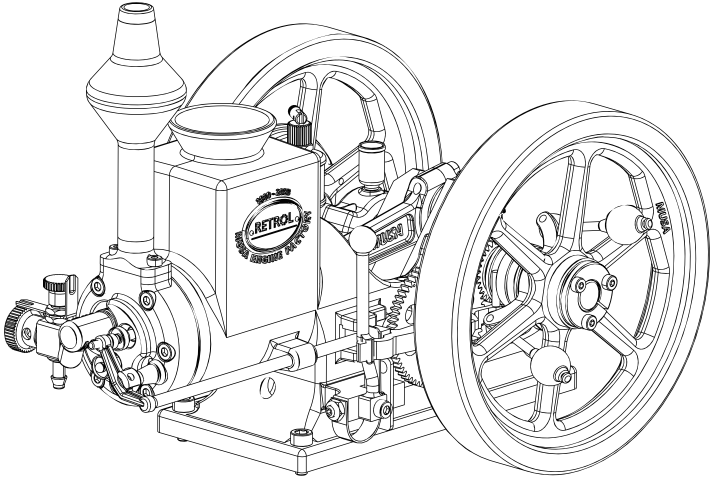
Four-stroke Horizontal Hit and Miss Engine Model Instruction Manual



Model:HM-01

Thank you for choosing to purchase RETROL ENGINE!

RETROL ENGINE is a brand dedicated to the simulation and production of retro-style model engines. With an excellent research and development team, strong manufacturing capabilities, and partnerships with outstanding engine designers and manufacturers worldwide, we uphold the brand philosophy of "making model engines a spice in our lives." We strive to provide a variety of high-quality and affordable model engine products for most model engine enthusiasts. We believe that the companionship of model engines will add brilliance to your leisure life.

The RETROL team, in collaboration with the MUSA factory, has spent 4 months developing and designing this brand new Hit & Miss engine model, named "HM-01." We have carefully selected premium materials and exquisite craftsmanship to ensure the reliability and durability of the engine.

Before operating your engine model, please read the entire product operation manual carefully to familiarize yourself with the product and follow the instructions and recommendations.

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About Your Engine

Please be aware that your engine is not a "toy" but a highly efficient internal combustion engine. Its output power can cause harm or other impacts. Do not modify or disassemble it. As a professional user, ensure the safe and cautious operation of the engine. If your RETROL engine is passed on to others in the future, we kindly request that you pass on these instructions to its new owner.

The following recommendations apply to all production engines. Improper operation or neglecting safety measures may result in engine damage or hazards.

Warning: These events may involve serious (in extreme cases, even fatal) injuries。

The model engine fuel is toxic. Do not allow it to come into contact with your eyes or mouth. Always store it in a clearly labeled container and keep it out of reach of children.

Model engine fuel is also highly flammable. Keep it away from open flames, heat, sparks, or any other items that may ignite. Do not smoke or permit anyone else to smoke near it.

Never operate the engine in enclosed spaces. Like car engines, model engines produce lethal carbon monoxide. Run the engine only in open areas.

Model engines generate significant heat. Do not touch any part of the engine before it has cooled. In particular, contact with the muffler, cylinder head, or exhaust pipe may result in severe burns.

Attention:
This engine is only suitable for desktop play, scientific experiments, educational tools, collectible displays, and regular DIY modification projects. Do not attempt violent modifications or use for other purposes.

Before starting the engine, securely fasten it to the base or stand using appropriate fastening screws and nuts.

During engine operation, some noise may occur. To minimize the impact of noise, avoid disturbing others. It is recommended to start the engine in specific locations or outdoors away from crowded areas.

Safety goggles are strongly recommended. Note that the power plug or battery wires should not come into contact with rotating parts. Additionally, ensure the throttle arm is securely connected.

For safety, keep all spectators, especially children, at least 3 meters away when starting the engine.

To stop the engine, completely close the throttle. In emergency situations, you can clamp the fuel line to cut off the fuel supply. Do not attempt to remove the flywheel.

Engine Features

In terms of product design, the engine features a transparent, adjustable-flow main fuel cup, a modern carburetor, and an echo-return exhaust pipe. The two large flywheels are balanced effectively, with the flywheel incorporating a spring-loaded ball and a split-type wide-faced pulley. The engine serves as a practical power output, and a unique "fast-slow gear switch" has been added for engine speed adjustment, allowing for both ultra-slow and high-speed operation as power output options. This design enhances the playability of the engine and provides users with a more interactive experience.

Regarding product craftsmanship, the entire unit is finished in Ferrari red using an electrophoresis surface treatment process. The main components, including the engine body, flywheel, connecting rod, etc., are cast from stainless steel 304 material. All assembly surfaces are precision-machined using CNC technology, and the high-carbon steel is used for the hardened one-piece crankshaft. This not only makes it a playable engine model but also a highly collectible piece of mechanical craftsmanship.

1. The main engine parts are precision cast and CNC machined.
2. Integrated Hardened Crankshaft (CNC)
3. Surface Electrophoretic Paint Baking Finish
4. Switchable Dual-speed Fast/Slow Gears
5. Visible Fine-tuning Lubricating Oil Cup
6. High-voltage Pulse Igniton and 1/4-32 ME-8 Spark Plug (Not Included)
7. Rosewood Base, Dovetail Wooden Box, Visible All-copper Fuel Tank (Not Included)

Safety Information

1. This machine is intended for operation by individuals aged 18 and above.

2. The machine utilizes pure gasoline as fuel, resulting in high-speed operation and inherent dangers. Please strictly follow the instructions provided.

3. Do not add any fuel other than kerosene and gasoline with an octane rating of 92 or above. The fuel must be clean and kept away from open flames. The presence of impurities in the fuel may clog the carburetor passages, compromising engine performance.

4. Do not place hands or other objects near the engine flywheel while the machine is in operation, as this may cause personal injury and increase the risk of machine damage.

5. If the machine fails to operate properly, do not attempt to force-start it. Immediately inspect the machine or contact customer service. Otherwise, there is an increased risk of machine damage.

6. Machine operation generates certain noise and emissions. It is recommended to operate the machine in open outdoor areas whenever possible.

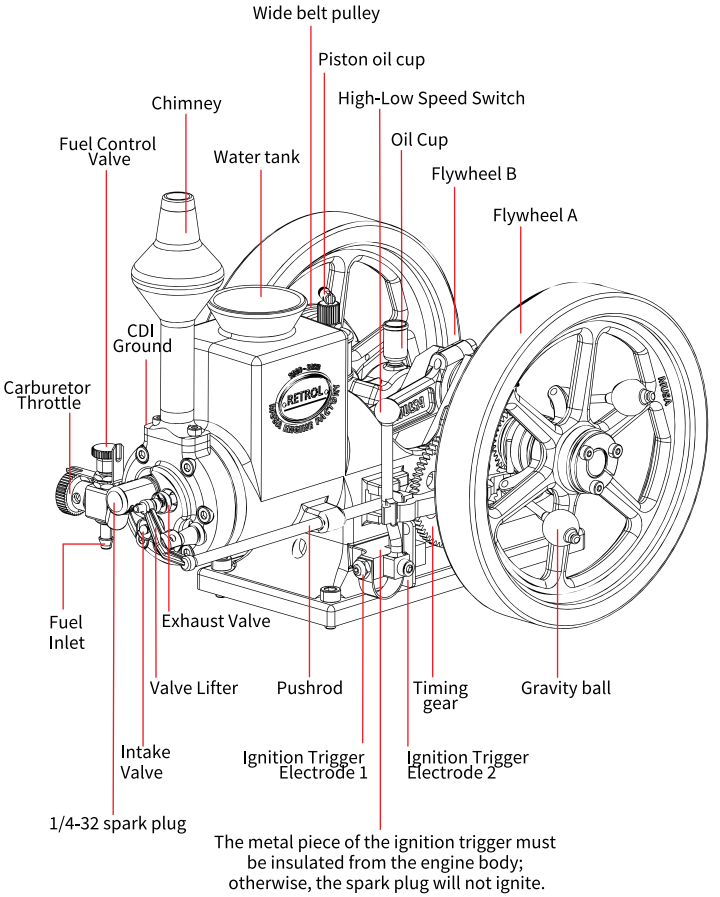
7. Regular maintenance of the machine, including oil changes, cleaning oil passages, and inspecting worn components, is essential. This will significantly extend its service life.

Basic Parameters

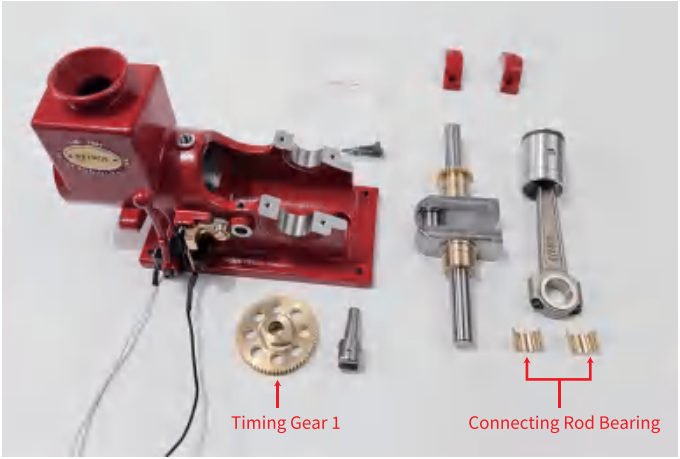
Brand: RETROL ENGINE
Model: HM-01
Material: Metal
Color: Red or Black
Form: Kit or Pre-assembled Version
Style: Single-Engine Model / Base Model / Cart Model
Dimensions: 17 × 13 × 13 cm
Engine Weight: 1.8 kg
Displacement: 7 cc
Cylinder: Horizontal Single-Cylinder
Cycle: Four-Stroke
Bore: 20 mm
Stroke: 22 mm
Cooling System: Evaporative Water Cooling
Lubrication System: Mixture oil + **Separate Oil Cup Lubrication**
Starting Method: Hand Spin or Recoil Pull Start
Ignition System: CDI Igniter
Igniter Power Supply: 1.5 V ('AA' Battery) / 6–12 V (Lithium Battery)
Spark Plug Type: 1/4-32 (ME-8) Spark Plug
Fuel Type: 92#/95#/98# Gasoline
Engine Oil Type: 2T/4T Engine Oil (4T 5W-40 Recommended)
Fuel-Oil Mix Ratio: Engine Oil/Gasoline = 1/25–30

