

Evolution NX Helicopter Engine

USER GUIDE



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EVOLUTION

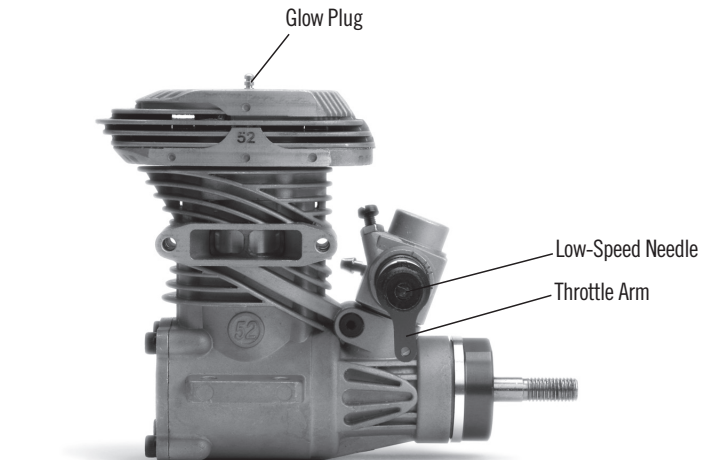
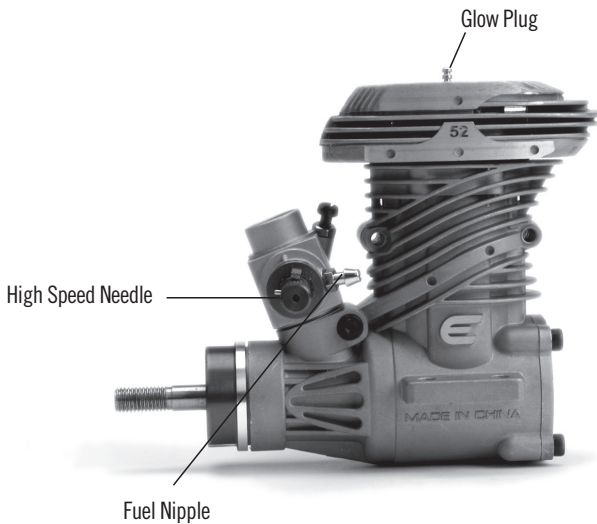
Introduction

Congratulations on your purchase of the newest and one of the most technically advanced 2-stroke helicopter engines in the world. Whether you are new to the sport of model aviation or an experienced flyer, you will enjoy the features of the new Evolution® Engine's NX Series Helicopter Engine.

The Evolution NX Helicopter Engine is designed to be the most powerful in its class, extremely easy to start and operate, and provide years of enjoyable service. It incorporates many unique design features, such as our SetRight™ needle valve assembly. Every feature is designed to ensure success with your new engine.

The Evolution NX Helicopter Engine features a piston/liner made of a unique combination of ABC (Aluminum piston, Brass, Chromed liner) type construction with the addition of a ring to ensure a great seal no matter the operating temperature.

Important: While the Evolution Helicopter Engine is extremely easy to operate, if this is your first experience flying a model helicopter, it is highly recommended that you have the help of an experienced modeler during the first few flights. Your local hobby shop or flying club can put you in touch with an experienced pilot in your area.



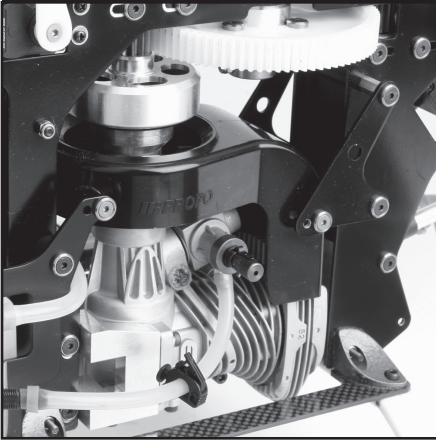
Features

1. Fits common and popular helicopters on the market
2. Excellent operating and power characteristics
3. Offers new technology to the helicopter market

Break-in

It is not necessary to mount this engine on a test stand for break-in. However, the engine should be adjusted slightly on the rich setting for the first few flights to insure proper break-in. Always use a good quality fuel which contains 15-30% nitro methane and an oil content of 20-23% low viscosity oil.

