



VORTEX FACTORY: Via E. Fermi, 5 – 27040 Campospinoso (PV)– ITALY – Tel. +39 0385 765200

# MINI ROK

# OWNER'S

# MANUAL



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## 1.1. INTRODUCTION

Thank you for your purchasing of a Vortex engine. This manual contains information on how to help you with getting the best results from your new engine. Furthermore, it will explain you how to operate your Vortex engine safely and in a proper manner.

Vortex update this manual constantly. All the information in this manual is based on the latest experience and product information available at the time of writing.

Vortex reserve the right to make any kind of changes to this manual at anytime without notice and without incurring in any obligation.

This manual shall be considered part of the Vortex engine and should remain with the engine itself if resold.

## 1.2. SYMBOLS



Personal injury



Mechanical Danger



Caution

Pay attention to the symbols of this manual. They alert you of dangerous situations for you or for your engine.

## 1.3. SAFETY INFORMATION



- Do not start the engine indoor as garages, trailers, etc. Start the engine in a well-ventilated area only. Exhaust emissions are hazardous for your health.
- Always wear gloves and proper clothing when working on your engine.
- Use caution when handling fuel. Gasoline is flammable and explosive. When working with fuel, do not smoke or use it near fire or flames. Avoid any skin contact and inhaling fuel vapors.
- Never touch moving parts when the engine is running.
- During operation both engine and muffler, become very hot. Do not touch them and do not place anything on them after operation.
- Do not touch the spark plug or cable. It may provoke electrical shocks.
- Understand the operation of all controls and learn how to stop the engine quickly in case of emergency.
- Do not use the engine without clutch cover and chain protection.



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## 1.4. TECHNICAL SPECIFICATIONS



Cylinder Displacement (max)	60cc.
Cylinder Bore (max)	42,10 mm.
Piston Stroke	43,00 mm.
Admission system	Piston Port
Cooling System	Free air
Carburetor	Dell'Orto PHBG 18 BS
Ignition System	Selettra
Ignition Type	Analogic
Ignition Timing	3 mm.
Spark Plug Gap	0,8 mm.
Fuel Mixture	3%
Engine Weight (Complete)	17 kg.

- All sizes and measurements in this manual are expressed in metrics.
- Always use original Vortex parts and proper tools when working on your engine.
- Proper fuel mix is necessary for optimum engine life and performance.

## 1.5. SPECIAL TECHNICAL SPECIFICATIONS FOR HOMOLOGATED ENGINE



Vortex Mini Rok Engine is produced in one version only. However, refer to your country homologation file for eventual specific rules and/or sizes.

## 1.6. PACKAGING

Your engine will be packed in a sealed box with the Vortex logo printed on and a sticker with model and serial number attached. It will be a second box complete with accessories as carburettor, muffler, fuel pump, air box, etc.

All USA engines must have an specific EPA sticker.



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## 2. ENGINE ASSEMBLING



**In order to perform this job, you will need the following tools:**

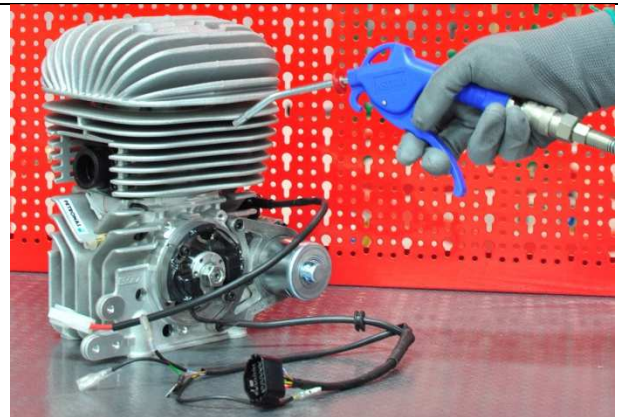
Compressed air	
Allen Wrench	3 - 4 - 5 - 6 - 8 mm
Fixed Wrench	5 - 7 - 8 - 10 - 14 - 17 mm
Flat Pliers	
Socket Spanner	11 mm
Hooker	
Straight Ruler	
Cross Screwdriver	
Flat Screwdriver	
Torque Wrench	

**1**



### Compressed air

Unpack the engine and remove any packaging material on it.

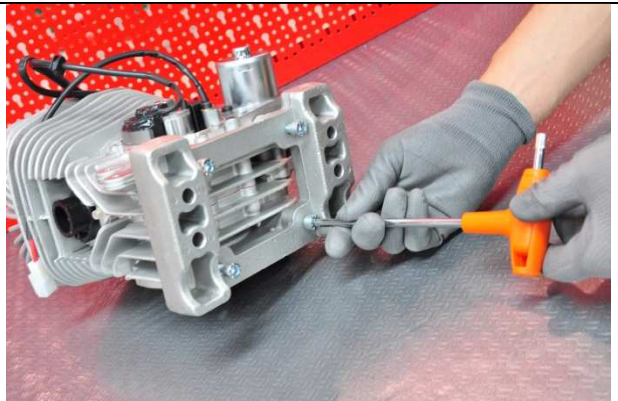


**2**



### 6mm Allen Wrench

Lay the engine on its side and attach the engine mount to the engine base with four 8 mm Allen screws.

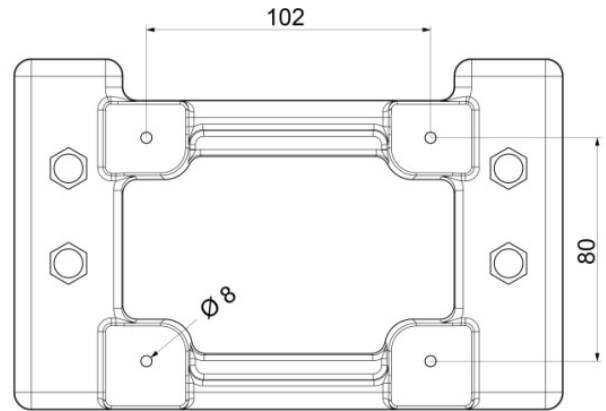




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**3**

Engine Wheelbase Measurements in case you need to drill your engine mount.



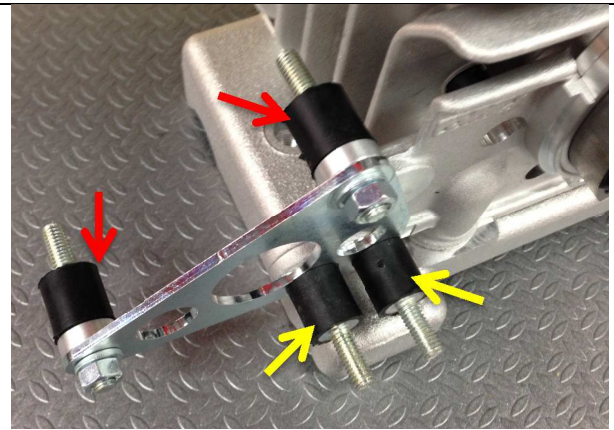
**4**



#### 10mm Fixed Wrench

Attach the specific metal-chromed bracket provided to the engine by using 2 of the 4 silent blocks provided (yellow arrows) to the support in the engine.

Insert the remained 2 silent blocks (red arrows) with specific spacers and tighten with washer and 6 mm nut. Sometimes thread on the silent blocks could be short, use a threadlocker then.

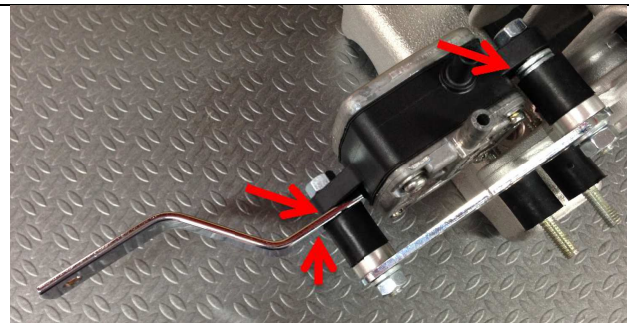


**5**



#### 10mm Fixed Wrench

Insert air box bracket into silent blocks (red arrows). Then insert fuel pump into silent blocks (red arrows). Tighten with washer and 6 mm nut. Sometimes thread on the silent block could be short. Use a threadlocker then.



**6**

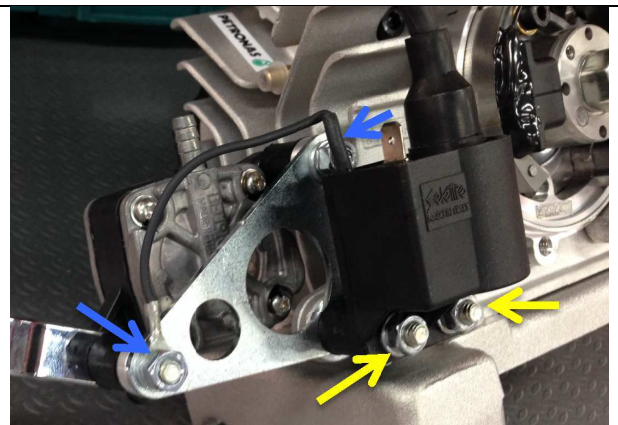


#### 10mm Fixed Wrench

Insert the coil into the 2 free silent blocks (yellow arrows). Tighten with washer and 6 mm nut.