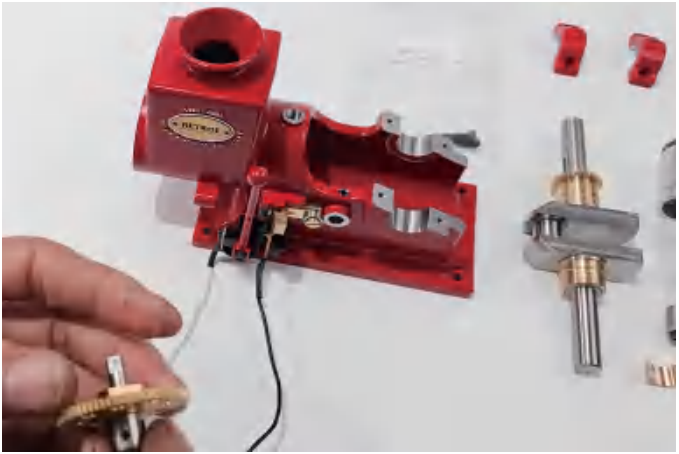
Packaging: Kraft Paper Box
Package Contents:
Engine × 1
Hand Starter × 1
Accessory Kit × 1
Instruction Manual × 1

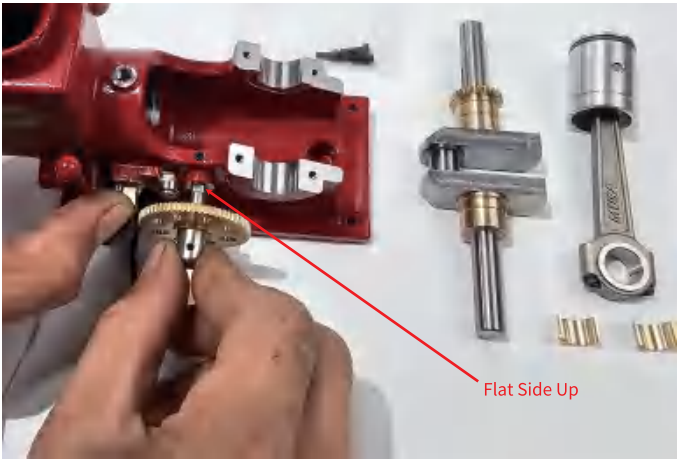
Structure and Components

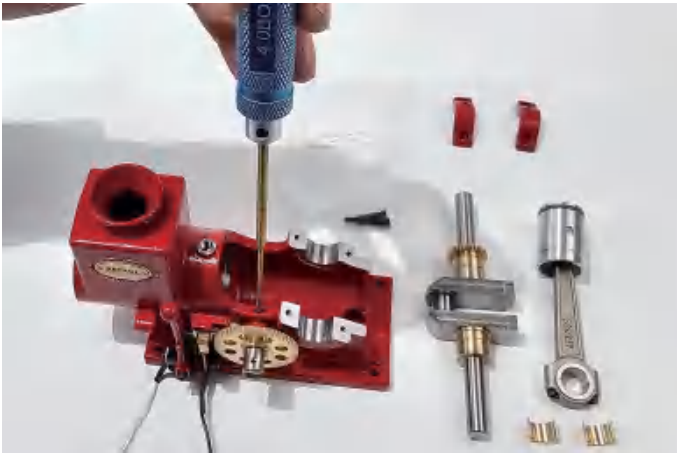


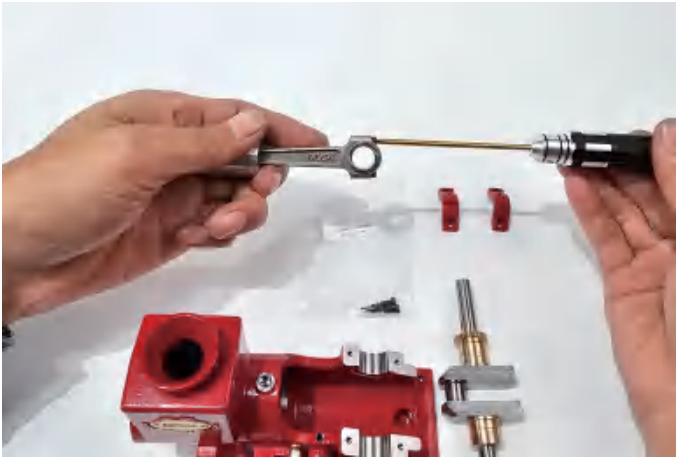



Timing Gear 1
Connecting Rod Bearing

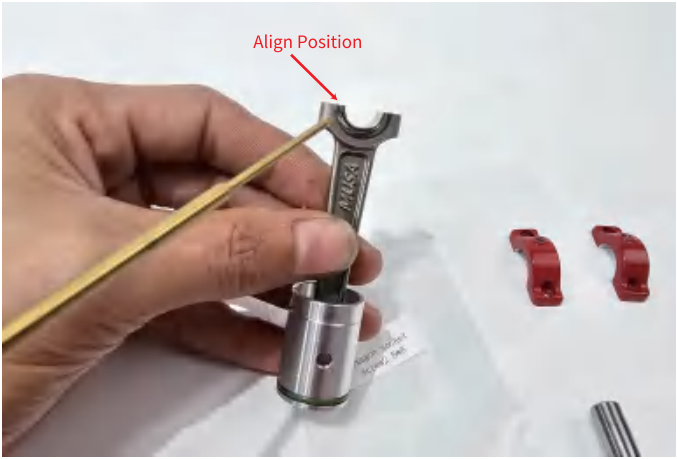



Flat Side Up



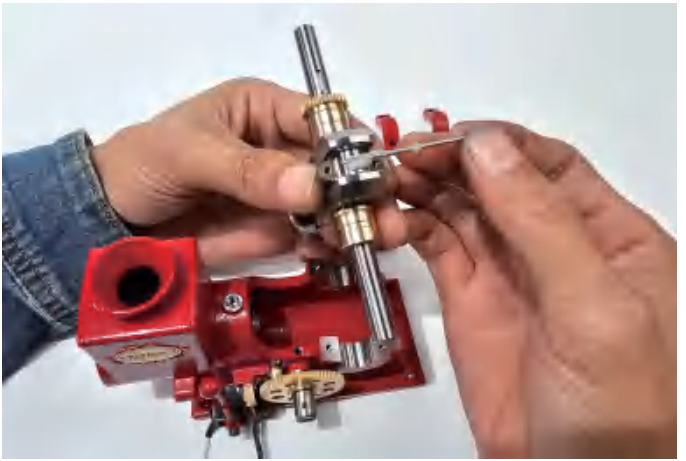




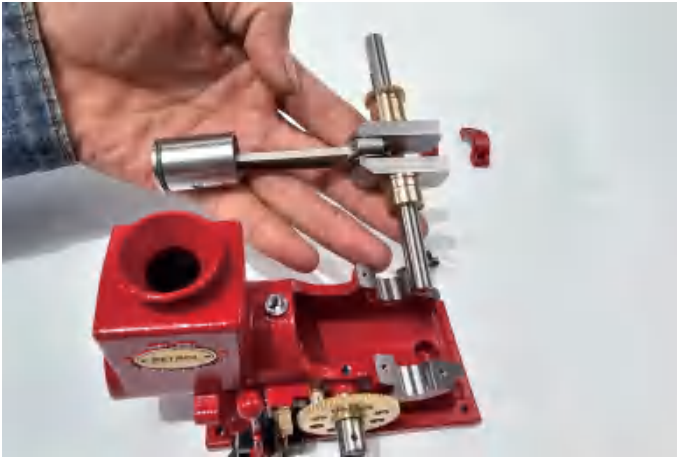

Align Position

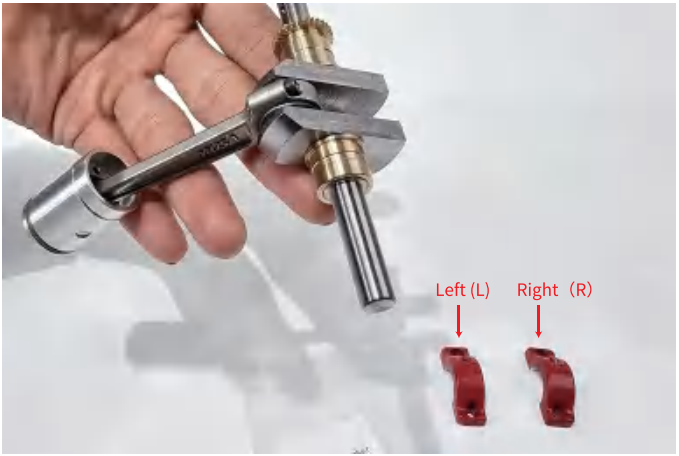

PETROL

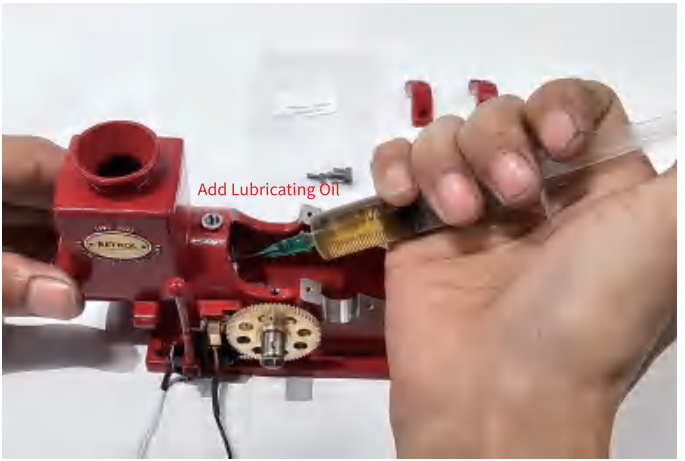
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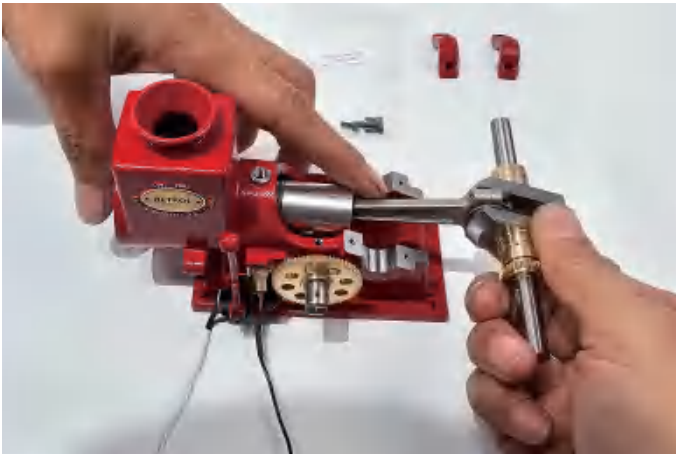