Mounting the Engine



Engine Mounted in Helicopter

Most model helicopter kits include an engine mount. Please refer to the helicopter manual for mounting instructions and guidelines. It is extremely important that the engine be securely mounted to the helicopter and that the engine is securely mounted to the engine mount. Follow the instructions included with the helicopter kit for mounting the engine.

Important: Before each flying session, check that all engine mounting screws are securely tightened.

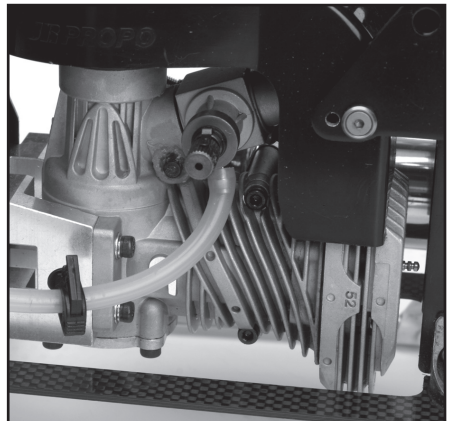
Installing the Muffler

The muffler must be mounted after the helicopter engine has been installed in the helicopter. Refer to the installation of the tank and engine in the helicopter manual for the proper sequence of installation steps.

Important: Be sure the lock washers for the muffler mounting screws are placed over the screws. Securely tighten both screws with moderate torque. It would be wise to check the muffler mounting screws after each run and prior to each flight as a part of your pre-flight check of the helicopter.

Notes on Installation of Fuel Tank

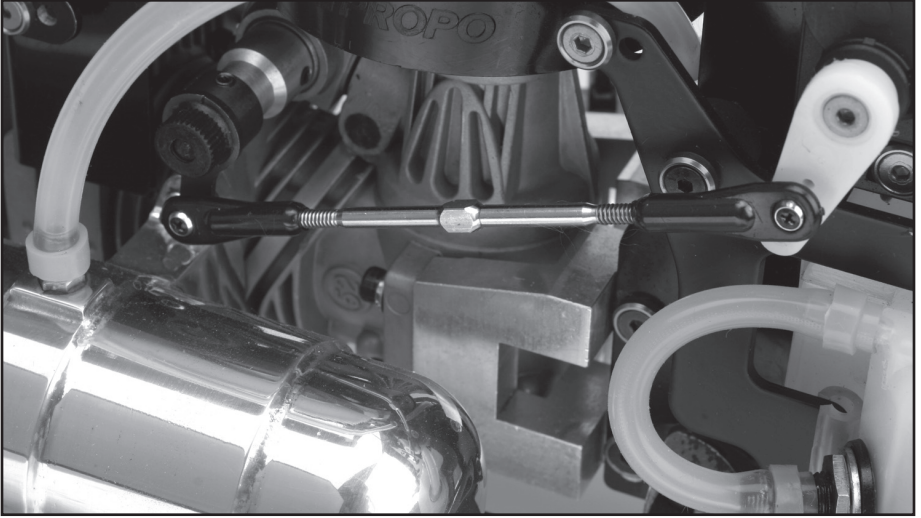
1. The fuel lines should be connected to the fuel tank as shown in the helicopter manual. Some helicopters will use a "header" or holding tank to help prevent foaming and provide for a more stable motor run.
2. Since the tank is exposed to high pressures, be sure all connections are secure and there is no leakage.
3. Engines are sensitive to dirt in the fuel, so we recommend a fuel filter be used. There are many brands of filters so the modeler has a wide choice. Always use the filter between the carburetor and the line that goes to the fuel tank.
4. Adjustment of the carburetor and linkage will be discussed later. Be sure to refer to the instructions provided in the helicopter kit.