Then attach the black cable (earth) coming out from the coil to silent block 3 and tighten with washer and 6 mm nut (blue arrows).

Sometimes thread on the silent block could be short. Use a threadlocker then.

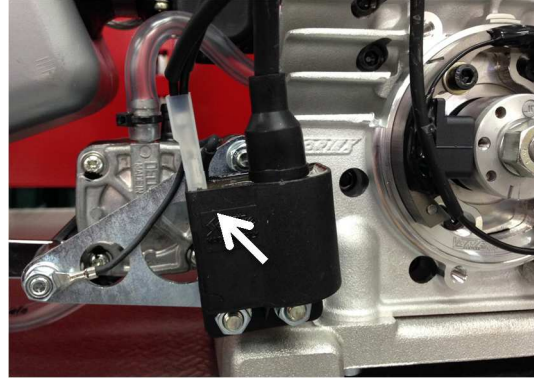




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7

Insert “stop” cable end coming from the ignition into the coil plug.



8



**Flat Screwdriver**

Remove the plastic cap from the head.



**Spark Plug Wrench**

Tighten the spark plug in the engine head.  
Tighten and loosen the spark plug 2/3 times to allow the gasket to seat. Then tighten the spark plug securely.

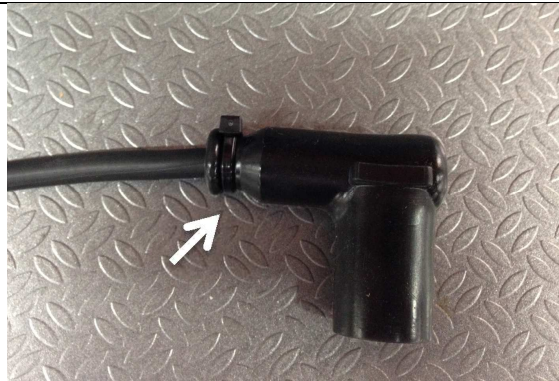


9

Insert the coil cable into the rubber plug cup so it is tight.

It is recommended to secure the coil cable by using a plastic tie.

Place the plug cap on to the spark plug and push the plug cap down firmly.



10



**Flat Screwdriver**

- Remove the plastic cap from inlet manifold.
- Remove carburettor from its box.
- Fit the clamp provided together with the carburettor over the inlet rubber manifold.
- Insert the carburettor into the inlet rubber manifold.





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**11**



**Flat Screwdriver**

Ensure the carburettor is correctly seated, then tighten the carburetor to the inlet manifold by using the specific clamp.



**12**

Screw the air box mount to the carburettor manually. Do not use any tool.



**13**



**Cross Screwdriver**

Remove the top of the carburettor by unscrewing the two screws.



**14**

Insert the throttle cable into the elbow on top of the carburettor with the lead nut in.







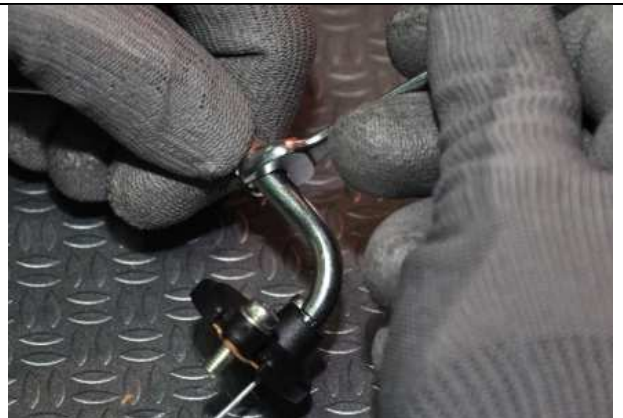
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**15**



**8 mm Fixed Wrench**

Tighten the carburettor throttle cable register elbow.



**16**

Pass the throttle cable through the spring and into the cut in the side of the plastic slide cover.



**17**

Take the slide out of the carburettor.



**18**

Insert the lead at the end of the throttle cable into the hole in the center of the slide.





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**19**

Hook the lead nut in the slide by moving it aside of the center.



**20**

Place the slide, plastic slide cover and spring into the carburettor.



**21**



**Cross Screwdriver**

Fix the top of the carburettor to the carburettor by using the 2 screws unscrewed before in Point **13**



**22**



**Flat Pliers**

By using flat pliers, very carefully, turn the two carburettor overflow elbows on the carburettor to point upwards.





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### 23

Insert the plastic tube provided on to each one of the carburettor overflow elbows. Cut half of the tube in the middle of the tube length to make a breath.

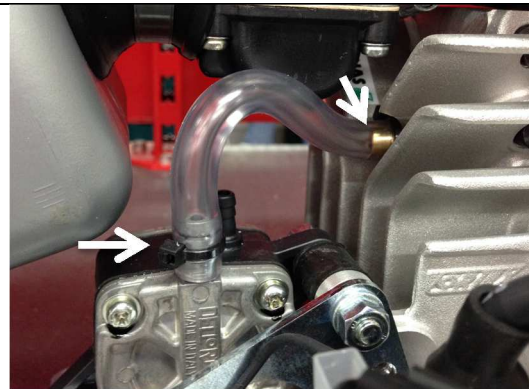


### 24



#### Flat Screwdriver

- a. Remove the plastic cap from the depression plug in the crankcase.
- b. Insert the fuel line in the depression outlet on top of the fuel pump and the other end into to the depression inlet in the crankcase. Secure it by using a plastic tie.



### 25

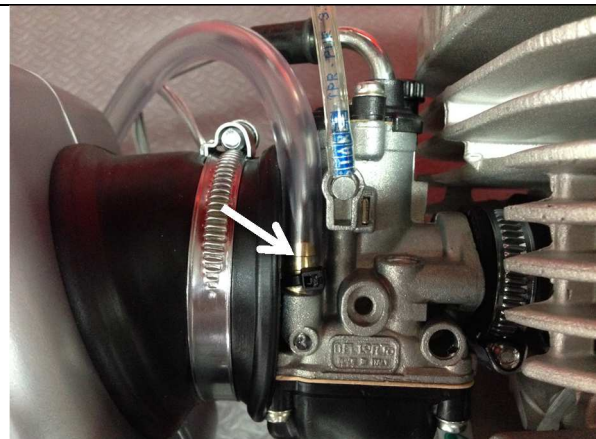
Insert the fuel line in the outlet on the bottom of the fuel pump. Secure it by using a plastic tie.

For the other end of the fuel line see Point **26**



### 26

Insert the fuel line from the outlet on the bottom of the fuel pump to the inlet on top carburetor. Secure it by using a plastic tie.





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**27**

Insert the air tube into the intake silencer and then place the plastic stone guard on top of the air tube.



**28**

Insert the into the intake silencer. There is a slot in the rubber manifold that should be properly inserted in the intake silencer.



**29**

Check the rubber manifold is properly fixed in intake silencer. Wrong assembly will cause the loss of the foam filter and intake silencer.

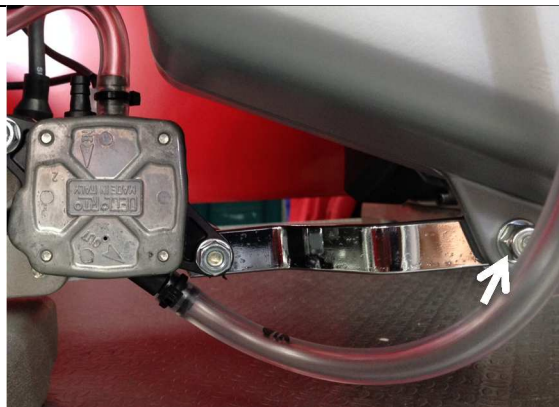


**30**



**4 mm Allen Wrench + 10 mm Fixed Wrench**

Use the specific “S” bended bracket assembled in Point 5 to connect the intake silencer. Secure the intake silencer by using one 6x25 screw washer and nut.





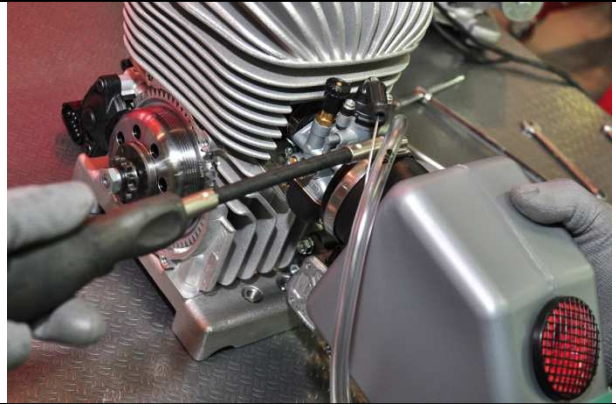
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**31**



**Flat Screwdriver**

Attach the assembled intake silencer to the adaptor and fix it by using the specific clamp provided.

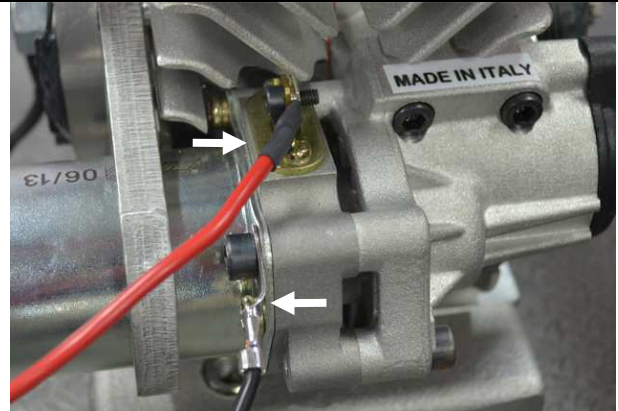


**32**



**3 mm and 5 mm Fixed Wrench**

- a. Attach the red cable to the electric starter using the screw there is in it.
- b. Unscrew the 5 mm Allen screw. Insert the earth cable (black) plug into the screw and screw firmly.