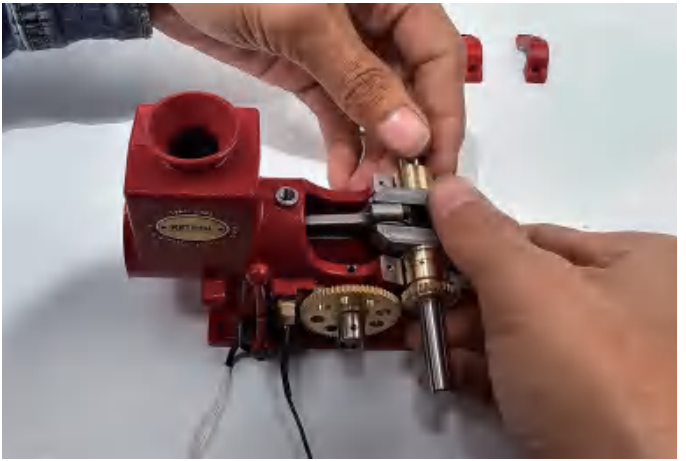


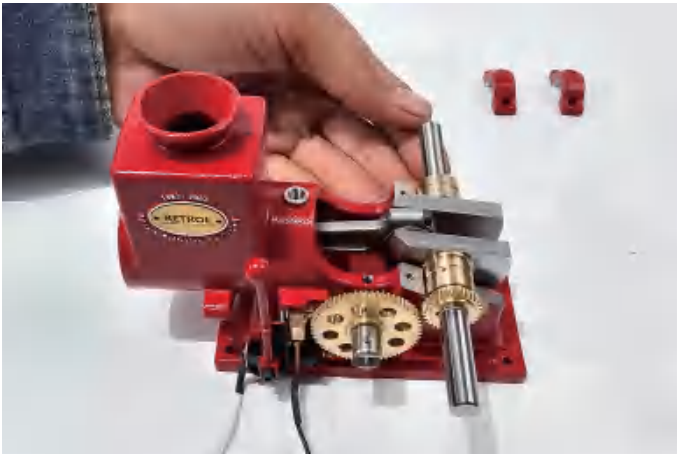


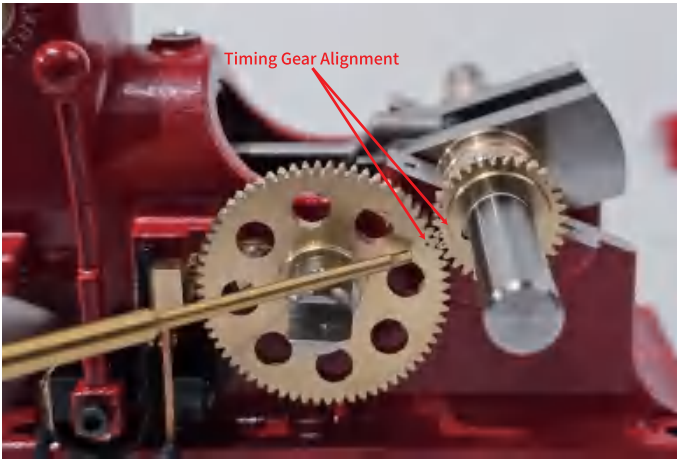

Left (L)
Right（R）

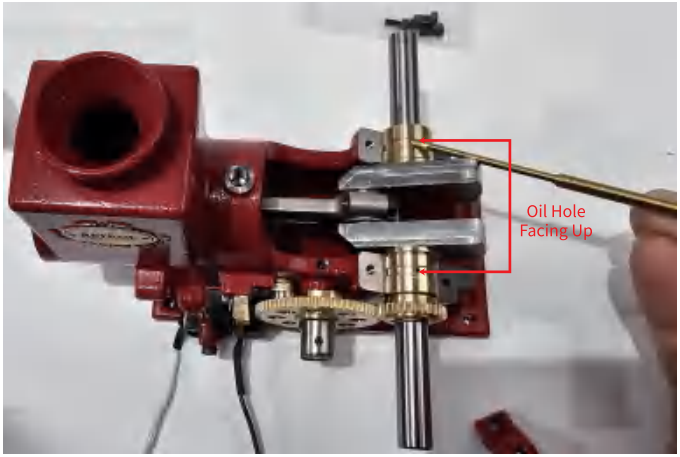

Add Lubricating Oil

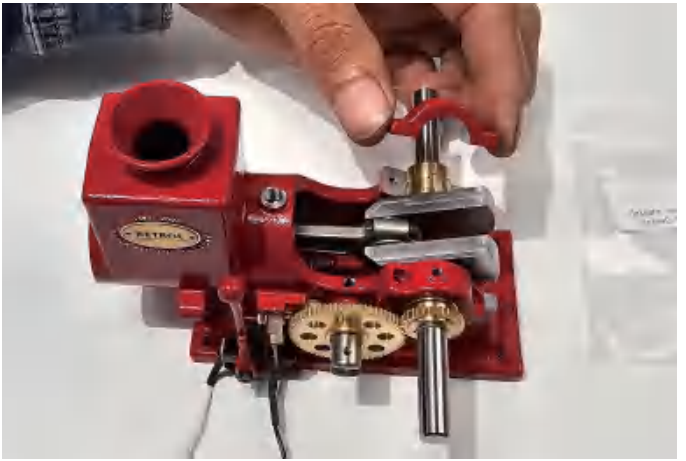


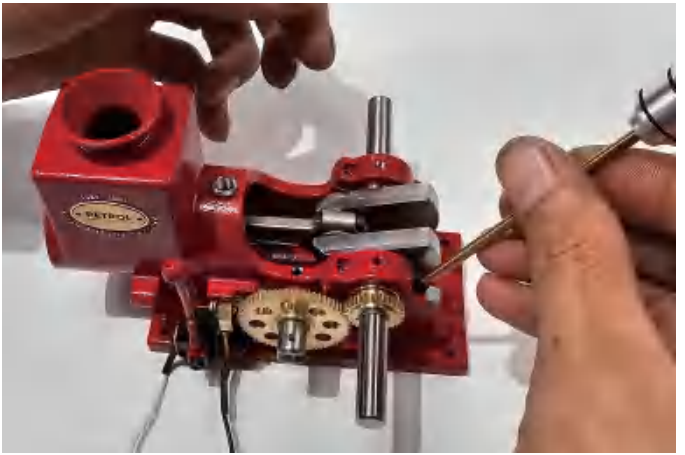


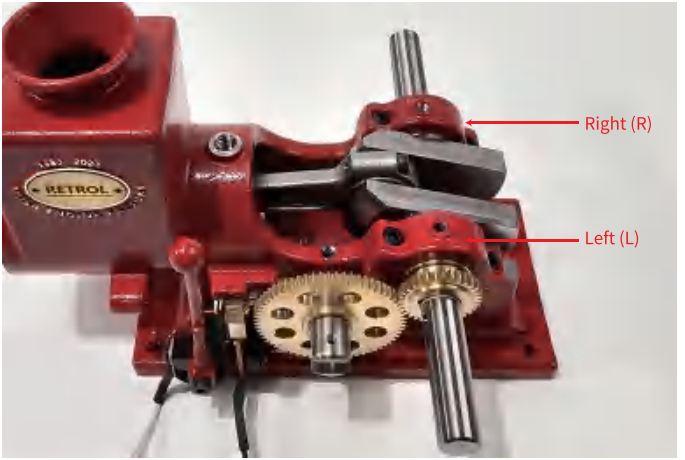

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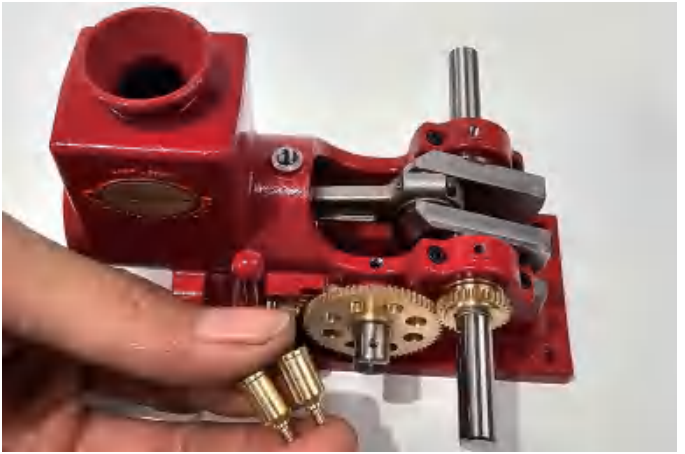

Timing Gear Alignment

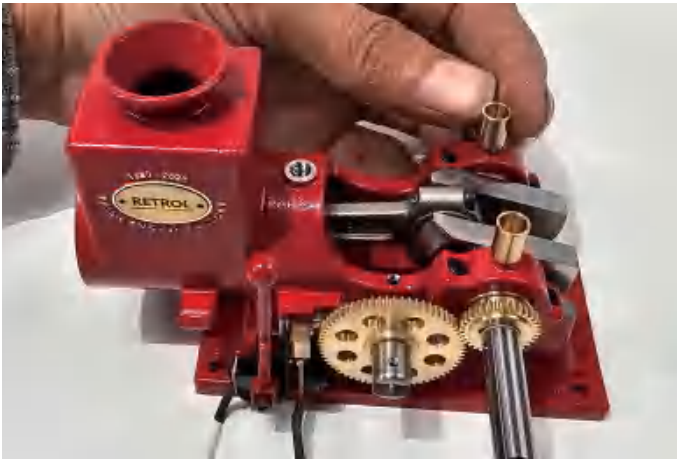

Oil Hole
Facing Up


PETROL


PETROL


RETROL
Right (R)
Left (L)



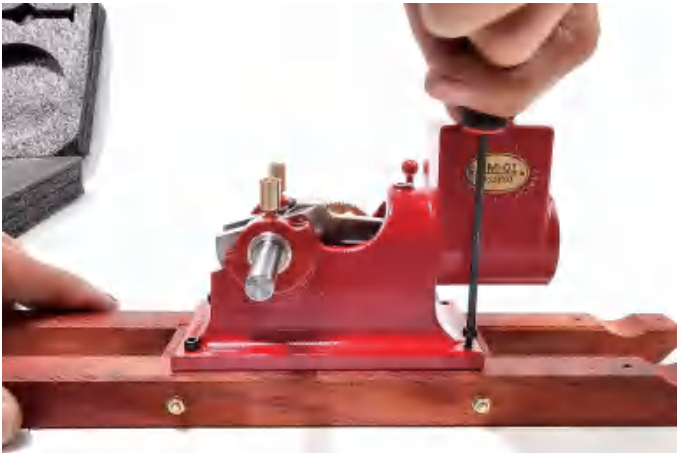

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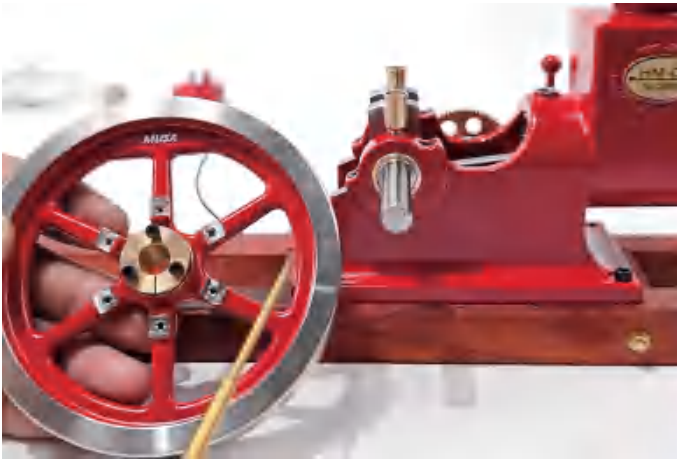












