this can lead to shear propeller bolts.

Engine	Suggested Propellers	Note
GP-61	2 blade: 22x12, 23x10, 24x8, 24x10. 3blade: 21x12, 22x10	GP-61 is designed for a power maximum of 9000 RPM. We recommend that you do not use propellers that turn the engine on the ground at more than 7700 RPM.
GP-123	Two-blade: 27x12, 28x10, 28x12, 29x10 Three-blade: 25x12, 26x12	GP-123 is designed for a power maximum of 8900 RPM. We recommend that you do not use propellers that turn the engine on the ground at more than 7000 RPM.
GP-88	2 blade: 26x10, 26x12, 27x10, 28x10	GP-88 is designed for a power maximum of 8500 RPM. We recommend that you do not use propellers that turn the engine on the ground at more than 7300 RPM.
GP-176	2 blade: 30x13, 31x12, 32x10.	GP-176 is designed for a power maximum of 8900 RPM. We recommend that you do not use propellers that turn the engine on the ground at more than 6700 RPM.

※Fuel and Oil Mix※

Always use 40 to 50 volume units of unleaded 89~93 octane fuel mixed with 1 unit of synthetic oil (40~50: 1). We recommend Red-line Two Stroke Racing Oil and Motul 710. These oils are easy to find at most motorcycle stores. Oil used in cheap garden appliances and synthetic oils are not intended for methanol model machines and must not be used. Any damage resulting from the use of low quality fuel is not the responsibility of GP Engine. Do not use mixed fuel that is more than 90 days old.

※Engine Installation※

Screw: You can mount the engine directly to the firewall. We recommend a M6 screw for GP-61, GP-123, GP-88 andGP-176. The firewall should be stiff enough to prevent engine vibrations. Use high grade 1/4 bolts with washers and locknuts in the rear of the firewall. Make sure your firewall is structurally sound.

Servo: We recommend a high quality servo for the throttle, as it ensures accurate and reliable throttle operation. We also recommend a high quality servo linkage. **Do not use all metallic servo linkages, as this could cause radio interference.**

Fuel Tank: We recommend a 450cc-500cc fuel tank for GP-61, a 800cc-1000cc fuel tank for GP-123 & GP-88 models, and an approximately 1500cc one for GP-176. The tank must be vented, and the vent should be routed to the outside of the plane, preferably at the bottom of the cowl.

Engine Cooling: Sufficient air circulation under the cowl must be ensured, as cooling is important for the engine's performance and longevity. To cool the engine, an appropriately sized air intake is required. The exhaust air outlet should be 3 times larger than the intake at the bottom rear of the cowl for the hot air to exhaust. Make sure cool air can go through the cylinder fins and does not bypass them and rake an easy route to the exit. It is better to build baffles, as this can create turbulent air movements through the cylinder fins, hence providing maximum cooling for an air cooled engine.

Caution: It is important to use seals to protect openings in order to prevent sawdust, residual abrasives etc., from entering the engine's interior when the engine is being mounted in the model. Ensure the cleanliness of the interior of the fuselage. Also ensure that all parts are tight and in place so that they will not be sucked into the engine.

※Needle Setting※

Turning the needle clockwise LEANS the fuel mixture. Turning the needle counterclockwise RICHENS the fuel mixture. The general starting points of the needles are as follows:

	Low Needle	High Needle
GP-61	1 ½ open on the Low needle	1 ½ open on the High needle
GP-88 STD& EVO	1 ½ open on the Low needle	1 ½ open on the High needle
GP-123	2 open on the Low needle	1 ½ open on the High needle
GP-176 STD& EVO	¾ open on the Low needle	1 ½ open on the High needle

Needle settings will vary according to different conditions, such as altitude, temperature, fuel carb variances, humidity, and so on.

Caution: The adjusting needles must not be tightened with too much strength as this can cause damage to the needles. If the needles are damaged, it will no longer be possible to make adjustments to the carburetor and a new one must be obtained.

※Starting Procedure※

1. Make sure the propeller bolts are all tight and secure.
2. Make sure the area is clear of any kind of loose debris, sand, dirt or gravel.
3. Have someone with eye protection firmly hold the plane. At least two people are required to start the engine.
4. We strongly recommend wearing heavy leather gloves when starting the engine.
5. Switch on the radio system and confirm that all controls work correctly and are in the correct direction. Ensure that you have the throttle cut switch set to fully close the throttle and stop the engine. After setting up, reconfirm that the throttle works by testing whether it stops the engine.
6. Switch on the ignition and close the choke. Then, flip the propeller until the engine fires or runs for a few seconds.
7. Release the choke, then set the throttle at a little higher around idle position(be aware that the engine can start on any flip of the propeller at anytime, even if the ignition is off). Give the engine a quick flip. It normally takes 5 to 10 flips to start the engine.
8. After the engine starts running, slowly open the throttle to a low idle and allow the engine to warm for 30 seconds. Then progressively open the throttle to full power and hold for 5 seconds to confirm that the engine can maintain full power. Next, throttle back and set the idle to a low RPM.
9. **WE STRONGLY RECOMMEND THAT YOU FOLLOW THIS PROCEDURE TO START YOUR ENGINE.**

