

# .36NT Control Line Evolution® Engine

## USER GUIDE



**E**<sup>®</sup>  
EVOLUTION

## Introduction

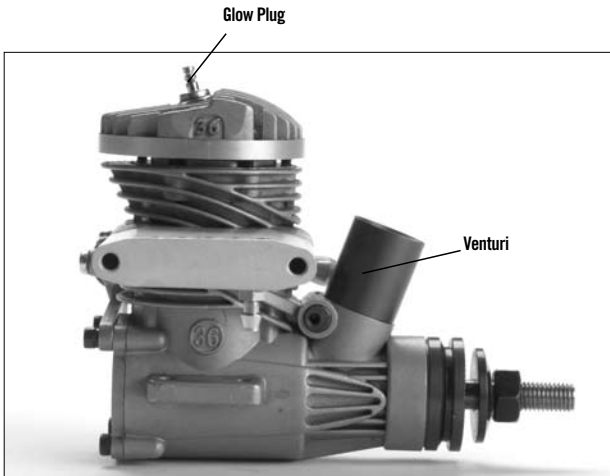
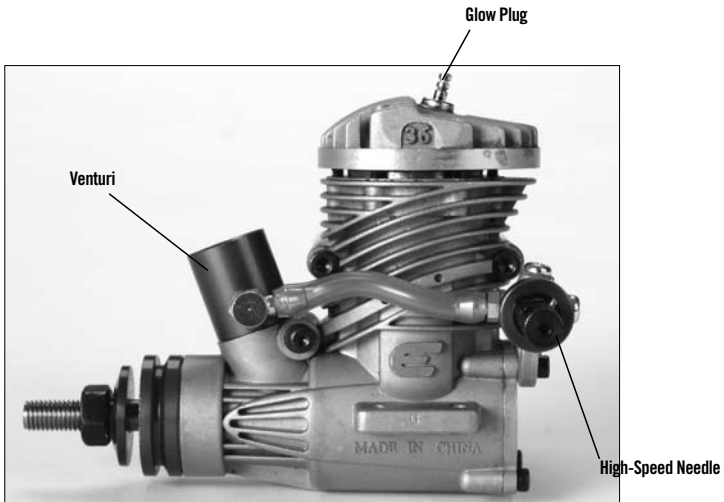
Congratulations on your purchase of the newest and one of the most technically advanced 2-stroke model airplane engines in the world. Whether you are new to the sport of model aviation or an experienced flier, you will enjoy the features of the new Evolution® Engines Control Line (CL) Engine.

The Evolution CL Engine is designed to be the most powerful yet controllable in its class, extremely easy to start and operate, and provide years of enjoyable service. It incorporates many unique design features, such as our Set Right™ needle

valve assembly. Every feature is designed to ensure success with your new engine.

This user's guide is intended to provide the basic information to operate and maintain your Evolution CL Engine.

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



## Mounting the Engine



Securely tighten all engine mounting screws and re-check tightness before each flying session.

All model airplanes include an engine mount of some type. It is extremely important that the engine be securely mounted to the airplane's engine mount. Follow the instructions included with the airplane for mounting the engine.

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

## Included Items

Engine	
Muffler (standard)	EVO036601
Muffler (Tongue)	EVO036601L
Muffler Screw Gasket Set	EVO036E36A,
Glow Plug	EVOGP1
Wrench	
Instructions	
Decal Sheet	

## Optional Items

Glow Plug (2 & 4 Cycle)	EVOGP1
Glow Plug Wrench	HAN2510
Manual Fuel Pump	HAN118
Blue Block After Run Oil	EVOX1000
Metered Glow Driver with Nicad	HAN7101
Power Pro 12V Starter	HAN161
Fieldmate Prebuilt Flight Box	HAN117

## Installing the Muffler

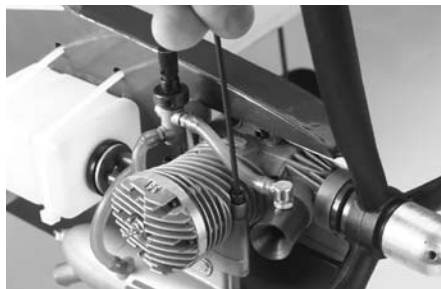


The muffler mounting accessory package includes mounting screws (2), lock washers (2), muffler gaskets (2) and an L-wrench.