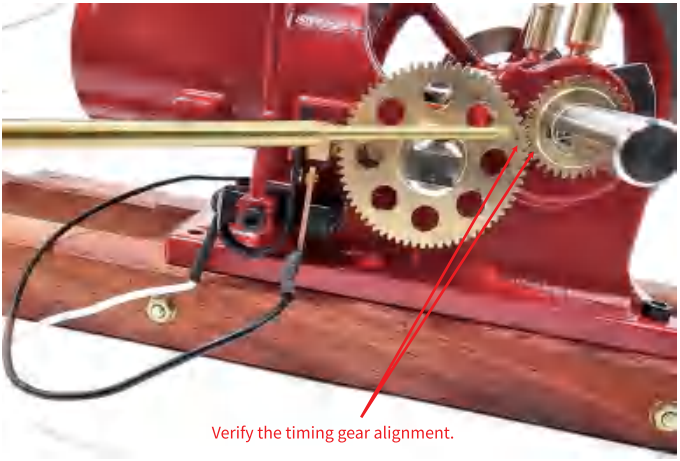


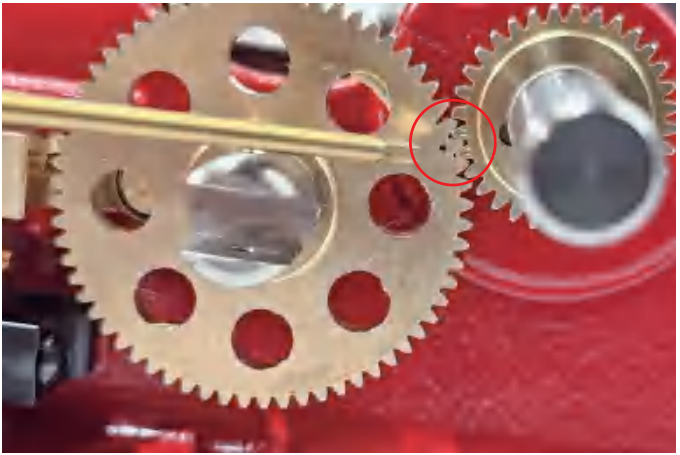

MUSA
HM-01

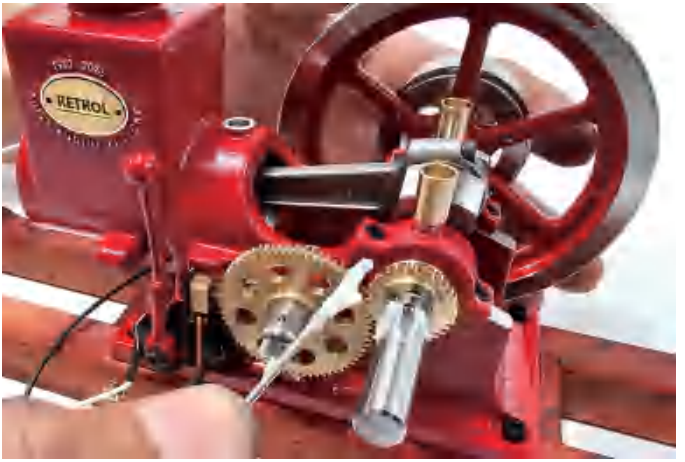

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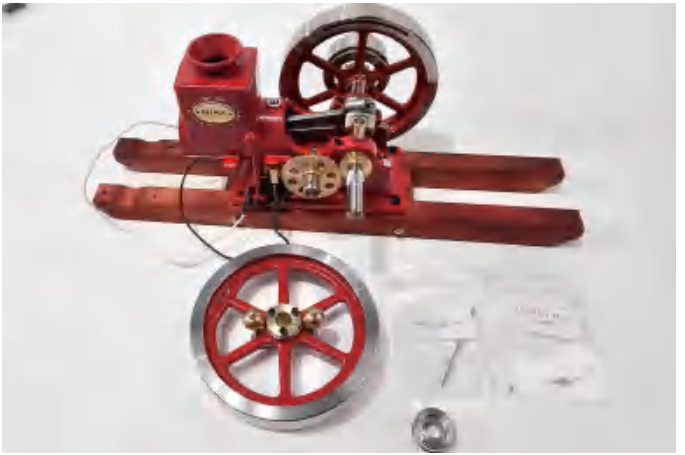

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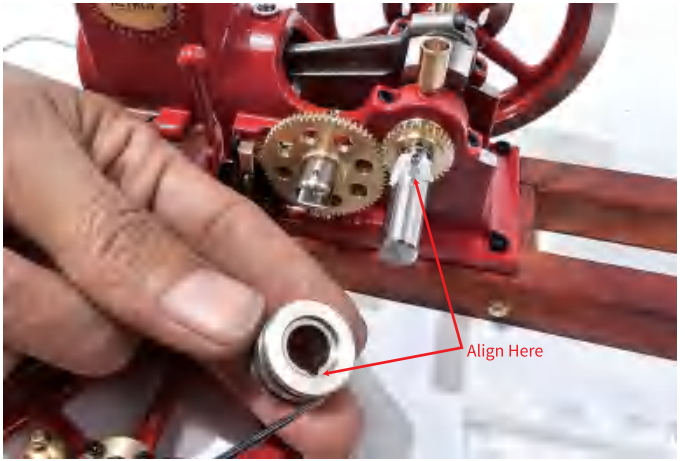

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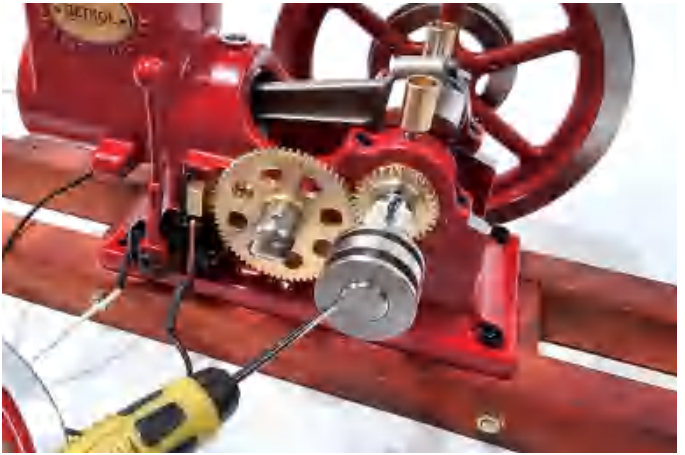

Verify the timing gear alignment.

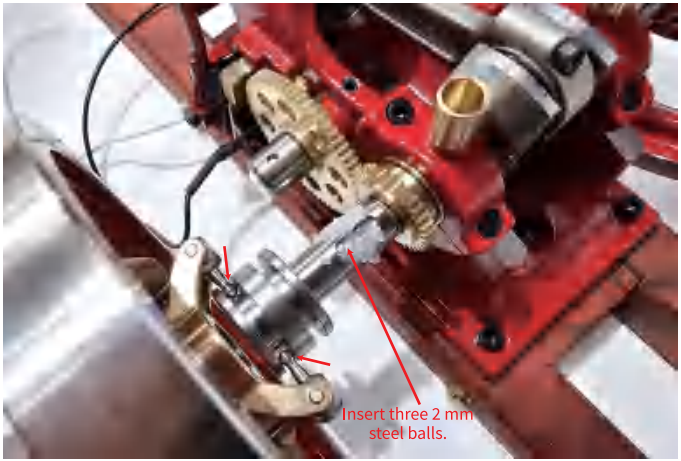


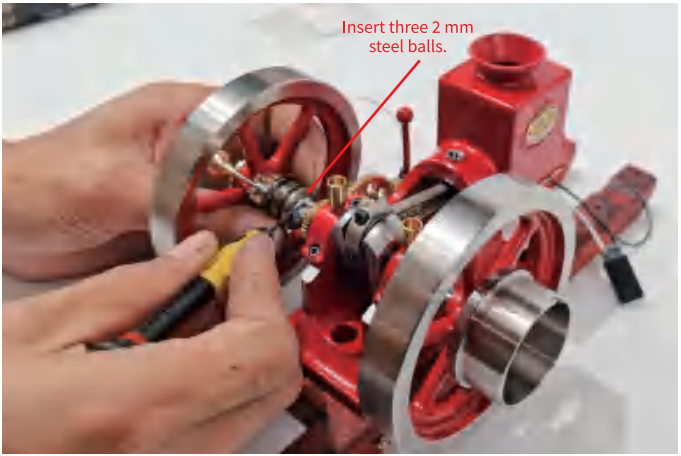

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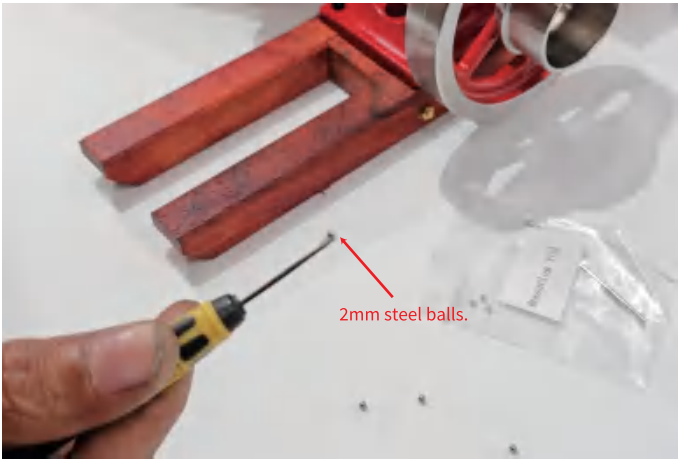


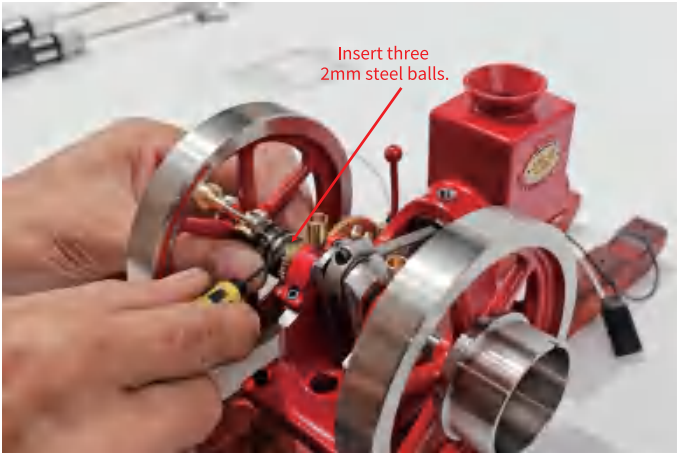

Align Here

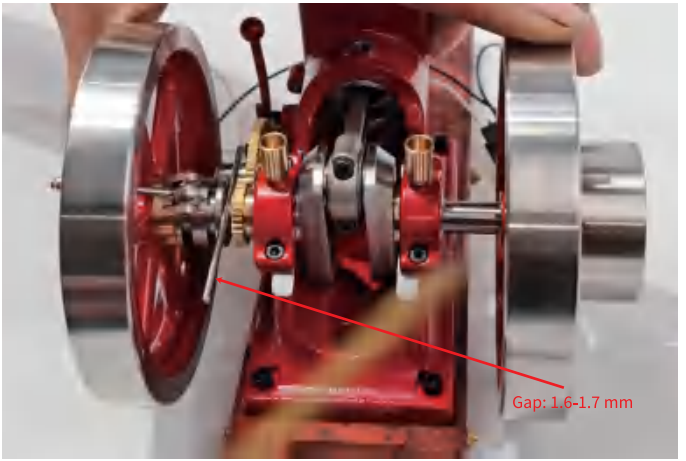



Insert three 2 mm
steel balls.