Fuel Line Installation

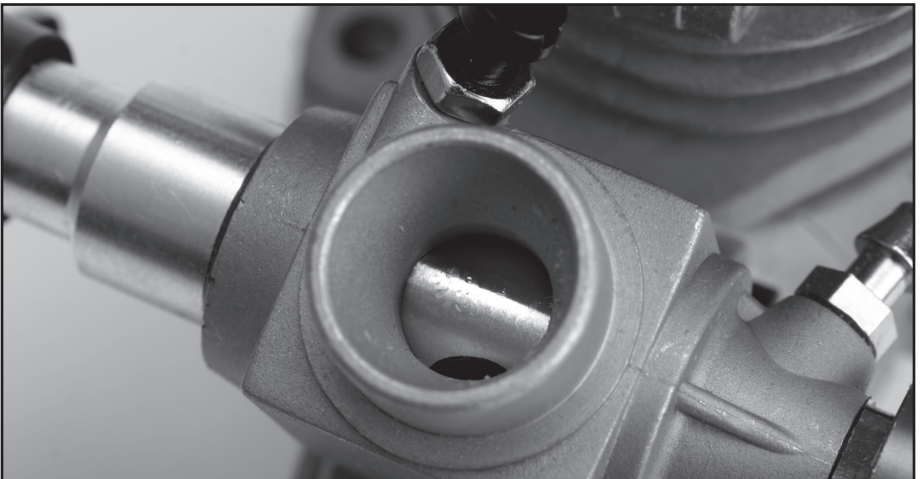
Throttle Linkage

Install the throttle linkage and servo as per the instructions in the helicopter kit manual. The following illustration is used as an example for the typical installation of the throttle arm and servo setup. Please note that we have included markings on the throttle arm side of the carb body and throttle barrel. These markings correspond to “full open, mid throttle, and fully closed carburetor positions. These marks are included to make your installation and setup of the throttle mechanism even easier.

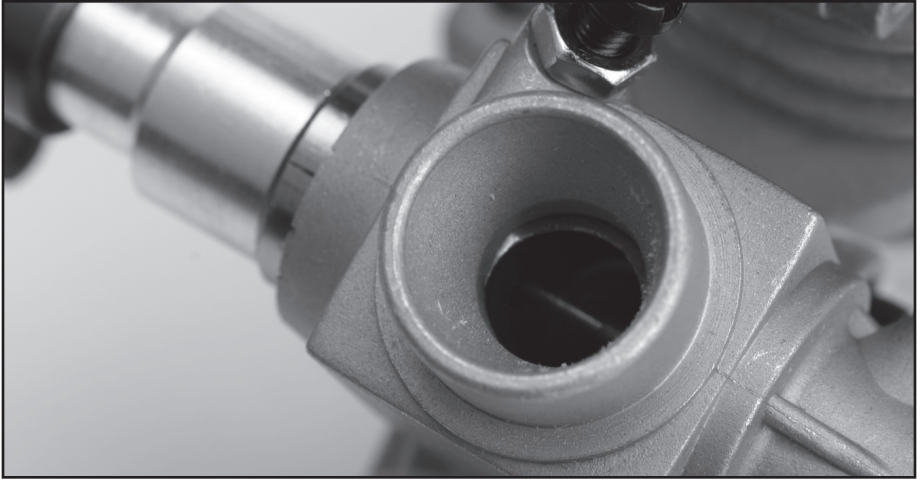


Throttle arm/Servo Link

With low-throttle and mid-trim (idle position on transmitter), the throttle barrel should be open approximately 1mm, giving a low rpm idle (see photo below). Adjust the length of the linkage until the throttle barrel is exactly 1mm open. Check to be sure the servo is moving in the correct direction. Full throttle should open the throttle barrel fully, while low throttle, low trim should completely close the throttle barrel. Reverse the servo throw if necessary. Refer to carb body markings.