Using the included muffler mounting screws and lock washers, attach your choice muffler with the included hex wrench. Be sure the lock washers are placed over the screws and that one gasket is placed between the muffler and the engine. A second gasket is included as a spare. Securely tighten both screws with moderate torque. The exhaust outlet of the muffler can be rotated to allow the exhaust outlet to be repositioned for various applications.

1. Loosen the lock nut on the back of the muffler and then loosen the assembly screw.
2. Rotate the rear half of the muffler to the desired position.
3. Tighten the assembly screw first and then tighten the lock nut.

**Important:** After five runs, retighten the muffler mounting screws and head bolt. Heat and vibration from these first few runs can cause the gasket to compress. Once the muffler screws are re-tightened, they will remain tight and leak-free until the muffler is removed. Also, if you have chosen the tube style muffler, tighten the muffler thru-bolt at this time as well—loosen the lock nut on the back of the muffler, tighten the thru-bolt via the screwhead at the front of the muffler then retighten the lock nut at the rear.



## Attaching the Propeller and Spinner



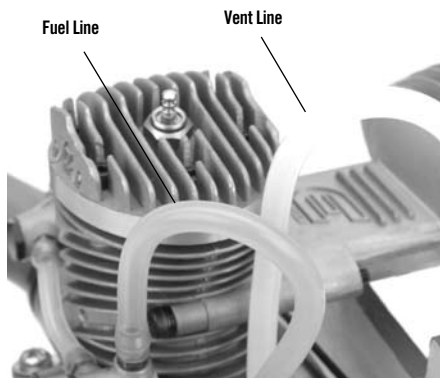
Securely tighten the prop nut using an adjustable wrench.



If you are using an aftermarket spinner nut, install the propeller, the prop washer and then the prop nut in that order (see photo). Securely tighten the prop nut using whatever is most suitable to tighten the spinner nut (if you are using one). In the photo above we are using a spinner nut only.

## Attaching the Fuel Lines

Using medium silicone fuel tubing, attach the fuel tank's clunk line to the fuel nipple. This line will supply fuel to the engine. Attach the vent line to the muffler pressure nipple. This line pressurizes the fuel tank with the muffler pressure, creating consistent fuel flow, regardless of the airplane's attitude.



## Starting the Evolution Engine

### Fuel

The Evolution engine comes baseline adjusted from the factory. We recommend using high quality Cool Power Omega or Power Master fuels containing 5 to 10% 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.

### Glow Plug

The Evolution engine comes with a specially designed "Super Plug". 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 Evolution 2-4 stroke Super Plug (EVOGP1).

### Starting the Engine

- Step 1.** Fill the tank with the above-mentioned 5 or 10% 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.

**Caution:** Do not attach the glow driver yet.

- Step 3.** Place your thumb over the venturi and flip the

prop counter-clockwise through 6 -10 complete revolutions, thus priming the engine. Have a helper hold your airplane.

**Step 4.** Attach the glow driver.

**Step 5.** Turn the engine over using an electric starter. The engine should fire within seconds of applying the starter.

**Step 6.** Remove the glow driver.

**Step 7.** Allow the engine to run for 30 seconds. And then adjust the needle valve for your desired ground rpm. We suggest you set the needle valve so the engine is running at a fast 4-cycle if you are using the engine for stunt and sport applications.



## Needle Limiters

**In most conditions:** With changes in flying field altitudes, changes in temperatures, etc., it will be necessary to adjust the needle valve. The needle has a limiter to restrict the movement to just under one full needle turn, more than enough range for most conditions.

If your engine starts from the above procedure, but won't reliably continue to run with the glow driver removed, follow the steps above right.

**Note:** We have found that the best rpm to start with for this engine is to set the needle so the ground rpm is 9200 - 9500. This will provide a solid 4-stroking style run with a 2-4 break when needed. Pick the appropriate prop to match the application and airplane. A 4-5 pitch prop at these rpms will yield a 5.2-5.4 second lap time on 60- to 62-foot lines. We recommend as a starting point the mid-sized venturi .236 in (6mm) and an 11 x 4 to 11 x 5 two-blade propeller.

## SetRight Needle Valves

The design of the SetRight needle valve system is such that, during normal operating conditions, the typical user will find that the normal range of adjustment allowed by the system is more than adequate for most situations. As a matter of fact, we intended this to be used as a tool to identify operating problems. If you find that the range of adjustment allowed by the SetRight needle is inadequate after your initial period of running, then a problem in your engine system has occurred. This might be a bad glow plug, dirty or old fuel, an air leak in the fuel system somewhere or any number of other reasons. Do not make any permanent adjustment range changes to the SetRight needle system if it was once working correctly for you and now does not. Investigate other problems first.