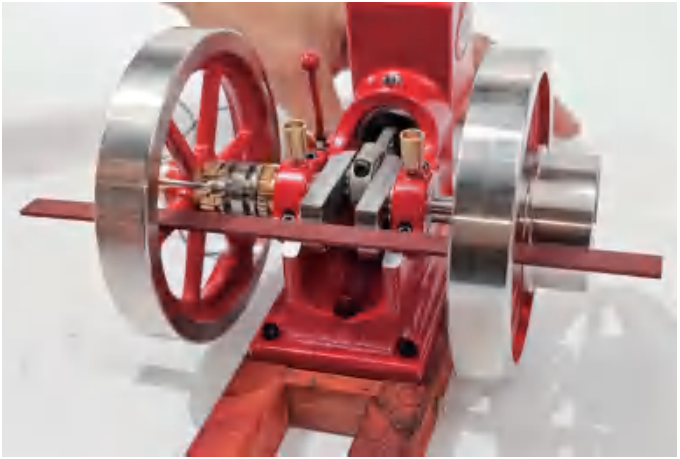

Insert three 2 mm
steel balls.

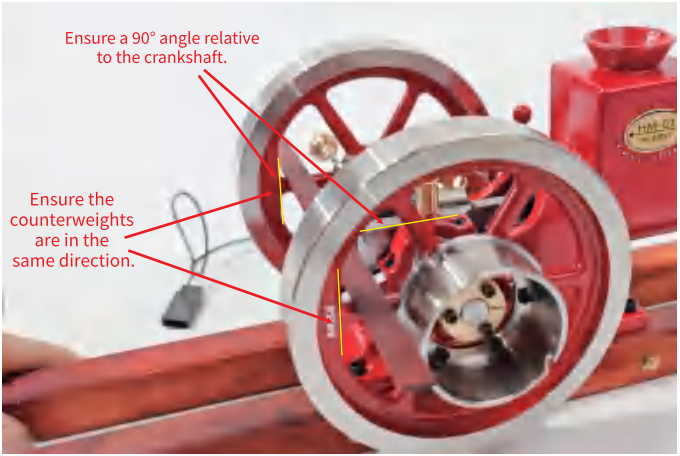

2mm steel balls.

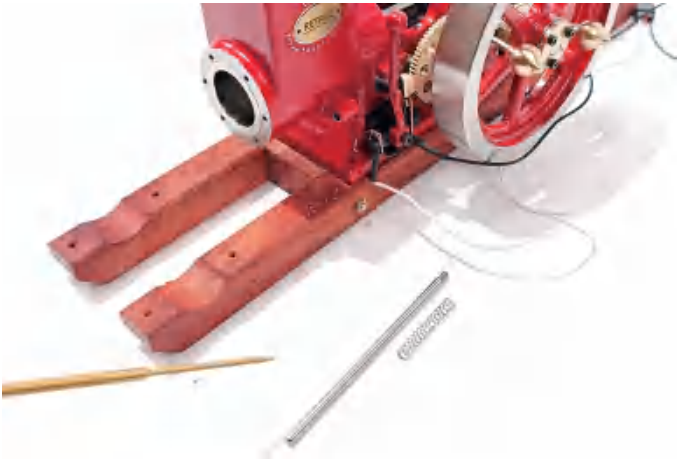

Insert three
2mm steel balls.

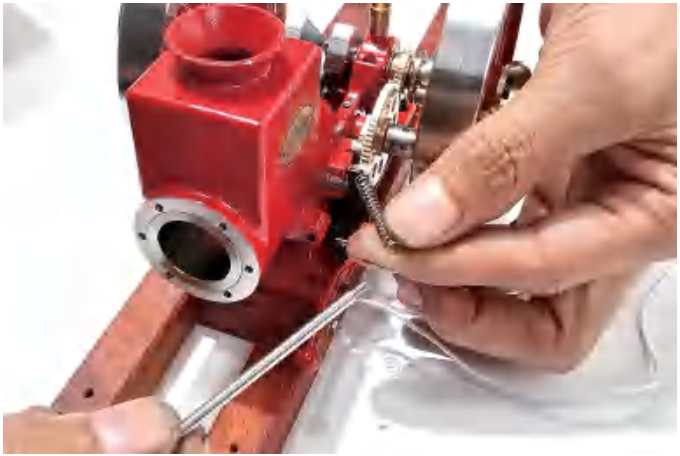

Gap: 1.6-1.7 mm

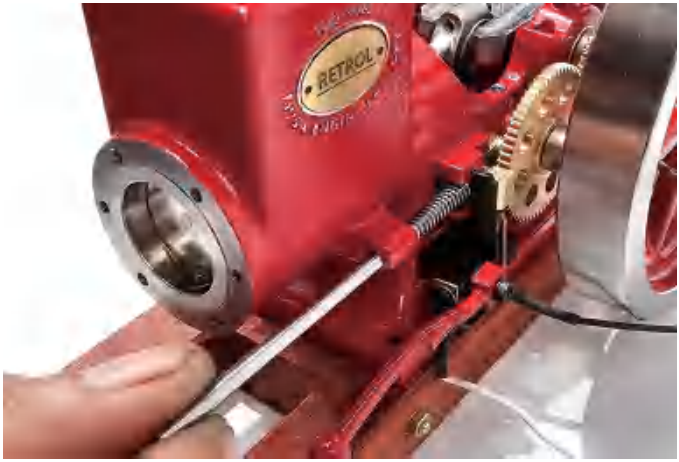





Ensure a 90° angle relative to the crankshaft.
Ensure the counterweights are in the same direction.



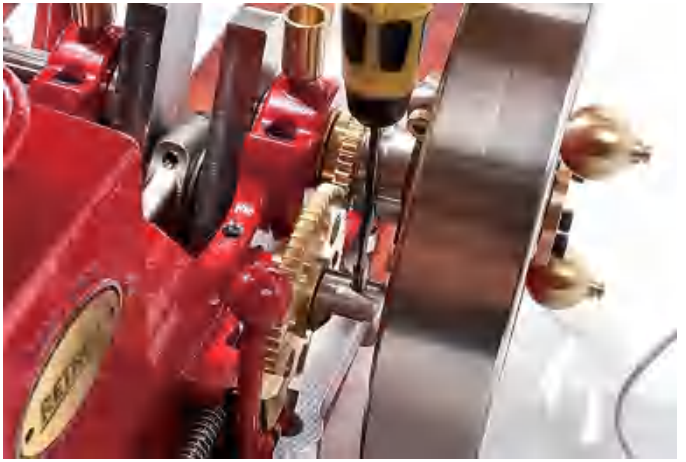


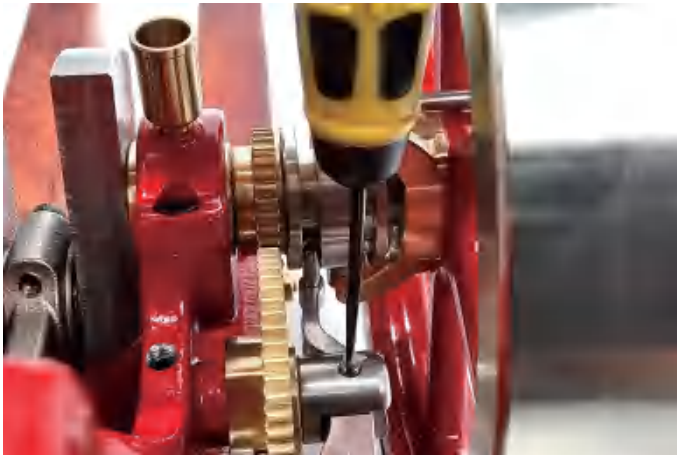

RETROL


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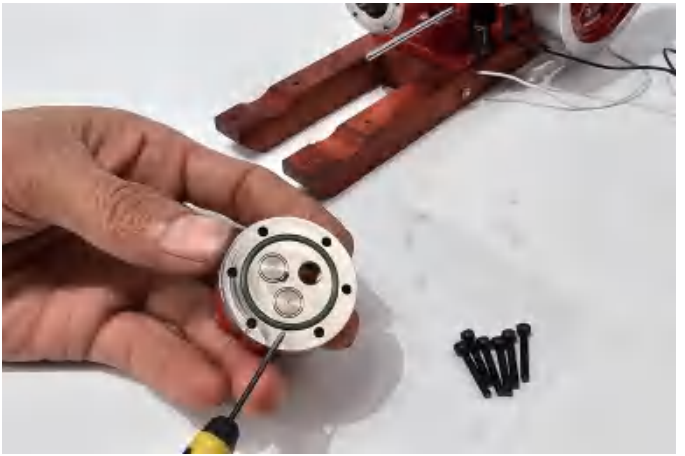