**33**

Cover both cables ends with the plastic covers inserted in the cables.



**34**

Your engine is now ready to be installed to the chassis.



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### 3. ENGINE/CHASSIS ASSEMBLY

1



**5 mm Allen Wrench + 10 mm Fixed Wrench**

Place the sprocket in the sprocket carrier and tighten with washer and nut.



2



**8mm Allen Wrench**

Now place the engine on the chassis. Tighten the engine mount clamps to the engine mount lightly enough to hold the engine in position. Do not tighten completely

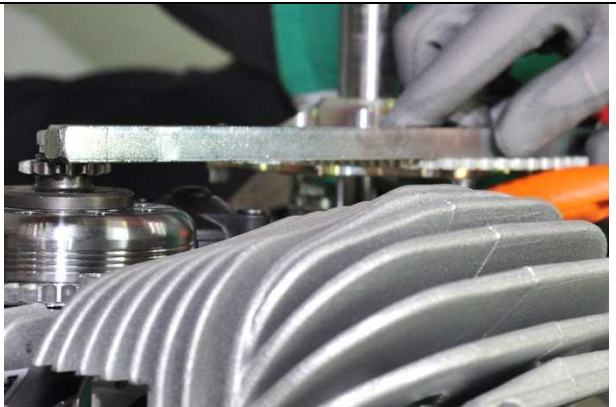


3



**Straight Ruler**

Align the rear sprocket (in the axle) with the front sprocket (in the clutch bell). Then install the chain of proper length. Chain length varies with gear sizes.



4

To adjust chain tension, move the engine ahead until the proper tension is reached. Proper tension is around 1 cm. of free up and down movements.





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**5**



**17 mm Fixed Wrench**

Once chain tension is correct, tighten mount clamps completely and re-check the chain tension again. Then set the engine stop to just contact the engine mount, (if provided by the chassis manufacturer.)



**6**



**5 mm Allen Wrench**

Attach the plastic guard bell cover to the engine by using three 6x20 mm Allen screws.



**7**

Insert now the throttle cable into the outer.



**8**

Insert the free end of the throttle cable into the register attached to the main rail of the chassis.





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9



### 3mm Allen Wrench

Insert a clamp into the throttle cable and pass the free end through the welded ring on the throttle pedal. Then loop it around and insert the free end of the cable into the to the clamp again and tighten it. Clamp not supplied.



10



### Flat Screwdriver

Take the intake silencer off the carburettor by unscrewing the clamp. It is **not** necessary to unscrew the bracket. The intake silencer will turn down easily.



11



### 8 mm Fixed Wrench

Adjust the throttle cable by setting the pedal stop on the chassis in order to get the pedal to stop at the point where the slide in the carburettor is fully open.



12



### 5 mm Fixed Wrench

Attach now the battery cradle to the chassis main rail next to the seat using the specific plastic clamp provided. A battery mounting spacer plate may be required to clear the brake cable.







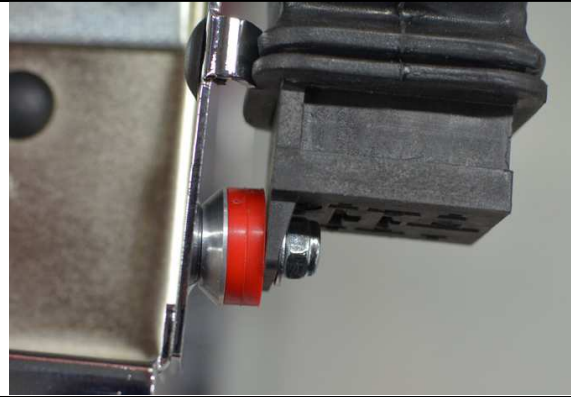
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**13**



**4 mm Allen Wrench + 10 mm Fixed Wrench**

Remove relay from socket in the wiring loom. Secure the wiring loom to the battery cradle using a 6x25 mm Allen screw, bi conical washer, 2 plastic spacer, washer and 4 mm nut.



**14**

Insert manually the relay into the female plug in the wiring loom. Do not use any tool.



**15**



**14 mm Fixed Wrench**

Place the start bottom (Green) and the stop bottom (Red) in the two slots located in the front of the battery cradle. Secure them with the specific nut attached in the cables.



**16**

Place the battery in the battery cradle. Insert the battery cables in the battery plugs. Red cable in red plug, black cable in black plug. Secure the battery using the two rubber O.R. provided.





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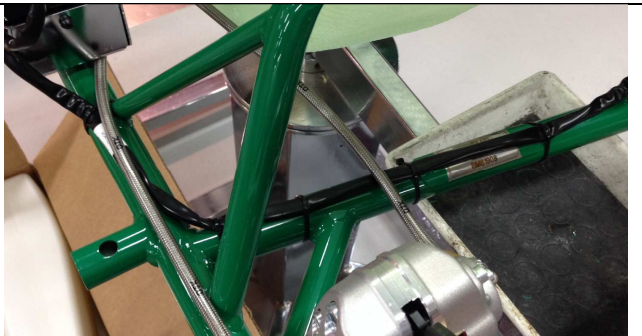
**17**

Secure the relay with the specific spring provided.  
Be sure the spring is in the right position and pressing. In case is needed just turn the end of the spring with a plier to make it press correctly.



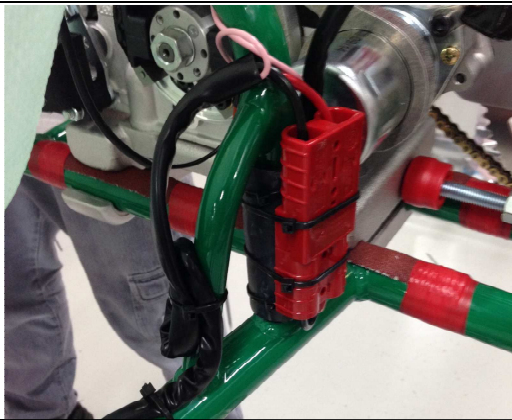
**18**

Pass the main wire loom under the seat and secure it to the chassis by using plastic cable ties. **Make sure there is no loose wiring that may drag on the track.**



**19**

Plug in the electric plug coming from the battery to the other half coming from the engine.



**20**

Hook the two springs provided into the exhaust manifold.





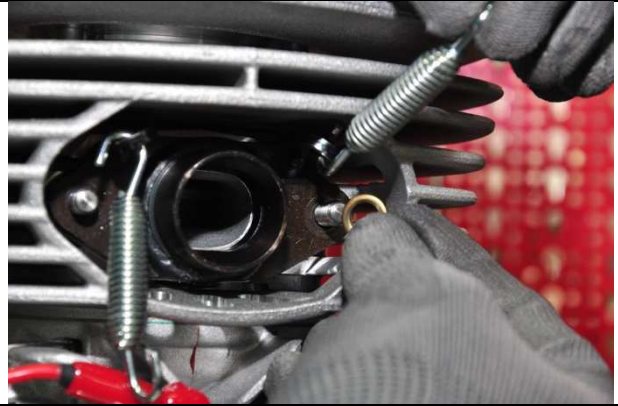
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**21**



### 11 mm Socket Wrench

Before fitting the exhaust manifold remove the exhaust gasket and the exhaust port cover. Refit the exhaust gasket to the cylinder, then fit the exhaust manifold by using the brass spacer and the nuts. Tighten each nut alternatively.



**22**



### Hook

Insert the muffler into the exhaust manifold. Fix the muffler by hooking the free ends of the spring into the rings welded to the muffler by pulling them.

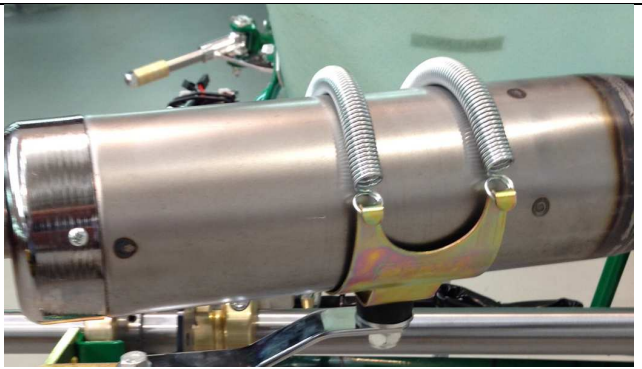


**23**



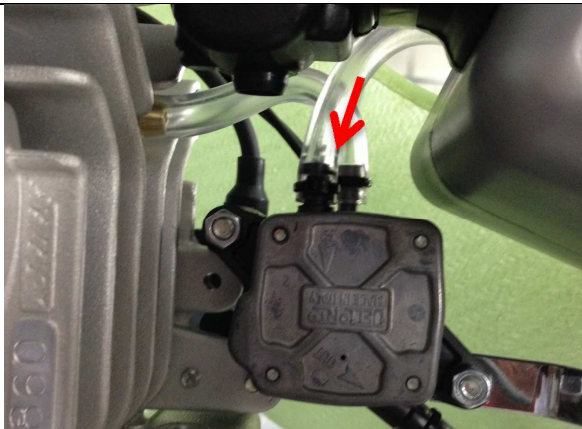
### Hook

Place the muffler in the exhaust cradle that is assembled on the chassis and pull the two springs provided to fasten it.