※Break-In※

We recommend breaking in the engine on the plane. Do not break it in on a test stand, even if you have a test stand with a proper cooling system, because doing so may cause the engine to overheat. We consider the engine fully broken in after 25 liters of fuel. The break-in procedure is as follows:

1. Start the engine at idle for 2-3 minutes (lower than 2500 RPM)
2. Slowly push the throttle to around 4000-4500 RPM and run a tank of fuel. Then stop the engine and let it cool down.
3. Restart the engine at idle for one minute. Then slowly push the engine to full throttle. Do not stay in full throttle for more than 5 seconds. Make sure the needle setting is done/ right and the engine is running smoothly.
4. Stop the engine again and let it cool down, before putting the cowling on and letting the plane fly. The engine should run smoothly from the beginning and improve as flight hours accumulate. We consider the engine fully broken in after 25 liters of fuel.

◎ Make sure you have a proper cooling system on your plane before flying.
◎ Do not run at full throttle than 10 seconds before the engine has been broken-in.

※Trouble Shooting※

Trouble Shooting I (The engine will not start)
1. Check the battery voltage. It should be over 6.6+ when checked under load. Also check all the ignition connections, wiring and switches. 2. Examine the fuel system for clogs, jams or a bad fuel line. Make sure the propeller is flipped over with authority. Check the carburetor mount is not loose, as air leaks may cause the engine to not start. 3. If too much fuel is dripping from the carburetor, the engine may be overflowed. If so, you can:(a)Turn off the ignition system and ensure the choke and throttle are opened completely. (b) Flip the propeller about 10 times at full throttle. (c) Close the throttle to idle position and follow the starting procedure again.

※For single cylinder engines (GP-38, GP61 and GP88) you can also unscrew the spark plugs and check its contacts, and dry or replace the spark plug(s). Further starting should only be done with the throttle is turned down. (If the plug(s) is/are dry, then it may be that not enough fuel has been drawn into the carburetor. In that case).

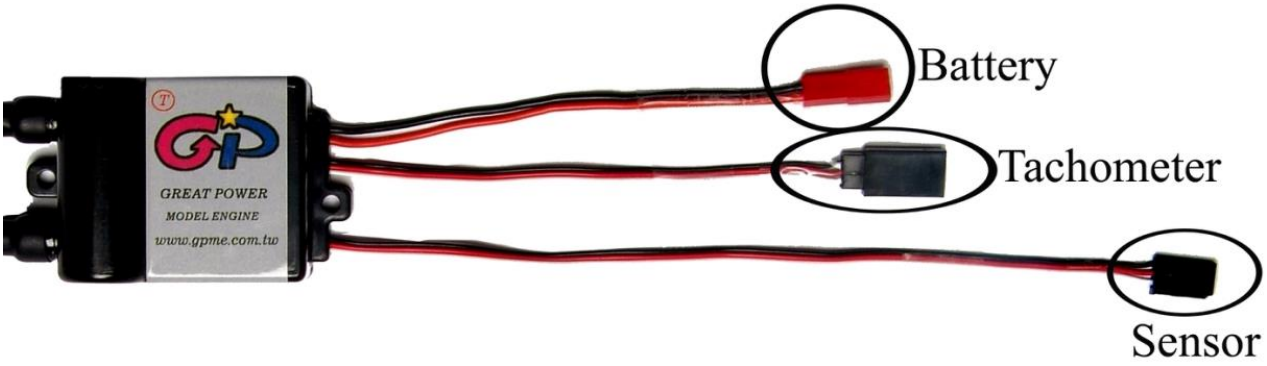
4. If the engine stops soon after starting even when the starting procedure has been followed, it is probably because the low needle is too lean. Turn the low needle counterclockwise for approximately 1/8of a turn.
5. **If the engine does not reach a normal RPM at full throttle**, shift back the GP muffler(s) to the original needle setting. If the problem remains, it may result from(a) a low battery;(b) the wrong needle setting (in which case we suggest adjusting 1/8 of a turn at a time until the RPM reaches a peak); (c)the diameter of the propeller is larger than recommended, in which case the RPM will be lower[3]; (d)the gasoline and oil mixture may not be correct[4]; (e) the muffler/ pipe system affecting the RPM (if you are using a pipe, make sure the length of the header, and the needle setting suit the pipe and header you are using. If you are not sure about the length of the header, contact your dealer. We are happy to be at your service); (f) bad ignition timing and a malfunctioning spark plug, which will cause a lower RPM as the crankshaft may be twisted.