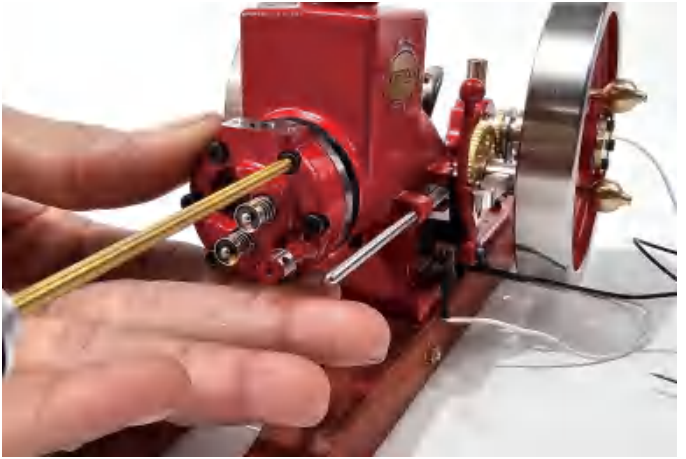

MUSA



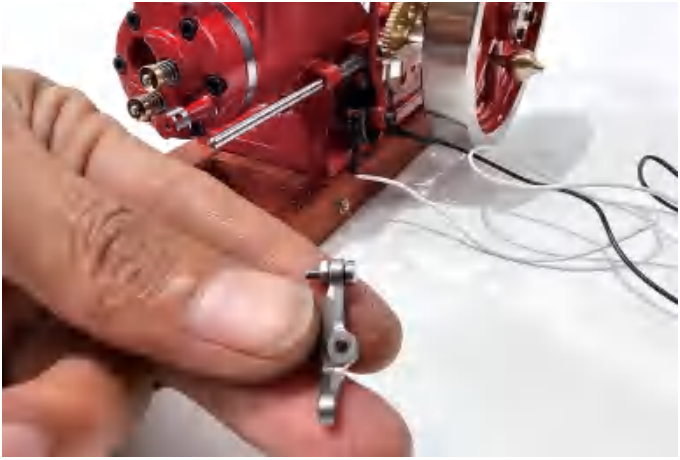






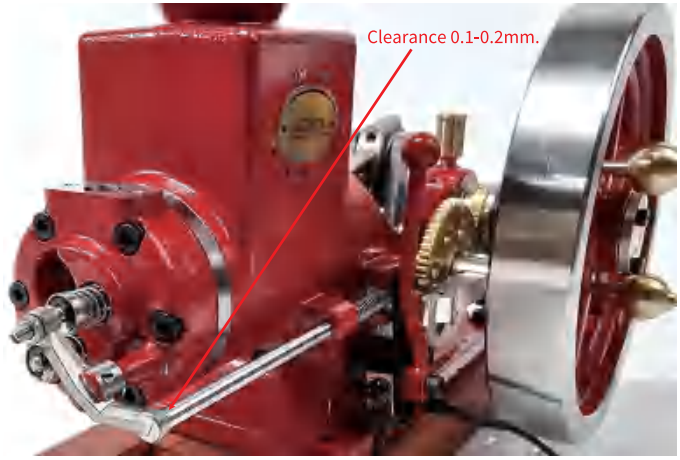






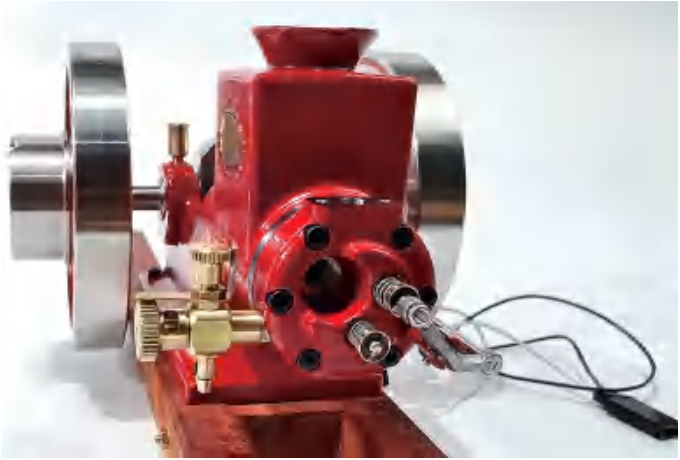

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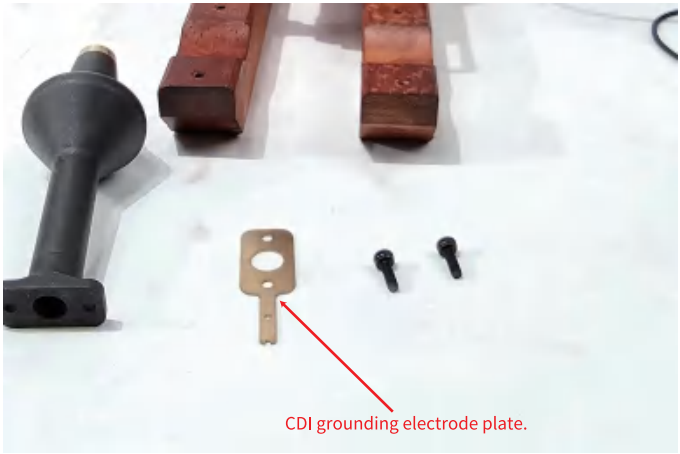


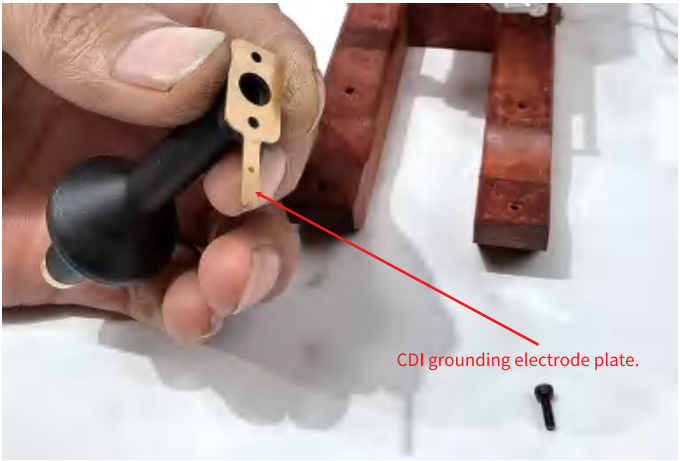

Clearance 0.1-0.2mm.


At the carburetor thread,
apply Loctite 272 adhesive.

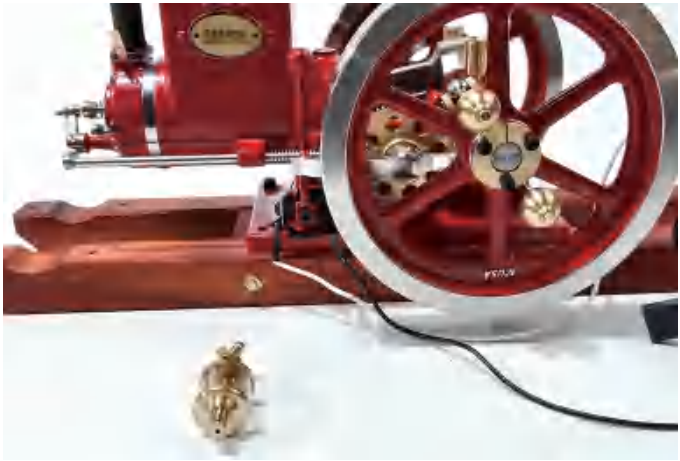

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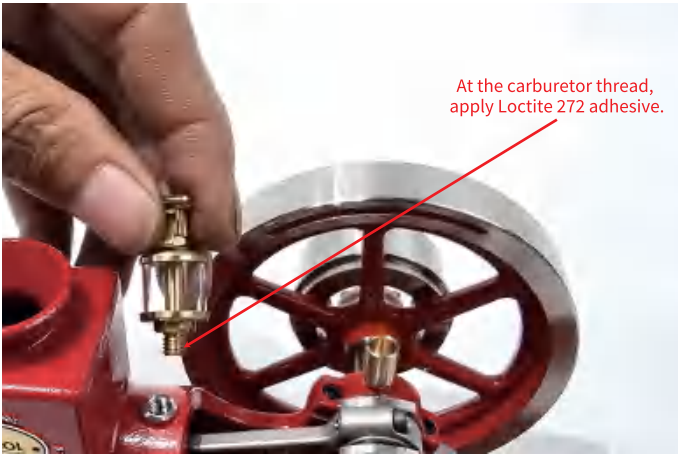



CDI grounding electrode plate.

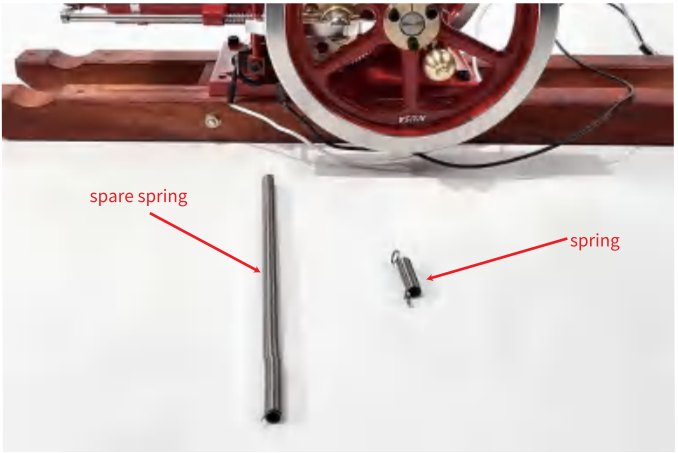

CDI grounding electrode plate.

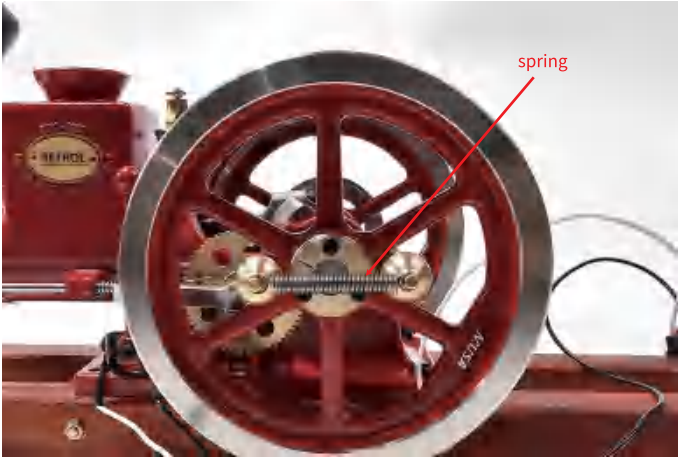





At the carburetor thread,
apply Loctite 272 adhesive.


PETROL


spare spring
spring





Optimal ignition advance angle is controlled within 3-6 degrees.
If the angle is not adjustable, it can be obtained by adjusting the 'trigger electrode plate'.