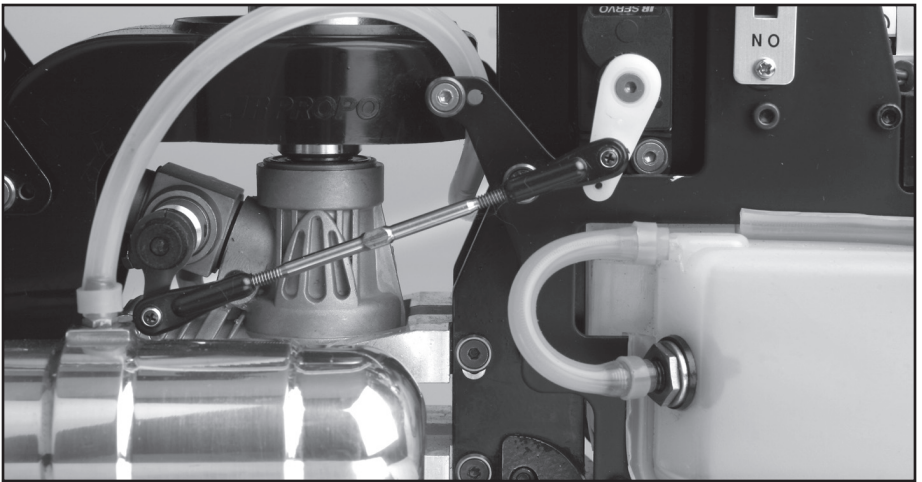
Idle, closed to 1mm open



Open, Full throttle

Note: it may be necessary to reposition the throttle arm on the carburetor and to adjust the length of the throttle linkage slightly to achieve full open and closed positions of the carburetor. Refer to the helicopter manual for more detailed instructions.

Starting the Evolution Engine



Engine installed with fuel lines attached

Fuel

The Evolution Engine comes pre-run and adjusted from the factory. We recommend using high quality Cool Power, Omega, Hangar 9® AeroBlend™ or Power Master fuels containing 15-30% Nitro. The Evolution Engine has been test run using these fuels. If another brand of fuel is used, it may be necessary to slightly adjust the needle valves to compensate for the differences in fuel.

Starting the Evolution Engine (cont.)

Glow Plug

The Evolution Engine comes with a specially designed "Super Plug" that prevents idle and transition flameouts. The plug's unique shape directs incoming fuel/air mixture away from the plug element. When replacing the plug, be sure to replace it with another Hangar 9 Super Plug (HAN3006).

Starting the Engine

- Step 1.** Fill the tank with the above-mentioned 15% to 30% fuel.
- Step 2.** Reattach the fuel lines, making sure the vent and clunk line are attached to the fuel nipple and the muffler pressure nipple.
- Step 3.** Close the throttle to the idle position and have a helper hold your helicopter and blades.
- Step 4.** Attach the glow driver.
- Step 5.** Turn the engine over using an electric starter with a starter shaft. The engine should fire within seconds of applying the starter.
- Step 6.** Allow the engine to idle for 30 seconds. Adjust the throttle trim if necessary to achieve a constant slow idle.

Needle Valve Adjustment

Start the engine and check the idle. Adjust as needed.

Lift the helicopter into a hover and check for the correct rotor rpm recommended by the helicopter kit manufacturer. Once this is done take note of the amount of smoke being produced by the muffler. The mixture is correct for hover when there is a steady stream of smoke being produced.

Land the helicopter for approximately 20-30 seconds. Lift the helicopter into a hover again taking note of the transition from idle to hover. If the engine exhibits a large amount of smoke

and the throttle response is sluggish, you will need to adjust the idle needle leaner to achieve a smooth transition. If the engine detonates and the smoke is inconsistent or a small amount is produced, the mixture is too lean.