**24**

Insert the fuel line from the fuel tank into the fuel pump





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#### 4. STARTING AND BRAKE-IN



Only a proper break-in will insure the best performance out of your engine in the future and guarantee its long and trouble-free life.

Break-in is required when an engine is new or has undergone a major service of the engine's main parts (pistons, rings, cylinder or crankshaft).

**1** Prepare fuel. Vortex engine works with commercial gasoline, leaded or unleaded, as well as racing fuel, with minimum 95 ROM.  
Mix oil and gasoline at 3% (i.e. 30cc of oil every 1.000 cc. of fuel).

**2** Use a high quality 2-stroke oil specifically made for kart engines. Vortex recommends Petronas Rok Lube, however many others oils with the same features may be used. Check any requirements of your ASN regarding the use of specific brand/type.

**3** Shake the can thoroughly to mix the fuel and the oil properly. Then fill the gas tank in your kart. A mistake in measurements could result in engine damage.

**4** Buttons: to start the engine press the green button. To stop the engine press the kill switch red button.

**5** To start a cold engine pull the choke lever up. Full fill the carburetor.

**6** Press the start button (green) in order to allow the fuel pump-to-pump fuel to the carburetor.

**7** Once the engine starts push the choke lever down.

**8** Run the engine by accelerating intermittently to higher RPMs. **Do not** accelerate to full throttle.

**9** Once the engine is warmed up, proceed to the track. By accelerating very carefully, the clutch will engage and the kart will start moving forward.

**10** Run the engine by alternating a few seconds on and off the throttle at  $\frac{3}{4}$  of the opening. **Do not** hold the throttle at a constant speed. Continue this way for 5/6 laps.

**11** Check everything on the kart is tighten properly. Be careful, engine and muffler are hot.

**12** Return to the track and slowly increase the RPM and duration of the acceleration for 10/15min more. Intermittently open the throttle fully and then release it.

**13** After 10/15 minutes of brake-in, your engine is ready for competition. During the break-in, nuts and bolts tend to loosen. Once the engine is cold, check the torque of the exhaust, head, etc



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## 5. SERVICING YOUR ENGINE



Good maintenance is essential for safe, economical and trouble-free operation. Here you will find a maintenance schedule, routine inspection procedures and very simple maintenance procedures by using basic tools. Some service tasks that are more difficult or needs special tools must be performed by Vortex technicians or qualified mechanics.

Timing schedule periods are only indicative.

### 5.1. Maintenance Schedule and Adjustments

<b>Carburettor</b>	Cleaning	After every race/heat
<b>Throttle Cable</b>	Check	Every race
<b>Spark Plug</b>	Check Change	Every Race After 30 hours
<b>Exhaust</b>	Internal cleaning	Every 10 hours
<b>Clutch</b>	Check and cleaning Change	Every 10 hours After 30 hours
<b>Piston</b>	Change	After 30 hours
<b>Chain</b>	Change	After 10 hours
<b>Cylinder</b>	Honing	After 30 hours
<b>Connecting Rod</b>	Change	After 90 hours
<b>Bottom End</b>	Re-built	After 90 hours

### 5.2. Torque Chart

Cylinder Head $\varnothing$ 8 mm Nut	kgm 1,8
Exhaust Manifold $\varnothing$ 7 mm Nut	kgm 1,5
Crankcase $\varnothing$ 6 mm Screws	kgm 1,2
Bendix cover Screws	kgm 0,8
Starter Gear Nut	kgm 6 (Use threadlocker)
Pinion Bell $\varnothing$ 5 mm Screws	kgm 0,8
Ignition Nut	kgm 2,8
Pinion Bell Nut	kgm 2,8
Ignition $\varnothing$ 5 mm Screws	kgm 0,8
Nylon crankshaft stuffer	kgm 0,8 (Use threadlocker)



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### 5.3. Sizes and Measures

<b>Tolerance Cylinder/piston</b>	10,5
<b>Timing</b>	3mm
<b>Piston Sizes</b>	
W240/MR01A	41,88
W240/MR03A	41,91
W240/MR06A	41,93
W240/MR09A	41,95
W240/MR11A	41,98

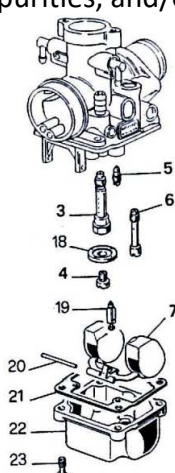
### 5.4. Chain

	<p>Lube the chain by spraying chain lube on the chain while manually rotating the rear wheel.</p> <p>To replace the chain, loosen the engine and slide it back to release the old chain from the sprocket. Reverse the procedure after installing a new chain.</p>
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### 5.5. Throttle Cable

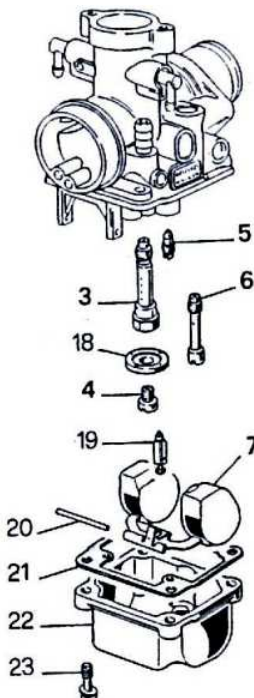
	<p>Lubricate the throttle cable each time the engine is run. Also check, and adjust the cable as needed, to assure the correct throttle and that the throttle returns properly and opens full size.</p> <p>If the cable frays, it must be replaced.</p>
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### 5.6. Carburettor

<p><b>Cleaning:</b></p> <p>Fuel and oil may contain some kind of rubbish, impurities, and/or residues.</p> 	<ol style="list-style-type: none"> <li>1. Take the intake silencer off the carburettor by unscrewing the clamp. It is <b>not</b> necessary to unscrew the bracket. The intake silencer will turn easily.</li> <li>2. Disconnect the throttle cable from the carburetor together with its spring and slide it.</li> <li>3. Took the carburetor off the engine and open the float chamber (22) by unscrewing the four screws (23). Clean the parts, openings and passages with compressed air. Check the float chamber gasket (21) and eventually change it if damaged.</li> <li>4. Close the float chamber by screwing the four screws (23) and re-place the carburettor in the engine.</li> <li>5. Clean the inside of the intake silencer.</li> <li>6. Attach the intake silencer assembly to the adaptor.</li> <li>7. Tighten it with the specific clamp. Wrong assembly will cause the loss of the intake silencer.</li> </ol>
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<p><b>Changing main jet:</b></p> 	<ol style="list-style-type: none"> <li>1. Take the intake silencer off the carburettor by unscrewing the clamp. It is <b>not</b> necessary to unscrew the bracket. The intake silencer will turn easily.</li> <li>2. Disconnect the throttle cable from the carburetor together with its spring and slide it.</li> <li>3. Took the carburetor off the engine and open the float chamber (22) by unscrewing the four screws (23). Clean the parts, openings and passages with compressed air.</li> <li>4. Unscrew the main jet (4) by using a cross screwdriver. Place a new one. Be careful, washer (18) has only one position. Wrong assembling will cause totally black out of carburettor.</li> <li>5. Check the float chamber gasket (21) and eventually change it if damaged.</li> <li>6. Close the float chamber by screwing the four screws (23) and re-place the carburettor in the engine.</li> <li>7. Clean the inside of the intake silencer.</li> <li>8. Attach the intake silencer assembly to the adaptor.</li> <li>9. Tighten it with the specific clamp. Wrong assembly will cause the loss of the intake silencer.</li> </ol>
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### 5.7. Spark Plug

<p><b>Cleaning:</b> Oil produces carbon deposits or residues that make necessary the spark plug to be checked and cleaned, at least every 5 hours.</p>	<p>Unplug the spark plug and clean it by using a metal brush.</p>
<p><b>Setting Plug Gap:</b></p>	<p>Use a specific spark plug gap gauge to set up correct gap. Correct gap: 0,8 mm.</p>