Preparation of Required Items

Standard Engine Equipment and Optional Accessories
(1) Hand Starter (included)
(2) ME-8 Spark Plug (optional)
(3) CDI Ignition Unit (optional)
(4) Fuel Tank and Hose (optional)
(5) Wooden Base (optional)
(6) Metal Cart (optional)

Engine Tools and Materials
(1) 1.5 mm/2.0 mm/2.5 mm Hex Wrenches
(2) 8 mm Socket Wrench
(3) Loctite 272 Adhesive
(4) 2T/4T Engine Lubricating Oil (5W-40)
(5) 92#/95#/98# Gasoline (or Zippo Kerosene)
(6) Purified/Distilled Water
(7) Power Supply Battery (Select according to CDI requirements)
A. 6–12V LiPo battery × 1 (No battery Pack Required)
B. 3.7V 18650 battery × 2 / 1.5V AA battery × 1 (Battery Pack Required)

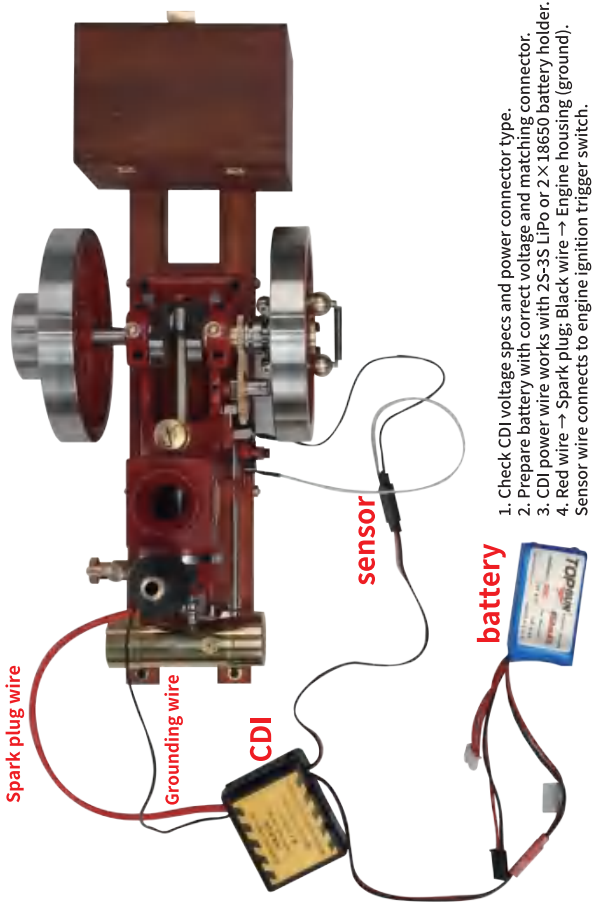
Notes:

(1) All above items are consumables. If damaged or depleted, please replace or replenish in time.

(2) In addition to the above items, conventional disassembly and assembly tools may also be needed. Be sure to use tools correctly and according to regulations.

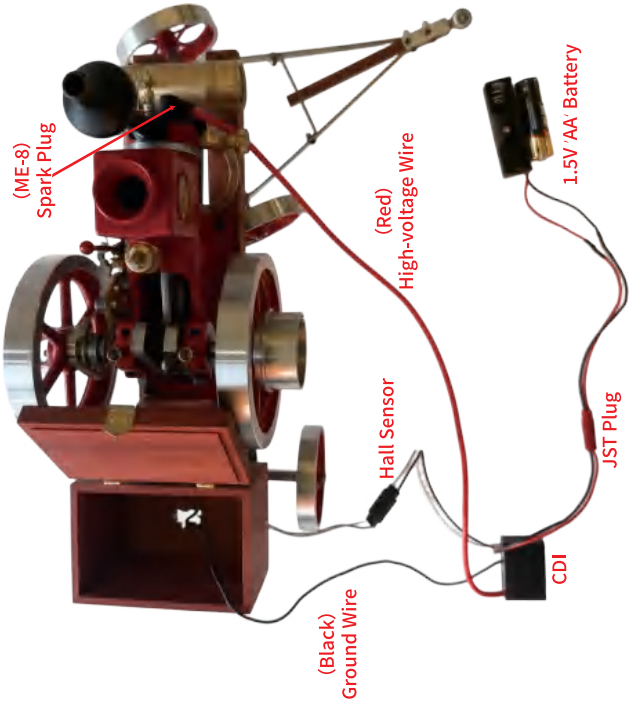
(3) Non-included items, like fuel, and batteries need to be provided by yourself or purchased separately.

Engine Circuit Wiring Diagram



1. Check CDI voltage specs and power connector type.
2. Prepare battery with correct voltage and matching connector.
3. CDI power wire works with 2S-3S LiPo or 2×18650 battery holder.
4. Red wire → Spark plug; Black wire → Engine housing (ground).
   Sensor wire connects to engine ignition trigger switch.

Engine Circuit Wiring Diagram



The new 1.5V powered CDI can work with the included battery holder; simply insert AA batteries.

Engine Start/Run/Stop

(1) Before starting, be sure to add lubricating oil to the three oil cups on the engine and other friction points. Open the drain rod of the transparent main oil cup. (Failure to add or insufficient oil may cause irreversible damage to the engine).

(2) Before starting, add an appropriate amount of coolant to the water tank; do not forget.

(3) Open the carburetor to 60%-80%, turn on the power for the CDI. Pull the starter cord counterclockwise around the flywheel pulley (Flywheel B) to rotate counterclockwise.

(4) Observe whether fuel is sucked into the carburetor through the fuel pipe. If not, use your fingers to lightly block the carburetor intake, allowing fuel to enter smoothly.

(5) The optimal ignition advance angle for this machine is controlled between 3-6 degrees (see detailed diagram). It can be adjusted by modifying the "Ignition Trigger Electrode 1."

(6) When switching from high-speed gear to super-slow gear, it's best to control the engine speed at medium to low speeds.

(7) The counterweights on both sides of the flywheel must be in the same position, with a crankshaft angle of 180 degrees (see detailed diagram). This effectively reduces vibrations during machine operation to achieve a balanced effect.

Engine Debugging

(1) The main oil needle of the carburetor controls the maximum fuel intake. Excessive fuel flow (rich mixture) or insufficient flow (lean mixture) will not allow the engine to run smoothly.

(2) During the initial engine start, tighten the main fuel needle and then loosen it by 2 turns. After starting the engine, listen to the engine sound. If the sound is dull, indicating a rich mixture, reduce the oil needle. If the sound is sharp, indicating a lean mixture, increase the oil needle. (This adjustment process also needs to be coordinated with the throttle.)

High Speed: Slowly open the carburetor throttle and listen to the engine sound. If the sound is dull and the speed decreases, it indicates that the fuel intake is too high. Reduce the oil needle to decrease the fuel intake. During this reduction, the engine speed will increase significantly. When the engine reaches high speed, appropriately increase the fuel intake to prevent the engine from running in a lean condition.

Low Speed: Single-needle carburetors automatically adapt when adjusting high and low speeds. For dual-needle carburetors, the secondary needle (idle needle) should be adjusted after setting the high speed.

Precautions

(1) The gap between the top rod and the valve stem contact surface must be maintained at a distance of 0.1mm-0.2mm.

(2) The engine should not overheat during operation. For air-cooled engines, a cooling duct must be implemented to cool the radiator, or a fan should be installed for cooling.

(3) Prolonged operation with a lean fuel mixture at high speeds can cause engine damage due to overheating.

(4) Multiple unsuccessful start attempts may cause excessive fuel to enter the cylinder and flood it, leading to damage to the engine connecting rod.

(5) The smoothness of the engine idle is related to ignition advance and can be adjusted by the position of "Ignition Trigger Electrode 1." (See detailed diagram)

(6) This machine has a gravity ball controlling the ignition trigger. The spring force on the gravity ball directly determines the idle effect. The tighter the spring, the higher the idle, and vice versa, super-low when the spring is loose.

Troubleshooting

(1) If the engine cannot start, first check whether the battery level is normal.

(2) Remove the spark plug socket, connect the spark plug boot with the positive lead, place the spark plug's metal body against the engine's metal body, and then rotate the flywheel to see if there is a spark.

(3) Check if the fuel is smoothly reaching the carburetor or if there is flooding. If flooding occurs, drain the excess fuel from the engine.

(4) Check the engine's ignition advance angle and timing. Adjust the ignition advance angle if necessary. (The ignition advance angle refers to the spark plug firing before the piston reaches the highest point, aiding in increasing engine power and improving idle stability.)

Maintenance Method

This is a high-precision machine that requires regular cleaning. Due to environmental and fuel influences during use, engine parts may experience wear and corrosion. Basic cleaning and maintenance can help keep it in good condition.

To maintain the carburetor in optimal condition, it's essential to clean it thoroughly, removing dirt and grease from the intake.

Spark plugs are considered consumables and must be handled accordingly. Prolonged use of spark plugs does not guarantee normal engine operation, but you can extend their lifespan and maintain engine performance through careful use.

When disassembling the engine, use appropriate tools.

Use the appropriate amount of 95% gasoline.

Do not excessively tilt the engine during adjustments, and do not connect the battery.

If the spark plug burns out or no longer provides optimal performance, it should be replaced. For example:
a. The threaded surface becomes rough and turns white.
b. Threaded coils become deformed.
c. External material adheres to the filament or plug, or there is corrosion.
d. Engine power decreases at idle.
e. Power goes out after starting the engine.

At the end of each operation, empty the fuel tank, power the spark plug, and attempt to restart the engine to burn any remaining fuel in the tank. Repeat this process until all fuel inside the engine is cleared.

Inject sterilizing oil and briefly start the engine to distribute oil to working parts. Do not inject this oil into the lubricator nozzle, as it may lead to the deterioration of the carburetor O-ring. Add solid lubricant to the camshaft and valve stem to ensure sufficient lubrication at each operation.

Note!
These maintenance procedures should be performed regularly. After some time, there may be a risk of corrosion or difficulty starting the engine. If you need assistance, please contact us.

Storage Method

When the engine is not in use, it should be stored properly.

Short-Term Storage (1-3 months):
First, clean the engine surface, blow it dry with compressed air, and evenly apply rust preventive oil to metal surfaces using a brush. Additionally, take rust prevention measures on the surface of the flywheel. Next, disconnect the power and switch lines, clean connector terminals, and seal all exposed pipes, intake, and exhaust pipes with moisture-proof paper. Cover the engine with a plastic/acrylic hood and place it in a dry room.

Long-Term Storage (over 3 months):
Before storage, start the engine at idle, run it for 1 to 1.5 minutes, then stop, draining the engine lubrication/oil in a warm state, but do not drain the coolant. Then, follow the steps for "cleaning the surface," but unlike short-term storage, you need to affix a (oil-free, do not use) sticker on the engine to remind others not to disturb it!

After Unpacking for Use:
First, remove the connecting pipes and pump the fuel system to prepare for the next awakening. Then connect the power, add clean oil, check the oil and coolant, and use a tool to rotate the flywheel/crankshaft 3-5 turns, ensuring there is no resistance. Now, you can awaken your engine. If the storage time exceeds 2 years, you need to replace the coolant and clean the cooling system.

Replacing Parts

Friction between engine components after prolonged use can lead to wear and excessive clearances. Timely replacement of parts can help restore optimal engine performance and extend its lifespan.