However, occasionally due to atmospheric, altitudinal or fuel conditions, you may find that the range of adjustment built into the SetRight needle valve system is inadequate for your needs. These conditions are rare and easy to fix.

### SetRight Needle Valve Correction

Should the SetRight needle valve need to be adjusted outside of the factory-established parameters, simply pull out the detent spring on the high-speed needle assembly and move the needle valve in the desired direction so the SetRight pin passes the spring detent. You now have re-established a new range for your purposes.

**Note:** We have found that if you rotate the blue collar that locks down the needle clip so that the setscrew is located adjacent to the actual clip itself, this will easily increase the tension on the needle clip and hold the needle in place more securely.

## Why would fuel go “bad”?

The largest portion of the fuel is methanol (alcohol). Methanol is hygroscopic; it attracts moisture. This can cause your fuel to be contaminated with water, which will cause poor engine performance. Additionally, the UV rays in sunlight will eventually break down the nitromethane if the fuel jug is stored in sunlight for long periods of time.

### How can you tell when your fuel has gone “bad”?

The first indications will generally be the inability to start the engines at previously run needle-valve settings. Another clue might be that the engine has very poor idle, runs but bogs down tremendously during run up and/or will not attain the same rpms that you are used to.

### How do I keep my fuel fresh?

If you have the opportunity, look for someone at a flying field on a sunny day who has a jug of fuel that is only 1/4 full. What you may notice is that there are droplets attached to the top and sides of the container. This is the moisture in the air that is condensing inside the jug because of the greenhouse effect of the semi-translucent plastic jug. The only way to overcome the greenhouse effect is to store your fuel in a metal can.

You can also combat the effects of the moisture in the air by squeezing all the extra air from your fuel container at the end of the day or transferring your fuel into smaller containers as the level of the fuel is reduced in your gallon jug. Many pilots will invest in 1/2 gallon or quart-size containers and only bring that amount of fuel to the field on any given day. This allows their main supply of fuel to stay at home in a controlled storage environment, virtually ensuring problem-free fuel.

## 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:

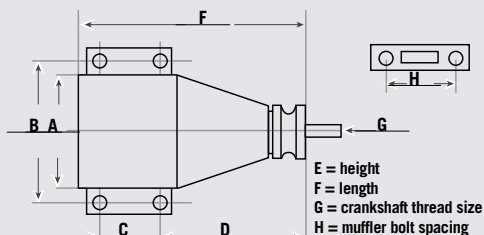
1. Twisted or mangled glow plug element (usually caused by too high a compression ratio).
2. Small “bumps” are attached to the glow plug element. This will generally be most noticeable during the break-in process. These are actually tiny pieces of aluminum that have attached to the element and will severely 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.

## Evolution Control Line Engine Specifications

Items	Disp (c.i.)	Bore (mm)	Stroke (mm)	Weight (oz)	Crank K (ISO)	Cylinder	Propeller
EVOE0365	.354"	.806"	.695"	9.2	1/4X28	ABC	11x4 or 11x5



Dimensions(mm)	A	B	C	D	E	F	G	H
EVOE0365	30	38	15	47	78	72	1/4X28	37

## Troubleshooting 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 EVOGP1 super plug

### Engine Runs Inconsistently

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

it will no longer fire. This gets all the fuel out of the engine.

At the end of every flying session, several drops (about 10) of after-run oil (Evolution Engine's Blue Block Rust Inhibitor) should be applied into the venturi and the engine should be flipped 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  
877-504-0233

### European Union:

*Electronics and engines requiring inspection or repair should be shipped to one of the following addresses:*

Horizon Hobby UK  
Units 1-4 Ployters Rd  
Staple Tye, Southern Way  
Harlow  
Essex CM18 7NS, United Kingdom

*Please call +44 1279 641 097 or sales@horizonhobby.co.uk with any questions or concerns regarding this product or warranty.*

Horizon Technischer Service  
Otto Hahn Str. 9a  
25337 Elmshorn  
Germany

*Please call +49 4121 46199 66 or service@horizonhobby.de with any questions or concerns regarding this product or warranty.*

## 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

# WARRANTY INFORMATION

## Warranty Period

Exclusive Warranty- Horizon Hobby, Inc., (Horizon) warrants that the Products purchased (the "Product") will be free from defects in materials and workmanship for a period of 2 years from the date of purchase by the Purchaser.