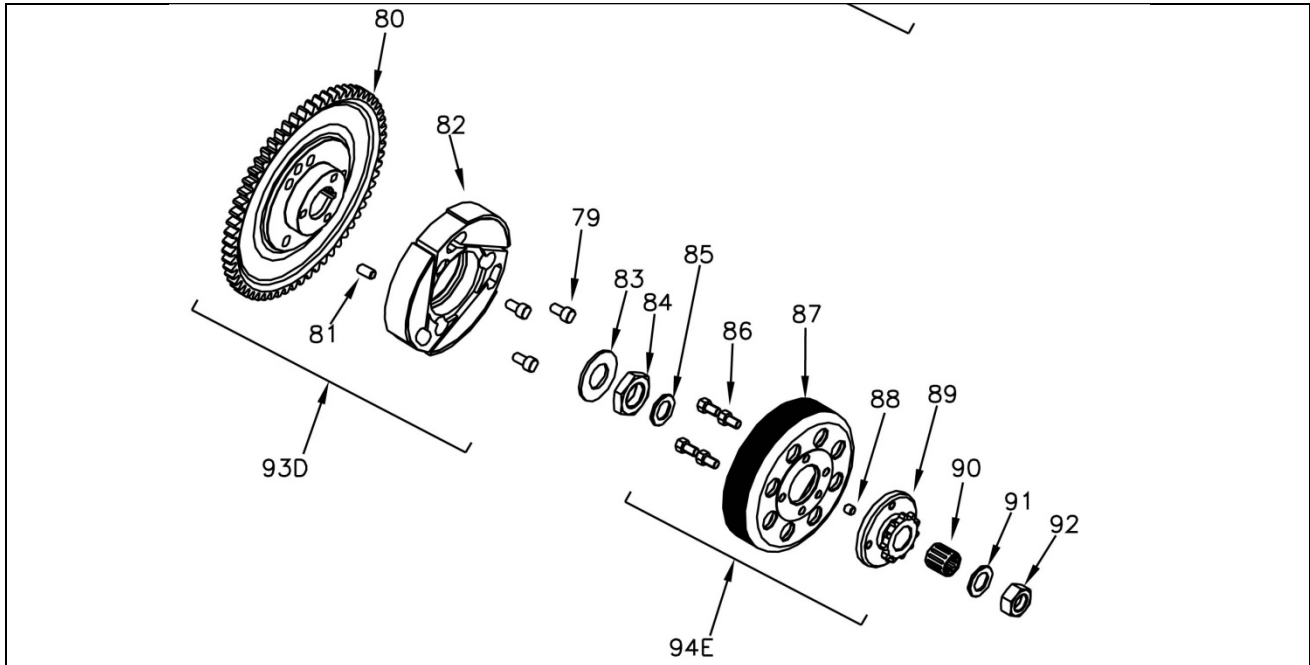
### 5.8. Exhaust

<p><b>Cleaning:</b> Oil produces carbon deposits or residues that make necessary the spark plug to be checked and cleaned, at least every 10 hours.</p>	<ol style="list-style-type: none"> <li>1. Remove the muffler from the engine by removing the 2 springs in the cradle and the 2 springs in the exhaust manifold.</li> <li>2. Unscrew the 3 bolts in the exhaust terminal.</li> <li>3. Warm up the pipe with a heat source and remove any carbon deposits by means of a metal brush.</li> </ol>
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## 5.9. Clutch and Starter Gear



### Cleaning and/or replacing clutch:

1. Disassemble the clutch cover.
2. Take away the Bendix cover
3. Stop the clutch drum by using the special tool designed by Vortex for this specific task.
4. Unscrew **anticlockwise** the nut on the clutch drum (92). Remove the washer (91), clutch drum (87) and roller bearing (90).
5. Unscrew the three 6x14mm Allen screws (79) on the clutch.
6. Unscrew **clockwise** the central nut (84) by using a 24mm fixed wrench to remove it. Stop the starter gear with the specific tool manufactured by Vortex.
7. Take away the clutch (82) by using the appropriate extractor.
8. Before assembling the new clutch, we recommend to clean the clutch area and the pinion bell with a solvent.

### ASSEMBLING

9. Install the new clutch (82) on the crankshaft by pushing lightly with your fingers and secure it with the three 6x14mm Allen screws (79). Use thread locker to secure them.
10. Put together again the elastic washer (83) and the central nut (84) and tighten. Use thread locker to secure the





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	<p>central nut.</p> <ol style="list-style-type: none"><li>11. After screwing the central nut place the washer (85).</li><li>12. Grease the needle bearing (90) totally and insert it on the crankshaft.</li><li>13. Place the clutch bell (87), the spacer (91) and screw the nut (92). Use thread locker to secure it.</li><li>14. Re-place Bendix cover.</li><li>15. Re-place the clutch cover.</li></ol>
<b>Replacing Starter Gear</b>	<ol style="list-style-type: none"><li>1. Disassemble the clutch cover.</li><li>2. Take away the Bendix cover</li><li>3. Stop the clutch drum by using the special tool designed by Vortex for this specific task.</li><li>4. Unscrew <b>anticlockwise</b> the nut on the clutch drum (92). Remove the washer (91), clutch drum (87) and roller bearing (90).</li><li>5. Unscrew <b>clockwise</b> the central nut (84) by using a 24mm fixed wrench to remove it. Stop the starter gear with the specific tool manufactured by Vortex.</li><li>6. Take away the clutch (82) together with the starter gear (80) by using the appropriate extractor.</li><li>7. Unscrew the three 6x14mm Allen screws (79) on the clutch.</li><li>8. Before re-assembling, we recommend to clean the area with a solvent.</li></ol> <p><b>ASSEMBLING</b></p> <ol style="list-style-type: none"><li>9. Screw the new starter gear (80) to the clutch (82) by using three 6x14mm Allen screws (79). Use thread locker to secure them.</li><li>10. Insert the starter gear and clutch on the crankshaft by pushing lightly with your fingers.</li><li>11. Put together again the elastic washer (83) and the central nut (84) and tighten. Use thread locker to secure the central nut.</li><li>12. After screwing the central nut place the washer (85).</li><li>13. Grease the needle bearing (90) totally and insert it on the crankshaft.</li><li>14. Place the clutch bell (87), the spacer (91) and screw the nut (92). Use thread locker to secure it.</li><li>15. Re-place Bendix cover.</li><li>16. Re-place the clutch cover.</li></ol>



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### 5.10. Pinion

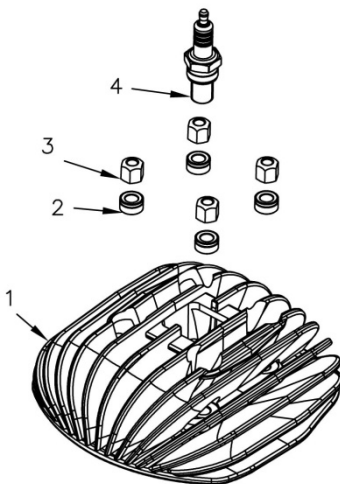
Some ASNs allows the use of Z11 or Z10 pinions.  
Vortex standard assembling is Z11.

1. Disassemble the clutch cover.
2. Stop the clutch drum by using the special tool designed by Vortex for this specific task.
3. Unscrew **anticlockwise** the nut on the clutch drum (92). Remove the washer (91), clutch drum (87) and roller bearing (90).
4. Unscrew the four bolts inside the drum.
5. Place the new pinion on the bell and secure it with the 4 bolts. Use thread locker to secure them.  
**Be aware if you are placing a Z10 pinion, a specific spacer is needed.**
6. Install roller bearing and the spacer. Grease the roller bearing properly.
6. Re-place the clutch drum, the washer and the nut. Tighten the nut by turning it to the left. Use thread locker to secure it.
7. Re-place the clutch cover.

### 5.11. Cylinder Head

Oils produce carbon deposits or residues that make necessary the spark plug to be checked and cleaned, at least every race.

**Be aware, cylinder head volume may be changed after the race, Carbon deposits may cause variations on the cylinder head volume.**



**In order to perform this job, we highly recommend taking the engine off the chassis. However, you may do the job even with the engine mounted.**

1. Unscrew the spark plug (4).
2. Unscrew the 4 nuts on top of the head (3).
3. Remove the head by pulling it up carefully.
4. Clean the combustion chamber using a rag moistened with gasoline or solvent.

#### ASSEMBLING

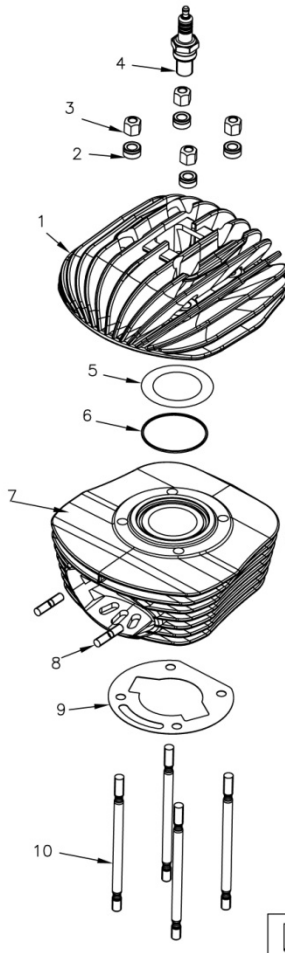
5. Check copper gasket on top of cylinder (5). This gasket may provoke changes in the combustion chamber volume.
6. Re-place cylinder head carefully in the four studs (10).
7. Insert brass washers (2) and nuts (3).
8. Tighten cylinder head with the proper tool and torque.



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## 5.12. Cylinder

Every 30 hours cylinder must be honed.



**In order to perform this job, we highly recommend taking the engine off the chassis. However, you may do the job even with the engine mounted.**

1. Take away the muffler from the engine by removing the 2 springs in the cradle and the 2 springs in the exhaust manifold.
  2. Remove the carburettor from the engine by unscrewing the specific clamp.
  3. Unscrew the 4 nuts on top of head (3).
  3. Remove the head by pulling it up carefully.
  4. Remove the cylinder with one hand by pulling it up. To avoid contact with the crankcase, use the other hand to hold the connecting rod.
- Whenever you disassemble the cylinder, we recommend replacing the cylinder gasket (9).**

### ASSEMBLING

**Check the tolerance between piston and cylinder. Wrong tolerance may cause serious damage.**

5. Place a new gasket (9) into the four studs (10).
6. Insert cylinder into the four studs carefully.
7. Check the rubber O.R. (6) and brass gasket (5) and eventually re-place them with new ones. Brass gasket may provoke changes in the combustion chamber volume.
8. Re-place the cylinder head carefully in the four studs.
9. Insert brass washers (2) and nuts (3).
10. Tighten cylinder head with the proper tool and torque.