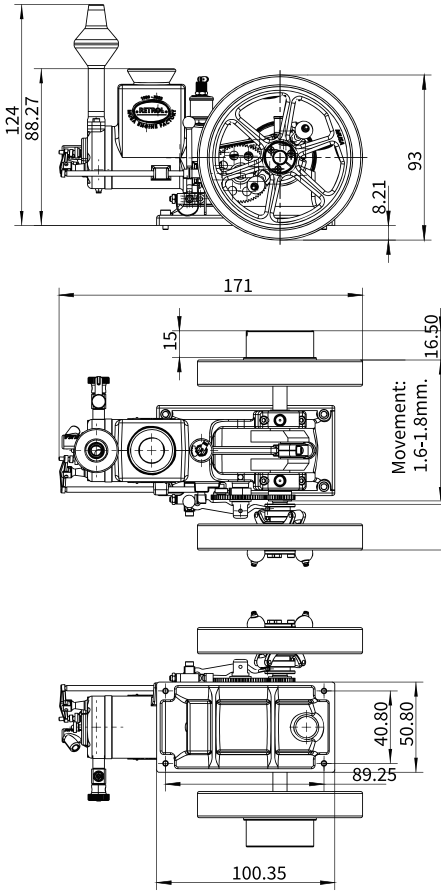
For required replacement parts and spares, you can inquire and purchase directly from where you purchased the engine.

We advise against attempting to disassemble the engine and replace parts without professional personnel and tools to avoid irreversible damage.

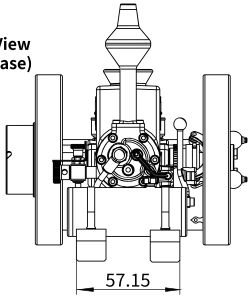
If you encounter difficulties in starting, power reduction, unstable idle, or other issues during engine use, please promptly provide feedback to the RETROL team or distributor (where you purchased the engine) and seek solutions. We are committed to providing you with high-quality after-sales service.

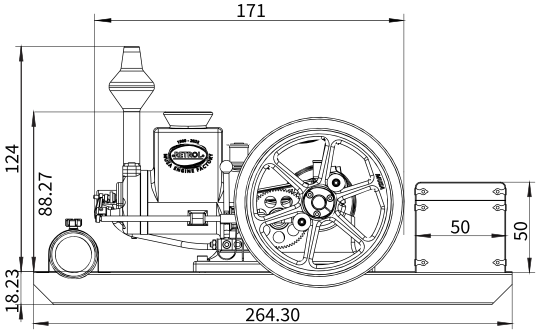
Engine Views

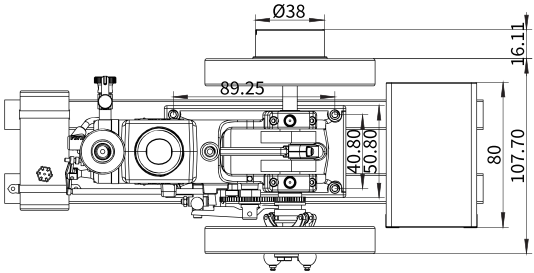
Three Views



Three View (with Base)







Multiple Views



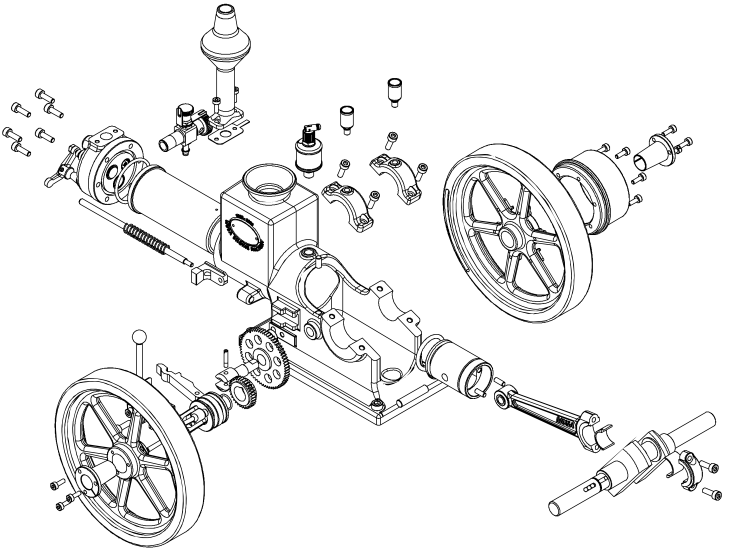




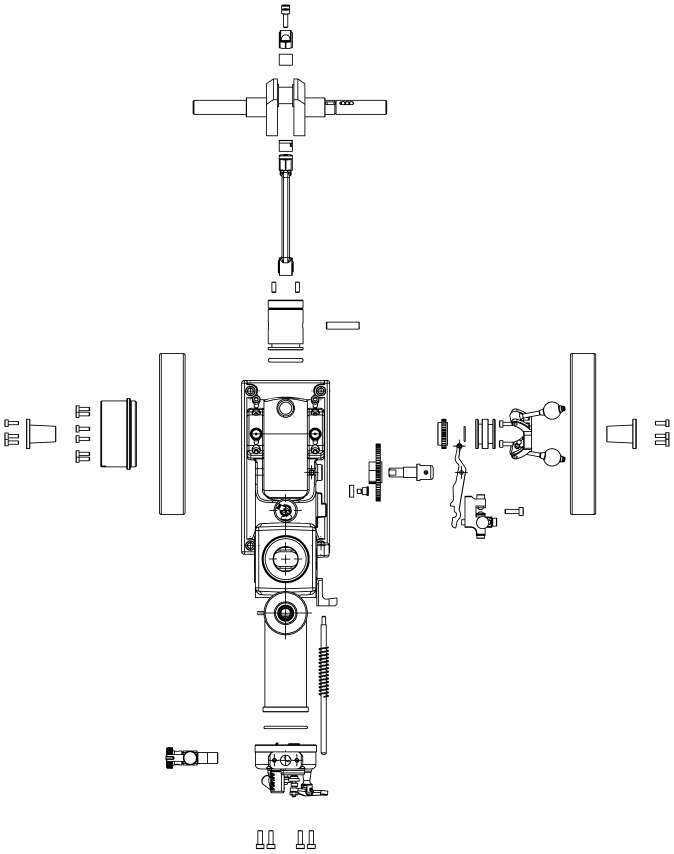




Exploded View



1. The optimal ignition advance angle for this machine is controlled between 3-6 degrees (see details). **I**t can be adjusted by modifying the "**I**gnition Trigger Electrode 1".
2. The counterweights on both sides of the flywheel must be in the same position, with a crankshaft angle of 180 degrees (see details). This effectively reduces vibrations during machine operation to achieve a balanced effect.
3. During operation, in addition to adding lubricating oil to the three oil cups, all other moving friction points must also be lubricated.
4. This machine is designed for medium to low-speed operation to achieve wonderful low-speed and intake sounds.



BOM List

Order	Name	Quantity
001	Cylinder Head Assembly	1
002	Carburetor Assembly	1
003	Cylinder	1
004	Main Body	1
005	Exhaust Pipe	1
006	CDI Ground Electrode Strip	1
007	Flywheel A	1
008	Flywheel B	1
009	Belt Pulley	1
010	Taper Sleeve	2
011	Piston	1
012	Connecting Rod	1
013	Connecting Rod Bearing	2
014	Crankshaft	1
015	Gearshift and Ignition Assembly	1
016	Lever	1
017	Lever Retaining Pin	1
018	Retaining Pin	1
019	Bearing	1
020	Bearing Retaining Screw	1
021	Timing Gear 1	1
022	Timing Gear 2	1
023	Gravity Ball Control Wheel	1
024	Gravity Ball Assembly	1
025	2mm Locating Steel Ball	3
026	Piston Oil Cup	1
027	Crankshaft Oil Cup	2
028	Crankshaft Pressure Block R	1
029	Crankshaft Pressure Block L	1
030	Valve Rocker Arm	1
031	Valve Push Rod	1
032	Push Rod Return Spring	1
033	L-Block	1
034	M2*6	14
035	M2.5*6	4
036	M2.5*10	2
037	M2.5*16	6

Order	Name	Quantity
038	Base Wood Screw	4
039	Set Screw M3*4	1
040	Set Screw M2.5*5	2
041	Starter Rope	1
042	Cylinder Head Seal O-Ring 1.5*25	1
043	Piston Ring O-Ring 2*20	1

After-Sale Service

Thank you for choosing our company's product. We will provide you with satisfactory after-sales technical support.
We recommend that you carefully read the assembly instructions, operation manual, relevant precautions, etc. before making the model, which we believe will be very helpful for you. If you need technical support, you can contact our store staff.

1.After-sales service standards
Due to differences in photography techniques and computer color deviation, the color of the actual product should prevail over the images.

Due to the continuous improvement and upgrading of product performance by manufacturers, product parameters and structures may be changed without prior notice. Please refer to the actual product.

Before the kit is shipped, a special person from our company will do a detailed inspection and test each item to ensure that it functions properly. When the delivery company delivers the goods, please be sure to check the integrity of the goods in detail in person. If any damage to the goods is found during the transportation process, the logistics company should provide relevant evidence or reject them on the spot, and send relevant photos to our company's customer service email within 24 hours. Otherwise, the related losses and responsibilities shall be borne by the buyer. If the model has other problems, you should also contact our company within 7 days.

Before using the model product, you must carefully read the product operation manual and comply with the manufacturer's instructions for use, maintenance, and care. Our company does not assume any responsibility for losses or injuries caused by improper use of the product, such as water ingress, fire, disassembly, modification, etc., nor does it assume responsibility for product damage caused by intentional or unintentional destruction, drops, or impacts.

Model products are definitely fragile, especially for beginners who are more likely to damage them (perhaps due to unfamiliarity with the parts). We ensure that every part is tested before being sent out. Therefore, the company does not provide any refund or compensation services for parts damaged in a short period of time, unless they are unused and absolutely new, and provide corresponding evidence verified by our staff. In this case, the entire set can be sent back to the manufacturer for repair, and the shipping fee will be borne by us. For other repair processing, the shipping fee will be borne by the buyer.

If the customer raises the issue that the product cannot meet the product description function within three days after receiving the goods, and it is proven true by a government-recognized third-party organization (or recognized by our company), our

company will provide free maintenance or replacement of parts. Customers cannot request a return or exchange due to personal perception of product performance differences (such as novice cannot operate), material manufacturing differences, and other differences.

When non-company product quality issues cause product damage and require repair, our company can provide repair services, but parts and labor costs will be charged. The transportation and postage fees incurred during the repair will be borne by the customer.

Model products must be used under the conditions or requirements allowed and regulated by the local government. Our company does not assume any liability for compensation for losses or injuries caused by improper use of the product or accessories by the user or third parties.

For some common sense and precautions when using model products, please refer to the product manual.

The final interpretation right belongs to our company.

2.User Feedback and Support
Dear buyer, we promise to provide you with high-quality and reliable services for the products you purchased and provide you with any necessary assistance. During the actual use of the product, if you encounter technical or usage problems, we have a professional technical team to answer your questions online for free, and you can also consult and request various parts and full set services from the

For Customer Support
service@retrolengine.com

Brand Website
www.retrolengine.com

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