## Limited Warranty

(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. This warranty covers only those Products purchased from an authorized Horizon dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims. Further, Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(b) Limitations- HORIZON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCT. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

(c) Purchaser Remedy- Horizon's sole obligation hereunder shall be that Horizon will, at its option, (i) repair or (ii) replace, any Product determined by Horizon to be defective. In the event of a defect, these are the Purchaser's exclusive remedies. Horizon reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone other than Horizon. Return of any goods by Purchaser must be approved in writing by Horizon before shipment.

## Damage Limits

HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new and unused condition to the place of purchase.

*LAW: These Terms are governed by Illinois law (without regard to conflict of law principals).*

## Safety Precautions

This is a sophisticated hobby Product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this Product in a safe and responsible manner could result in injury or damage to the Product or other property. This Product is not intended for use by children without direct adult supervision. The Product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

## Questions, Assistance, and Repairs

Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the Product has been started, you must contact Horizon directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance. For questions or assistance, please direct



your email to [productsupport@horizonhobby.com](mailto:productsupport@horizonhobby.com), or call 877.504.0233 toll free to speak to our product support staff.

### **Inspection or Repairs**

If this Product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the Product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as Horizon is not responsible for merchandise until it arrives and is accepted at our facility. A Service Repair Request is available at [www.horizonhobby.com](http://www.horizonhobby.com) on the "Support" tab. If you do not have internet access, please include a letter with your complete name, street address, email address and phone number where you can be reached during business days, your RMA number, a list of the included items, method of payment for any non-warranty expenses and a brief summary of the problem. Your original sales receipt must also be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

### **Warranty Inspection and Repairs**

TO RECEIVE WARRANTY SERVICE, YOU MUST INCLUDE YOUR ORIGINAL SALES RECEIPT verifying the proof-of-purchase date. Provided warranty conditions have been met, your Product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

### **Non-Warranty Repairs**

SHOULD YOUR REPAIR NOT BE COVERED BY WARRANTY, THE REPAIR WILL BE COMPLETED AND PAYMENT WILL BE REQUIRED WITHOUT NOTIFICATION OR ESTIMATE OF THE EXPENSE UNLESS THE EXPENSE EXCEEDS 50% OF THE RETAIL PURCHASE COST. By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon accepts money orders and cashiers checks,

as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly. PLEASE NOTE: NON-WARRANTY REPAIR IS ONLY AVAILABLE ON ELECTRONICS AND MODEL ENGINES.

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Service Center  
4105 Fieldstone Road  
Champaign, Illinois 61822

All other Products requiring warranty inspection or repair should be shipped to the following address:

Horizon Product Support  
4105 Fieldstone Road  
Champaign, Illinois 61822

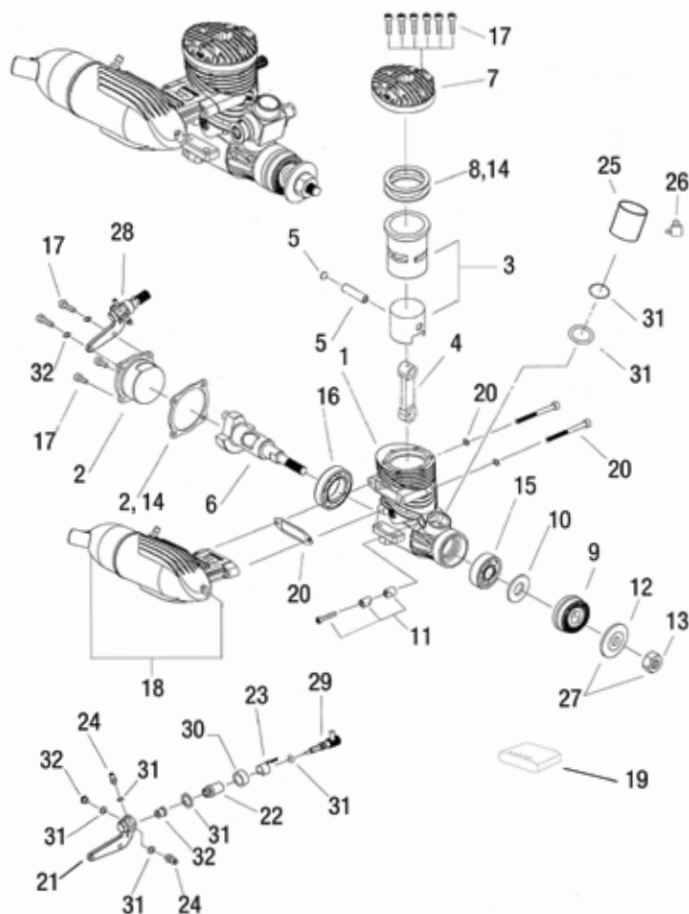
PLEASE CALL 877-504-0233 WITH ANY QUESTIONS OR CONCERNS REGARDING THIS PRODUCT OR WARRANTY.