The high-speed needle refines the fuel mixture for forward flight without affecting the hovering adjustment.

After the engine is started and warmed up, lift off into a hover and check that the engine is running smooth with a good trail of smoke. If everything is fine, open the throttle and enter forward flight. Take note of the amount of smoke as you did in the hover adjustment. It is correct when you see noticeably steady smoke trail. Adjust the high-speed needle valve to obtain slightly rich but consistent setting.

Stopping the Engine

Fully close the throttle barrel to stop the engine.

Prior to putting your helicopter away for the day, pull off the fuel line from the tank to the carburetor, then start the engine and let it burn off all the trapped fuel inside the carburetor and the engine. If you do not plan to run the engine for a time, use after run oil and squirt into the carburetor, use your electric starter to turn over the engine for a few seconds to let the oil coat the inside of the engine.



High Speed Needle Valve



Low Speed Needle Valve

How to Tell if your Glow Plug is Bad

The glow plugs on the market today are designed to provide good service to the user and may last a long time or a short time, all dependent upon the way you choose to operate your engine.

Physical indications that you might need to change the glow plug are:

1. Twisted or mangled glow plug element (usually caused by too high a compression ratio).
2. Small "bumps" are attached to the glow plug element. This will generally be most noticeable during the break-in process. These are actually tiny pieces of aluminum that have attached to the element and these will severely hinder the operation of the glow plug.
3. The glow plug element is no longer shiny but is dull, almost a white powder color. (This just comes with age and is a by-product of the

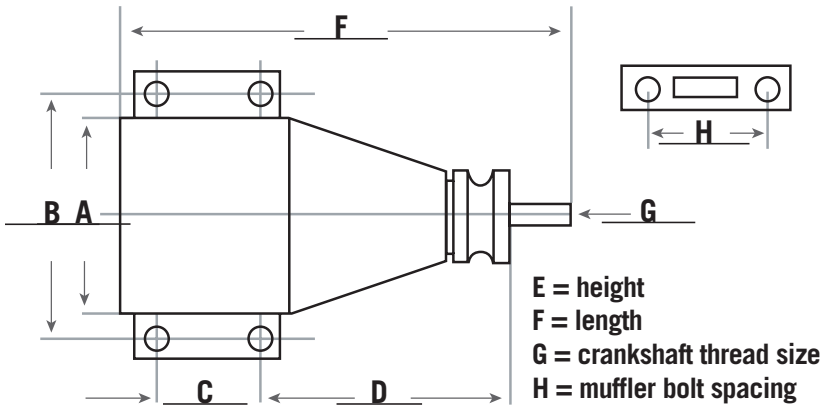
catalytic reaction. The shinier the wire, the better the catalytic reaction can be).

Operating indications that you need to change your glow plug are:

1. The glow element will not light with a charged glow igniter. This indicates that there is a physical short or breakage in the element wire itself.
2. Glow plug lights but the engine will not continue running once the battery is disconnected. (This is usually an indication of the microscopic particles we discussed earlier).
3. Glow plug lights, engine runs but there is a perceptible loss of rpm at full throttle when the battery is disconnected. This is a typical indication that the white powder residue is building to the point that the catalytic reaction of the glow plug is no longer anywhere close to being optimum.

NX Evolution Helicopter Engine Specifications

Items	Disp (c.I.)	Bore (mm)	Stroke (mm)	Weight (oz)	Crank K (ISO)	Cylinder	Propeller
EVOE0520H	.520"	.882"	.847"	15.36	1/4X28	ABC RING	N/A



Dimensions(mm)	A	B	C	D	E	F	G	H
EVOE0520H	36	44	17.5	52.5	93.25	105	1/4 X 28	37

Trouble-Shooting Guide

Engine Won't Fire

- Glow starter not charged
 - Charge glow starter
- Glow plug burnt out
 - Replace glow plug
- No fuel is getting to the carburetor
 - Check tank, fuel lines reversed
- The starter is reversed
 - Reverse the polarity on the starter cables