**Important:** After honing the cylinder and eventually changing the piston, the engine must go through another break-in period. See "**Starting and Break-in**".

## 5.13. Piston

Oils produce carbon deposits or residues that make necessary the spark plug to be checked and cleaned, at least every race.

**Be aware, cylinder head volume may be changed after the race, carbon deposits may cause**

**In order to perform this job, we highly recommend taking the engine off the chassis. However, you may do the job even with the engine mounted.**

1. Take away the muffler from the engine by removing the 2 springs in the cradle and the 2 springs in the exhaust manifold.



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### **variations on the cylinder head volume.**

Every 30 hours piston must be replaced.

2.Remove the carburettor from the engine by unscrewing the specific clamp.

3.Unscrew the 4 nuts on top of head (3).

3.Remove the head by pulling it up carefully.

4.Remove the cylinder with one hand by pulling it up. To avoid contact with the crankcase, use the other hand to hold the connecting rod.

**Whenever you disassemble the cylinder, we recommend replacing the cylinder gasket.**

5.Remove the 2 piston pin circlips (65) by squeezing the ends together with the needle-nose

6.Hook the connecting rod each side with two fingers.

7.Push the piston pin (66) off the piston by using a proper tool.

8.In order to avoid damages pull the piston up with one hand while holding the connecting rod with the other.

9.Take the roller bearing (70) off the connecting rod.

### **ASSEMBLING**

**Check the tolerance between piston and cylinder.**

**Assemble ONLY a new piston with the right tolerance.**

**Wrong tolerance may cause serious damage.**

10.Grease and place a new roller bearing (70), if needed, on the connecting rod.

11.Insert a new piston in the connecting rod. The arrow marked on top of it, must face the exhaust port.

12.Insert the piston pin into the piston.

13.Insert piston pin circlips on each side of the piston. **Be aware, wrong assembly of piston pin circlips may cause important damage.**

14.Place the piston ring in the piston and check both ends close properly against the brass pin inserted in the piston.

15.Place a new gasket (9) into the four studs (10).

16.Insert the cylinder into the four studs carefully.

17.Check the rubber O.R. (6) and the copper gasket (5) and eventually re place them with new ones. Brass gasket may provoke changes in the combustion chamber volume.

18.Re-place the cylinder head carefully in the four studs.

19.Insert brass washers (2) and nuts (3).

20.Tighten cylinder head with proper tool and torque.

**Important:** After changing the piston, the engine must go through another break-in period. **See "Starting and Break-in".**



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#### 5.14. Connecting Rod

Every 60 hours the roller cage must be changed. During this operation is good use to check, and eventually replace the connecting rod, too.

**Due to special tools required, this operation must be performed by the Vortex technicians or qualified mechanics only.**

#### 5.15. Bottom End

Bearings must be checked, and eventually replaced, after 60 hours of use.

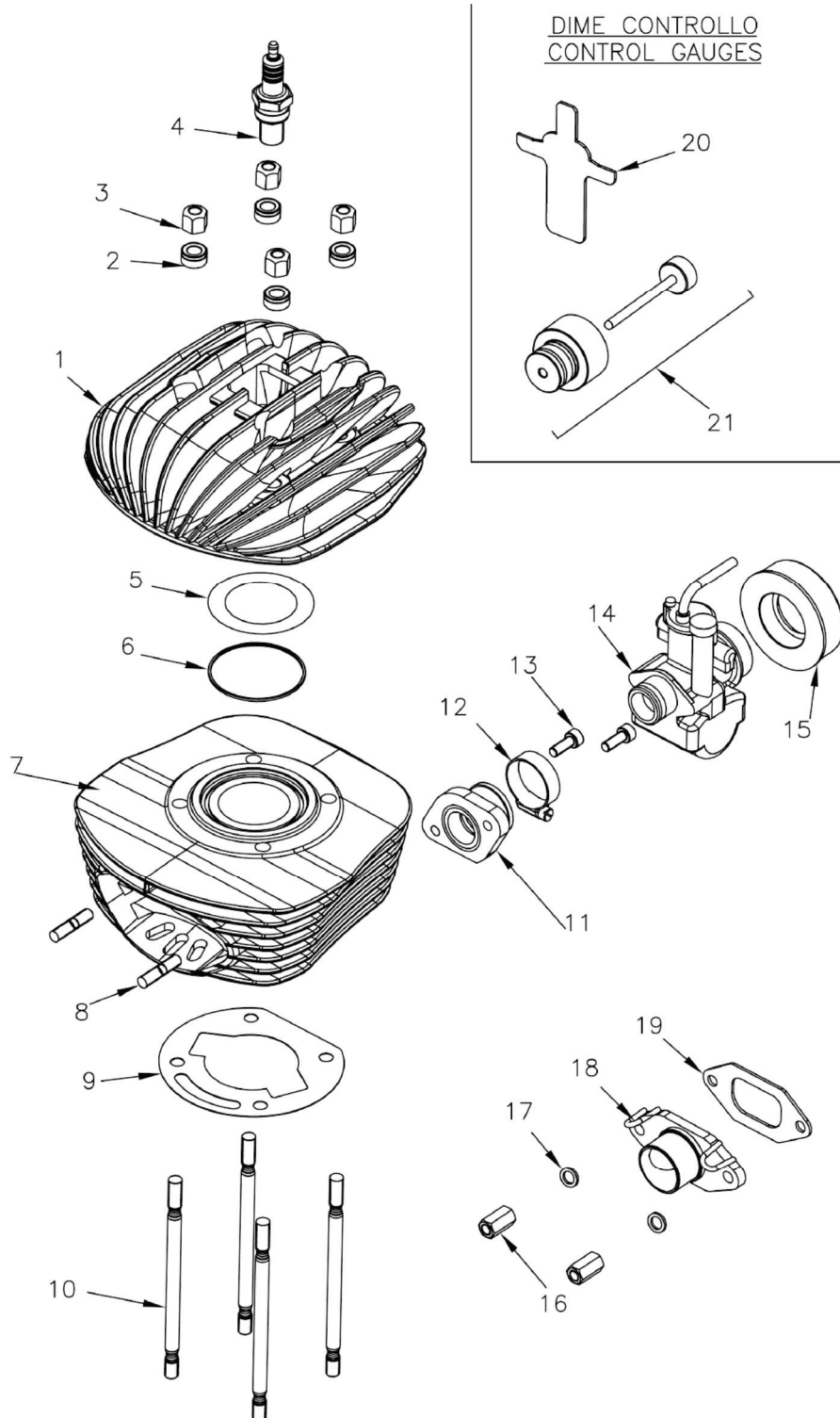
Bearings must be assembled or reassembled, with name and type facing each others.

**Due to special tools required, this operation must be performed by the Vortex technicians or qualified mechanics only.**



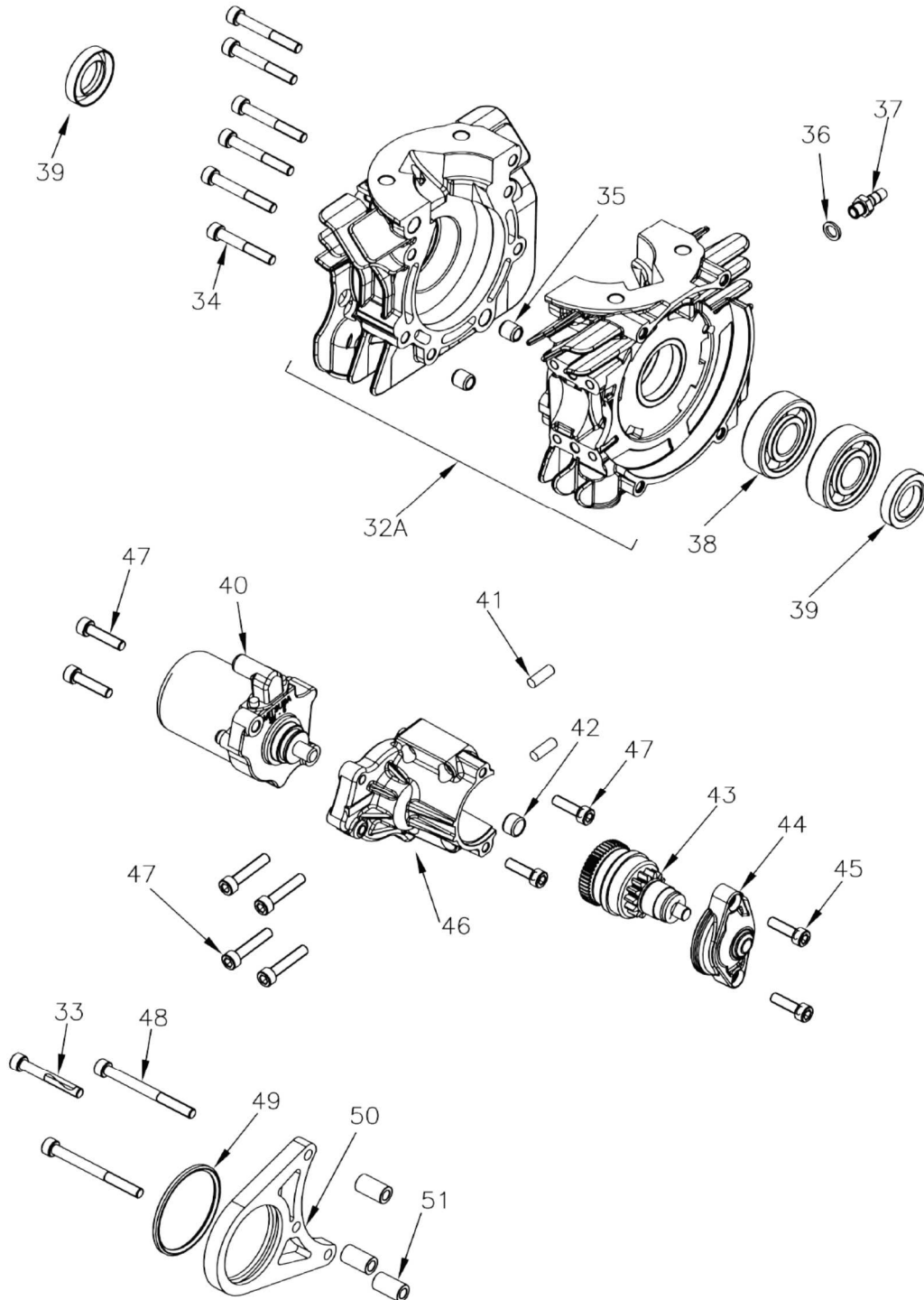
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## 6. ENGINE EXPLODED VIEW AND PARTS LIST