### **European Union:**

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Hobby UK  
Units 1-4 Ployters Rd  
Staple Tye  
Southern Way  
Harlow  
Essex CM18 7NS  
United Kingdom  
Please call +44 (0) 1279 641 097 or email  
[sales@horizonhobby.co.uk](mailto:sales@horizonhobby.co.uk) with any questions or concerns regarding this product or warranty.

Horizon Technischer Service  
Otto Hahn Str. 9a  
25337 Elmshorn  
Germany  
Telephone: +49 4121 46199 66  
Fax: +49 4121 46199 70  
Mail: [service@horizonhobby.de](mailto:service@horizonhobby.de)



## No. Description

- 1 Crankcase
- 2 Rear Cover with Gasket
- 3 Piston & Liner Set (ABC)
- 4 Connecting Rod (Dual Bushing)
- 5 Wrist Pin w/Clips (Teflon)
- 6 Crankshaft (1/4 X 28)
- 7 Cylinder Head
- 8 Cylinder Head Shims
- 9 Prop Driver
- 10 Spacer Washer
- 11 Carburetor Retainer (Drawbar)
- 12 Prop Washer
- 13 Prop Nut (1/4 X 28)
- 14 Gasket Set, Engine
- 15 Ball Bearing, Front (Rubber Seal)
- 16 Ball Bearing, Rear (Open Race)

## No. Description

- 17 Screw Set, Engine
- 18 Muffler (Standard)
- 19 Muffler (Tongue Style .36)
- 20 Muffler Gasket & Mounting Screw Set
- 21 Spraybar Bracket (Remote)
- 22 Spraybar (Remote)
- 23 High-Speed Needle Valve Ratchet
- 24 Fuel Nipple & Gasket Set
- 25 Venturi Set (3 pcs.)
- 26 Venturi Fuel Nipple
- 27 Propeller Washer & Nut Set
- 28 Needle Valve Assembly
- 29 High Speed Needle Valve
- 30 Collar w/Set Screw
- 31 Carburetor Gasket O-Ring Set
- 32 Small Parts Set, Carburetor

## Cross-Reference of Evolution .36 CL Part Number

#	Description	.36CL
1	Crankcase	EV0036101
2	Rear Cover w/Gasket	EV0032102
3	Piston & Liner (ABC)	EV0036203CL
4	Connecting Rod (Dual Bushing)	EV0032204
5	Wrist Pin w/Clips (Teflon)	EV0032213
6	Crankshaft (1/4 x 28)	EV0032210
7	Cylinder Head	EV0036103
8	Cylinder Head Shims	EV0036112
9	Prop Driver	EV0036219
10	Spacer Washer	EV0032225
11	Carburetor Retainer (Drawbar)	EV0036129
12	Prop Washer	EV0100220
13	Prop Nut (1/4 x 28)	EV0100221
14	Gasket Set, Engine	EV0036416
15	Ball Bearing, Front (Rubber Seal)	EV0032109
16	Ball Bearing, Rear (Open Race)	EV0028110
17	Screw Set, Engine	EV0036901
18	Muffler (Standard)	EV0036601
19	Muffler (Tongue Style .36)	EV0036601L
20	Muffler Mounting Screw Set w/Gasket	EV0036E36A
21	Spraybar Bracket (Remote)	EV0036870
22	Spraybar, Remote	EV0100830
23	High-Speed Needle Valve Ratchet	EV0100873
24	Fuel Nipple & Gasket Set	EV0100114
25	Venturi Set (3 pcs.)	EV0036827
26	Venturi Fuel Nipple	EV0100115
27	Propeller Washer & Nut Set	EV0040228
28	Needle Valve Assembly	EV0036874
29	High Speed Needle Valve	EV0100829A
30	Collar w/Set Screw	EV0100834A
31	Carburetor Gasket O-Ring Set	EV0036E36B
32	Small Parts Set, Carburetor	EV0061E61C



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