Engine Quits Repeatedly

- Needles need adjusting
 - See adjustment procedure
- Bad or old fuel
 - Replace with fresh fuel
- Worn out glow plug
 - Replace with new HAN3006 super plug

Engine Runs Inconsistently

- Hole in fuel line
 - Replace fuel line
- Bad or old fuel
 - Replace with fresh fuel

Maintenance

After each flying session:

1. Fully drain the fuel from the tank.
2. Start the engine and run it until the fuel is completely run out of the engine.
3. Try starting the engine three more times or until it will no longer fire. This gets all the fuel out of the engine.

If the engine will not be used within 10 days, several drops (about 10) of after run oil (Evolution Engine's Blue Block Rust Inhibitor) should be applied into the carburetor and the engine should be turned over for a few seconds with the starter. This will prevent rust and corrosion.

If you need additional help or have any questions, please call Horizon's Service Center. Horizon has trained technicians who are qualified to answer your engine questions.

Evolution/Horizon Service Center

4105 Fieldstone Road
Champaign, IL 61822
1-877-504-0233

Evolution® Engines 2-Year Warranty

This Evolution Engines product is guaranteed to be free from defects in materials and workmanship for a period of 2 years from the date of purchase. During this time, Evolution's authorized service center will repair or replace, at their discretion, any defective parts, without charge.

This warranty does not apply to damage or defects resulting from misuse, neglect or abuse; damage caused by customer disassembly, use of substandard fuel, use of incorrect accessories (glow plug, propeller, etc.); or damage resulting from a crash or any use of this engine other than for which it is specifically intended. Any of the above will automatically void the warranty of the engine.

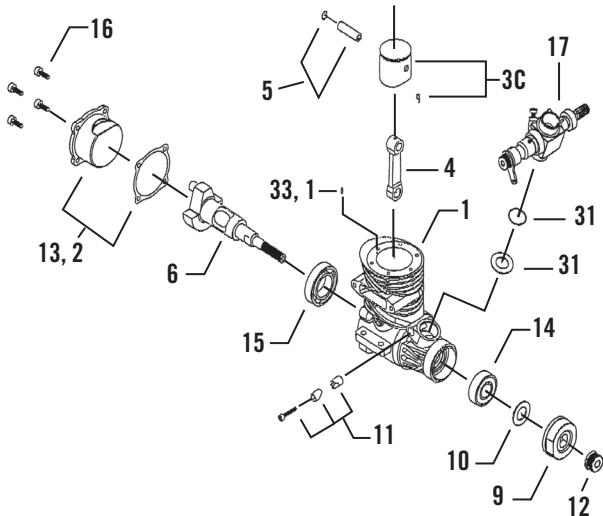
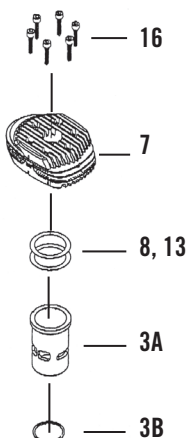
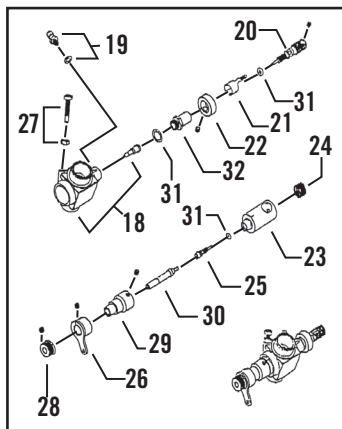
Should your engine require warranty or non-

warranty repair service, please package it carefully and return it to the address at the bottom, along with a copy of the original invoice or receipt and a detailed letter explaining the problems. Write your name, address and daytime phone number clearly on the letter and return it via UPS or insured Parcel Post (Evolution Engines will not be responsible for product lost en route).