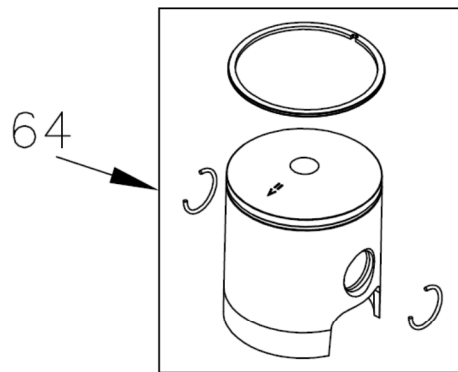
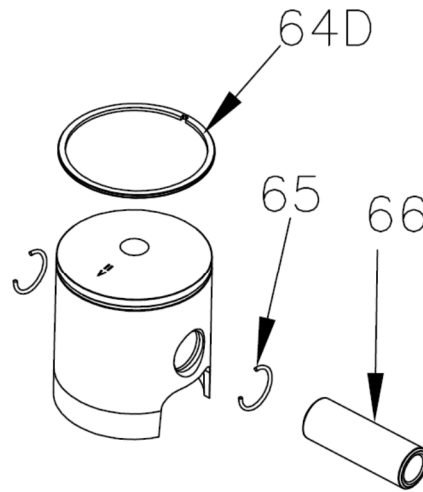


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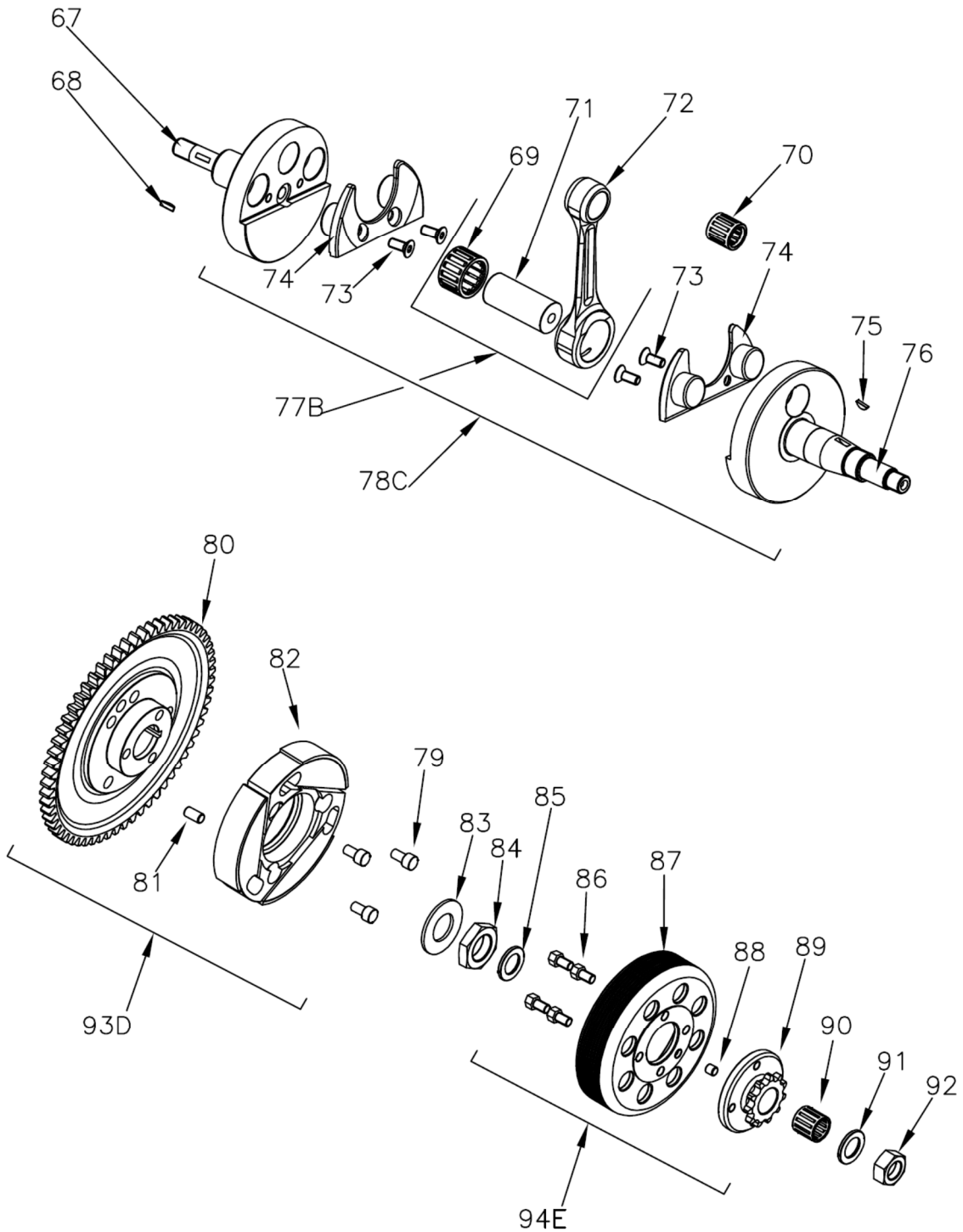


64D		
SEGMENTO	DALLA SELEZIONE	ALLA SELEZIONE
PISTON RING	FROM SELECTION	TO SELECTION
MR 95 L	41.88	41.91
MR 00 L	41.93	41.95
MR 05 L	41.98	-



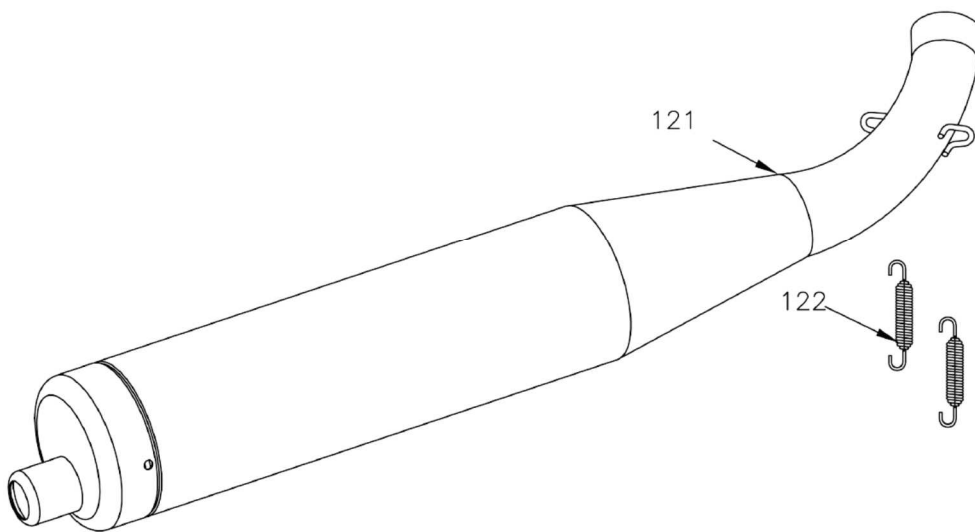
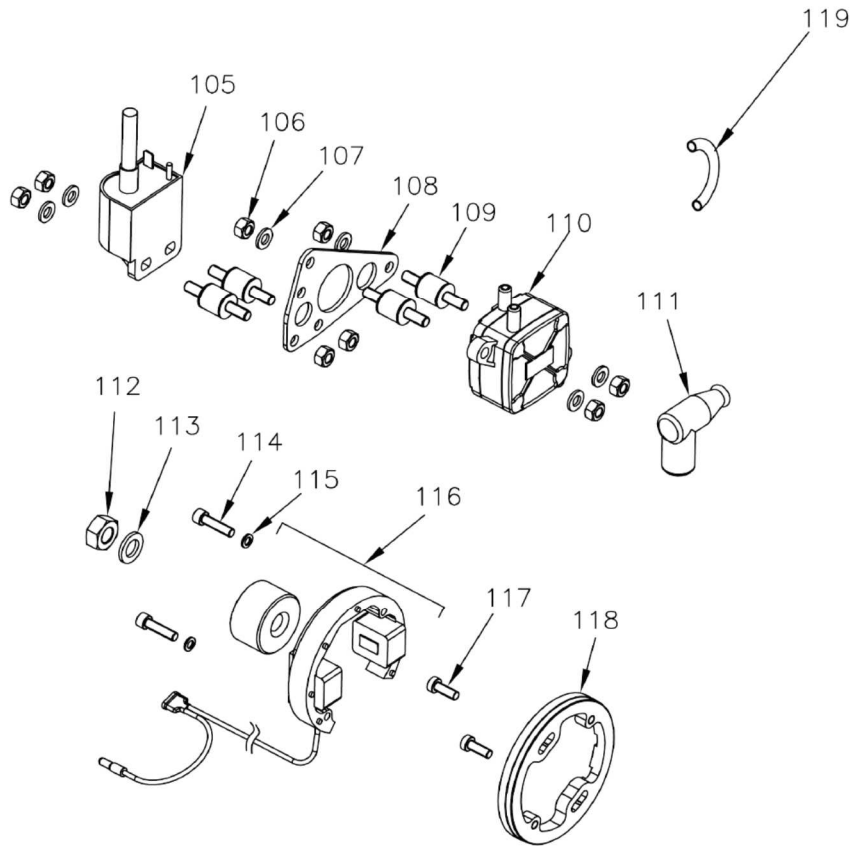