◎Caution: **If the engine is running roughly or vibrating strongly**: (1) Make sure the low needle setting is not too rich. (2) Check the balance of the propeller and spinner.(3)Ensure the engine's mount bolts are secure. (4) Check the ignition timing (bad ignition timing could cause severe damage). (5) Check the structure of the engine box and firewall on your plane.

※Ignition Wire Diagram※

[3] Please refer to ※Choosing a Suitable Propeller※

[4] Please refer to ※Fuel and Oil Mixture※



※Maintenance※

Please note that as a high performance two-stroke engine, certain parts of the GP-176 may wear out more quickly than others. Piston rings, needle bearings, pistons, spark plugs etc. may need to be occasionally replaced outside of the warranty in order to maintain peak performance. Please check the condition of the screws on the engine, firewall and propeller regularly to ensure the screws are not loose and have not fallen out. Also check that all screws are tight to the required torque rating on a regular basis. The following chart lists the size of the screws and torque specifications.

Item	Engine	Screws	Torque Specification
Spark Plug	All Engines		100 in. lbs.
Carbon Steel Crankcase Bolts	GP-61	M5x20	90-100 in. lbs.
	GP-123	M5x30	
	GP-88	M5x18	
	GP-176	M5x25	
Carbon Steel Cylinder Base Bolts	GP-61	M5x16	90 in. lbs.
	GP-123	M5x16	
	GP-88	M5x18	90-100 in lbs.
	GP-176	M5x18	
Carbon Steel Carburetor Mount Bolts	GP-61	M5x50	70 in. lbs.[5]
	GP-123	M5x45	
	GP-188	M5x45	

[5] The adjusting needles must not be tightened with too much strength as doing so can cause damage to the needles. If the needles are damaged, it will no longer be possible to make adjustments to the carburetor and a new one must be obtained.

	GP-176	M5x55	
Carbon Steel Propeller Bolts	GP-61	M5x45	75 in lbs. for Wood Prop 90 in lbs. for Carbon Prop
	GP-123	M5x50	
	GP-88	M5x45	
	GP-176	M6x55[6]	90 in lbs. for Wood Prop 110 in lbs. for Carbon Prop

◎ The engine must be checked regularly for fuel seepage as this can indicate a leak that creates a lean fuel/air ratio, which may cause engine damage or erratic engine running.

◎ After every 20 hours of running, we suggest you change the spark plug(s). After 50 hours of operation time, check the reed valve. After 300 hours of operation time, commit the engine to a professional warranty service department.

※Limited Warranty※

GP engines are covered by a 24 months warranty from the date of purchase. The warranty covers the replacement of defective parts as a direct result of manufacturing or faulty materials. The warranty does not cover any damage caused as a result of **failure to follow the operation instructions**, **mishandling**, **the use of aftermarket parts**, **unskilled repair**, **modification**, **crash**, **the use of low-quality/ improper fuel or additives**. Only original owner of the engines are eligible warranty claimants. The warranty cannot be transferred with a change in ownership. Please request your dealer to fill out a warranty card for you when you purchase the engine. **Caution:** The warranty card is required for the warranty to be honored. It must therefore be kept in a safe place. Please note that disassembly of the engine or ignition voids the warranty on that item. The warranty does not cover shipping expenses to and from GP engine for warranty service.

Great Power Engine

No.48, Linyuan North Road,

[6] **Important**: Normal carbon-steel screw is not strong enough for huge horsepower engines, hence, we attach M6x55mm special alloy screws for GP-176 engine, the M6x55mm screws are special alloy (SNCM439) which has a better tensile strength to prevent the possibility of breaking prop screws during flight. Please use GP M6x55mm on GP-176 only.

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Note for customers in the United States
Aviator Plus, Mile High RC, and Planebender Products are offering after-sales service. The warranty/ after-sales service is bound to the original seller. If the warranty service is needed, please contact your original seller, do not contact/ send your engine to other sellers. We appreciate your understanding of inconveniences caused.

※Service Centers in The United States※

Aviator Plus Rc

Address: 1982 Leslie Dr, Zanesville, OH 43701, USA
Contact Person: Joe Lewis
Phone: 1-740-919-7670
Email: joe@aviatorplusrc.com
Website: http://www.aviatorplusrc.com/rcaviation/

Mile High RC

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Contact Person: Mike Maloney
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