For repairs not covered under warranty, please specify in your letter whether you want an estimate of the repair charges prior to performing the service (which may cause a slight delay). Unless otherwise specified, all repaired engines will be returned C.O.D. We will do everything we can to expedite the service required to your Evolution product.

Evolution/Horizon Service Center

4105 Fieldstone Road, Champaign, IL 61822
1-877-504-0233



No. Description

- 1 Crankcase
- 2 Rear Cover w/Gasket
- 3A Cylinder Liner
- 3B Piston Ring
- 3C Piston & Pin
- 4 Connecting Rod
(Dual Bushing)
- 5 Wrist Pin w/Clips (Teflon)
- 6 Crankshaft (1/4X28)
- 7 Cylinder Head (Helicopter)
- 8 Cylinder Head Shim
- 9 Prop Driver
- 10 Spacer Washer (Drive Gasket)

No. Description

- 11 Carburetor Retainer (Drawbar)
- 12 Prop Nut
- 13 Gasket Set, Engine
- 14 Ball Bearing, Front
(Rubber seal)
- 15 Ball Bearing, Rear (Open Race)
- 16 Screw Set, Engine
- 17 Carburetor
- 18 Carburetor Body (w/spraybar)
- 19 Fuel Nipple & Gasket
- 20 High-Speed Needle Valve
- 21 High-Speed Needle
Valve Ratchet

No. Description

- 22 Collar w/Set Screw
- 23 Throttle Barrel
- 24 Spring, Throttle Barrel
- 25 Idle Needle
- 26 Throttle Arm
- 27 Idle Stop Screw w/Nut
- 28 Idle Needle Knob
- 29 Throttle Arm Extension
- 30 Idle Needle Valve Extension
- 31 Carburetor Gasket/O-Ring Set
- 32 Small Parts Set, Carburetor
- 33 Sleeve Index Pin

Cross-Reference List of Evolution NX Helicopter Part Numbers

No.	Description	HHD PN#
1	Crankcase	EVO052101
2	Rear Cover w/Gasket	EVO052102
3A	Cylinder Liner	EVO052202H
3B	Piston Ring	EVO052236H
3C	Piston & Pin	EVO052214H
4	Connecting Rod (Dual Bushing)	EVO052204
5	Wrist Pin w/Clips (Teflon)	EVO052213
6	Crankshaft (1/4X28)	EVO052210H
7	Cylinder Head (Helicopter)	EVO052103H
8	Cylinder Head Shim	EVO052112
9	Prop Driver	EVO052219H
10	Spacer Washer (Drive Gasket)	EVO100219B
11	Carburetor Retainer (Drawbar)	EVO100129
12	Prop Nut	EVO100221
13	Gasket Set, Engine	EVO052416
14	Ball Bearing, Front (Rubber seal)	EVO100109
15	Ball Bearing, Rear (Open Race)	EVO051110
16	Screw Set, Engine	EVO052901H
17	Carburetor	EVO052801H
18	Carburetor Body (w/spraybar)	EVO052863H
19	Fuel Nipple & Gasket	EVO100114
20	High-Speed Needle Valve	EVO100829A
21	High-Speed Needle Valve Ratchet	EVO100833
22	Collar w/Set Screw	EVO100834A
23	Throttle Barrel	EVO052813H
24	Spring, Throttle Barrel	EVO100814A
25	Idle Needle	EVO052844H
26	Throttle Arm	EVO052864H
27	Idle Stop Screw w/Nut	EVO100825F
28	Idle Needle Knob	EVO052865H
29	Throttle Arm Extension	EVO052869H
30	Idle Needle Valve Extension	EVO052867H
31	Carburetor Gasket/O-Ring Set	EVO052E52B
32	Small Parts Set, Carburetor	EVO052E52C
33	Sleeve Index Pin	EVO400160





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