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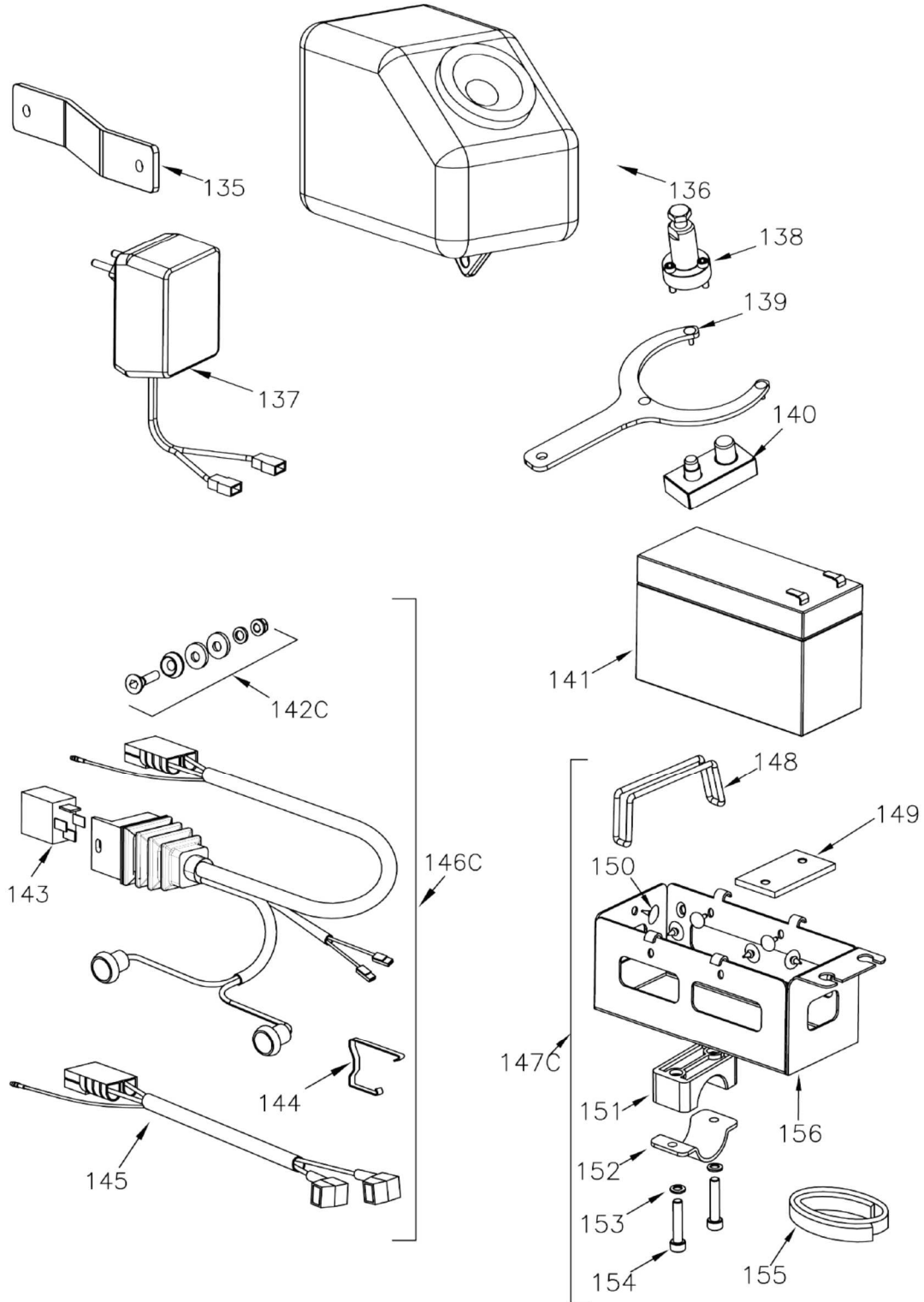


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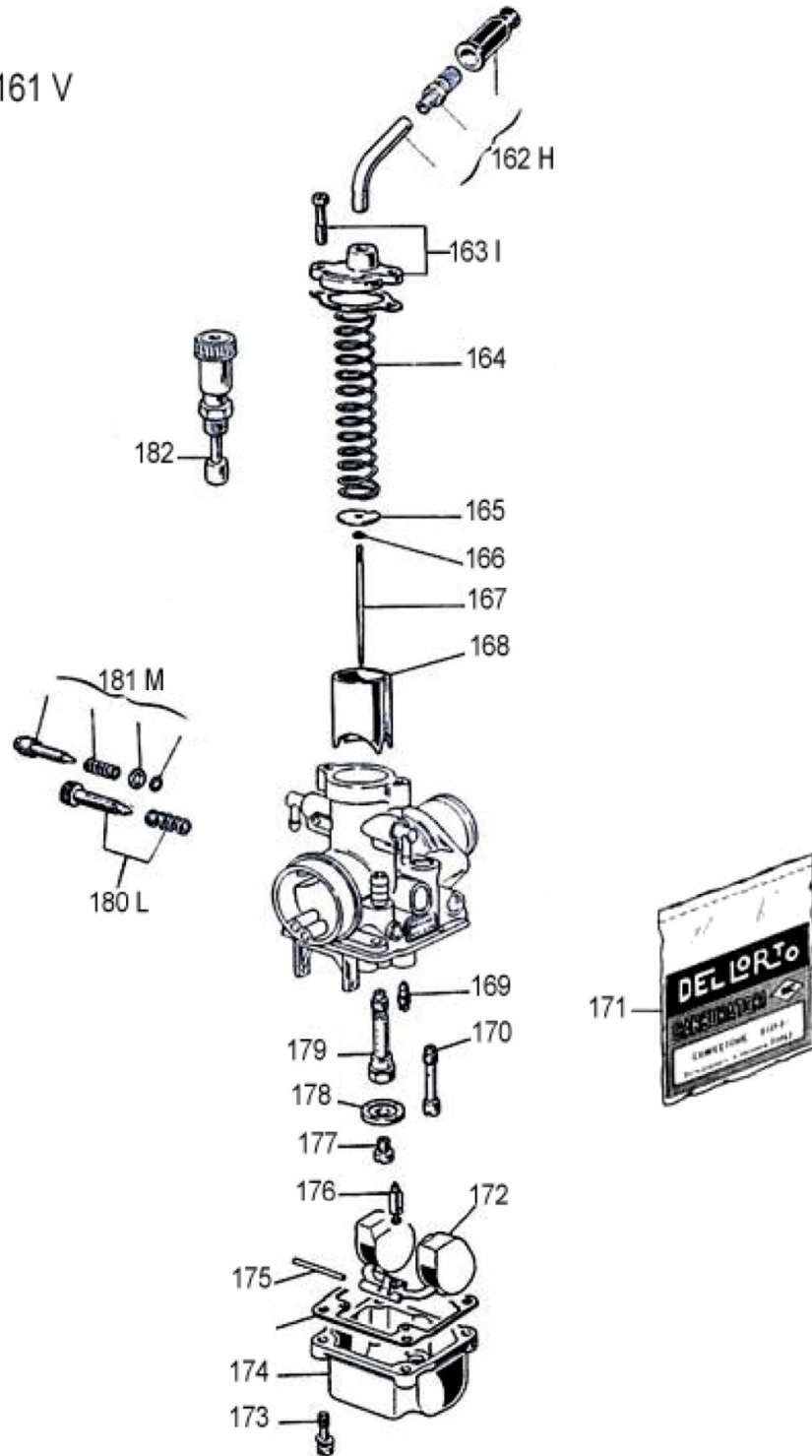
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